Mathematics

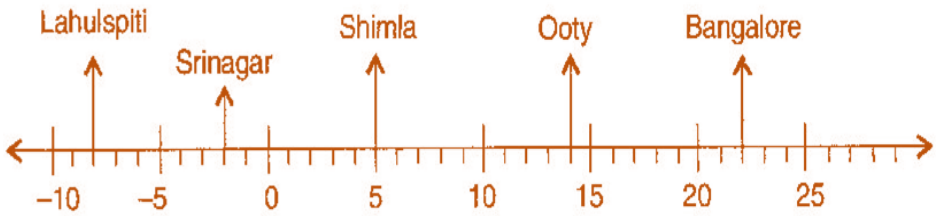
(Chapter – 1) (Integers)

(Class – VII)

Exercise 1.1

Question 1:

Following number line shows the temperature in degree Celsius (°C) at different places on a particular day:



(a) Observe this number line and write the temperature of the places marked on it.

(b) What is the temperature difference between the hottest and the coldest places among the above?

(c) What is the temperature difference between Lahulspiti and Srinagar?

(d) Can we say temperature of Srinagar and Shimla taken together is less than the temperature at Shimla? Is it also less than the temperature at Srinagar?

Answer 1:

(a) The temperature of the places marked on it is:

Places	Temperature	Places	Temperature
Bangalore	22°C	Srinagar	–2°C
Ooty	14°C	Lahulspiti	–8°C
Shimla	5°C		

(b) The temperature of the hottest place Bangalore = 22°C

The temperature of the coldest place Lahulspiti = –8°C

Difference = 22°C – (–8°C) = 22°C + 8°C = 30°C

(c) The temperature of Srinagar = –2°C

The temperature of Lahulspiti = –8°C

Difference = –2°C + (–8°C) = –2°C –8°C = 6°C

(d) The temperature of Srinagar and Shimla = 5°C + (–2°C) = 5°C –2°C = 3°C

The temperature at Shimla = 5°C

Therefore, 3°C < 5°C

Thus, temperature of Srinagar and Shimla taken together is less than the temperature at Shimla.

Now, Temperature of Srinagar = –2°C

Therefore, 3°C > –2°C

No, it is not less than the temperature at Srinagar.

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Question 2:

In a quiz, positive marks are given for correct answers and negative marks are given for incorrect answers. If jack's scores in five successive rounds were $25, -5, -10, 15$ and 10, what was his total at the end?

Answer 2:

Jack's scores in five successive rounds are $25, -5, -10, 15$ and 10.

Total marks got by Jack = $25 + (-5) + (-10) + 15 + 10$

$= 25 - 15 + 25 = 35$

Thus, 35 marks are got by Jack in a quiz.

Question 3:

At Srinagar temperature was $-5°\,C$ on Monday and then it dropped by $2°\,C$ on Tuesday. What was the temperature of Srinagar on Tuesday? On Wednesday, it rose by $4°\,C$. What was the temperature on this day?

Answer 3:

On Monday, temperature at Srinagar = -5^oC

On Tuesday, temperature dropped = 2^oC

$\therefore$ Temperature on Tuesday = $-5^oC - 2^oC = -7^oC$

On Wednesday, temperature rose up = 4^oC

$\therefore$ Temperature on Wednesday = $-7^oC + 4^oC = -3^oC$

Thus, temperature on Tuesday and Wednesday was -7^oC and -3^oC respectively.

Question 4:

A plane is flying at the height of 5000 m above the sea level. At a particular point, it is exactly above a submarine floating 1200 m below the sea level. What is the vertical distance between them?

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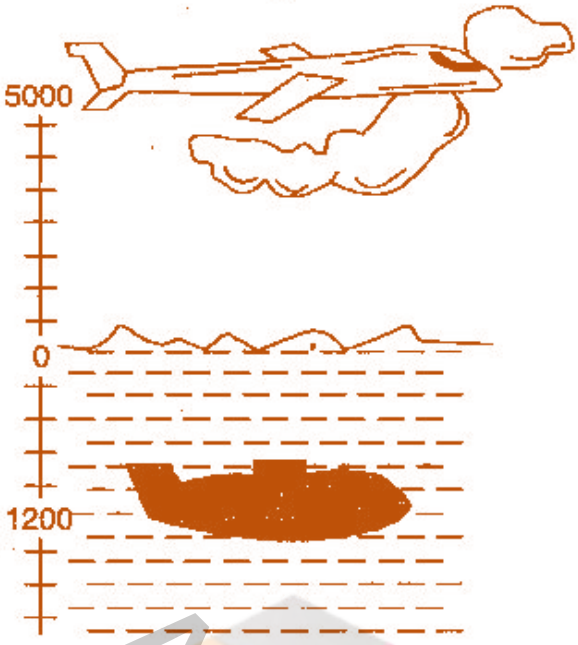


Answer 4:

Height of a place above the sea level = 5000 m

Floating a submarine below the sea level = 1200 m

∴ The vertical distance between the plane and the submarine

= 5000 + 1200 = 6200 m

Thus, the vertical distance between the plane and the submarine is 6200 m.

Question 5:

Mohan deposits ₹2,000 in his bank account and withdraws ₹1,642 from it, the next day. If withdrawal of amount from the account is represented by a negative integer, then how will you represent the amount deposited? Find the balance in Mohan's accounts after the withdrawal?

Answer 5:

Deposit amount = ₹2,000 and Withdrawal amount = ₹1,642

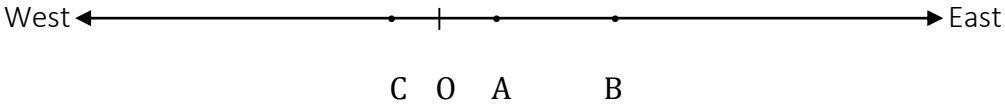
∴ Balance = 2,000 – 1,642 = ₹358

Thus, the balance in Mohan's account after withdrawal is ₹ 358.

Question 6:

Rita goes 20 km towards east from a point A to the point B. From B, she moves 30 km towards west along the same road. If the distance towards east is represented by a positive integer then, how will you represent the distance travelled towards west? By which integer will you represent her final position from A?

Answer 6:



According to the number line, Rita moves towards east is represented by a positive integer. But she moves in opposite direction means Rita moves west, is represented by negative integer.

Distance from A to B = 20 km
Distance from B to C = 30 km
Distance from A to C = 20 – 30 = –10 km

Thus, Rita is at final position from A to C is –10 km.

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Question 7:

In a magic square each row, column and diagonal have the same sum. Check which of the following is a magic square.

5	–1	– 4
–5	–2	7
0	3	–3

(i)

1	–10	0
– 4	–3	–2
– 6	4	–7

(ii)

Answer 7:

(i) Taking rows $5 + (-1) + (-4) = 5 - 5 = 0$
$(-5) + (-2) + 7 = -7 + 7 = 0$
$0 + 3 + (-3) = 3 - 3 = 0$

Taking columns $5 + (-5) + 0 = 5 - 5 = 0$
$(-1) + (-2) + 3 = -3 + 3 = 0$
$(-4) + 7 + (-3) = 7 - 7 = 0$

Taking diagonals $5 + (-2) + (-3) = 5 - 5 = 0$

$(-4) + (-2) + 0 = -6$

This box is not a magic square because all the sums are not equal.

(ii) Taking rows $1 + (-10) + 0 = 1 - 10 = -9$

$(-4) + (-3) + (-2) = -7 - 2 = -9$

$(-6) + 4 + (-7) = -2 - 7 = -9$

Taking columns $1 + (-4) + (-6) = 1 - 10 = -9$

$(-10) + (-3) + 4 = -13 + 4 = -9$

$0 + (-2) + (-7) = 0 - 9 = -9$

Taking diagonals $1 + (-3) + (-7) = 1 - 10 = -9$

$0 + (-3) + (-6) = -9$

This box is magic square because all the sums are equal.

Question 8:

Verify $a-(-b)=a+b$ for the following values of a and b:

(i) $a=21, b=18$ (ii) $a=118, b=125$

(iii) $a=75, b=84$ (iv) $a=28, b=11$

Answer 8:

(i) Given: $a=21, b=18$

We have $a-(-b)=a+b$

Putting the values in L.H.S. = $a-(-b)=21-(-18)$ = 21 + 18 = 39

Putting the values in R.H.S. = $a+b$ = 21 + 19 = 39

Since, L.H.S. = R.H.S

Hence, verified.

(ii) Given: $a=118, b=125$

We have $a-(-b)=a+b$

Putting the values in L.H.S. = $a-(-b)=118-(-125)$ = 118 + 125 = 243

Putting the values in R.H.S. = $a+b$ = 118 + 125 = 243

Since, L.H.S. = R.H.S

Hence, verified.

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(iii) Given: $a = 75, b = 84$

We have $a-(-b)=a+b$

Putting the values in L.H.S. = $a-(-b)=75-(-84)$ = 75 + 84 = 159

Putting the values in R.H.S. = $a+b$ = 75 + 84 = 159

Since, L.H.S. = R.H.S

Hence, verified.

(iv) Given: $a = 28, b = 11$

We have $a-(-b)=a+b$

Putting the values in L.H.S. = $a-(-b)=28-(-11)$ = 28 + 11 = 39

Putting the values in R.H.S. = $a+b$ = 28 + 11 = 39

Since, L.H.S. = R.H.S

Hence, verified.

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Question 9:

Use the sign of >, < or = in the box to make the statements true:

(a) $(-8)+(-4)\square(-8)-(-4)$

(b) $(-3)+7-(19)\square 15-8+(-9)$

(c) $23-41+11\square 23-41-11$

(d) $39+(-24)-(15)\square 36+(-52)-(-36)$

(e) $(-231)+79+51\square(-399)+159+81$

Answer 9:

(a) $(-8)+(-4)\square(-8)-(-4)$

$\Rightarrow \quad -8-4\square -8+4$

$\Rightarrow \quad -12\square -4$

$\Rightarrow \quad -12\boxed{<}-4$

(b) $(-3)+7-(19)\square 15-8+(-9)$

$\Rightarrow \quad -3+7-19\square 15-8-9$

$\Rightarrow \quad 4-19 \square 15-17$

$\Rightarrow \quad -15 \square -2$

$\Rightarrow \quad -15 \boxed{<} -2$

(c) $23-41+11 \square 23-41-11$

$\Rightarrow \quad -18+11 \square 23-52$

$\Rightarrow \quad -7 \square -29$

$\Rightarrow \quad -7 \boxed{>} -29$

(d) $39+(-24)-(15) \square 36+(-52)-(-36)$

$\Rightarrow \quad 39-24-15 \square 36-52+36$

$\Rightarrow \quad 39-39 \square 72-52$

$\Rightarrow \quad 0 \square 20$

$\Rightarrow \quad 0 \boxed{<} 20$

(e) $(-231)+79+51 \square (-399)+159+81$

$\Rightarrow \quad -231+130 \square -399+240$

$\Rightarrow \quad -101 \square -159$

$\Rightarrow \quad -101 \boxed{>} -159$

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Question 10:

A water tank has steps inside it. A monkey is sitting on the topmost step (i.e., the first step). The water level is at the ninth step:

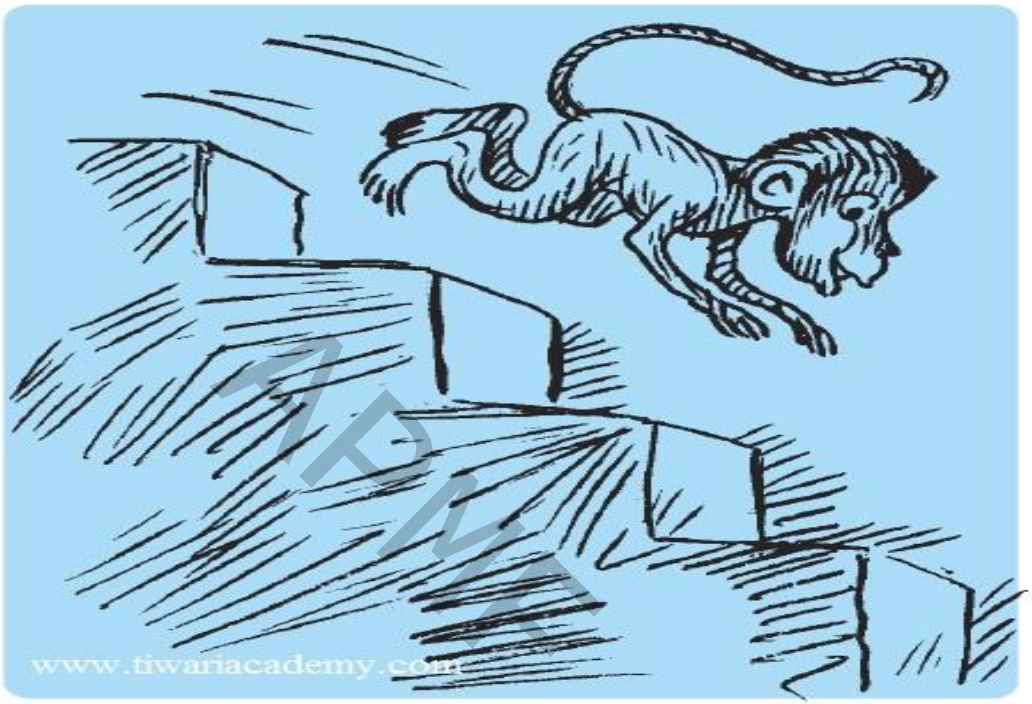
(i) He jumps 3 steps down and then jumps back 2 steps up. In how many jumps will he reach the water level?

(ii) After drinking water, he wants to go back. For this, he jumps 4 steps up and then jumps back 2 steps down in every move. In how many jumps will he reach back the top step?

(iii) If the number of steps moved down is represented by negative integers and the number of steps move up by positive integers, represent his moves in part (i) and (ii) by completing the following:

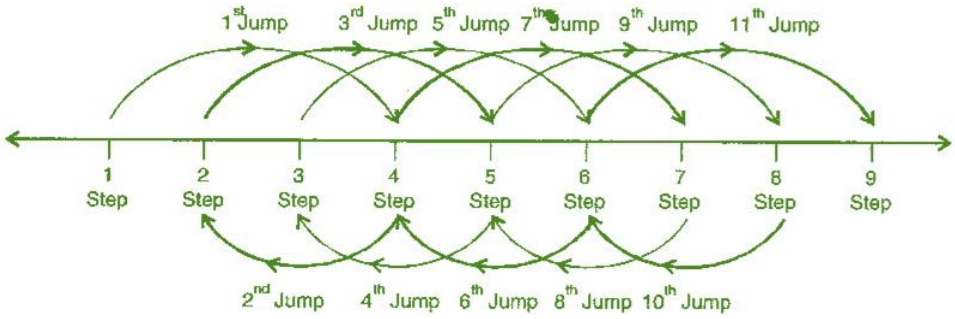
(a) $-3+2-\ldots\ldots\ldots=-8$ (b) $4-2+\ldots\ldots\ldots=8$

In (a) the sum (-8) represent going down by eight steps. So, what will the sum 8 in (b) represent?



Answer 10:

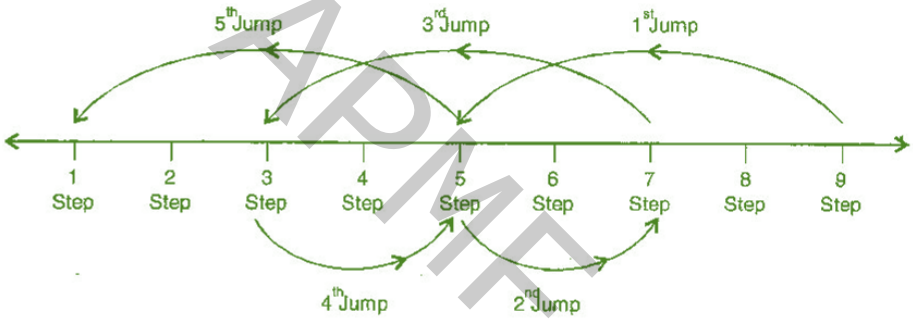
(i) He jumps 3 steps down and jumps back 2 steps up. Following number ray shows the jumps of monkey:



First jump = 1 + 3 = 4 steps

Second jump = 4 – 2 = 2 steps
Third jump = 2 + 3 = 5 steps
Fourth jump = 5 – 2 = 3 steps
Fifth jump = 3 + 3 = 6 steps
Sixth jump = 6 – 2 = 4 steps
Seventh jump = 4 + 3 = 7 steps
Eighth jump = 7 – 2 = 5 steps
Ninth jump = 5 + 3 = 8 steps
Tenth jump = 8 – 2 = 6 steps
Eleventh jump = 6 + 3 = 9 steps
He will reach ninth steps in 11 jumps.

(ii) He jumps four steps and then jumps down 2 steps. Following number ray shows the jumps of monkey:



Thus monkey reach back on the first step in fifth jump.

(iii) (a) $-3+2-3+2-3+2-3+2-3+2-3+2-3+2-3+2=-8$

(b) $4-2+4-2+4-2+4-2=8$

Thus, sum 8 in (b) represents going up by eight steps.

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Exercise 1.2

Question 1:

Write down a pair of integers whose:

(a) sum is -7

(b) difference is -10

(a) sum is 0

Answer 1:

(a) One such pair whose sum is -7: $-5+(-2)=-7$

(b) One such pair whose difference is -10: $-2-8=-10$

(c) One such pair whose sum is 0: $-5+5=0$

Question 2:

(a) Write a pair of negative integers whose difference gives 8.

(b) Write a negative integer and a positive integer whose is -5.

(c) Write a negative integer and a positive integer whose difference is -3.

Answer 2:

(a) $-2-(-10)-2+10=8$

(b) $(-7)+2=-5$

(c) $(-2)-1=-2-1=-3$

Question 3:

In a quiz, team A scored $-40, 10, 0$ and team B scores 10, 0, -40 in three successive rounds. Which team scored more? Can we say that we can add integers in any order?

Answer 3:

Team A scored $-40, 10, 0$

Total score of Team A = $-40+10+0=-30$

Team B scored $10, 0, -40$

Total score of Team B = $10+0+(-40)=10+0-40=-30$

Thus, scores of both teams are same.

Yes, we can add integers in any order due to commutative property.

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Question 4:

Fill in the blanks to make the following statements true:

(i) $(-5)+(-8)=(-8)+(.....)$

(ii) $-53+.....=-53$

(iii) $17 + ... = 0$

(iv) $[13+(-12)]+(.....)=13+[(-12)+(-7)]$

(v) $(-4)+[15+(-3)]=[-4+15]+.....$

Answer 4:

(i) $(-5)+(-8)=(-8)+\underline{(-5)}$ [Commutative property]

(ii) $-53+\underline{0}=-53$ [Zero additive property]

(i) $17+\underline{(-17)}=0$ (Additive identity]

(ii) $[13+(12)]+\underline{(-7)}=13+[(-12)+(-7)]$ [Associative property]

(iii) $(-4)+[15+(-3)]=[-4+15]+\underline{(-3)}$ [Associative property]

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Exercise 1.3

Question 1:

Find the each of the following products:

(a) 3 x (–1)
(b) (–1) x 225
(c) (–21) x (–30)
(d) (–316) x (–1)
(e) (–15) x 0 x (–18)
(f) (–12) x (–11) x (10)
(g) 9 x (–3) x (–6)
(h) (–18) x (–5) x (–4)
(i) (–1) x (–2) x (–3) x 4
(j) (–3) x (–6) x (2) x (–1)

Answer 1:

(a) 3 x (–1) = –3
(b) (–1) x 225 = –225
(c) (–21) x (–30) = 630
(d) (–316) x (–1) = 316
(e) (–15) x 0 x (–18) = 0
(f) (–12) x (–11) x (10) = 132 x 10 = 1320
(g) 9 x (–3) x (–6) = 9 x 18 = 162
(h) (–18) x (–5) x (–4) = 90 x (–4) = –360
(i) (–1) x (–2) x (–3) x 4 = (–6 x 4) = –24
(j) (–3) x (–6) x (2) x (–1) = (–18) x (–2) = 36

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Question 2:

Verify the following:

(a) 18 x [7 + (–3)] = [18 x 7] + [18 x (–3)]
(b) (–21) x [(–4) + (–6)] = [(–21) x (-4)] + [(–21) x (–6)]

Answer 2:

(a) 18 x [7 + (–3)] = [18 x 7] + [18 x (–3)]
⇒ 18 x 4 = 126 + (–54)
⇒ 72 = 72
⇒ L.H.S. = R.H.S.
Hence verified.

(b) (–21) x [(–4) + (–6)] = [(–21) x (–4)] + [(–21) x (–6)]
⇒ (–21) x (–10) = 84 + 126
⇒ 210 = 210
⇒ L.H.S. = R.H.S.
Hence verified.

Question 3:

(i) For any integer a, what is $(-1)\times a$ equal to?

(ii) Determine the integer whose product with (-1) is:

(a) –22 (b) 37 (c) 0

Answer 3:

(i) $(-1)\times a = -a$, where a is an integer.

(ii) (a) $(-1)\times(-22) = 22$

(b) $(-1)\times 37 = -37$

(c) $(-1)\times 0 = 0$

Question 4:

Starting from $(-1)\times 5$, write various products showing some patterns to show $(-1)\times(-1) = 1$.

Answer 4:

$(-1)\times 5 = -5$

$(-1)\times 4 = -4$

$(-1)\times 3 = -3$

$(-1)\times 2 = -2$

$(-1)\times 1 = -1$

$(-1)\times 0 = 0$

$(-1)\times(-1) = 1$

Thus, we can conclude that this pattern shows the product of one negative integer and one positive integer is negative integer whereas the product of two negative integers is a positive integer.

Question 5:

Find the product, using suitable properties:

(a) $26\times(-48)+(-48)\times(-36)$

(b) $8\times 53\times(-125)$

(c) $15\times(-25)\times(-4)\times(-10)$

(d) $(-41)\times(102)$

(e) $625\times(-35)+(-625)\times 65$

(f) $7\times(50-2)$

(g) $(-17)\times(-29)$

(h) $(-57)\times(-19)+57$

APME

Answer 5:

(a) $26\times(-48)+(-48)\times(-36)$

$\Rightarrow \quad (-48)\times[26+(-36)]$ [Distributive property]

$\Rightarrow \quad (-48)\times(-10)$

$\Rightarrow \quad 480$

(b) $8\times53\times(-125)$

$\Rightarrow \quad 53\times[8\times(-125)]$ [Commutative property]

$\Rightarrow \quad 53\times(-1000)$

$\Rightarrow \quad -53000$

(c) $15\times(-25)\times(-4)\times(-10)$

$\Rightarrow \quad 15\times[(-25)\times(-4)\times(-10)]$ [Commutative property]

$\Rightarrow \quad 15\times(-1000)$

$\Rightarrow \quad -15000$

(d) $(-41)\times(102)$

$\Rightarrow \quad -41\times[100+2]$ [Distributive property]

$\Rightarrow \quad [(-41)\times100]+[(-41)\times2]$

$\Rightarrow \quad -4100+(-82)$

$\Rightarrow \quad -4182$

(e) $625\times(-35)+(-625)\times65$

$\Rightarrow \quad 625\times[(-35)+(-65)]$ [Distributive property]

$\Rightarrow \quad 625\times(-100)$

$\Rightarrow \quad -62500$

(c) $7\times(50-2)$

$\Rightarrow \quad 7\times50-7\times2$ [Distributive property]

$\Rightarrow \quad 350-14=336$

APMF

(d) $(-17)\times(-29)$

$\Rightarrow$ $(-17)\times[(-30)+1]$ [Distributive property]

$\Rightarrow$ $(-17)\times(30)+(-17)\times 1$

$\Rightarrow$ $510+(-17)$

$\Rightarrow$ 493

(e) $(-57)\times(-19)+57$

$\Rightarrow$ $(-57)\times(-19)+57\times 1$

$\Rightarrow$ 57 x 19 + 57 x 1

$\Rightarrow$ 57 x (19 + 1) [Distributive property]

$\Rightarrow$ 57 x 20 = 1140

Question 6:

A certain freezing process requires that room temperature be lowered from 40°C at the rate of 5°C every hour. What will be the room temperature 10 hours after the process begins?

Answer 6:

Given: Present room temperature = 40°C

Decreasing the temperature every hour = 5°C

Room temperature after 10 hours = 40°C + 10 x (–5°C)

= 40°C – 50°C

= – 10°C

Thus, the room temperature after 10 hours is – 10°C after the process begins.

Question 7:

In a class test containing 10 questions, 5 marks are awarded for every correct answer and (-2) marks are awarded for every incorrect answer and 0 for questions not attempted.

(i) Mohan gets four correct and six incorrect answers. What is his score?

(ii) Reshma gets five correct answers and five incorrect answers, what is her score?

(iii) Heena gets two correct and five incorrect answers out of seven questions she attempts. What is her score?

APME

Answer 7:

(i) Mohan gets marks for four correct questions = 4 x 5 = 20
He gets marks for six incorrect questions = 6 x (–2) = –12
Therefore, total scores of Mohan = (4 x 5) + [6 x (–2)]
= 20 – 12 = 8
Thus, Mohan gets 8 marks in a class test.

(ii) Reshma gets marks for five correct questions = 5 x 5 = 25
She gets marks for five incorrect questions = 5 x (–2) = –10
Therefore, total score of Resham = 25 + (–10) = 15
Thus, Reshma gets 15 marks in a class test.

(iii) Heena gets marks for two correct questions = 2 x 5 = 10
She gets marks for five incorrect questions = 5 x (–2) = –10
Therefore, total score of Resham = 10 + (–10) = 0
Thus, Reshma gets 0 marks in a class test.

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Question 8:

A cement company earns a profit of ₹8 per bag of white cement sold and a loss of ₹ 5 per bag of grey cement sold.

(a) The company sells 3,000 bags of white cement and 5,000 bags of grey cement in a month. What is its profit or loss?

(b) What is the number of white cement bags it must sell to have neither profit nor loss. If the number of grey bags sold is 6,400 bags.

Answer 8:

Given: Profit of 1 bag of white cement = ₹ 8
And Loss of 1 bag of grey cement = ₹ 5

(a) Profit on selling 3000 bags of white cement = 3000 x ₹ 8 = ₹ 24,000
Loss of selling 5000 bags of grey cement = 5000 x ₹ 5 = ₹ 25,000
SinceProfit < Loss
Therefore, his total loss on selling the grey cement bags = Loss – Profit
= ₹ 25,000 – ₹ 24,000
= ₹ 1,000
Thus, he has lost of `₹1,000 on selling the grey cement bags.

(b) Let the number of bags of white cement be x.

According to question, Loss = Profit

$\therefore$ 5 x 6,400 = x x 8

$\Rightarrow$ $x = \frac{5 \times 6400}{8}$ = 5000 bags

Thus, he must sell 4000 white cement bags to have neither profit nor loss.

Question 9:

Replace the blank with an integer to make it a true statement:

(a) $(-3) \times \_\_\_\_\_ = 27$

(b) $5 \times \_\_\_\_\_ = -35$

(c) $\_\_\_\_\_ \times (-8) = -56$

(d) $\_\_\_\_\_ \times (-12) = 132$

Answer 9:

(a) $(-3) \times \underline{(-9)} = 27$

(b) $5 \times \underline{(-7)} = -35$

(c) $\underline{7} \times (-8) = -56$

(d) $\underline{(-11)} \times (-12) = 132$

APMF

Exercise 1.4

Question 1:

Evaluate each of the following:

(a) $(-30)\div 10$

(b) $50\div(-5)$

(c) $(-36)\div(-9)$

(d) $(-49)\div 49$

(e) $13\div[(-2)+1]$

(f) $0\div(-12)$

(g) $(-31)\div[(-30)\div(-1)]$

(h) $[(-36)\div 12]\div 3$

(i) $[(-6)+5]\div[(-2)+1]$

Answer 1:

(a) $(-30)\div 10 = (-30)\times\frac{1}{10}=\frac{-30\times 1}{10}=-3$

(b) $50\div(-5) = 50\times\left(\frac{-1}{5}\right)=\frac{50\times(-1)}{5}=-10$

(c) $(-36)\div(-9) = (-36)\times\left(\frac{-1}{9}\right)=\frac{(-36)\times(-1)}{9}=\frac{36}{9}=4$

(d) $(-49)\div 49 = (-49)\times\frac{1}{49}=\frac{-49}{49}=-1$

(e) $13\div[(-2)+1] = 13\div(-1)=13\times\left(\frac{-1}{1}\right)=-13$

(f) $0\div(-12) = 0\times\left(\frac{-1}{12}\right)=\frac{0}{12}=0$

(g) $(-31)\div[(-30)\div(-1)] = (-31)\div(-30-1)=(-31)\div(-31)=(-31)\times\left(\frac{-1}{31}\right)=\frac{31}{31}=1$

(h) $[(-36)\div 12]\div 3 = \left[(-36)\times\frac{1}{12}\right]\times\frac{1}{3}=\left(\frac{-36}{12}\right)\times\frac{1}{3}=(-3)\times\frac{1}{3}=\frac{-3}{3}=-1$

(i) $[(-6)+5]\div[(-2)+1] = (-6+5)\div(-2+1)=(-1)\div(-1)=(-1)\times\frac{(-1)}{1}=1$

APME

Question 2:

Verify that $a \div (b+c) \neq (a \div b)+(a \div c)$ for each of the following values of a, b and c.

(a) $a=12, b=-4, c=2$ (b) $a=(-10), b=1, c=1$

Answer 2:

(a) Given: $a \div (b+c) \neq (a \div b)+(a \div c)$

$a=12, b=-4, c=2$

Putting the given values in L.H.S. = $12 \div (-4+2)$

$= 12 \div (-2) = 12 \div \left(\frac{-1}{2}\right) = \frac{-12}{2} = -6$

Putting the given values in R.H.S. = $\left[12 \div (-4)\right]+(12 \div 2)$

$= \left(12 \times \frac{-1}{4}\right)+6 = -3+6 = 3$

Since, L.H.S. $\neq$ R.H.S.

Hence verified.

(b) Given: $a \div (b+c) \neq (a \div b)+(a \div c)$

$a=-10, b=1, c=1$

Putting the given values in L.H.S. = $-10 \div (1+1)$

$= -10 \div (2) = -5$

Putting the given values in R.H.S. = $\left[-10 \div 1\right]+(-10 \div 1)$

$= -10-10 = -20$

Since, L.H.S. $\neq$ R.H.S.

Hence verified.

APME

Question 3:

Fill in the blanks:

(a) $369 \div$ _____ $= 369$

(b) $(-75) \div$ _____ $= (-1)$

(c) $(-206) \div$ _____ $= 1$

(d) $(-87) \div$ _____ $= 87$

(e) _____ $\div 1 = -87$

(f) _____ $\div 48 = -1$

(g) $20 \div$ _____ $= -2$

(h) _____ $\div (4) = -3$

Answer 3:

(a) $369 \div 1 = 369$

(b) $(-75) \div 75 = (-1)$

(c) $(-206) \div (-206) = 1$

(d) $(-87) \div (-1) = 87$

(e) $(-87) \div 1 = -87$

(f) $(-48) \div 48 = -1$

(g) $20 \div (-10) = -2$

(h) $(-12) \div (4) = -3$

Question 4:

Write five pairs of integers (a, b) such that $a \div b = -3$. One such pair is $(6, -2)$ because $6 \div (-2) = (-3)$.

Answer 4:

(i) $(-6) \div 2 = -3$

(ii) $9 \div (-3) = -3$

(iii) $12 \div (-4) = -3$

(iv) $(-9) \div 3 = -3$

(v) $(-15) \div 5 = -3$

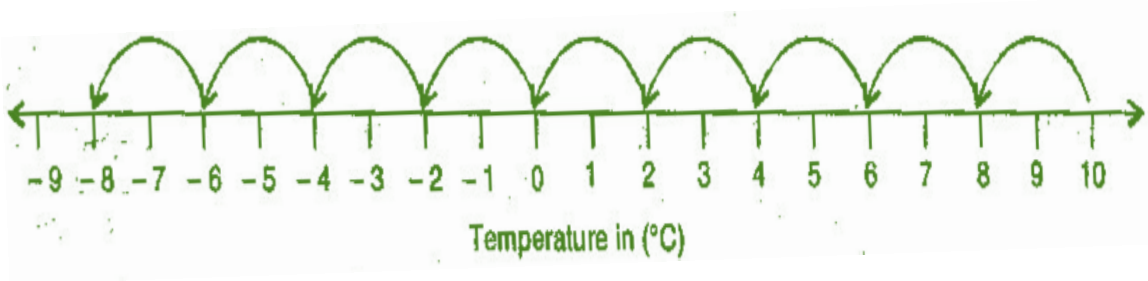
APMF

Question 5:

The temperature at noon was 10^{o}C above zero. If it decreases at the rate of 2^{o}C per hour until mid-night, at what time would the temperature be 8^{o}C below zero? What would be the temperature at mid-night?

Answer 5:

Following number line is representing the temperature:



The temperature decreases 2^{o}C = 1 hour

The temperature decreases $1^oC = \frac{1}{2}$ hour

The temperature decreases $18^oC = \frac{1}{2} \times 18 = 9$ hours

Total time = 12 noon + 9 hours = 21 hours = 9 pm

Thus, at 9 pm the temperature would be 8^oC below 0^oC.

Question 6:

In a class test (+3) marks are given for every correct answer and (-2) marks are given for every incorrect answer and no marks for not attempting any question.

(i) Radhika scored 20 marks. If she has got 12 correct answers, how many questions has she attempted incorrectly?

(ii) Mohini scores (-5) marks in this test, though she has got 7 correct answers. How many questions has she attempted incorrectly?

Answer 6:

(i) Marks given for one correct answer = 3
Marks given for 12 correct answers = 3 x 12 = 36
Radhika scored 20 marks.
Therefore, Marks obtained for incorrect answers = 20 – 36 = –16
Now, marks given for one incorrect answer = –2
Therefore, number of incorrect answers = $(-16) \div (-2) = 8$
Thus, Radhika has attempted 8 incorrect questions.

(ii) Marks given for seven correct answers = 3 x 7 = 21
Mohini scores = –5
Marks obtained for incorrect answers = = –5 – 21 = –26
Now, marks given for one incorrect answer = –2
Therefore, number of incorrect answers = $(-26) \div (-2) = 13$
Thus, Mohini has attempted 13 incorrect questions.

APMF

Question 7:

An elevator descends into a mine shaft at the rate of 6 m/min. If the descent starts from 10 above the ground level, how long will it take to reach -350 m?

Answer 7:

Starting position of mine shaft is 10 m above the ground but it moves in opposite direction so it travels the distance (–350) m below the ground.

So total distance covered by mine shaft = 10 m – (–350) m = 10 + 350 = 360 m

Now, time taken to cover a distance of 6 m by it = 1 minute

So, time taken to cover a distance of 1 m by it = $\frac{1}{6}$ minute

Therefore, time taken to cover a distance of 360 m = $\frac{1}{6} \times 360$

= 60 minutes = 1 hour

(Since 60 minutes = 1 hour)

Thus, in one hour the mine shaft reaches –350 below the ground.

APMF

Mathematics

(Chapter – 2) (Fractions and Decimals)

(Class – VII)

Exercise 2.1

Question 1:

Solve:

(i) $2-\frac{3}{5}$

(ii) $4+\frac{7}{8}$

(iii) $\frac{3}{5}+\frac{2}{7}$

(iv) $\frac{9}{11}-\frac{4}{15}$

(v) $\frac{7}{10}+\frac{2}{5}+\frac{3}{2}$

(vi) $2\frac{2}{3}+3\frac{1}{2}$

(vii) $8\frac{1}{2}-3\frac{5}{8}$

Answer 1:

(i) $2-\frac{3}{5}=\frac{10-3}{5}=\frac{7}{5}=1\frac{2}{5}$

(ii) $4+\frac{7}{8}=\frac{32+7}{8}=\frac{39}{8}=4\frac{7}{8}$

(iii) $\frac{3}{5}+\frac{2}{7}=\frac{21+10}{35}=\frac{31}{35}$

(iv) $\frac{9}{11}-\frac{4}{15}=\frac{135-44}{165}=\frac{91}{165}$

(v) $\frac{7}{10}+\frac{2}{5}+\frac{3}{2}=\frac{7+4+15}{10}=\frac{26}{10}=\frac{13}{5}=2\frac{3}{5}$

(vi) $2\frac{2}{3}+3\frac{1}{2}=\frac{8}{3}+\frac{7}{2}=\frac{16+21}{6}=\frac{37}{6}=6\frac{1}{6}$

(vii) $8\frac{1}{2}-3\frac{5}{8}=\frac{17}{2}-\frac{29}{8}=\frac{68-19}{8}=\frac{39}{8}=4\frac{7}{8}$

APMF

Question 2:

Arrange the following in descending order:

(i) $\frac{2}{9},\frac{2}{3},\frac{8}{21}$

(ii) $\frac{1}{5},\frac{3}{7},\frac{7}{10}$

Answer 2:

(i) $\frac{2}{9}, \frac{2}{3}, \frac{8}{21}$

$\Rightarrow \frac{14}{63}, \frac{42}{63}, \frac{24}{63}$ [Converting into like fractions]

$\Rightarrow \frac{42}{63} > \frac{24}{63} > \frac{14}{63}$ [Arranging in descending order]

Therefore, $\frac{2}{3} > \frac{8}{21} > \frac{2}{9}$

(ii) $\frac{1}{5}, \frac{3}{7}, \frac{7}{10}$

$\Rightarrow \frac{14}{70}, \frac{30}{70}, \frac{49}{70}$ [Converting into like fractions]

$\Rightarrow \frac{49}{70} > \frac{30}{70} > \frac{14}{70}$ [Arranging in descending order]

Therefore, $\frac{7}{10} > \frac{3}{7} > \frac{1}{5}$

APMF

Question 3:

In a "magic square", the sum of the numbers in each row, in each column and along the diagonals is the same. Is this a magic square?

$\frac{4}{11}$	$\frac{9}{11}$	$\frac{2}{11}$
$\frac{3}{11}$	$\frac{5}{11}$	$\frac{7}{11}$
$\frac{8}{11}$	$\frac{1}{11}$	$\frac{6}{11}$

$\left(\text{Along the first row } \frac{4}{11}+\frac{9}{11}+\frac{2}{11}=\frac{15}{11}\right)$

Answer 3:

Sum of first row $= \frac{4}{11}+\frac{9}{11}+\frac{2}{11}=\frac{15}{11}$ [Given]

Sum of second row $= \frac{3}{11}+\frac{5}{11}+\frac{7}{11}=\frac{3+5+7}{11}=\frac{15}{11}$

Sum of third row $= \frac{8}{11}+\frac{1}{11}+\frac{6}{11}=\frac{8+1+6}{11}=\frac{15}{11}$

Sum of first column $= \frac{4}{11}+\frac{3}{11}+\frac{8}{11}=\frac{4+3+8}{11}=\frac{15}{11}$

Sum of second column $= \frac{9}{11}+\frac{5}{11}+\frac{1}{11}=\frac{9+5+1}{11}=\frac{15}{11}$

Sum of third column $= \frac{2}{11}+\frac{7}{11}+\frac{6}{11}=\frac{2+7+6}{11}=\frac{15}{11}$

Sum of first diagonal (left to right) $= \frac{4}{11}+\frac{5}{11}+\frac{6}{11}=\frac{4+5+6}{11}=\frac{15}{11}$

Sum of second diagonal (left to right) $= \frac{2}{11}+\frac{5}{11}+\frac{8}{11}=\frac{2+5+8}{11}=\frac{15}{11}$

Since the sum of fractions in each row, in each column and along the diagonals are same, therefore it is a magic square.

APME

Question 4:

A rectangular sheet of paper is $12\frac{1}{2}$ cm long and $10\frac{2}{3}$ cm wide. Find its perimeter.

Answer 4:

Given: The sheet of paper is in rectangular form.

Length of sheet = $12\frac{1}{2}$ cm and Breadth of sheet = $10\frac{2}{3}$ cm

Perimeter of rectangle = 2 (length + breadth)

$$= 2\left(12\frac{1}{2}+10\frac{2}{3}\right) = 2\left(\frac{25}{2}+\frac{32}{3}\right)$$

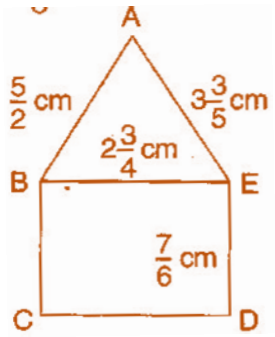
$$= 2\left(\frac{25\times3+32\times2}{6}\right) = 2\left(\frac{75+64}{6}\right)$$

$$= 2\times\frac{139}{6} = \frac{139}{3}=46\frac{1}{3} \text{ cm.}$$

Thus, the perimeter of the rectangular sheet is $46\frac{1}{3}$ cm.

Question 5:

Find the perimeter of (i) ΔABE, (ii) the rectangle BCDE in this figure. Whose perimeter is greater?



Answer 5:

(i) In ΔABE, $AB = \frac{5}{2}$ cm, $BE = 2\frac{3}{4}$ cm, $AE = 3\frac{3}{5}$ cm

The perimeter of ΔABE = AB + BE + AE

$$= \frac{5}{2} + 2\frac{3}{4} + 3\frac{3}{5} = \frac{5}{2} + \frac{11}{4} + \frac{18}{5}$$

$$= \frac{50+55+72}{20} = \frac{177}{20} = 8\frac{17}{20} \text{ cm}$$

Thus, the perimeter of ΔABE is $8\frac{17}{20}$ cm.

(ii) In rectangle BCDE, $BE = 2\frac{3}{4}$ cm, $ED = \frac{7}{6}$ cm

Perimeter of rectangle = 2 (length + breadth)

$$= 2\left(2\frac{3}{4} + \frac{7}{6}\right) = 2\left(\frac{11}{4} + \frac{7}{6}\right)$$

$$= 2\left(\frac{33+14}{12}\right) = \frac{47}{6} = 7\frac{5}{6} \text{ cm}$$

Thus, the perimeter of rectangle BCDE is $7\frac{5}{6}$ cm.

Comparing the perimeter of triangle and that of rectangle,

$$8\frac{17}{20} \text{ cm} > 7\frac{5}{6} \text{ cm}$$

Therefore, the perimeter of triangle ABE is greater than that of rectangle BCDE.

ABNF

Question 6:

Salil wants to put a picture in a frame. The picture is $7\frac{3}{5}$ cm wide. To fit in the frame the picture cannot be more than $7\frac{3}{10}$ cm wide. How much should the picture be trimmed?

Answer 6:

Given: The width of the picture $= 7\frac{3}{5}$ cm

and the width of picture frame $= 7\frac{3}{10}$ cm

Therefore, the picture should be trimmed $= 7\frac{3}{5} - 7\frac{3}{10} = \frac{38}{5} - \frac{73}{10}$

$= \frac{76-73}{10} = \frac{3}{10}$ cm

Thus, the picture should be trimmed by $\frac{3}{10}$ cm.

APME

Question 7:

Ritu ate $\frac{3}{5}$ part of an apple and the remaining apple was eaten by her brother Somu. How much part of the apple did Somu eat? Who had the larger share? By how much?

Answer 7:

The part of an apple eaten by Ritu $= \frac{3}{5}$

The part of an apple eaten by Somu $= 1 - \frac{3}{5} = \frac{5-3}{5} = \frac{2}{5}$

Comparing the parts of apple eaten by both Ritu and Somu $\frac{3}{5} > \frac{2}{5}$

Larger share will be more by $\frac{3}{5} - \frac{2}{5} = \frac{1}{5}$ part.

Thus, Ritu's part is $\frac{1}{5}$ more than Somu's part.

Question 8:

Michael finished colouring a picture in $\frac{7}{12}$ hour. Vaibhav finished colouring the same picture in $\frac{3}{4}$ hour. Who worked longer? By what fraction was it longer?

Answer 8:

Time taken by Michael to colour the picture = $\frac{7}{12}$ hour

Time taken by Vaibhav to colour the picture = $\frac{3}{4}$ hour

Converting both fractions in like fractions, $\frac{7}{12}$ and $\frac{3\times3}{4\times3}=\frac{9}{12}$

Here, $\frac{7}{12} < \frac{9}{12} \Rightarrow \frac{7}{12} < \frac{3}{4}$

Thus, Vaibhav worked longer time.

Vaibhav worked longer time by $\frac{3}{4}-\frac{7}{12}=\frac{9-7}{12}=\frac{2}{12}=\frac{1}{6}$ hour.

Thus, Vaibhav took $\frac{1}{6}$ hour more than Michael.

APMF

Exercise 2.2

Question 1:

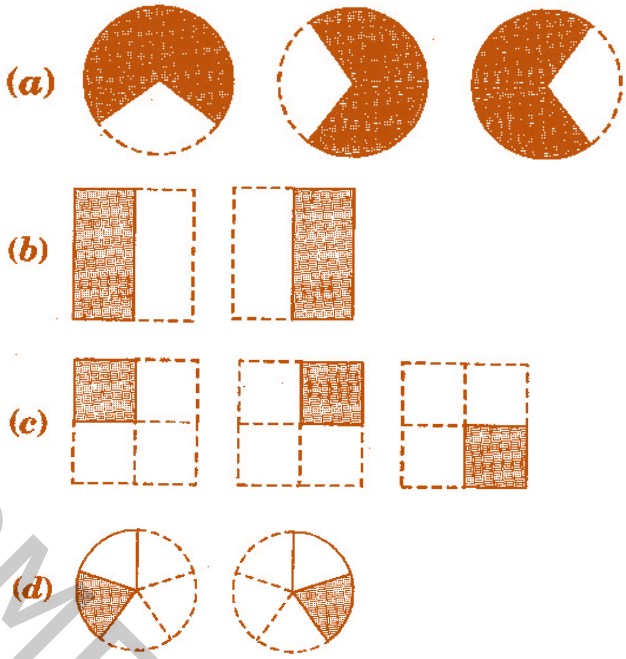
Which of the drawings (a) to (d) show:

(i) $2\times\frac{1}{5}$

(ii) $2\times\frac{1}{2}$

(iii) $3\times\frac{2}{3}$

(iv) $3\times\frac{1}{4}$



APMF

Answer 1:

(i) – (d) Since $2\times\frac{1}{5}=\frac{1}{5}+\frac{1}{5}$

(ii) – (b) Since $2\times\frac{1}{2}=\frac{1}{2}+\frac{1}{2}$

(iii) – (a) Since $3\times\frac{2}{3}=\frac{2}{3}+\frac{2}{3}+\frac{2}{3}$

(iv) – (c) Since $3\times\frac{1}{4}=\frac{1}{4}+\frac{1}{4}+\frac{1}{4}$

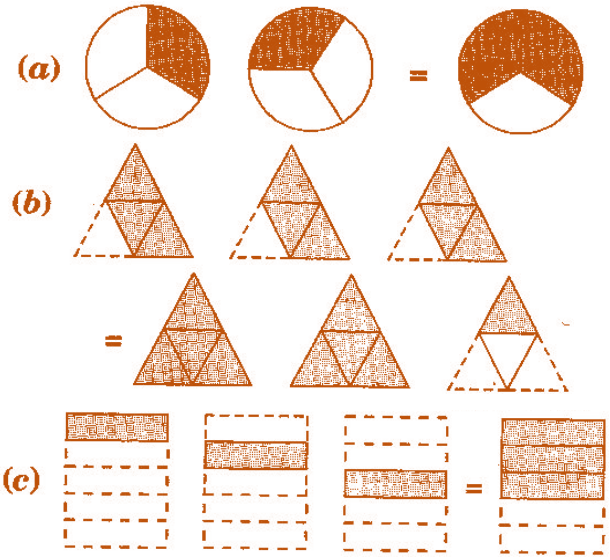
Question 2:

Some pictures (a) to (c) are given below. Tell which of them show:

(i) $3\times\frac{1}{5}=\frac{3}{5}$

(ii) $2\times\frac{1}{3}=\frac{2}{3}$

(iii) $3\times\frac{3}{4}=2\frac{1}{4}$



APMF

Answer 2:

(i) – (c) Since $3\times\frac{1}{5}=\frac{1}{5}+\frac{1}{5}+\frac{1}{5}$

(ii) – (a) Since $2\times\frac{1}{3}=\frac{1}{3}+\frac{1}{3}$

(iii) – (b) Since $3\times\frac{3}{4}=\frac{3}{4}+\frac{3}{4}+\frac{3}{4}$

Question 3:

Multiply and reduce to lowest form and convert into a mixed fraction:

(i) $7\times\frac{3}{5}$ (ii) $4\times\frac{1}{3}$ (iii) $2\times\frac{6}{7}$ (iv) $5\times\frac{2}{9}$

(v) $\frac{2}{3}\times4$ (vi) $\frac{5}{2}\times6$ (vii) $11\times\frac{4}{7}$ (viii) $20\times\frac{4}{5}$

(ix) $13\times\frac{1}{3}$ (x) $15\times\frac{3}{5}$

Answer 3:

(i) $7\times\frac{3}{5} = \frac{7\times3}{5} = \frac{21}{5} = 4\frac{1}{5}$

(ii) $4\times\frac{1}{3} = \frac{4\times1}{3} = \frac{4}{3} = 1\frac{1}{3}$

(iii) $2\times\frac{6}{7} = \frac{2\times6}{7} = \frac{12}{7} = 1\frac{5}{7}$

(iv) $5\times\frac{2}{9} = \frac{5\times2}{9} = \frac{10}{9} = 1\frac{1}{9}$

(v) $\frac{2}{3}\times4 = \frac{2\times4}{3} = \frac{8}{3} = 2\frac{2}{3}$

(vi) $\frac{5}{2}\times6 = 5\times3 = 15$

(vii) $11\times\frac{4}{7} = \frac{11\times4}{7} = \frac{44}{7} = 6\frac{2}{7}$

(viii) $20\times\frac{4}{5}$ = 4 x 4 = 16

(ix) $13\times\frac{1}{3} = \frac{13\times1}{3} = \frac{13}{3} = 4\frac{1}{3}$

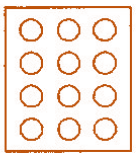
(x) $15\times\frac{3}{5}$ = 3 x 3 = 9

APMF

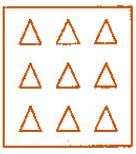
Question 4:

Shade:

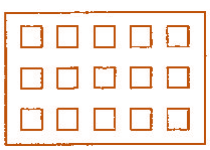
(i) $\frac{1}{2}$ of the circles in box

(a) 

(ii) $\frac{2}{3}$ of the triangles in box

(b) 

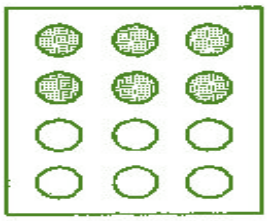
(iii) $\frac{3}{5}$ of the squares inbox

(c) 

Answer 4:

(i) $\frac{1}{2}$ of 12 circles

$= \frac{1}{2} \times 12 = 6$ circles

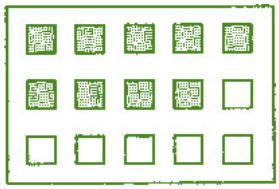


(ii) $\frac{2}{3}$ of 9 triangles

$= \frac{2}{3} \times 9 = 2 \text{ x } 3 = 6$ triangles

(iii) $\frac{3}{5}$ of 15 squares

$= \frac{3}{5} \times 15$ 3 x 3 = 9 squares



APMF

Question 5:

Find:

(a) $\frac{1}{2}$ of (i) 24 (ii) 46

(b) $\frac{2}{3}$ of (i) 18 (ii) 27

(c) $\frac{3}{4}$ of (i) 16 (ii) 36

(d) $\frac{4}{5}$ of (i) 20 (ii) 35

Answer 5:

(a) (i) $\frac{1}{2}$ of 24 = 12 (ii) $\frac{1}{2}$ of 46 = = 23

(b) (i) $\frac{2}{3}$ of $18 = \frac{2}{3} \times 18 = 2 \text{ x } 6 = 12$ (ii) $\frac{2}{3}$ of $27 = \frac{2}{3} \times 27 = 2 \text{ x } 9 = 18$

(c) (i) $\frac{3}{4}$ of $16 = \frac{3}{4} \times 16 = 3 \text{ x } 4 = 12$ (ii) $\frac{3}{4}$ of $36 = \frac{3}{4} \times 36 = 3 \text{ x } 9 = 27$

(d) (i) $\frac{4}{5}$ of $20 = \frac{4}{5} \times 20 = 4 \text{ x } 4 = 16$ (ii) $\frac{4}{5}$ of $35 = \frac{4}{5} \times 35 = 4 \text{ x } 7 = 28$

Question 6:

Multiply and express as a mixed fraction:

(a) $3\times5\frac{1}{5}$ (b) $5\times6\frac{3}{4}$ (c) $7\times2\frac{1}{4}$

(d) $4\times6\frac{1}{3}$ (e) $3\frac{1}{4}\times6$ (f) $3\frac{2}{5}\times8$

Answer 6:

(a) $3\times5\frac{1}{5}=3\times\frac{26}{5}=\frac{3\times26}{5}=\frac{78}{5}=15\frac{3}{5}$

(b) $5\times6\frac{3}{4}=5\times\frac{27}{4}=\frac{5\times27}{4}=\frac{135}{4}=33\frac{3}{4}$

(c) $7\times2\frac{1}{4}=7\times\frac{9}{4}=\frac{7\times9}{4}=\frac{63}{4}=15\frac{3}{4}$

(d) $4\times6\frac{1}{3}=4\times\frac{19}{3}=\frac{4\times19}{3}=\frac{76}{3}=25\frac{1}{3}$

(e) $3\frac{1}{4}\times6=\frac{13}{4}\times6=\frac{13\times3}{2}=\frac{39}{2}=19\frac{1}{2}$

(f) $3\frac{2}{5}\times8=\frac{17}{5}\times8=\frac{17\times8}{5}=\frac{136}{5}=27\frac{1}{5}$

APMF

Question 7:

Find:

(a) $\frac{1}{2}$ of (i) $2\frac{3}{4}$ (ii) $4\frac{2}{9}$ (b) $\frac{5}{8}$ of (i) $3\frac{5}{6}$ (ii) $9\frac{2}{3}$

Answer 7:

(a) (i) $\frac{1}{2}$ of $2\frac{3}{4}=\frac{1}{2}\times2\frac{3}{4}=\frac{1}{2}\times\frac{11}{4}=\frac{11}{8}=1\frac{3}{8}$

(ii) $\frac{1}{2}$ of $4\frac{2}{9}=\frac{1}{2}\times4\frac{2}{9}=\frac{1}{2}\times\frac{38}{9}=\frac{19}{9}=2\frac{1}{9}$

(b) (i) $\frac{5}{8}$ of $3\frac{5}{6}=\frac{5}{8}\times3\frac{5}{6}=\frac{5}{8}\times\frac{23}{6}=\frac{115}{48}=2\frac{19}{48}$

(ii) $\frac{5}{8}$ of $9\frac{2}{3}=\frac{5}{8}\times9\frac{2}{3}=\frac{5}{8}\times\frac{29}{3}=\frac{145}{24}=6\frac{1}{24}$

Question 8:

Vidya and Pratap went for a picnic. Their mother gave them a water bottle that contained 5 litres of water. Vidya consumed $\frac{2}{5}$ of the water. Pratap consumed the remaining water.

(i) How much water did Vidya drink?

(ii) What fraction of the total quantity of water did Pratap drink?

Answer 8:

Given: Total quantity of water in bottle = 5 litres

(i) Vidya consumed = $\frac{2}{5}$ of 5 litres = $\frac{2}{5} \times 5$ = 2 litres

Thus, Vidya drank 2 litres water from the bottle.

(ii) Pratap consumed = $\left(1 - \frac{2}{5}\right)$ part of bottle

$= \frac{5-2}{5} = \frac{3}{5}$ part of bottle

Pratap consumed $\frac{3}{5}$ of 5 litres water = $\frac{3}{5} \times 5$ = 3 litres

Thus, Pratap drank $\frac{3}{5}$ part of the total quantity of water.

APMF

Exercise 2.3

Question 1:

Find:

(i) $\frac{1}{4}$ of (a) $\frac{1}{4}$ (b) $\frac{3}{5}$ (c) $\frac{4}{3}$

(ii) $\frac{1}{7}$ of (a) $\frac{2}{9}$ (b) $\frac{6}{5}$ (c) $\frac{3}{10}$

Answer 1:

(i) (a) $\frac{1}{4}$ of $\frac{1}{4} = \frac{1}{4}\times\frac{1}{4} = \frac{1\times1}{4\times4} = \frac{1}{16}$

(b) $\frac{1}{4}$ of $\frac{3}{5} = \frac{1}{4}\times\frac{3}{4} = \frac{1\times3}{4\times4} = \frac{3}{16}$

(c) $\frac{1}{4}$ of $\frac{4}{3} = \frac{1}{4}\times\frac{4}{3} = \frac{1\times4}{4\times3} = \frac{1}{3}$

(ii) (a) $\frac{1}{7}$ of $\frac{2}{9} = \frac{1}{7}\times\frac{2}{9} = \frac{1\times2}{7\times9} = \frac{2}{63}$

(b) $\frac{1}{7}$ of $\frac{2}{9} = \frac{1}{7}\times\frac{6}{5} = \frac{1\times6}{7\times5} = \frac{6}{35}$

(c) $\frac{1}{7}$ of $\frac{2}{9} = \frac{1}{7}\times\frac{3}{10} = \frac{1\times3}{7\times10} = \frac{3}{70}$

APME

Question 2:

Multiply and reduce to lowest form (if possible):

(i) $\frac{2}{3}\times2\frac{2}{3}$ (ii) $\frac{2}{7}\times\frac{7}{9}$ (iii) $\frac{3}{8}\times\frac{6}{4}$ (iv) $\frac{9}{5}\times\frac{3}{5}$

(v) $\frac{1}{3}\times\frac{15}{8}$ (vi) $\frac{11}{2}\times\frac{3}{10}$ (vii) $\frac{4}{5}\times\frac{12}{7}$

Answer 2:

(i) $\frac{2}{3}\times2\frac{2}{3} = \frac{2}{3}\times\frac{8}{3} = \frac{2\times8}{3\times3} = \frac{16}{9} = 1\frac{7}{9}$

(ii) $\frac{2}{7}\times\frac{7}{9} = \frac{2\times7}{7\times9} = \frac{2}{9}$

(iii) $\frac{3}{8}\times\frac{6}{4}=\frac{3\times6}{8\times4}=\frac{3\times3}{8\times2}=\frac{9}{16}$

(iv) $\frac{9}{5}\times\frac{3}{5}=\frac{9\times3}{5\times5}=\frac{27}{25}=1\frac{2}{25}$

(v) $\frac{1}{3}\times\frac{15}{8}=\frac{1\times15}{3\times8}=\frac{1\times5}{1\times8}=\frac{5}{8}$

(vi) $\frac{11}{2}\times\frac{3}{10}=\frac{11\times3}{2\times10}=\frac{33}{20}=1\frac{3}{20}$

(vii) $\frac{4}{5}\times\frac{12}{7}=\frac{4\times12}{5\times7}=\frac{48}{35}=1\frac{13}{35}$

Question 3:

Multiply the following fractions:

(i) $\frac{2}{5}\times5\frac{1}{4}$ (ii) $6\frac{2}{5}\times\frac{7}{9}$ (iii) $\frac{3}{2}\times5\frac{1}{3}$ (iv) $\frac{5}{6}\times2\frac{3}{7}$

(v) $3\frac{2}{5}\times\frac{4}{7}$ (vi) $2\frac{3}{5}\times3$ (vii) $3\frac{4}{7}\times\frac{3}{5}$

Answer 3:

(i) $\frac{2}{5}\times5\frac{1}{4}=\frac{2}{5}\times\frac{21}{4}=\frac{2\times21}{5\times4}=\frac{1\times21}{5\times2}=\frac{21}{10}=2\frac{1}{10}$

(ii) $6\frac{2}{5}\times\frac{7}{9}=\frac{32}{5}\times\frac{7}{9}=\frac{32\times7}{5\times9}=\frac{224}{45}=4\frac{44}{45}$

(iii) $\frac{3}{2}\times5\frac{1}{3}=\frac{3}{2}\times\frac{16}{3}=\frac{48}{6}=8$

(iv) $\frac{5}{6}\times2\frac{3}{7}=\frac{5}{6}\times\frac{17}{7}=\frac{85}{42}=2\frac{1}{42}$

(v) $3\frac{2}{5}\times\frac{4}{7}=\frac{17}{7}\times\frac{4}{7}=\frac{68}{35}=1\frac{33}{35}$

(vi) $2\frac{3}{5}\times3=\frac{13}{5}\times\frac{3}{1}=\frac{13\times3}{5\times1}=\frac{39}{5}=7\frac{4}{5}$

(vii) $3\frac{4}{7}\times\frac{3}{5}=\frac{25}{7}\times\frac{3}{5}=\frac{5\times3}{7\times1}=\frac{15}{7}=2\frac{1}{7}$

APME

Question 4:

Which is greater:

(i) $\frac{2}{7}$ of $\frac{3}{4}$ or $\frac{3}{5}$ of $\frac{5}{8}$ (ii) $\frac{1}{2}$ of $\frac{6}{7}$ or $\frac{2}{3}$ of $\frac{3}{7}$

Answer 4:

(i) $\frac{2}{7}$ of $\frac{3}{4}$ or $\frac{3}{5}$ of $\frac{5}{8}$

$\Rightarrow \frac{2}{7} \times \frac{3}{4}$ or $\frac{3}{5} \times \frac{5}{8}$

$\Rightarrow \frac{3}{14}$ or $\frac{3}{8}$

$\Rightarrow \frac{3}{14} < \frac{3}{8}$

Thus, $\frac{3}{5}$ of $\frac{5}{8}$ is greater.

(ii) $\frac{1}{2}$ of $\frac{6}{7}$ or $\frac{2}{3}$ of $\frac{3}{7}$

$\Rightarrow \frac{1}{2} \times \frac{6}{7}$ or $\frac{2}{3} \times \frac{3}{7}$

$\Rightarrow \frac{3}{7}$ or $\frac{2}{7}$

$\Rightarrow \frac{3}{7} > \frac{2}{7}$

Thus, $\frac{1}{2}$ of $\frac{6}{7}$ is greater.

APMF

Question 5:

Saili plants 4 saplings in a row in her garden. The distance between two adjacent saplings is $\frac{3}{4}$ m. Find the distance between the first and the last sapling.

Answer 5:

The distance between two adjacent saplings = $\frac{3}{4}$ m

Saili planted 4 saplings in a row, then number of gap in saplings = 3

Therefore,

The distance between the first and the last saplings = $3 \times \frac{3}{4} = \frac{9}{4}$ m = $2\frac{1}{4}$ m

Thus the distance between the first and the last saplings is $2\frac{1}{4}$ m.

Question 6:

Lipika reads a book for $1\frac{3}{4}$ hours everyday. She reads the entire book in 6 days. How many hours in all were required by her to read the book?

Answer 6:

Time taken by Lipika to read a book = $1\frac{3}{4}$ hours.

She reads entire book in 6 days.

Now, total hours taken by her to read the entire book = $1\frac{3}{4} \times 6$

$= \frac{7}{4} \times 6 = \frac{21}{2} = 10\frac{1}{2}$ hours

Thus, 10 hours were required by her to read the book.

Question 7:

A car runs 16 km using 1 litre of petrol. How much distance will it cover using $2\frac{3}{4}$ litres of petrol?

Answer 7:

In 1 litre of pertrol, car covers the distance = 16 km

In $2\frac{3}{4}$ litres of petrol, car covers the distance = $2\frac{3}{4}$ of 16 km

$= \frac{11}{4} \times 16 = 44$ km

Thus, the car will cover 44 km distance.

Question 8:

(a) (i) Provide the number in the box $\square$, such that $\frac{2}{3}\times\square=\frac{10}{30}$.

(ii) The simplest form of the number obtained in $\square$ is _____.

(b) (i) Provide the number in the box $\square$, such that $\frac{3}{5}\times\square=\frac{24}{75}$.

(ii) The simplest form of the number obtained in $\square$ is _____.

Answer 8:

(a) (i) $\frac{2}{3}\times\boxed{\frac{5}{10}}=\frac{10}{30}$ (ii) The simplest form of $\frac{5}{10}$ is $\frac{1}{2}$.

(b) (i) $\frac{3}{5}\times\boxed{\frac{8}{15}}=\frac{24}{75}$ (ii) The simplest form of $\frac{8}{15}$ is $\frac{8}{15}$.

APMF

Exercise 2.4

Question 1:

Find:

(i) $12 \div \frac{3}{4}$ (ii) $14 \div \frac{5}{6}$ (iii) $8 \div \frac{7}{3}$

(iv) $4 \div \frac{8}{3}$ (v) $3 \div 2\frac{1}{3}$ (vi) $5 \div 3\frac{4}{7}$

Answer 1:

(i) $12 \div \frac{3}{4} = 12 \times \frac{4}{3} = 16$

(ii) $14 \div \frac{5}{6} = 14 \times \frac{6}{5} = \frac{84}{5} = 16\frac{4}{5}$

(iii) $8 \div \frac{7}{3} = 8 \times \frac{3}{7} = \frac{24}{7} = 3\frac{3}{7}$

(iv) $4 \div \frac{8}{3} = 4 \times \frac{3}{8} = \frac{3}{2} = 1\frac{1}{2}$

(v) $3 \div 2\frac{1}{3} = 3 \div \frac{7}{3} = 3 \times \frac{3}{7} = \frac{9}{7} = 1\frac{2}{7}$

(vi) $5 \div 3\frac{4}{7} = 5 \div \frac{25}{7} = 5 \times \frac{7}{25} = \frac{7}{5} = 1\frac{2}{5}$

APMF

Question 2:

Find the reciprocal of each of the following fractions. Classify the reciprocals as proper fraction, improper fractions and whole numbers.

(i) $\frac{3}{7}$ (ii) $\frac{5}{8}$ (iii) $\frac{9}{7}$ (iv) $\frac{6}{5}$

(v) $\frac{12}{7}$ (vi) $\frac{1}{8}$ (vii) $\frac{1}{11}$

Answer 2:

(i) Reciprocal of $\frac{3}{7} = \frac{7}{3}$ $\longrightarrow$ Improper fraction

(ii) Reciprocal of $\frac{5}{8} = \frac{8}{5}$ $\longrightarrow$ Improper fraction

(iii) Reciprocal of $\frac{9}{7} = \frac{7}{9}$ $\longrightarrow$ Proper fraction

(iv) Reciprocal of $\frac{6}{5} = \frac{5}{6}$ $\longrightarrow$ Proper fraction

(v) Reciprocal of $\frac{12}{7} = \frac{7}{12}$ $\longrightarrow$ Proper fraction

(vi) Reciprocal of $\frac{1}{8} = 8 \longrightarrow$ Whole number

(vi) Reciprocal of $\frac{1}{11} = 11 \longrightarrow$ Whole number

Question 3:

Find:

(i) $\frac{7}{3} \div 2$ (ii) $\frac{4}{9} \div 5$ (iii) $\frac{6}{13} \div 7$

(iv) $4\frac{1}{3} \div 3$ (v) $3\frac{1}{2} \div 4$ (vi) $4\frac{3}{7} \div 7$

Answer 3:

(i) $\frac{7}{3} \div 2 = \frac{7}{3} \times \frac{1}{2} = \frac{7 \times 1}{3 \times 2} = \frac{7}{6} = 1\frac{1}{6}$

(ii) $\frac{4}{9} \div 5 = \frac{4}{9} \times \frac{1}{5} = \frac{4 \times 1}{9 \times 5} = \frac{4}{45}$

(iii) $\frac{6}{13} \div 7 = \frac{6}{13} \times \frac{1}{7} = \frac{6 \times 1}{13 \times 7} = \frac{6}{91}$

(iv) $4\frac{1}{3} \div 3 = \frac{13}{3} \div 3 = \frac{13}{3} \times \frac{1}{3} = \frac{13}{9} = 1\frac{4}{9}$

(v) $3\frac{1}{2} \div 4 = \frac{7}{2} \div 4 = \frac{7}{2} \times \frac{1}{4} = \frac{7}{8}$

(vi) $4\frac{3}{7} \div 7 = \frac{31}{7} \div 7 = \frac{31}{7} \times \frac{1}{7} = \frac{31}{49}$

Question 4:

Find:

(i) $\frac{2}{5} \div \frac{1}{2}$ (ii) $\frac{4}{9} \div \frac{2}{3}$ (iii) $\frac{3}{7} \div \frac{8}{7}$

(iv) $2\frac{1}{3} \div \frac{3}{5}$ (v) $3\frac{1}{2} \div \frac{8}{3}$ (vi) $\frac{2}{5} \div 1\frac{1}{2}$

(vii) $3\frac{1}{5} \div 1\frac{2}{3}$ (viii) $2\frac{1}{5} \div 1\frac{1}{5}$

APMF

Answer 4:

(i) $\frac{2}{5}\div\frac{1}{2}=\frac{2}{5}\times\frac{2}{1}=\frac{2\times2}{5\times1}=\frac{4}{5}$

(ii) $\frac{4}{9}\div\frac{2}{3}=\frac{4}{9}\times\frac{3}{2}=\frac{2}{3}$

(iii) $\frac{3}{7}\div\frac{8}{7}=\frac{3}{7}\times\frac{7}{8}=\frac{3}{8}$

(iv) $2\frac{1}{3}\div\frac{3}{5}=\frac{7}{3}\div\frac{3}{5}=\frac{7}{3}\times\frac{5}{3}=\frac{35}{9}=3\frac{8}{9}$

(v) $3\frac{1}{2}\div\frac{8}{3}=\frac{7}{2}\div\frac{8}{3}=\frac{7}{2}\times\frac{3}{8}=\frac{7\times3}{2\times8}=\frac{21}{16}=1\frac{5}{16}$

(vi) $\frac{2}{5}\div1\frac{1}{2}=\frac{2}{5}\div\frac{3}{2}=\frac{2}{5}\times\frac{2}{3}=\frac{2\times2}{5\times3}=\frac{4}{15}$

(vii) $3\frac{1}{5}\div1\frac{2}{3}=\frac{16}{5}\div\frac{5}{3}=\frac{16}{5}\times\frac{3}{5}=\frac{16\times3}{5\times5}=\frac{48}{25}=1\frac{23}{25}$

(viii) $2\frac{1}{5}\div1\frac{1}{5}=\frac{11}{5}\div\frac{6}{5}=\frac{11}{5}\times\frac{5}{6}=\frac{11}{6}=1\frac{5}{6}$

APMF

Exercise 2.5

Question 1:

Which is greater:

(i) 0.5 or 0.05 (ii) 0.7 or 0.5 (iii) 7 or 0.7

(iv) 1.37 or 1.49 (v) 2.03 or 2.30 (vi) 0.8 or 0.88

Answer 1:

(i) $0.5 > 0.05$ (ii) $0.7 > 0.5$ (iii) $7 > 0.7$

(iv) $1.37 < 1.49$ (v) $2.03 < 2.30$ (vi) $0.8 < 0.88$

Question 2:

Express as rupees using decimals:

(i) 7 paise (ii) 7 rupees 7 paise

(iii) 77 rupees 77 paise (iv) 50 paise

(v) 235 paise

Answer 2:

$\because$ 100 paise = ₹1

$\therefore$ 1 paisa = ₹ $\frac{1}{100}$

(i) 7 paise = ₹ $\frac{7}{100}$ = ₹ 0.07

(ii) 7 rupees 7 paise = ₹ 7 + ₹ $\frac{7}{100}$ = ₹ 7 + ₹ 0.07 = ₹ 7.07

(iii) 77 rupees 77 paise = ₹ 77 + ₹ $\frac{77}{100}$ = ₹ 77 + ₹ 0.77 = ₹ 77.77

(iv) 50 paise = ₹ $\frac{50}{100}$ = ₹ 0.50

(v) 235 paise = ₹ $\frac{235}{100}$ = ₹ 2.35

APMF

Question 3:

(i) Express 5 cm in metre and kilometer.

(ii) Express 35 mm in cm, m and km.

Answer 3:

(i) Express 5 cm in meter and kilometer.

$\because$ 100 cm = 1 meter

$\therefore$ 1 cm = $\frac{1}{100}$ meter

$\Rightarrow$ 5 cm = $\frac{5}{100}$ = 0.05 meter.

Now,

$\because$ 1000 meters = 1 kilometers

$\therefore$ 1 meter = $\frac{1}{1000}$ kilometer

$\Rightarrow$ 0.05 meter = $\frac{0.05}{1000}$ = 0.00005 kilometer

(ii) Express 35 mm in cm, m and km.

$\because$ 10 mm = 1 cm

$\therefore$ 1 mm = $\frac{1}{10}$ cm

$\Rightarrow$ 35 mm = $\frac{35}{10}$ = 3.5 cm

Now, $\because$ 100 cm = 1 meter

$\therefore$ 1 cm = $\frac{1}{100}$ meter

$\Rightarrow$ 3.5 cm = $\frac{3.5}{100}$ = 0.035 meter

Again,

$\because$ 1000 meters = 1 kilometers

$\therefore$ 1 meter = $\frac{1}{1000}$ kilometer

$\Rightarrow$ 0.035 meter = $\frac{0.035}{1000}$ = 0.000035 kilometer

APMF

Question 4:

Express in kg.:

(i) 200 g (ii) 3470 g (iii) 4 kg 8 g

Answer 4:

Let us consider,

1000 g = 1 kg

$\Rightarrow$ 1 g = $\frac{1}{1000}$ kg

(i) 200 g = $\left(200\times\frac{1}{1000}\right)$ kg = 0.2 kg

(ii) 3470 g = $\left(3470\times\frac{1}{1000}\right)$ kg = 3.470 kg

(iii) 4 kg 8 g = 4 kg + $\left(8\times\frac{1}{1000}\right)$ kg = 4 kg + 0.008 kg = 4.008 kg

APMF

Question 5:

Write the following decimal numbers in the expanded form:

(i) 20.03 (ii) 2.03 (iii) 200.03 (iv) 2.034

Answer 5:

(i) $20.03 = 2\times10+0\times1+0\times\frac{1}{10}+3\times\frac{1}{100}$

(ii) $2.03 = 2\times1+0\times\frac{1}{10}+3\times\frac{1}{100}$

(iii) $200.03 = 2\times100+0\times10+0\times1+0\times\frac{1}{10}+3\times\frac{1}{100}$

(iv) $2.034 = 2\times1+0\times\frac{1}{10}+3\times\frac{1}{100}+4\times\frac{1}{1000}$

Question 6:

Write the place value of 2 in the following decimal numbers:

(i) 2.56 (ii) 21.37 (iii) 10.25

(iv) 9.42 (v) 63.352

Answer 6:

(i) Place value of 2 in 2.56 = 2 x 1 = 2 ones

(ii) Place value of 2 in 21.37 = 2 x 10 = 2 tens

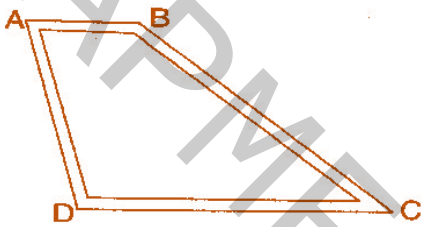
(iii) Place value of 2 in 10.25 = $2 \times \frac{1}{10}$ = 2 tenths

(iv) Place value of 2 in 9.42 = $2 \times \frac{1}{100}$ = 2 hundredth

(v) Place value of 2 in 63.352 = $2 \times \frac{1}{1000}$ = 2 thousandth

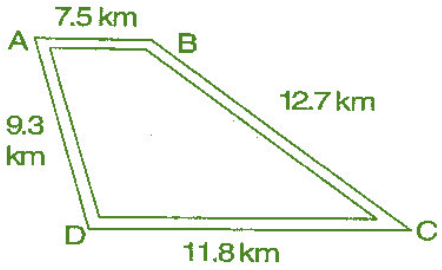
Question 7:

Dinesh went from place A to place B and from there to place C. A is 7.5 km from B and B is 12.7 km from C. Ayub went from place A to place D and from there to place C. D is 9.3 km from A and C is 11.8 km from D. Who travelled more and by how much?



Answer 7:

Distance travelled by Dinesh when he went from place A to place B = 7.5 km and from place B to C = 12.7 km.



Total distance covered by Dinesh = AB + BC

= 7.5 + 12.7 = 20.2 km

Total distance covered by Ayub = AD + DC

= 9.3 + 11.8 = 21.1 km

On comparing the total distance of Ayub and Dinesh,

21.1 km > 20.2 km

Therefore, Ayub covered more distance by 21.1 – 20.2 = 0.9 km = 900 m

Question 8:

Shyam bought 5 kg 300 g apples and 3 kg 250 g mangoes. Sarala bought 4 kg 800 g oranges and 4 kg 150 g bananas. Who bought more fruits?

Answer 8:

Total weight of fruits bought by Shyam = 5 kg 300 g + 3 kg 250 g = 8 kg 550 g
Total weight of fruits bought by Sarala = 4 kg 800 g + 4 kg 150 g = 8 kg 950 g

On comparing the quantity of fruits, 8 kg 550 g < 8 kg 950 g
Therefore, Sarala bought more fruits.

Question 9:

How much less is 28 km than 42.6 km?

Answer 9:

We have to find the difference of 42.6 km and 28 km.
Difference = 42.6 – 28.0 = 14.6 km
Therefore 14.6 km less is 28 km than 42.6 km.

APMF

Exercise 2.6

Question 1:

Find:

(i)	0.2 x 6	(ii)	8 x 4.6	(iii)	2.71 x 5
(iv)	20.1 x 4	(v)	0.05 x 7	(vi)	211.02 x 4
(vii)	2 x 0.86				

Answer 1:

(i)	0.2 x 6 = 1.2	(ii)	8 x 4.6 = 36.8
(iii)	2.71 x 5 = 13.55	(iv)	20.1 x 4 = 80.4
(v)	0.05 x 7 = 0.35	(vi)	211.02 x 4 = 844.08
(vii)	2 x 0.86 = 1.72		

Question 2:

Find the area of rectangle whose length is 5.7 cm and breadth is 3 cm.

Answer 2:

Given: Length of rectangle = 5.7 cm and
Breadth of rectangle = 3 cm
Area of rectangle = Length x Breadth = 5.7 x 3 = 17.1 cm^2

Thus, the area of rectangle is 17.1 cm^2.

APMF

Question 3:

Find:

(i)	1.3 x 10	(ii)	36.8 x 10	(iii)	153.7 x 10
(iv)	168.07 x 10	(v)	31.1 x 100	(vi)	156.1 x 100
(vii)	3.62 x 100	(viii)	43.07 x 100	(ix)	0.5 x 10
(x)	0.08 x 10	(xi)	0.9 x 100	(xii)	0.03 x 1000

Answer 3:

(i)	1.3 x 10 = 13.0	(ii)	36.8 x 10 = 368.0
(iii)	153.7 x 10 = 1537.0	(iv)	168.07 x 10 = 1680.7
(v)	31.1 x 100 = 3110.0	(vi)	156.1 x 100 = 15610.0
(vii)	3.62 x 100 = 362.0	(viii)	43.07 x 100 = 4307.0
(ix)	0.5 x 10 = 5.0	(x)	0.08 x 10 = 0.80
(xi)	0.9 x 100 = 90.0	(xii)	0.03 x 1000 = 30.0

Question 4:

A two-wheeler covers a distance of 55.3 km in one litre of petrol. How much distance will it cover in 10 litres of petrol?

Answer 4:

$\because$ In one litre, a two-wheeler covers a distance = 55.3 km

$\therefore$ In 10 litres, a two- wheeler covers a distance = 55.3 x 10 = 553.0 km

Thus, 553 km distance will be covered by it in 10 litres of petrol.

Question 5:

Find:

(i)	2.5 x 0.3	(ii)	0.1 x 51.7	(iii)	0.2 x 316.8
(iv)	1.3 x 3.1	(v)	0.5 x 0.05	(vi)	11.2 x 0.15
(vii)	1.07 x 0.02	(viii)	10.05 x 1.05	(ix)	101.01 x 0.01
(x)	100.01 x 1.1				

Answer 5:

(i)	2.5 x 0.3 = 0.75	(ii)	0.1 x 51.7 = 5.17
(iii)	0.2 x 316.8 = 63.36	(iv)	1.3 x 3.1 = 4.03
(v)	0.5 x 0.05 = 0.025	(vi)	11.2 x 0.15 = 1.680
(vii)	1.07 x 0.02 = 0.0214	(viii)	10.05 x 1.05 = 10.5525
(ix)	101.01 x 0.01 = 1.0101	(x)	100.01 x 1.1 = 110.11

APME

Exercise 2.7

Question 1:

Find:

(i) $0.4 \div 2$ (ii) $0.35 \div 5$ (iii) $2.48 \div 4$

(iv) $65.4 \div 6$ (v) $651.2 \div 4$ (v) $14.49 \div 7$

(vii) $3.96 \div 4$ (viii) $0.80 \div 5$

Answer 1:

(i) $0.4 \div 2 = \frac{4}{10} \times \frac{1}{2} = \frac{2}{10} = 0.2$

(ii) $0.35 \div 5 = \frac{35}{100} \times \frac{1}{5} = \frac{7}{100} = 0.07$

(iii) $2.48 \div 4 = \frac{248}{100} \times \frac{1}{4} = \frac{62}{100} = 0.62$

(iv) $65.4 \div 6 = \frac{654}{10} \times \frac{1}{6} = \frac{109}{10} = 10.9$

(v) $651.2 \div 4 = \frac{6512}{10} \times \frac{1}{4} = \frac{1628}{10} = 162.8$

(vi) $14.49 \div 7 = \frac{1449}{100} \times \frac{1}{7} = \frac{207}{100} = 2.07$

(vii) $3.96 \div 4 = \frac{396}{100} \times \frac{1}{4} = \frac{99}{100} = 0.99$

(viii) $0.80 \div 5 = \frac{80}{100} \times \frac{1}{5} = \frac{16}{100} = 0.16$

KPMF

Question 2:

Find:

(i) $4.8 \div 10$ (ii) $52.5 \div 10$ (iii) $0.7 \div 10$

(iv) $33.1 \div 10$ (v) $272.23 \div 10$ (vi) $0.56 \div 10$

(vii) $3.97 \div 10$

Answer 2:

(i) $4.8 \div 10 = \frac{4.8}{10} = 0.48$ (ii) $52.5 \div 10 = \frac{52.5}{10} = 5.25$

(iii) $0.7 \div 10 = \frac{0.7}{10} = 0.07$ (iv) $33.1 \div 10 = \frac{33.1}{10} = 3.31$

(v) $272.23 \div 10 = \frac{272.23}{10} = 27.223$ (vi) $0.56 \div 10 = \frac{0.56}{10} = 0.056$

(vii) $3.97 \div 10 = \frac{3.97}{10} = 0.397$

Question 3:

Find:

(i) $2.7 \div 100$ (ii) $0.3 \div 100$ (iii) $0.78 \div 100$

(iv) $432.6 \div 100$ (v) $23.6 \div 100$ (vi) $98.53 \div 100$

Answer 3:

(i) $2.7 \div 100 = \frac{27}{10} \times \frac{1}{100} = \frac{27}{1000} = 0.027$

(ii) $0.3 \div 100 = \frac{3}{10} \times \frac{1}{100} = \frac{3}{1000} = 0.003$

(iii) $0.78 \div 100 = \frac{78}{100} \times \frac{1}{100} = \frac{78}{10000} = 0.0078$

(iv) $432.6 \div 100 = \frac{4326}{10} \times \frac{1}{100} = \frac{4326}{1000} = 4.326$

(v) $23.6 \div 100 = \frac{236}{10} \times \frac{1}{100} = \frac{236}{1000} = 0.236$

(vi) $98.53 \div 100 = \frac{9853}{100} \times \frac{1}{100} = \frac{9853}{10000}$ 0.9853

Question 4:

Find:

(i) $7.9 \div 1000$ (ii) $26.3 \div 1000$ (iii) $38.53 \div 1000$

(iv) $128.9 \div 1000$ (v) $0.5 \div 1000$

Answer 4:

(i) $7.9 \div 1000 = \frac{79}{10} \times \frac{1}{1000} = \frac{79}{10000} = 0.0079$

(ii) $26.3 \div 1000 = \frac{263}{10} \times \frac{1}{1000} = \frac{263}{10000} = 0.0263$

(iii) $38.53 \div 1000 = \frac{3853}{100} \times \frac{1}{1000} = \frac{3853}{100000} = 0.03853$

(iv) $128.9 \div 1000 = \frac{1289}{10} \times \frac{1}{1000} = \frac{1289}{10000} = 0.1289$

(v) $0.5 \div 1000 = \frac{5}{10} \times \frac{1}{1000} = \frac{5}{10000} = 0.0005$

Question 5:

Find:

(i)	$7 \div 3.5$	(ii)	$36 \div 0.2$	(iii)	$3.25 \div 0.5$
(iv)	$30.94 \div 0.7$	(v)	$0.5 \div 0.25$	(vi)	$7.75 \div 0.25$
(vii)	$76.5 \div 0.15$	(viii)	$37.8 \div 1.4$	(ix)	$2.73 \div 1.3$

Answer 5:

(i) $7 \div 3.5 = 7 \div \frac{35}{10} = 7 \times \frac{10}{35} = \frac{10}{5} = 2$

(ii) $36 \div 0.2 = 36 \div \frac{2}{10} = 36 \times \frac{10}{2} = 18 \text{ x } 10 = 180$

(iii) $3.25 \div 0.5 = \frac{325}{100} \div \frac{5}{10} = \frac{325}{100} \times \frac{10}{5} = \frac{65}{10} = 6.5$

(iv) $30.94 \div 0.7 = \frac{3094}{100} \div \frac{7}{10} = \frac{3094}{100} \times \frac{10}{7} = \frac{442}{10} = 44.2$

(v) $0.5 \div 0.25 = \frac{5}{10} \div \frac{25}{100} = \frac{5}{10} \times \frac{100}{25} = \frac{10}{5} = 2$

(vi) $7.75 \div 0.25 = \frac{775}{100} \div \frac{25}{100} = \frac{775}{100} \times \frac{100}{25} = 31$

(vii) $76.5 \div 0.15 = \frac{765}{10} \div \frac{15}{100} = \frac{765}{10} \times \frac{100}{15} = 51 \text{ x } 10 = 510$

(viii) $37.8 \div 1.4 = \frac{378}{10} \div \frac{14}{10} = \frac{378}{10} \times \frac{10}{14} = 27$

(ix) $2.73 \div 1.3 = \frac{273}{100} \div \frac{13}{10} = \frac{273}{100} \times \frac{10}{13} = \frac{21}{10} = 2.1$

APME

Question 6:

A vehicle covers a distance of 43.2 km in 2.4 litres of petrol. How much distance will it cover in one litre petrol?

Answer 6:

∵ In 2.4 litres of petrol, distance covered by the vehicle = 43.2 km

∴ In 1 litre of petrol, distance covered by the vehicle = 43.2 ÷ 2.4

$$= \frac{432}{10} \div \frac{24}{10} = \frac{432}{10} \times \frac{24}{10}$$

= 18 km

Thus, it covered 18 km distance in one litre of petrol.

APMF

Exercise 3.1

Question 1:

Find the range of heights of any ten students of your class.

Answer 1:

S. No.	Name of students	Height (in feet)
1.	Gunjan	4.2
2.	Aditi	4.5
3.	Nikhil	5
4.	Akhil	5.1
5.	Riya	5.2
6.	Akshat	5.3
7.	Abhishek	5.1
8.	Mayank	4.7
9.	Rahul	4.9
10.	Ayush	4.5

Range = Highest height – Lowest height

= 5.3 – 4.2 = 1.1 feet.

Question 2:

Organize the following marks in a class assessment, in a tabular form:

4, 6, 7, 5, 3, 5, 4, 5, 2, 6, 2, 5, 1, 9, 6, 5, 8, 4, 6, 7.

(i) Which number is the highest?

(ii) Which number of the lowest?

(iii) What is the range of the lowest?

(iv) Find the arithmetic mean

Answer 2:

S. No.	Marks	Tally marks	Frequency (No. of students)
1.	1	I	1
2.	2	II	2
3.	3	I	1
4.	4	III	3
5.	5	𝍸	5
6.	6	IIII	4
7.	7	II	2
8.	8	I	1
9.	9	I	1

(i) The highest number is 9.

(ii) The lowest number is 1.

(iii) The range of the data is 9 – 1 = 8

(iv) Arithmetic mean =

$$\frac{4+6+7+5+3+5+4+5+2+6+2+5+1+9+6+5+8+4+6+7}{20}$$

$$= \frac{100}{20} = 5$$

APMF

Question 3:

Find the mean of the first five whole numbers.

Answer 3:

The first five whole numbers are 0, 1, 2, 3 and 4.

Therefore,

$$\text{Mean of first five whole numbers} = \frac{\text{Sum of numbers}}{\text{Total number}} = \frac{0+1+2+3+4}{5} = \frac{10}{5} = 2$$

Thus, the mean of first five whole numbers is 5.

Question 4:

A cricketer scores the following runs in eight innings: 58, 76, 40, 35, 46, 45, 0, 100

Find the mean score.

Answer 4:

Number of innings = 8

$$\text{Mean of score} = \frac{\text{Sum of scores}}{\text{Number of innings}} = \frac{58+76+40+35+46+45+0+100}{8} = \frac{400}{8} = 50$$

Thus, the mean score is 50.

Question 5:

Following table shows the points of each player scored in four games:

Player	Game 1	Game 2	Game 3	Game 4
A	14	16	10	10
B	0	8	6	4
C	8	11	Did not play	13

Now answer the following questions:

(i) Find the mean to determine A's average number of points scored per game.

(ii) To find the mean number of points per game for C. would you divide the total points by 3 or 47? Why?

(iii) B played in all the four games. How would you find the mean?

(iv) Who is the best performer?

Answer 5:

(i) $$\text{Mean of player A} = \frac{\text{Sum of scores by A}}{\text{No. of games played by A}} = \frac{14+16+10+10}{4} = \frac{50}{4} = 12.5$$

(ii) We should divide the total points by 3 because player C played only three games.

(iii) Player B played in all the four games.

$$\therefore \text{Mean of player B} = \frac{\text{Sum of scores by B}}{\text{No. of games played by B}} = \frac{0+8+6+4}{4} = \frac{18}{4} = 4.5$$

(iv) To find the best performer, we should know the mean of all players.

Mena of player A = 12.5

Mean of player B = 4.5

$$\text{Mean of player C} = \frac{8+11+13}{3} = \frac{32}{3} = 10.67$$

Therefore, on comparing means of all players, player A is the best performer.

Question 6:

The marks (out of 100) obtained by a group of students in a science test are 85, 76, 90, 85, 39, 48, 56, 95, 81 and 75. Find the:

(i) The highest and the lowest marks obtained by the students.

(ii) Range of the marks obtained.

(iii) Mean marks obtained by the group.

Answer 6:

(i) Highest marks obtained by the student = 95

Lowest marks obtained by the student = 39

(ii) Range of marks = Highest marks – Lowest marks

$= 95 - 39 = 56$

(iii) Mean of obtained marks $= \frac{\text{Sum of marks}}{\text{Total number of marks}}$

$= \frac{85+76+90+85+39+48+56+95+81+75}{10}$

$= \frac{730}{10} = 73$

Thus, the mean marks obtained by the group of students is 73.

Question 7:

The enrolment in a school during six consecutive years was as follows:
1555, 1670, 1750, 2013, 2540, 2820
Find the mean enrolment of the school for this period.

Answer 7:

Mean enrolment $= \frac{\text{Sum of numbers of enrolment}}{\text{Total number of enrolment}}$

$= \frac{1555+1670+1750+2013+2540+2820}{6}$

$= \frac{12348}{6} = 2058$

Thus, the mean enrolment of the school is 2,058.

Question 8:

The rainfall (in mm) in a city on 7 days of a certain week was recorded as follows:

Day	Mon	Tue	Wed	Thur	Fri	Sat	Sun
Rainfall (in mm)	0.0	12.2	2.1	0.0	20.5	5.5	1.0

(i) Find the range of the rainfall in the above data.

(ii) Find the mean rainfall for the week.

(iii) On how many days was the rainfall less than the mean rainfall?

Answer 8:

(i) The range of the rainfall = Highest rainfall – Lowest rainfall

$= 20.5 - 0.0 = 20.5$ mm

(ii) Main rainfall $= \frac{\text{Sum of rainfall recorded}}{\text{Total number of days}}$

$= \frac{0.0+12.2+2.1+2.2+20.5+5.5+1.0}{7}$

$= \frac{41.3}{7} = 5.9$ mm

(iii) 5 days. i.e., Monday, Wednesday, Thursday, Saturday and Sunday rainfalls were less than the mean rainfall.

Question 9:

The height of 10 girls were measured in cm and the results are as follows:
135, 150, 139, 128, 151, 132, 146, 149, 143, 141

(i) What is the height of the tallest girl?
(ii) What is the height of the shortest girl?
(iii) What is the range of data?
(iv) What is the mean height of the girls?
(v) How many girls have heights more than the mean height?

Answer 9:

(i) The height of the tallest girl = 151 cm
(ii) The height of the shortest girl = 128 cm
(iii) The range of the data = Highest height – Lowest height
= 151 – 128 = 23 cm

(iv) The mean height $= \frac{\text{Sum of heights of the girsl}}{\text{Total numebr of girls}}$

$= \frac{135+150+139+128+151+132+146+149+143+141}{10}$

$= \frac{1414}{10} = 141.4$ cm

(v) Five girls, i.e., 150, 151, 146, 149, 143 have heights (in cm) more than the mean height.

Exercise 3.2

Question 1:

The scores in mathematics test (out of 25) of students is as follows:
19, 25, 23, 20, 9, 20, 15, 10, 5, 16, 25, 20, 24, 12, 20
Find the mode and median of this data. Are they same?

Answer 1:

Arranging the given data in ascending order,
5, 9, 10, 12, 15, 16, 19, 20, 20, 20, 20, 23, 24, 25, 25

Mode is the observation occurred the highest number of times.
Therefore, Mode = 20

Median is the middle observation = 20

Yes, Mode and Median are same of given observation.

Question 2:

The runs scored in a cricket match by 11 players is as follows:
6, 15, 120, 50, 100, 80, 10, 15, 8, 10, 15
Find the mean, mode and median of this data. Are the three same?

Answer 2:

Arranging the given data in ascending order,
6, 8, 10, 10, 15, 15, 15, 50, 80, 100, 120

$$\text{Mean} = \frac{\text{Sum of observations}}{\text{Number of observations}}$$

$$= \frac{6+8+10+10+15+15+15+50+80+100+120}{11}$$

$$= \frac{429}{11} = 39$$

Mode is the observation occurred the highest number of times = 15
Median is the middle observation = 15
Therefore, Mode and Median is 15.
No, the mean, median and mode are not same.

Question 3:

The weight (in kg) of 15 students of a class are:
38, 42, 35, 37, 45, 50, 32, 43, 43, 40, 36, 38, 43, 38, 47

(i) Find the mode and median of this data.

(ii) Is there more than one mode?

Answer 3:

Arranging the given data in ascending order,
32, 35, 36, 37, 38, 38, 38, 40, 42, 43, 43, 43, 45, 47, 50

A.P.M.E.

(i) Mode is the observation occurred the highest number of times.
Therefore, Mode = 38 and 43
Median is the middle observation = 40

(ii) Yes, there are 2 modes.

Question 4:

Find the mode and median of the data: 13, 16, 12, 14, 19, 12, 14, 13, 14.

Answer 4:

Arranging the given data in ascending order,
12, 12, 13, 13, 14, 14, 14, 16, 19
Mode is the observation occurred the highest number of times = 14
Median is the middle observation = 14

Question 5:

Tell whether the statement is true or false:

(i) The mode is always one of the numbers in a data.
(ii) The mean is one of the numbers in a data.
(iii) The median is always one of the numbers in a data.
(iv) The data 6, 4, 3, 8, 9, 12, 13, 9 has mean 9.

Answer 5:

(i) True (ii) False (iii) True (iv) False

ARMF

Exercise 3.3

Question 1:

Use the bar graph (fig 3.3) to answer the following questions:

(a) Which is the most popular pet?

(b) How many students have dog as a pet?

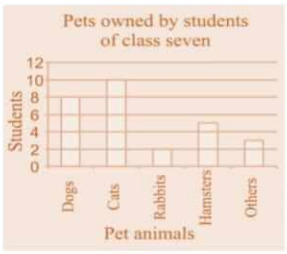


Fig 3.3

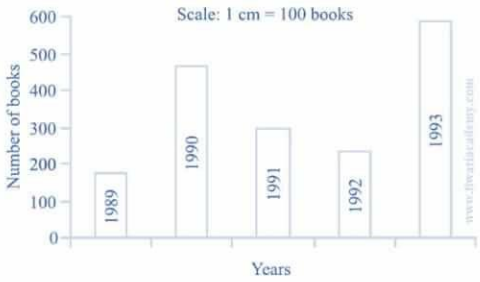
Answer 1:

(a) Cat is the most popular pet.

(b) 8 students have dog as a pet.

Question 2:

Read the bar graph which shows the number of books sold by a bookstore during five consecutive years and answer the following questions:



(i) About how many books were sold in 1989? 1990? 1992?

(ii) In which year were about 475 books sold? About 225 books sold?

(iii) In which years were fewer than 250 books sold?

(iv) Can you explain how you would estimate the number of books sold in 1989?

Answer 2:

According to the given bar graph,

(i) (a) In 1989, 180 books were sold. (b) In 1990, 475 books were sold.
(c) In 1992, 225 books were sold.

(ii) In 1990, about 475 books were sold and in 1992, about 225 books were sold.

(iii) In 1989 and 1992 fewer than 250 books were sold.

(iv) By reading the graph, we calculate that 180 books were sold in 1989.

Question 3:

Number of children in six different classes are given below. Represent the data on a bar graph.

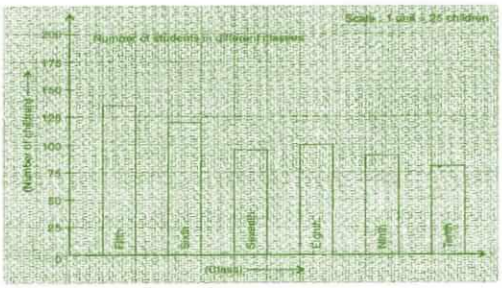
Class	Fifth	Sixth	Seventh	Eighth	Ninth	Tenth
No. of children	135	120	95	100	90	80

(a) How would you choose a scale?

(b) Answer the following questions:

(i) Which class has the maximum number of children? And the minimum?

(ii) Find the ratio of students of class sixth to the students of class eighth.



Answer 3:

Data represented by the bar graph is as follows:

(a) Scale: 1 unit = 25 children

(b) (i) Fifth class has the maximum number of children and Tenth class has the minimum number of children.

(ii) $\text{Ratio} = \frac{\text{Number of students in class sixth}}{\text{Number of students in class eighth}} = \frac{120}{100} = \frac{6}{5} = 6:5$

Question 4:

The performance of a student in 1st term and 2nd term is given. Draw a double bar graph choosing appropriate scale and answer the following:

Subject	English	Hindi	Maths	Science	S. Science
1st term (MM. 100)	67	72	88	81	73
2nd term (MM (100)	70	65	95	85	75

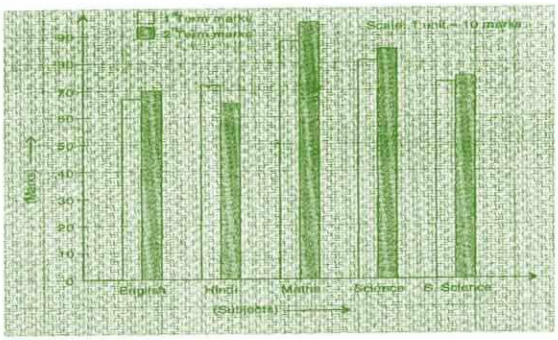
(i) In which subject has the child improved his performance the most?
(ii) In which subject is the improvement the least?
(iii) Has the performance gone down in any subject?

Answer 4:

Data represented by bar graph is as follows:

Difference of marks of 1st term and 2nd term

English = 70 – 67 = 3
Hindi = 65 – 72 = –7
Maths = 95 – 88 = 7
Science = 85 – 81 = 4
S. Science = 75 – 73 = 2



(i) He has most improved in Maths subject.
(ii) In S. Science subject, his improvement is less.
(iii) Yes, in Hindi subject, his performance has gone down.

Question 5:

Consider this data collected from a survey of a colony.

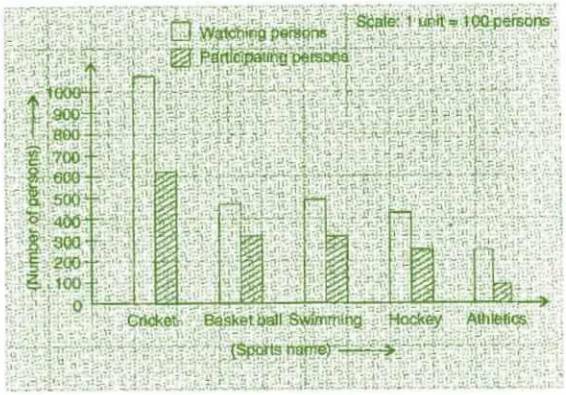
Favourite Sport	Cricket	Basket Ball	Swimming	Hockey	Athletics
Watching	1240	470	510	423	250
Participating	620	320	320	250	105

(i) Draw a double bar graph choosing an appropriate scale. What do you infer from the bar graph?
(ii) Which sport is most popular?
(iii) Which is more preferred, watching or participating in sports?

Answer 5:

Data represented by the double bar graph is as follows:

(i) This bar graph represents the number of persons who are watching and participating in their favourite sports.



(ii) Cricket is most popular.
(iii) Watching sports is more preferred.

APMF

Question 6:

Take the data giving the minimum and the maximum temperature of various cities given in the beginning of this Chapter. Plot a double bat graph using the data and answer the following:

Temperature of Cities as on 20.6.2006

City	Ahmedabad	Amritsar	Bangalore	Chennai
Max.	38° C	37° C	28° C	36° C
Min.	29° C	26° C	21° C	27° C
City	Delhi	Jaipur	Jammu	Mumbai
Max.	38° C	39° C	41° C	32° C
Min.	28° C	29° C	26° C	27° C

(i) Which city has the largest difference in the minimum and maximum temperature on the given data?

(ii) Which is the hottest city and which is the coldest city?

(iii) Name two cities where maximum temperature of one was less than the minimum temperature of the order.

(iv) Name the city which has the least difference between its minimum and the maximum temperature.

Answer 6:

Data represented by double bar graph is as follows:

(i) Jammu has the largest difference in temperature i.e.,
Maximum temperature = 41°C and
Minimum temperature = 26°C.
∴ Difference = 41°C – 26°C = 15°C

(ii) Jammu is the hottest city due to maximum temperature is high and Bangalore is the coldest city due to maximum temperature is low.

(iii) Maximum temperature of Bangalore is 28°C
Minimum temperature of two cities whose minimum temperature is higher than the maximum temperature of Bangalore are Ahemedabad and Jaipur where the minimum temperature is 29°C

(iv) Mumbai has the least difference in temperature i.e.,
Maximum temperature = 32°C and
Minimum temperature = 27°C
∴ Difference = 32°C – 27°C = 5°C

Exercise 3.4

Question 1:

Tell whether the following is certain to happen, impossible can happen but not certain.

(i) You are older today than yesterday.

(ii) A tossed coin will land heads up.

(iii) A die when tossed shall land up with 8 on top.

(iv) The next traffic light seen will be green.

(v) Tomorrow will be a cloudy day.

Answer 1:

(i) It is certain to happen.

(ii) It can happen but not certain.

(iii) It is impossible.

(iv) It can happen but not certain.

(v) It can happen but not certain.

Question 2:

There are 6 marbles in a box with numbers from 1 to 6 marked on each of them.

(i) What is the probability of drawing a marble with number 2?

(i) What is the probability of drawing a marble with number 5?

Answer 2:

Total marbles from 1 to 6 marked in a box = 6

(i) The probability of drawing a marble with number 2.

$\Rightarrow$ P (drawing one marble) = $\frac{1}{6}$

(ii) The probability of drawing a marble with number 5.

$\Rightarrow$ P (drawing one marble) = $\frac{1}{6}$

Question 3:

A coin is flipped to decide which team starts the game. What is the probability that your team will start?

Answer 3:

A coin has two possible outcomes Head and Tail.

Probability of getting Head or Tail is equal.

$\therefore$ P (Starting game) = $\frac{1}{2}$

Mathematics

(Chapter – 4) (Simple Equations)

(Class – VII)

Exercise 4.1

Question 1:

Complete the last column of the table:

S. No.	Equation	Value	Say, whether the Equation is satisfied. (Yes / No)
(i)	$x+3=0$	$x=3$	
(ii)	$x+3=0$	$x=0$	
(iii)	$x+3=0$	$x=-3$	
(iv)	$x-7=1$	$x=7$	
(v)	$x-7=1$	$x=8$	
(vi)	$5x=25$	$x=0$	
(vii)	$5x=25$	$x=5$	
(viii)	$5x=25$	$x=-5$	
(viii)	$\frac{m}{3}=2$	$m=-6$	
(ix)	$\frac{m}{3}=2$	$m=0$	
(x)	$\frac{m}{3}=2$	$m=6$	

APMF

Answer 1:

S. No.	Equation	Value	Say, whether the Equation is satisfied. (Yes / No)
(i)	$x+3=0$	$x=3$	No
(ii)	$x+3=0$	$x=0$	No
(iii)	$x+3=0$	$x=-3$	Yes
(iv)	$x-7=1$	$x=7$	No
(v)	$x-7=1$	$x=8$	Yes

(vi)	$5x = 25$	$x = 0$	No
(vii)	$5x = 25$	$x = 5$	Yes
(viii)	$5x = 25$	$x = -5$	No
(viii)	$\frac{m}{3} = 2$	$m = -6$	No
(ix)	$\frac{m}{3} = 2$	$m = 0$	No
(x)	$\frac{m}{3} = 2$	$m = 6$	Yes

APME

Question 2:

Check whether the value given in the brackets is a solution to the given equation or not:

(a) $n+5=19 (n=1)$

(b) $7n+5=19 (n=-2)$

(c) $7n+5=19 (n=2)$

(d) $4p-3=13 (p=1)$

(e) $4p-3=13 (p=-4)$

(f) $4p-3=13 (p=0)$

Answer 2:

(a) $n+5=19 (n=1)$

Putting $n=1$ in L.H.S.,

$1 + 5 = 6$

$\because$ L.H.S. $\neq$ R.H.S.,

$\therefore$ $n=1$ is not the solution of given equation.

(b) $7n+5=19 (n=-2)$

Putting $n=-2$ in L.H.S.,

$7(-2)+5=-14+5=-9$

$\because$ L.H.S. $\neq$ R.H.S.,

$\therefore$ $n=-2$ is not the solution of given equation.

(c) $7n+5=19(n=2)$

Putting $n=2$ in L.H.S.,

$7(2)+5=14+5=19$

$\because$ L.H.S. = R.H.S.,

$\therefore$ $n=2$ is the solution of given equation.

(a) $4p-3=13(p=1)$

Putting $p=1$ in L.H.S.,

$4(1)-3=4-3=1$

$\because$ L.H.S. $\neq$ R.H.S.,

$\therefore$ $p=1$ is not the solution of given equation.

(b) $4p-3=13(p=-4)$

Putting $p=-4$ in L.H.S.,

$4(-4)-3=-16-3=-19$

$\because$ L.H.S. $\neq$ R.H.S.,

$\therefore$ $p=-4$ is not the solution of given equation.

(c) $4p-3=13(p=0)$

Putting $p=0$ in L.H.S.,

$4(0)-3=0-3=-3$

$\because$ L.H.S. $\neq$ R.H.S.,

$\therefore$ $p=0$ is not the solution of given equation.

APMF

Question 3:

Solve the following equations by trial and error method:

(i) $5p+2=17$ (ii) $3m-14=4$

Answer 3:

(i) $5p+2=17$

Putting $p=-3$ in L.H.S. $5(-3)+2 = -15+2=-13$

$\because$ $-13\neq17$ Therefore, $p=-3$ is not the solution.

Putting $p=-2$ in L.H.S. $5(-2)+2=-10+2=-8$

$\because -8\neq 17$ Therefore, $p=-2$ is not the solution.

Putting $p=-1$ in L.H.S. $5(-1)+2=-5+2=-3$

$\because -3\neq 17$ Therefore, $p=-1$ is not the solution.

Putting $p=0$ in L.H.S. $5(0)+2=0+2=2$

$\because 2\neq 17$ Therefore, $p=0$ is not the solution.

Putting $p=1$ in L.H.S. $5(1)+2=5+2=7$

$\because 7\neq 17$ Therefore, $p=1$ is not the solution.

Putting $p=2$ in L.H.S. $5(2)+2=10+2=12$

$\because 12\neq 17$ Therefore, $p=2$ is not the solution.

Putting $p=3$ in L.H.S. $5(3)+2=15+2=17$

$\because 17=17$ Therefore, $p=3$ is the solution.

(ii) $3m-14=4$

Putting $m=-2$ in L.H.S. $3(-2)-14=-6-14=-20$

$\because -20\neq 4$ Therefore, $m=-2$ is not the solution.

Putting $m=-1$ in L.H.S. $3(-1)-14=-3-14=-17$

$\because -17\neq 4$ Therefore, $m=-1$ is not the solution.

Putting $m=0$ in L.H.S. $3(0)-14=0-14=-14$

$\because -14\neq 4$ Therefore, $m=0$ is not the solution.

Putting $m=1$ in L.H.S. $3(1)-14=3-14=-11$

$\because -11\neq 4$ Therefore, $m=1$ is not the solution.

Putting $m=2$ in L.H.S. $3(2)-14=6-14=-8$

$\because -8\neq 4$ Therefore, $m=2$ is not the solution.

Putting $m=3$ in L.H.S. $3(3)-14=9-14=-5$

$\because -5\neq 4$ Therefore, $m=3$ is not the solution.

Putting $m=4$ in L.H.S. $3(4)-14=12-14=-2$

$\because -2\neq 4$ Therefore, $m=4$ is not the solution.

Putting $m=5$ in L.H.S. $3(5)-14=15-14=1$

$\because 1\neq 4$ Therefore, $m=5$ is not the solution.

Putting $m=6$ in L.H.S. $3(6)-14=18-14=4$

$\because 4=4$ Therefore, $m=6$ is the solution.

APMF

Question 4:

Write equations for the following statements:

(i) The sum of numbers x and 4 is 9.

(ii) 2 subtracted from y is 8.

(iii) Ten times a is 70.

(iv) The number b divided by 5 gives 6.

(v) Three-fourth of t is 15.

(vi) Seven times m plus 7 gets you 77.

(vii) One-fourth of a number x minus 4 gives 4.

(viii) If you take away 6 from 6 times y, you get 60.

(ix) If you add 3 to one-third of z, you get 30.

Answer 4:

(i) $x+4=9$

(ii) $y-2=8$

(iii) $10a=70$

(iv) $\frac{b}{5}=6$

(v) $\frac{3}{4}t=15$

(vi) $7m+7=77$

(vii) $\frac{x}{4}-4=4$

(viii) $6y-6=60$

(ix) $\frac{z}{3}+3=30$

APMF

Question 5:

Write the following equations in statement form:

(i) $p+4=15$

(ii) $m-7=3$

(iii) $2m=7$

(iv) $\frac{m}{5}=3$

(v) $\frac{3m}{5}=6$

(vi) $3p+4=25$

(vii) $4p-2=18$

(viii) $\frac{p}{2}+2=8$

Answer 5:

(i) The sum of numbers p and 4 is 15.

(ii) 7 subtracted from m is 3.

(iii) Two times m is 7.

(iv) The number m is divided by 5 gives 3.

(v) Three-fifth of the number m is 6.

(vi) Three times p plus 4 gets 25.

(vii) If you take away 2 from 4 times p, you get 18.

(viii) If you added 2 to half is p, you get 8.

Question 6:

Set up an equation in the following cases:

(i) Irfan says that he has 7 marbles more than five times the marbles Parmit has. Irfan has 37 marbles. (Tale m to be the number of Parmit's marbles.)

(ii) Laxmi's father is 49 years old. He is 4 years older than three times Laxmi's age. (Take Laxmi's age to be y years.)

(iii) The teacher tells the class that the highest marks obtained by a student in her class are twice the lowest marks plus 7. The highest score is 87. (Take the lowest score to be l.)

(iv) In an isosceles triangle, the vertex angle is twice either base angle. (Let the base angle be b in degrees. Remember that the sum of angles of a triangle is 180°.)

Answer 6:

(i) Let m be the number of Parmit's marbles.

$\therefore \quad 5m+7=37$

(ii) Let the age of Laxmi be y years.

$\therefore \quad 3y+4=49$

(iii) Let the lowest score be l.

$\therefore \quad 2l+7=87$

(iv) Let the base angle of the isosceles triangle be b, so vertex angle = $2b$.

$\therefore \quad 2b+b+b=180°$

$\Rightarrow \quad 4b=180°$ [Angle sum property of a Δ]

RPMF

Exercise 4.2

Question 1:

Give first the step you will use to separate the variable and then solve the equations:

(a) $x-1=0$ (b) $x+1=0$

(c) $x-1=5$ (d) $x+6=2$

(e) $y-4=-7$ (f) $y-4=4$

(g) $y+4=4$ (h) $y+4=-4$

Answer 1:

(a) $x-1=0$

$\Rightarrow \quad x-1+1=0+1$ [Adding 1 both sides]

$\Rightarrow \quad x=1$

(b) $x+1=0$

$\Rightarrow \quad x+1-1=0-1$ [Subtracting 1 both sides]

$\Rightarrow \quad x=-1$

(c) $x-1=5$

$\Rightarrow \quad x-1+1=5+1$ [Adding 1 both sides]

$\Rightarrow \quad x=6$

(d) $x+6=2$

$\Rightarrow \quad x+6-6=2-6$ [Subtracting 6 both sides]

$\Rightarrow \quad x=-4$

(e) $y-4=-7$

$\Rightarrow \quad y-4+4=-7+4$ [Adding 4 both sides]

$\Rightarrow \quad y=-3$

(f) $y-4=4$

$\Rightarrow \quad y-4+4=4+4$ [Adding 4 both sides]

$\Rightarrow \quad y=8$

(g) $y+4=4$

$\Rightarrow \quad y+4-4=4-4$ [Subtracting 4 both sides]

$\Rightarrow \quad y=0$

(h) $y+4=-4$

$\Rightarrow \quad y+4-4=-4-4$ [Subtracting 4 both sides]

$\Rightarrow \quad y=-8$

APMF

Question 2:

Give first the step you will use to separate the variable and then solve the equations

(a) $3l = 42$ (b) $\frac{b}{2} = 6$ (c) $\frac{p}{7} = 4$

(d) $4x = 25$ (e) $8y = 36$ (f) $\frac{z}{3} = \frac{5}{4}$

(g) $\frac{a}{5} = \frac{7}{15}$ (h) $20t = -10$

Answer 2:

(a) $3l = 42$

$\Rightarrow \quad \frac{3l}{3} = \frac{42}{3}$ [Dividing both sides by 3]

$\Rightarrow \quad l = 14$

(b) $\frac{b}{2} = 6$

$\Rightarrow \quad \frac{b}{2} \times 2 = 6 \times 2$ [Multiplying both sides by 2]

$\Rightarrow \quad b = 12$

(c) $\frac{p}{7} = 4$

$\Rightarrow \quad \frac{p}{7} \times 7 = 4 \times 7$ [Multiplying both sides by 7]

$\Rightarrow \quad p = 28$

(d) $4x = 25$

$\Rightarrow \quad \frac{4x}{4} = \frac{25}{4}$ [Dividing both sides by 4]

$\Rightarrow \quad x = \frac{25}{4}$

(e) $8y = 36$

$\Rightarrow \quad \frac{8y}{8} = \frac{36}{8}$ [Dividing both sides by 8]

$\Rightarrow \quad y = \frac{9}{2}$

APMF

(f) $\frac{z}{3}=\frac{5}{4}$

$\Rightarrow \quad \frac{z}{3}\times 3=\frac{5}{4}\times 3$ [Multiplying both sides by 3]

$\Rightarrow \quad z=\frac{15}{4}$

(g) $\frac{a}{5}=\frac{7}{15}$

$\Rightarrow \quad \frac{a}{5}\times 5=\frac{7}{15}\times 5$ [Multiplying both sides by 5]

$\Rightarrow \quad a=\frac{7}{3}$

(h) $20t=-10$

$\Rightarrow \quad \frac{20t}{20}=\frac{-10}{20}$ [Dividing both sides by 20]

$\Rightarrow \quad t=\frac{-1}{2}$

APMF

Question 3:

Give first the step you will use to separate the variable and then solve the equations

(a) $3n-2=46$ (b) $5m+7=17$

(c) $\frac{20p}{3}=40$ (d) $\frac{3p}{10}=6$

Answer 3:

(a) $3n-2=46$

Step I: $3n-2+2=46+2$

$\Rightarrow \quad 3n=48$ [Adding 2 both sides]

Step II: $\frac{3n}{3}=\frac{48}{3}$

$\Rightarrow \quad n=16$ [Dividing both sides by 3]

(b) $5m+7=17$

Step I: $5m+7-7=17-7$

$\Rightarrow \quad 5m=10$ [Subtracting 7 both sides]

Step II: $\frac{5m}{5}=\frac{10}{5}$

$\Rightarrow \quad m=2$ [Dividing both sides by 5]

(c) $\frac{20p}{3} = 40$

Step I: $\frac{20p}{3} \times 3 = 40 \times 3$

$\Rightarrow \quad 20p = 120$ [Multiplying both sides by 3]

Step II: $\frac{20p}{20} = \frac{120}{20}$

$\Rightarrow \quad p = 6$ [Dividing both sides by 20]

(d) $\frac{3p}{10} = 6$

Step I: $\frac{3p}{10} \times 10 = 6 \times 10$

$\Rightarrow \quad 3p = 60$ [Multiplying both sides by 10]

Step II: $\frac{3p}{3} = \frac{60}{3}$

$\Rightarrow \quad p = 20$ [Dividing both sides by 3]

APMF

Question 4:

Solve the following equation:

(a) $10p = 100$ (b) $10p + 10 = 100$ (c) $\frac{p}{4} = 5$

(d) $\frac{-p}{3} = 5$ (e) $\frac{3p}{4} = 6$ (f) $3s = -9$

(g) $3s + 12 = 0$ (h) $3s = 0$ (i) $2q = 6$

(j) $2q - 6 = 0$ (k) $2q + 6 = 0$ (l) $2q + 6 = 12$

Answer 4:

(a) $10p = 100$

$\Rightarrow \quad \frac{10p}{10} = \frac{100}{10}$ [Dividing both sides by 10]

$\Rightarrow \quad p = 10$

(b) $10p + 10 = 100$

$\Rightarrow \quad 10p + 10 - 10 = 100 - 10$ [Subtracting both sides 10]

$\Rightarrow \quad 10p = 90$

$\Rightarrow \quad \frac{10p}{10} = \frac{90}{10}$ [Dividing both sides by 10]

$\Rightarrow \quad p = 9$

(c) $\frac{p}{4} = 5$

$\Rightarrow \quad \frac{p}{4} \times 4 = 5 \times 4$ [Multiplying both sides by 4]

$\Rightarrow \quad p = 20$

(d) $\frac{-p}{3} = 5$

$\Rightarrow \quad \frac{-p}{3} \times (-3) = 5 \times (-3)$ [Multiplying both sides by – 3]

$\Rightarrow \quad p = -15$

(e) $\frac{3p}{4} = 6$

$\Rightarrow \quad \frac{3p}{4} \times 4 = 6 \times 4$ [Multiplying both sides by 4]

$\Rightarrow \quad 3p = 24$

$\Rightarrow \quad \frac{3p}{3} = \frac{24}{3}$ [Dividing both sides by 3]

$\Rightarrow \quad p = 8$

(f) $3s = -9$

$\Rightarrow \quad \frac{3s}{3} = \frac{-9}{3}$ [Dividing both sides by 3]

$\Rightarrow \quad s = -3$

(g) $3s + 12 = 0$

$\Rightarrow \quad 3s + 12 - 12 = 0 - 12$ [Subtracting both sides 10]

$\Rightarrow \quad 3s = -12$

$\Rightarrow \quad \frac{3s}{3} = \frac{-12}{3}$ [Dividing both sides by 3]

$\Rightarrow \quad s = -4$

(h) $3s = 0$

$\Rightarrow \quad \frac{3s}{3} = \frac{0}{3}$ [Dividing both sides by 3]

$\Rightarrow \quad s = 0$

APME

(i) $2q = 6$

$\Rightarrow \quad \frac{2q}{2} = \frac{6}{2}$ [Dividing both sides by 2]

$\Rightarrow \quad q = 3$

(j) $2q - 6 = 0$

$\Rightarrow \quad 2q - 6 + 6 = 0 + 6$ [Adding both sides 6]

$\Rightarrow \quad 2q = 6$

$\Rightarrow \quad \frac{2q}{2} = \frac{6}{2}$ [Dividing both sides by 2]

$\Rightarrow \quad q = 3$

(k) $2q + 6 = 0$

$\Rightarrow \quad 2q + 6 - 6 = 0 - 6$ [Subtracting both sides 6]

$\Rightarrow \quad 2q = -6$

$\Rightarrow \quad \frac{2q}{2} = \frac{-6}{2}$ [Dividing both sides by 2]

$\Rightarrow \quad q = -3$

(l) $2q + 6 = 12$

$\Rightarrow \quad 2q + 6 - 6 = 12 - 6$ [Subtracting both sides 6]

$\Rightarrow \quad 2q = 6$

$\Rightarrow \quad \frac{2q}{2} = \frac{6}{2}$ [Dividing both sides by 2]

$\Rightarrow \quad q = 3$

APME

Exercise 4.3

Question 1:

Solve the following equations:

(a) $2y+\frac{5}{2}=\frac{37}{2}$ (b) $5t+28=10$ (c) $\frac{a}{5}+3=2$

(d) $\frac{q}{4}+7=5$ (e) $\frac{5}{2}x=10$ (f) $\frac{5}{2}x=\frac{25}{4}$

(g) $7m+\frac{19}{2}=13$ (h) $6z+10=-2$ (i) $\frac{3l}{2}=\frac{2}{3}$

(j) $\frac{2b}{3}-5=3$

Answer 1:

(a) $2y+\frac{5}{2}=\frac{37}{2}$

$\Rightarrow \quad 2y=\frac{37}{2}-\frac{5}{2}$

$\Rightarrow \quad 2y=\frac{37-5}{2}$

$\Rightarrow \quad 2y=\frac{32}{2}$

$\Rightarrow \quad 2y=16$

$\Rightarrow \quad y=\frac{16}{2}$

$\Rightarrow \quad y=8$

(b) $5t+28=10$

$\Rightarrow \quad 5t=10-28$

$\Rightarrow \quad 5t=-18$

$\Rightarrow \quad t=\frac{-18}{5}$

(c) $\frac{a}{5}+3=2$

$\Rightarrow \quad \frac{a}{5}=2-3$

APMF

$$\Rightarrow \quad \frac{a}{5} = -1$$
$$\Rightarrow \quad a = -1 \times 5$$
$$\Rightarrow \quad a = -5$$

(d) $\frac{q}{4} + 7 = 5$

$$\Rightarrow \quad \frac{q}{4} = 5 - 7$$
$$\Rightarrow \quad \frac{q}{4} = -2$$
$$\Rightarrow \quad q = -2 \times 4$$
$$\Rightarrow \quad q = -8$$

(e) $\frac{5}{2}x = 10$

$$\Rightarrow \quad 5x = 10 \times 2$$
$$\Rightarrow \quad 5x = 20$$
$$\Rightarrow \quad x = \frac{20}{5}$$
$$\Rightarrow \quad x = 4$$

(f) $\frac{5}{2}x = \frac{25}{4}$

$$\Rightarrow \quad 5x = \frac{25}{4} \times 2$$
$$\Rightarrow \quad 5x = \frac{25}{2}$$
$$\Rightarrow \quad x = \frac{25}{2 \times 5}$$
$$\Rightarrow \quad x = \frac{5}{2}$$

(g) $7m + \frac{19}{2} = 13$

$$\Rightarrow \quad 7m = 13 - \frac{19}{2}$$

APMF

$$\Rightarrow \quad 7m = \frac{26-19}{2}$$

$$\Rightarrow \quad 7m = \frac{7}{2}$$

$$\Rightarrow \quad m = \frac{7}{2\times 7}$$

$$\Rightarrow \quad m = \frac{1}{2}$$

(h) $6z + 10 = -2$

$$\Rightarrow \quad 6z = -2 - 10$$

$$\Rightarrow \quad 6z = -12$$

$$\Rightarrow \quad z = \frac{-12}{6}$$

$$\Rightarrow \quad z = -2$$

(i) $\frac{3l}{2} = \frac{2}{3}$

$$\Rightarrow \quad 3l = \frac{2}{3}\times 2$$

$$\Rightarrow \quad 3l = \frac{4}{3}$$

$$\Rightarrow \quad l = \frac{4}{3\times 3}$$

$$\Rightarrow \quad l = \frac{4}{9}$$

(j) $\frac{2b}{3} - 5 = 3$

$$\Rightarrow \quad \frac{2b}{3} = 3 + 5$$

$$\Rightarrow \quad \frac{2b}{3} = 8$$

$$\Rightarrow \quad 2b = 8\times 3$$

$$\Rightarrow \quad 2b = 24$$

$$\Rightarrow \quad b = \frac{24}{2}$$

$$\Rightarrow \quad b = 12$$

APMF

Question 2:

Solve the following equations:

(a) $2(x+4)=12$

(b) $3(n-5)=21$

(c) $3(n-5)=-21$

(d) $3-2(2-y)=7$

(e) $-4(2-x)=9$

(f) $4(2-x)=9$

(g) $4+5(p-1)=34$

(h) $34-5(p-1)=4$

Answer 2:

(a) $2(x+4)=12$

$\Rightarrow \quad x+4=\frac{12}{2}$

$\Rightarrow \quad x+4=6$

$\Rightarrow \quad x=6-4$

$\Rightarrow \quad x=2$

(b) $3(n-5)=21$

$\Rightarrow \quad n-5=\frac{21}{3}$

$\Rightarrow \quad n-5=7$

$\Rightarrow \quad n=7+5$

$\Rightarrow \quad n=12$

(c) $3(n-5)=-21$

$\Rightarrow \quad n-5=\frac{-21}{3}$

$\Rightarrow \quad n-5=-7$

$\Rightarrow \quad n=-7+5$

$\Rightarrow \quad n=-2$

(d) $3-2(2-y)=7$

$\Rightarrow \quad -2(2-y)=7-3$

$\Rightarrow \quad -2(2-y)=4$

$\Rightarrow \quad 2-y=\frac{4}{-2}$

APMF

$\Rightarrow \quad 2-y=-2$

$\Rightarrow \quad -y=-2-2$

$\Rightarrow \quad -y=-4$

$\Rightarrow \quad y=4$

(e) $-4(2-x)=9$

$\Rightarrow \quad -4\times 2-x\times(-4)=9$

$\Rightarrow \quad -8+4x=9$

$\Rightarrow \quad 4x=9+8$

$\Rightarrow \quad 4x=17$

$\Rightarrow \quad x=\frac{17}{4}$

(f) $4(2-x)=9$

$\Rightarrow \quad 4\times 2-x\times(4)=9$

$\Rightarrow \quad 8-4x=9$

$\Rightarrow \quad -4x=9-8$

$\Rightarrow \quad -4x=1$

$\Rightarrow \quad x=\frac{-1}{4}$

(g) $4+5(p-1)=34$

$\Rightarrow \quad 5(p-1)=34-4$

$\Rightarrow \quad 5(p-1)=30$

$\Rightarrow \quad p-1=\frac{30}{5}$

$\Rightarrow \quad p-1=6$

$\Rightarrow \quad p=6+1$

$\Rightarrow \quad p=7$

(h) $34-5(p-1)=4$

$\Rightarrow \quad -5(p-1)=4-34$

$\Rightarrow \quad -5(p-1)=-30$

APMF

$$\Rightarrow \quad p-1=\frac{-30}{-5}$$
$$\Rightarrow \quad p-1=6$$
$$\Rightarrow \quad p=6+1$$
$$\Rightarrow \quad p=7$$

Question 3:

Solve the following equations:

(a) $4=5(p-2)$

(b) $-4=5(p-2)$

(c) $-16=-5(2-p)$

(d) $10=4+3(t+2)$

(e) $28=4+3(t+5)$

(f) $0=16+4(m-6)$

Answer 3:

(a) $4=5(p-2)$

$$\Rightarrow \quad 4=5\times p-5\times 2$$
$$\Rightarrow \quad 4=5p-10$$
$$\Rightarrow \quad 5p-10=4$$
$$\Rightarrow \quad 5p=4+10$$
$$\Rightarrow \quad 5p=14$$
$$\Rightarrow \quad p=\frac{14}{5}$$

(b) $-4=5(p-2)$

$$\Rightarrow \quad -4=5\times p-5\times 2$$
$$\Rightarrow \quad -4=5p-10$$
$$\Rightarrow \quad 5p-10=-4$$
$$\Rightarrow \quad 5p=-4+10$$
$$\Rightarrow \quad 5p=6$$
$$\Rightarrow \quad p=\frac{6}{5}$$

APMF

(c) $-16=-5(2-p)$

$\Rightarrow \quad -16=-5\times 2-(-5)\times p$

$\Rightarrow \quad -16=-10+5p$

$\Rightarrow \quad -10+5p=-16$

$\Rightarrow \quad 5p=-16+10$

$\Rightarrow \quad 5p=-6$

$\Rightarrow \quad p=\dfrac{-6}{5}$

(d) $10=4+3(t+2)$

$\Rightarrow \quad 10-4=3(t+2)$

$\Rightarrow \quad 6=3(t+2)$

$\Rightarrow \quad \dfrac{6}{3}=t+2$

$\Rightarrow \quad 2=t+2$

$\Rightarrow \quad 2-2=t$

$\Rightarrow \quad 0=t$

$\Rightarrow \quad t=0$

(e) $28=4+3(t+5)$

$\Rightarrow \quad 28-4=3(t+5)$

$\Rightarrow \quad 24=3(t+5)$

$\Rightarrow \quad \dfrac{24}{3}=t+5$

$\Rightarrow \quad 8=t+5$

$\Rightarrow \quad 8-5=t$

$\Rightarrow \quad 3=t$

$\Rightarrow \quad t=3$

(f) $0=16+4(m-6)$

$\Rightarrow \quad 0-16=4(m-6)$

$\Rightarrow \quad -16=4(m-6)$

APMF

$$\Rightarrow \quad \frac{-16}{4} = m - 6$$

$$\Rightarrow \quad -4 = m - 6$$

$$\Rightarrow \quad -4 + 6 = m$$

$$\Rightarrow \quad 2 = m$$

$$\Rightarrow \quad m = 2$$

Question 4:

(a) Construct 3 equations starting with $x = 2$.

(b) Construct 3 equations starting with $x = -2$.

Answer 4:

(a) 3 equations starting with $x = 2$.

(i) $x = 2$

Multiplying both sides by 10,

$10x = 20$

Adding 2 both sides

$10x + 2 = 20 + 2 \;=\; 10x + 2 = 22$

(ii) $x = 2$

Multiplying both sides by 5

$5x = 10$

Subtracting 3 from both sides

$5x - 3 = 10 - 3 \;=\; 5x - 3 = 7$

(iii) $x = 2$

Dividing both sides by 5

$$\frac{x}{5} = \frac{2}{5}$$

(b) 3 equations starting with $x = -2$.

(i) $x = -2$

Multiplying both sides by 3

$3x = -6$

(ii) $x = -2$

Multiplying both sides by 3

$3x = -6$

Adding 7 to both sides

$3x + 7 = -6 + 7 \;=\; 3x + 7 = 1$

APMF

(iii) $x = -2$

Multiplying both sides by 3

$3x = -6$

Adding 10 to both sides

$3x + 10 = -6 + 10 \;=\; 3x + 10 = 4$

APMF

Exercise 4.4

Question 1:

Set up equations and solve them to find the unknown numbers in the following cases:

(a) Add 4 to eight times a number; you get 60.

(b) One-fifth of a number minus 4 gives 3.

(c) If I take three-fourth of a number and add 3 to it, I get 21.

(d) When I subtracted 11 from twice a number, the result was 15.

(e) Munna subtracts thrice the number of notebooks he has from 50, he finds the result to be 8.

(f) Ibenhal thinks of a number. If she adds 19 to it divides the sum by 5, she will get 8.

(g) Answer thinks of a number. If he takes away 7 from $\frac{5}{2}$ of the number, the result is $\frac{11}{2}$.

APME

Answer 1:

(a) Let the number be x.

According to the question, $8x+4=60$

$\Rightarrow \quad 8x=60-4$

$\Rightarrow \quad 8x=56$

$\Rightarrow \quad x=\frac{56}{8}$

$\Rightarrow \quad x=7$

(b) Let the number be y.

According to the question, $\frac{y}{5}-4=3$

$\Rightarrow \quad \frac{y}{5}=3+4$

$\Rightarrow \quad \frac{y}{5}=7$

$\Rightarrow \quad y=7\times 5$

$\Rightarrow \quad y=35$

(c) Let the number be z.

According to the question, $\frac{3}{4}z+3=21$

$\Rightarrow \quad \frac{3}{4}z=21-3$

$\Rightarrow \quad \frac{3}{4}z=18$

$\Rightarrow \quad 3z=18\times 4$

$\Rightarrow \quad 3z=72$

$\Rightarrow \quad z=\frac{72}{3}$

$\Rightarrow \quad z=24$

(d) Let the number be x.

According to the question, $2x-11=15$

$\Rightarrow \quad 2x=15+11$

$\Rightarrow \quad 2x=26$

$\Rightarrow \quad x=\frac{26}{2}$

$\Rightarrow \quad x=13$

APMF

(e) Let the number be m.

According to the question, $50-3m=8$

$\Rightarrow \quad -3m=8-50$

$\Rightarrow \quad -3m=-42$

$\Rightarrow \quad m=\frac{-42}{-3}$

$\Rightarrow \quad m=14$

(f) Let the number be n.

According to the question, $\frac{n+19}{5}=8$

$\Rightarrow \quad n+19=8\times 5$

$\Rightarrow \quad n+19=40$

$\Rightarrow \quad n=40-19$

$\Rightarrow \quad n=21$

(g) Let the number be x.

According to the question, $\frac{5}{2}x-7=\frac{11}{2}$

$\Rightarrow \quad \frac{5}{2}x=\frac{11}{2}+7$

$\Rightarrow \quad \frac{5}{2}x=\frac{11+14}{2}$

$\Rightarrow \quad \frac{5}{2}x=\frac{25}{2}$

$\Rightarrow \quad 5x=\frac{25\times 2}{2}$

$\Rightarrow \quad 5x=25$

$\Rightarrow \quad x=\frac{25}{5}$

$\Rightarrow \quad x=5$

APME

Question 2:

Solve the following:

(a) The teacher tells the class that the highest marks obtained by a student in her class are twice the lowest marks plus 7. The highest score is 87. What is the lowest score?

(b) In an isosceles triangle, the base angles are equal. The vertex angle is $40°$. What are the base angles of the triangle? (Remember, the sum of three angles of a triangle is $180°$.)

(c) Sachin scored twice as many runs as Rahul. Together, their runs fell two short of a double century. How many runs did each one score?

Answer 2:

(a) Let the lowest marks be y.

According to the question, $2y+7=87$

$\Rightarrow \quad 2y=87-7$

$\Rightarrow \quad 2y=80$

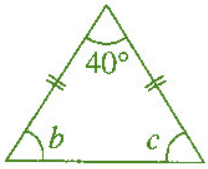
$\Rightarrow \quad y=\frac{80}{2}$

$\Rightarrow \quad y=40$

Thus, the lowest score is 40.

(b) Let the base angle of the triangle be b.

Given, $a = 40°, b = c$



Since, $a + b + c = 180°$ [Angle sum property of a triangle]

$\Rightarrow \quad 40° + b + b = 180°$

$\Rightarrow \quad 40° + 2b = 180°$

$\Rightarrow \quad 2b = 180° - 40°$

$\Rightarrow \quad 2b = 140°$

$\Rightarrow \quad b = \frac{140°}{2}$

$\Rightarrow \quad b = 70°$

Thus, the base angles of the isosceles triangle are $70°$ each.

(c) Let the score of Rahul be x runs and Sachin's score is $2x$.

According to the question, $x + 2x = 198$

$\Rightarrow \quad 3x = 198$

$\Rightarrow \quad x = \frac{198}{3}$

$\Rightarrow \quad x = 66$

Thus, Rahul's score = 66 runs

And Sachin's score = 2 x 66 = 132 runs.

APMF

Question 3:

Solve the following:

(i) Irfan says that he has 7 marbles more than five times the marbles Parmit has. Irfan has 37 marbles. How many marbles does Parmit have?

(ii) Laxmi's father is 49 years old. He is 4 years older than three times Laxmi's age. What is Laxmi's age?

(iii) People of Sundergram planted a total of 102 trees in the village garden. Some of the trees were fruit trees. The number of non-fruit trees were two more than three times the number of fruit trees. What was the number of fruit trees planted?

Answer 3:

(i) Let the number of marbles Parmit has be m.

According to the question, $5m+7=37$

$\Rightarrow \quad 5m=37-7$

$\Rightarrow \quad 5m=30$

$\Rightarrow \quad m=\frac{30}{5}$

$\Rightarrow \quad m=6$

Thus, Parmit has 6 marbles.

(ii) Let the age of Laxmi be y years.

Then her father's age = $(3y+4)$ years

According to question, $3y+4=49$

$\Rightarrow \quad 3y=49-4$

$\Rightarrow \quad 3y=45$

$\Rightarrow \quad y=\frac{45}{3}$

$\Rightarrow \quad y=15$

Thus, the age of Laxmi is 15 years.

(iii) Let the number of fruit trees be t.

Then the number of non-fruits tree = $3t+2$

According to the question, $t+3t+2=102$

$\Rightarrow \quad 4t+2=102$

$\Rightarrow \quad 4t=102-2$

$\Rightarrow \quad 4t=100$

$\Rightarrow \quad t=\frac{100}{4}$

$\Rightarrow \quad t=25$

Thus, the number of fruit trees are 25.

APMF

Question 4:

Solve the following riddle:

I am a number,

Tell my identity!

Take me seven times over,

And add a fifty!

To reach a triple century,

You still need forty!

Answer 4:

Let the number be n.

According to the question, $7n+50+40=300$

$\Rightarrow \quad 7n+90=300$

$\Rightarrow \quad 7n=300-90$

$\Rightarrow \quad 7n=210$

$\Rightarrow \quad n=\frac{210}{7}$

$\Rightarrow \quad n=30$

Thus, the required number is 30.

APMF

Mathematics

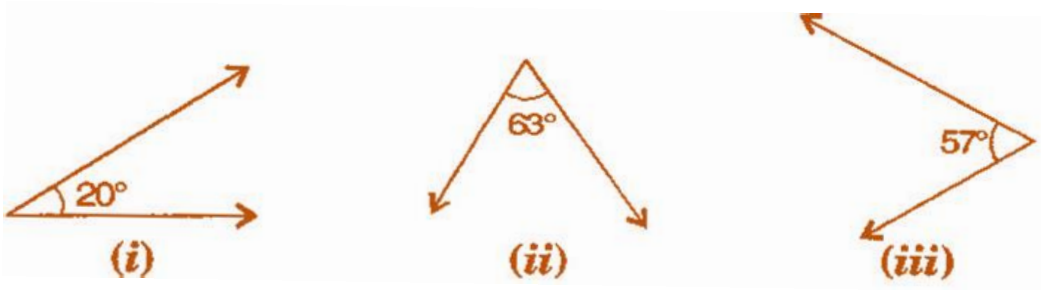
(Chapter – 5) (Lines and Angles)

(Class – VII)

Exercise 5.1

Question 1:

Find the complement of each of the following angles:



Answer 1:

Complementary angle = 90° – given angle

(i) Complement of $20^\circ = 90^\circ - 20^\circ = 70^\circ$

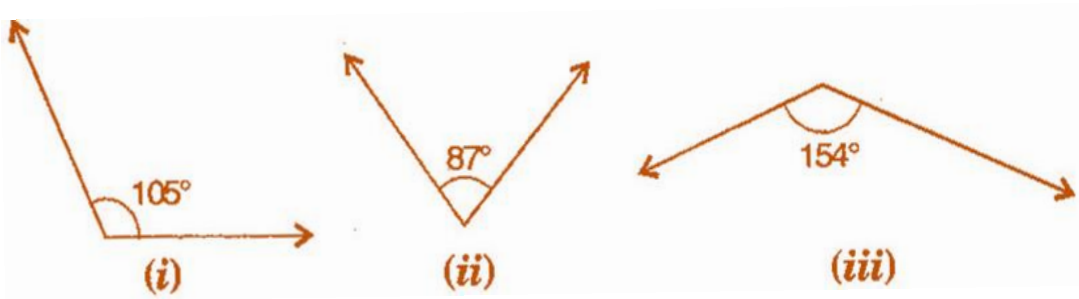
(ii) Complement of $63^\circ = 90^\circ - 63^\circ = 27^\circ$

(iii) Complement of $57^\circ = 90^\circ - 57^\circ = 33^\circ$

APME

Question 2:

Find the supplement of each of the following angles:



Answer 2:

Supplementary angle = 180° – given angle

(i) Supplement of $105^\circ = 180^\circ - 105^\circ = 75^\circ$

(ii) Supplement of $87^\circ = 180^\circ - 87^\circ = 93^\circ$

(iii) Supplement of $154^\circ = 180^\circ - 154^\circ = 26^\circ$

Question 3:

Identify which of the following pairs of angles are complementary and which are supplementary:

(i)	$65°, 115°$	(ii)	$63°, 27°$	(iii)	$112°, 68°$
(iv)	$130°, 50°$	(v)	$45°, 45°$	(vi)	$80°, 10°$

Answer 3:

If sum of two angles is 180°, then they are called supplementary angles.

If sum of two angles is 90°, then they are called complementary angles.

(i)	$65° + 115° = 180°$	These are supplementary angles.
(ii)	$63° + 27° = 90°$	These are complementary angles.
(iii)	$112° + 68° = 180°$	These are supplementary angles.
(iv)	$130° + 50° = 180°$	These are supplementary angles.
(v)	$45^\circ + 45^\circ = 90^\circ$	These are complementary angles.
(vi)	$80° + 10° = 90°$	These are complementary angles.

APMF

Question 4:

Find the angle which is equal to its complement.

Answer 4:

Let one of the two equal complementary angles be x.

$\therefore \quad x + x = 90^\circ$

$\Rightarrow \quad 2x = 90^\circ$

$\Rightarrow \quad x = \frac{90^\circ}{2} = 45^\circ$

Thus, 45° is equal to its complement.

Question 5:

Find the angle which is equal to its supplement.

Answer 5:

Let x be two equal angles of its supplement.

Therefore, $x + x = 180°$ [Supplementary angles]

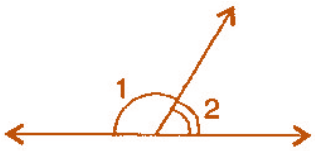
$\Rightarrow \quad 2x = 180°$

$\Rightarrow \quad x = \frac{180°}{2} = 90^\circ$

Thus, 90° is equal to its supplement.

Question 6:

In the given figure, $\angle 1$ and $\angle 2$ are supplementary angles. If $\angle 1$ is decreased, what changes should take place in $\angle 2$ so that both the angles still remain supplementary?



Answer 6:

If $\angle 1$ is decreased then, $\angle 2$ will increase with the same measure, so that both the angles still remain supplementary.

Question 7:

Can two angles be supplementary if both of them are:

(i) acute (ii) obtuse (iii) right?

Answer 7:

(i) No, because sum of two acute angles is less than 180°.

(ii) No, because sum of two obtuse angles is more than 180°.

(iii) Yes, because sum of two right angles is 180°.

APMF

Question 8:

An angle is greater than 45°. Is its complementary angle greater than 45° or equal to 45° or less than 45° ?

Answer 8:

Let the complementary angles be x and y, i.e., $x + y = 90^\circ$

It is given that $x > 45^\circ$

Adding y both sides, $x + y > 45^\circ + y$

$\Rightarrow \quad 90^\circ > 45^\circ + y$

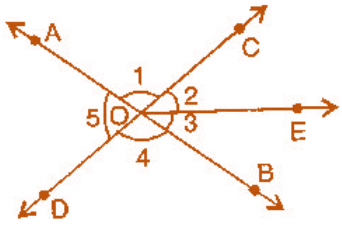
$\Rightarrow \quad 90^\circ - 45^\circ > y$

$\Rightarrow \quad y < 45^\circ$

Thus, its complementary angle is less than 45°.

Question 9:

In the adjoining figure:



(i) Is $\angle 1$ adjacent to $\angle 2$?

(ii) Is $\angle AOC$ adjacent to $\angle AOE$?

(iii) Do $\angle COE$ and $\angle EOD$ form a linear pair?

(iv) Are $\angle BOD$ and $\angle DOA$ supplementary?

(v) Is $\angle 1$ vertically opposite to $\angle 4$?

(vi) What is the vertically opposite angle of $\angle 5$?

Answer 9:

(i) Yes, in $\angle AOE$, OC is common arm.

(ii) No, they have no non-common arms on opposite side of common arm.

(iii) Yes, they form linear pair.

(iv) Yes, they are supplementary.

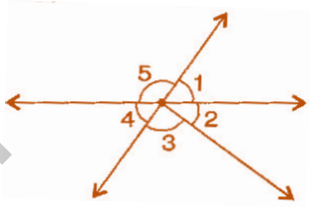
(v) Yes, they are vertically opposite angles.

(vi) Vertically opposite angles of $\angle 5$ is $\angle COB$.

APMF

Question 10:

Indicate which pairs of angles are:



(i) Vertically opposite angles?

(ii) Linear pairs?

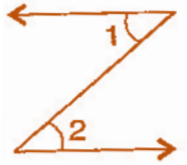
Answer 10:

(i) Vertically opposite angles, $\angle 1$ and $\angle 4$; $\angle 5$ and $\angle 2 + \angle 3$.

(ii) Linear pairs $\angle 1$ and $\angle 5$; $\angle 5$ and $\angle 4$.

Question 11:

In the following figure, is $\angle 1$ adjacent to $\angle 2$? Give reasons.

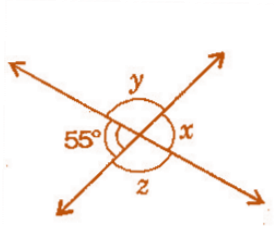


Answer 11:

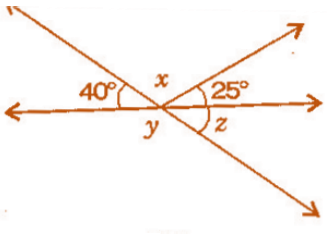
$\angle 1$ and $\angle 2$ are not adjacent angles because their vertex is not common.

Question 12:

Find the values of the angles x, y and z in each of the following:



(i)



(ii)

Answer 12:

(i) $x = 55°$ [Vertically opposite angles]

Now $55° + y = 180°$ [Linear pair]

$\Rightarrow$ $y = 180° - 55° = 125°$

Also $y = z = 125°$ [Vertically opposite angles]

Thus, $x = 55°, y = 125°$ and $z = 125°$.

(ii) $40° + x + 25° = 180°$ [Angles on straight line]

$\Rightarrow$ $65° + x = 180°$

$\Rightarrow$ $x = 180° - 65° = 115°$

Now $40° + y = 180°$ [Linear pair]

$\Rightarrow$ $y = 180° - 40° = 140°$ .....(i)

Also $y + z = 180°$ [Linear pair]

$\Rightarrow$ $140° + z = 180°$ [From equation (i)]

$\Rightarrow$ $z = 180° - 140° = 40°$

Thus, $x = 115°, y = 140°$ and $z = 40°$.

Question 13:

Fill in the blanks:

(i) If two angles are complementary, then the sum of their measures is _____.

(ii) If two angles are supplementary, then the sum of their measures is _____.

(iii) Two angles forming a linear pair are _____.

(iv) If two adjacent angles are supplementary, they form a _____.

APMF

(v) If two lines intersect a point, then the vertically opposite angles are always _____.

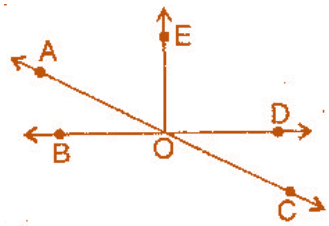
(vi) If two lines intersect at a point and if one pair of vertically opposite angles are acute angles, then the other pair of vertically opposite angles are _____.

Answer 13:

(i)	90°	(ii)	180°	(iii)	supplementary
(iv)	linear pair	(v)	equal	(vi)	obtuse angles

Question 14:

In the adjoining figure, name the following pairs of angles:



(i) Obtuse vertically opposite angles.

(ii) Adjacent complementary angles.

(iii) Equal supplementary angles.

(iv) Unequal supplementary angles.

(v) Adjacent angles that do not form a linear pair.

Answer 14:

(i) Obtuse vertically opposite angles means greater than 90° and equal $\angle AOD = \angle BOC$.

(ii) Adjacent complementary angles means angles have common vertex, common arm, non-common arms are on either side of common arm and sum of angles is 90°.

(iii) Equal supplementary angles means sum of angles is 180° and supplement angles are equal.

(iv) Unequal supplementary angles means sum of angles is 180° and supplement angles are unequal.

i.e., $\angle AOE, \angle EOC$; $\angle AOD, \angle DOC$ and $\angle AOB, \angle BOC$

(v) Adjacent angles that do not form a linear pair mean, angles have common ray but the angles in a linear pair are not supplementary.

i.e., $\angle AOB, \angle AOE$; $\angle AOE, \angle EOD$ and $\angle EOD, \angle COD$

ARME

Exercise 5.2

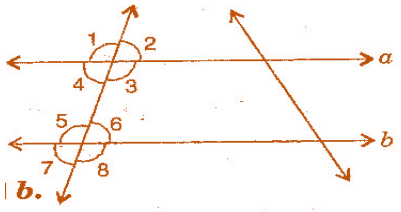
Question 1:

State the property that is used in each of the following statements:

(i) If $a \| b$, then $\angle 1 = \angle 5$.

(ii) If $\angle 4 = \angle 6$, then $a \| b$.

(iii) If $\angle 4 + \angle 5 + 180°$, then $a \| b$.



Answer 1:

(i) Given, $a \| b$, then $\angle 1 = \angle 5$ [Corresponding angles]

If two parallel lines are cut by a transversal, each pair of corresponding angles are equal in measure.

(ii) Given, $\angle 4 = \angle 6$, then $a \| b$ [Alternate interior angles]

When a transversal cuts two lines such that pairs of alternate interior angles are equal, the lines have to be parallel.

(iii) Given, $\angle 4 + \angle 5 = 180°$, then $a \| b$ [Co-interior Angles]

When a transversal cuts two lines, such that pairs of interior angles on the same side of transversal are supplementary, the lines have to be parallel.

RDMF

Question 2:

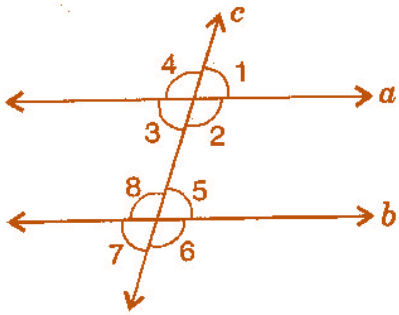
In the adjoining figure, identify:

(i) the pairs of corresponding angles.

(ii) the pairs of alternate interior angles.

(iii) the pairs of interior angles on the same side of the transversal.

(iv) the vertically opposite angles.



Answer 2:

(i) The pairs of corresponding angles:
$\angle 1, \angle 5$; $\angle 2, \angle 6$; $\angle 4, \angle 8$ and $\angle 3, \angle 7$

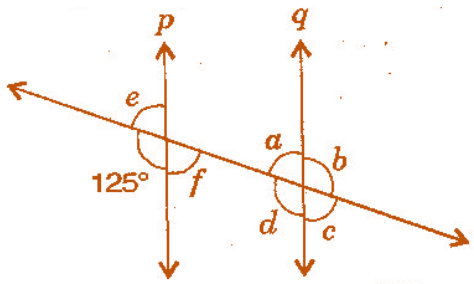
(ii) The pairs of alternate interior angles are:
$\angle 3, \angle 5$ and $\angle 2, \angle 8$

(iii) The pair of interior angles on the same side of the transversal:
$\angle 3, \angle 8$ and $\angle 2, \angle 5$

(iv) The vertically opposite angles are:
$\angle 1, \angle 3$; $\angle 2, \angle 4$; $\angle 6, \angle 8$ and $\angle 5, \angle 7$

Question 3:

In the adjoining figure, $p \| q$. Find the unknown angles.



Answer 3:

Given, $p \| q$ and cut by a transversal line.

$\because$ $125° + e = 180°$ [Linear pair]

$\therefore$ $e = 180° - 125° = 55°$ .....(i)

Now $e = f = 55°$ [Vertically opposite angles]

Also $a = f = 55°$ [Alternate interior angles]

$a + b = 180°$ [Linear pair]

$\Rightarrow$ $55° + b = 180°$ [From equation (i)]

$\Rightarrow$ $b = 180° - 55° = 125°$

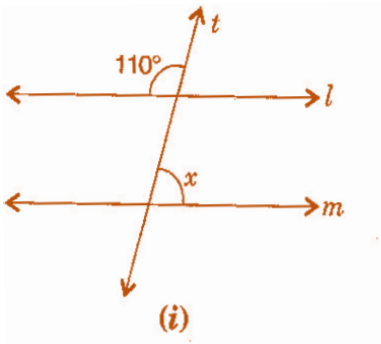
Now $a = c = 55°$ and $b = d = 125°$ [Vertically opposite angles]

Thus, $a = 55°, b = 125°, c = 55°, d = 125°, e = 55°$ and $f = 55°$.

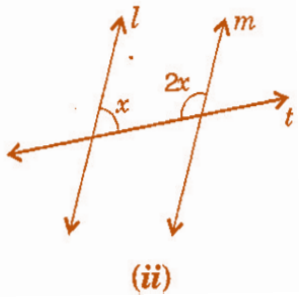
APMF

Question 4:

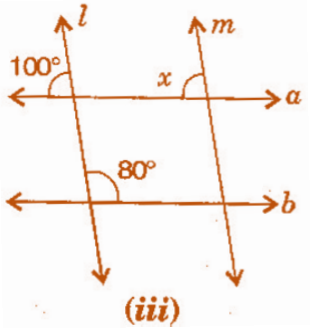
Find the values of x in each of the following figures if $l \| m$



(i)



(ii)



(iii)

Answer 4:

(i) Given, $l \| m$ and t is transversal line.

$\therefore$ Interior vertically opposite angle between lines l and $t = 110°$.

$\therefore \quad 110° + x = 180°$ [Supplementary angles]

$\Rightarrow \quad x = 180° - 110° = 70°$

(ii) Given, $l \| m$ and t is transversal line.

$x + 2x = 180$ [Interior opposite angles]

$\Rightarrow \quad 3x = 180°$

$\Rightarrow \quad x = \frac{180°}{3} = 60°$

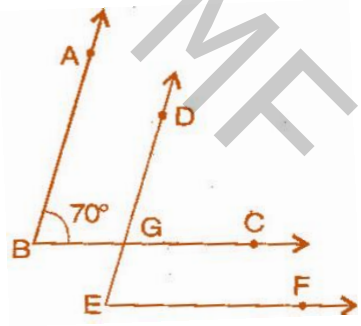
(iii) Given, $l \| m$ and $a \| b$.

$x = 100°$ [Corresponding angles]

Question 5:

In the given figure, the arms of two angles are parallel. If $\Delta ABC = 70°$, then find:

(i) $\angle$ DGC (ii) $\angle$ DEF



Answer 5:

(i) Given, AB || DE and BC is a transversal line and $\angle ABC = 70°$

$\because \quad \angle$ ABC = $\angle$ DGC [Corresponding angles]

$\therefore \quad \angle$ DGC = 70° .....(i)

(ii) Given, BC || EF and DE is a transversal line and $\angle DGC = 70°$

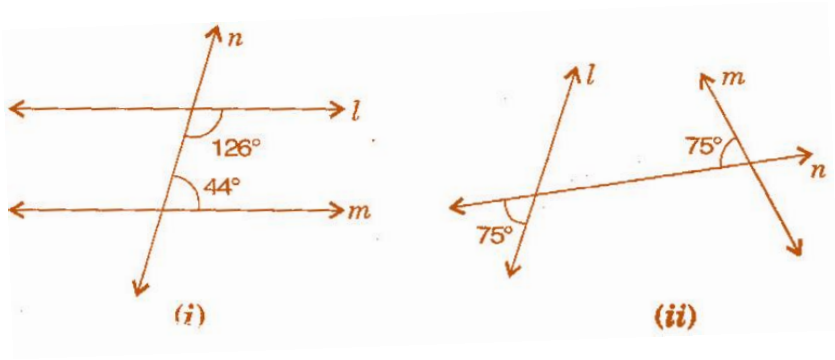
$\because \quad \angle$ DGC = $\angle$ DEF [Corresponding angles]

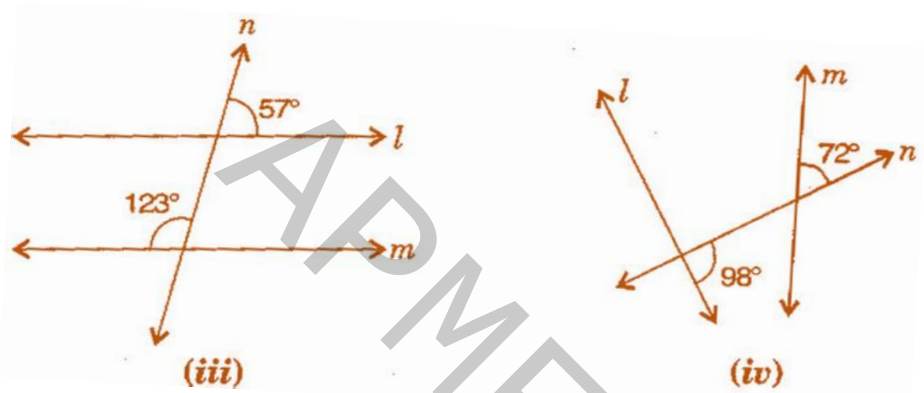
$\therefore \quad \angle$ DEF = 70° [From equation (i)]

APMF

Question 6:

In the given figures below, decide whether l is parallel to m.





APMF

Answer 6:

(i) $126° + 44° = 170°$

$l \parallel m$ because sum of interior opposite angles should be 180°.

(ii) $75° + 75° = 150°$

$l \parallel m$ because sum of angles does not obey the property of parallel lines.

(iii) $57° + 123° = 180°$

$l \parallel m$ due to supplementary angles property of parallel lines.

(iv) $98° + 72° = 170°$

l is not parallel to m because sum of angles does not obey the property of parallel lines.

Mathematics

(Chapter – 6) (The Triangle and its Properties)

(Class – VII)

Exercise 6.1

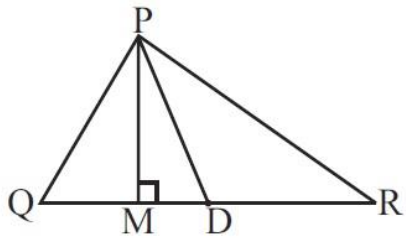
Question 1:

In ΔPQR, D is the mid-point of $\overline{QR}$.

$\overline{PM}$ is _____

PD is _____

Is QM = MR?



Answer 1:

Given: QD = DR

$\therefore$ $\overline{PM}$ is altitude.

PD is median.

No, QM $\neq$ MR as D is the mid-point of QR.

APMF

Question 2:

Draw rough sketches for the following:

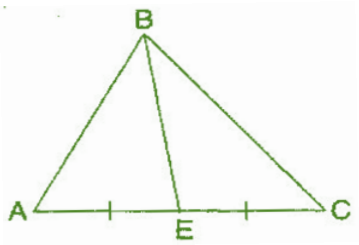
(a) In ΔABC, BE is a median.

(b) In ΔPQR, PQ and PR are altitudes of the triangle.

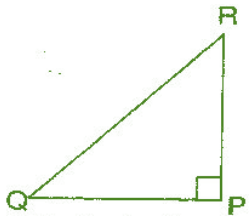
(c) In ΔXYZ, YL is an altitude in the exterior of the triangle.

Answer 2:

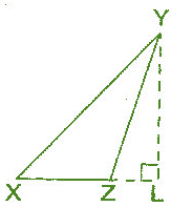
(a) Here, BE is a median in ΔABC and AE = EC.



(b) Here, PQ and PR are the altitudes of the ΔPQR and $RP \perp QP$.



(c) YL is an altitude in the exterior of ΔXYZ.



APMF

Question 3:

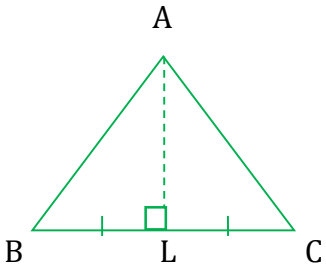
Verify by drawing a diagram if the median and altitude of a isosceles triangle can be same.

Answer 3:

Isosceles triangle means any two sides are same.

Take ΔABC and draw the median when AB = AC.

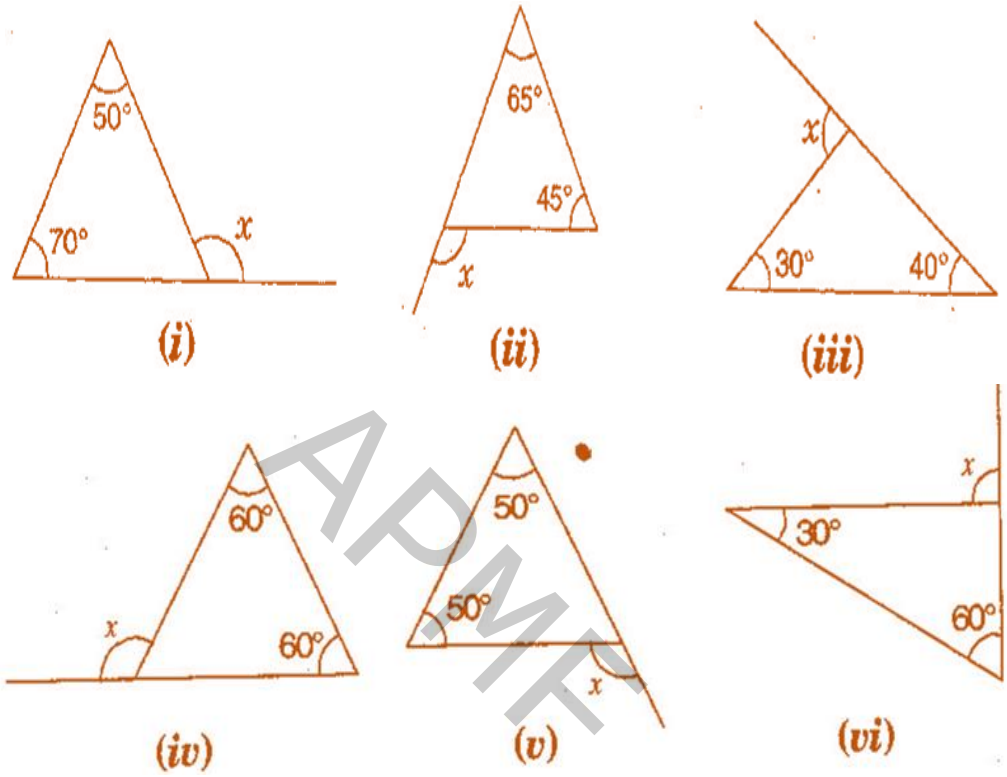
AL is the median and altitude of the given triangle.



Exercise 6.2

Question 1:

Find the value of the unknown exterior angle x in the following diagrams:



APME

Answer 1:

Since, Exterior angle = Sum of interior opposite angles, therefore

(i) $x = 50° + 70° = 120°$

(ii) $x = 65° + 45° = 110°$

(iii) $x = 30° + 40° = 70°$

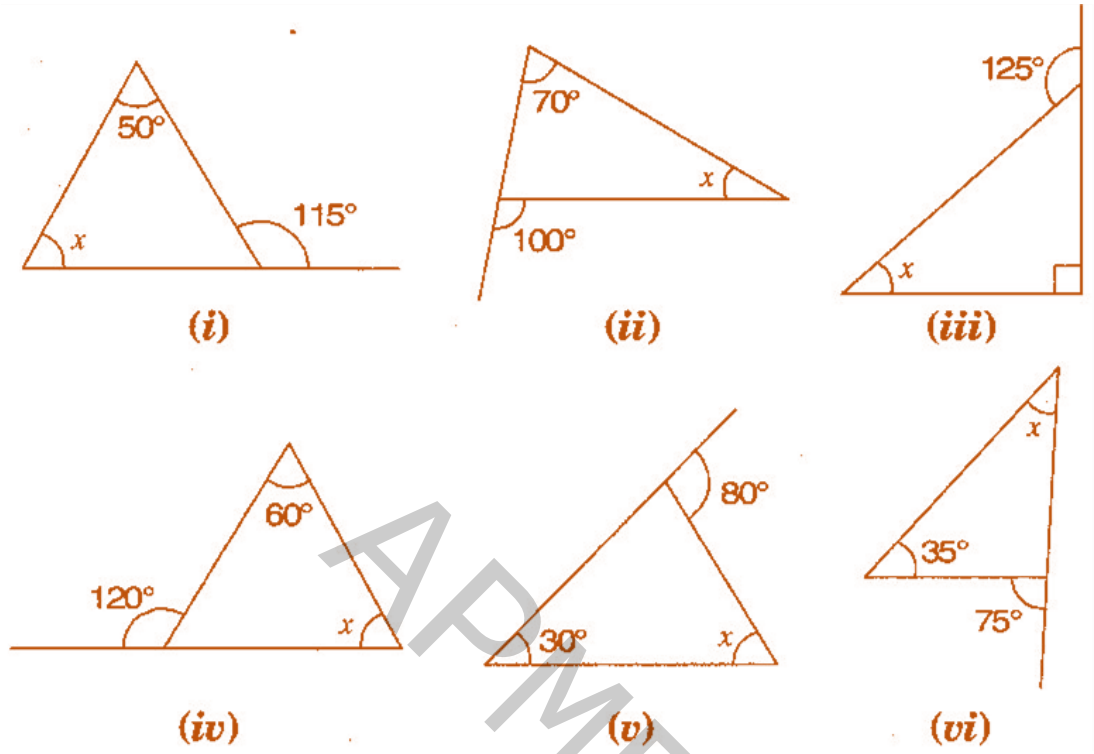
(iv) $x = 60° + 60° = 120°$

(v) $x = 50° + 50° = 100°$

(vi) $x = 60^\circ + 30^\circ = 90^\circ$

Question 2:

Find the value of the unknown interior angle x in the following figures:



APME

Answer 2:

Since, Exterior angle = Sum of interior opposite angles, therefore

(i) $x+50°=115°$ $\Rightarrow$ $x=115°-50°=65°$

(ii) $70°+x=100°$ $\Rightarrow$ $x=100°-70°=30°$

(iii) $x+90°=125°$ $\Rightarrow$ $x=120°-90°=35°$

(iv) $60°+x=120°$ $\Rightarrow$ $x=120°-60°=60°$

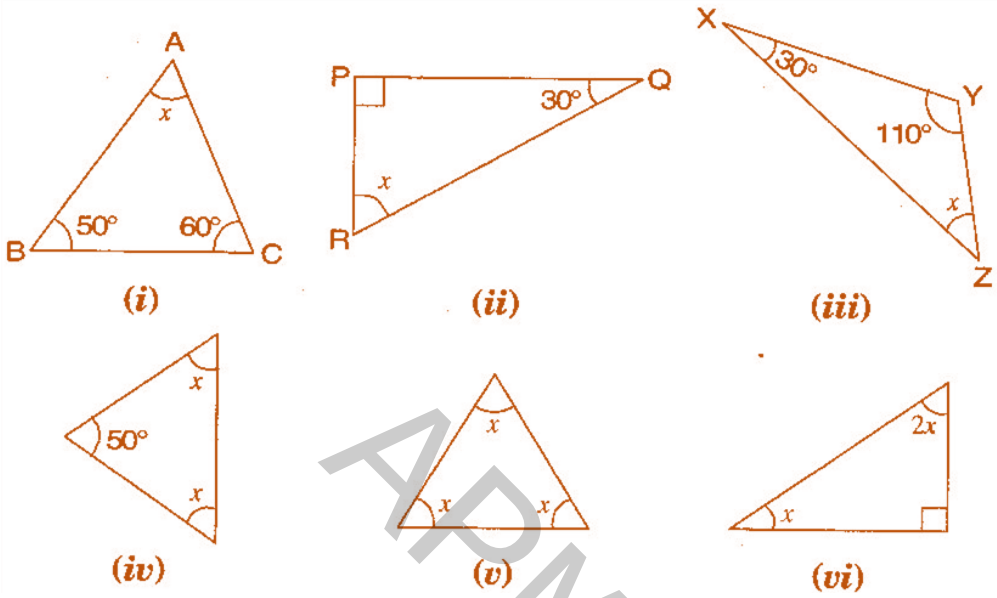
(v) $30°+x=80°$ $\Rightarrow$ $x=80°-30°=50°$

(vi) $x+35°=75°$ $\Rightarrow$ $x=75°-35°=40°$

Exercise 6.3

Question 1:

Find the value of unknown x in the following diagrams:



APME

Answer 1:

(i) In ΔABC,

$\angle BAC + \angle ACB + \angle ABC = 180°$ [By angle sum property of a triangle]

$\Rightarrow \quad x + 50° + 60° = 180°$

$\Rightarrow \quad x + 110° = 180°$

$\Rightarrow \quad x = 180° - 110° = 70°$

(ii) In ΔPQR,

$\angle RPQ + \angle PQR + \angle RPQ = 180°$ [By angle sum property of a triangle]

$\Rightarrow \quad 90^\circ + 30^\circ + x = 180°$

$\Rightarrow \quad x + 120° = 180°$

$\Rightarrow \quad x = 180° - 120° = 60°$

(iii) In ΔXYZ,

$\angle ZXY + \angle XYZ + \angle YZX = 180°$ [By angle sum property of a triangle]

$\Rightarrow \quad 30^\circ + 110^\circ + x = 180°$

$\Rightarrow \quad x + 140° = 180°$

$\Rightarrow \quad x = 180° - 140° = 40°$

(iv) In the given isosceles triangle,

$x+x+50^\circ=180^\circ$ [By angle sum property of a triangle]

$\Rightarrow \quad 2x+50^\circ=180^\circ$

$\Rightarrow \quad 2x=180^\circ-50^\circ$

$\Rightarrow \quad 2x=130^\circ$

$\Rightarrow \quad x=\frac{130^\circ}{2}=65^\circ$

(v) In the given equilateral triangle,

$x+x+x=180^\circ$ [By angle sum property of a triangle]

$\Rightarrow \quad 3x=180^\circ$

$\Rightarrow \quad x=\frac{180^\circ}{3}=60^\circ$

(vi) In the given right angled triangle,

$x+2x+90^\circ=180^\circ$ [By angle sum property of a triangle]

$\Rightarrow \quad 3x+90^\circ=180^\circ$

$\Rightarrow \quad 3x=180^\circ-90^\circ$

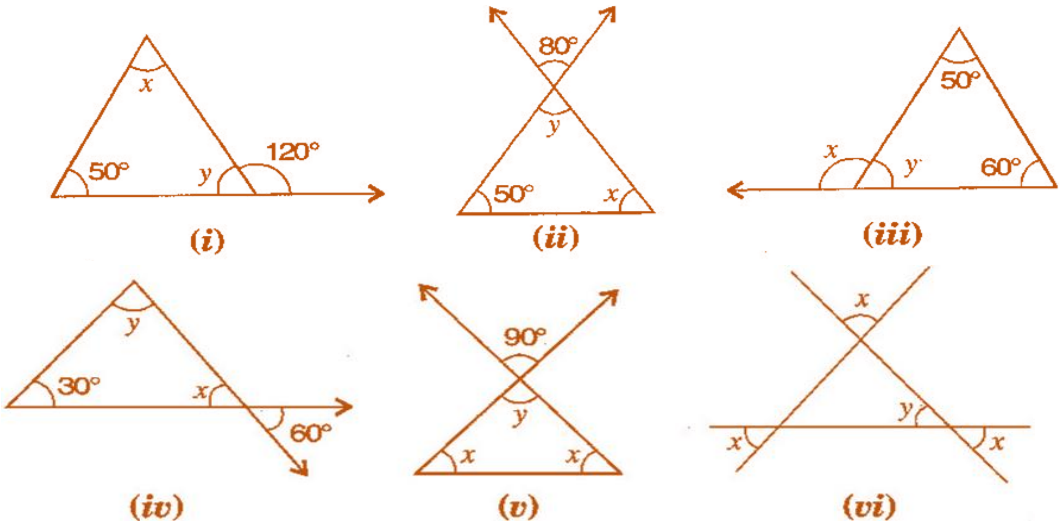
$\Rightarrow \quad 3x=90^\circ$

$\Rightarrow \quad x=\frac{90^\circ}{3}=30^\circ$

APMF

Question 2:

Find the values of the unknowns x and y in the following diagrams:



Answer 2:

(i) $50° + x = 120°$ [Exterior angle property of a Δ]

$\Rightarrow \quad x = 120° - 50° = 70°$

Now, $50° + x + y = 180°$ [Angle sum property of a Δ]

$\Rightarrow \quad 50° + 70° + y = 180°$

$\Rightarrow \quad 120° + y = 180°$

$\Rightarrow \quad y = 180° - 120° = 60°$

(ii) $y = 80°$ .....(i) [Vertically opposite angle]

Now, $50° + x + y = 180°$ [Angle sum property of a Δ]

$\Rightarrow \quad 50° + 80° + y = 180°$ [From equation (i)]

$\Rightarrow \quad 130° + y = 180°$

$\Rightarrow \quad y = 180° - 130° = 50°$

(iii) $50° + 60° = x$ [Exterior angle property of a Δ]

$\Rightarrow \quad x = 110°$

Now $50° + 60° + y = 180°$ [Angle sum property of a Δ]

$\Rightarrow \quad 110° + y = 180°$

$\Rightarrow \quad y = 180° - 110°$

$\Rightarrow \quad y = 70°$

(iv) $x = 60^\circ$ .....(i) [Vertically opposite angle]

Now, $30° + x + y = 180°$ [Angle sum property of a Δ]

$\Rightarrow \quad 50° + 60° + y = 180°$ [From equation (i)]

$\Rightarrow \quad 90° + y = 180°$

$\Rightarrow \quad y = 180° - 90° = 90°$

(v) $y = 90^\circ$ .....(i) [Vertically opposite angle]

Now, $y + x + x = 180°$ [Angle sum property of a Δ]

$\Rightarrow \quad 90° + 2x = 180°$ [From equation (i)]

$\Rightarrow \quad 2x = 180° - 90°$

$\Rightarrow \quad 2x = 90°$

$\Rightarrow \quad x = \frac{90^\circ}{2} = 45^\circ$

APMF

(vi) $x = y$ .....(i) [Vertically opposite angle]

Now, $x + x + y = 180°$ [Angle sum property of a Δ]

$\Rightarrow \quad 2x + x = 180°$ [From equation (i)]

$\Rightarrow \quad 3x = 180°$

$\Rightarrow \quad x = \frac{180°}{3} = 60°$

APMF

Exercise 6.4

Question 1:

Is it possible to have a triangle with the following sides?

(i) 2 cm, 3 cm, 5 cm

(ii) 3 cm, 6 cm, 7 cm

(iii) 6 cm, 3 cm, 2 cm

Answer 1:

Since, a triangle is possible whose sum of the lengths of any two sides would be greater than the length of third side.

(i) 2 cm, 3 cm, 5 cm

2 + 3 > 5 No

2 + 5 > 3 Yes

3 + 5 > 2 Yes

This triangle is not possible.

(ii) 3 cm, 6 cm, 7 cm

3 + 6 > 7 Yes

6 + 7 > 3 Yes

3 + 7 > 6 Yes

This triangle is possible.

(iii) 6 cm, 3 cm, 2 cm

6 + 3 > 2 Yes

6 + 2 > 3 Yes

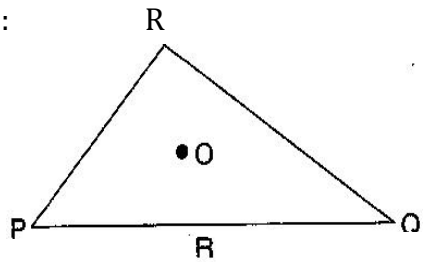
2 + 3 > 6 No

This triangle is not possible.

APMF

Question 2:

Take any point O in the interior of a triangle PQR. Is:



(i) OP + OQ > PQ ?

(ii) OQ + OR > QR ?

(iii) OR + OP > RP ?

Answer 2:

Join OR, OQ and OP.

(i) Is OP + OQ > PQ ?

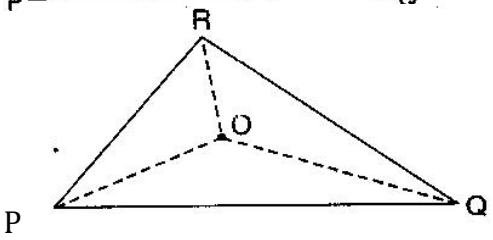
Yes, POQ form a triangle.

(ii) Is OQ + OR > QR ?

Yes, RQO form a triangle.

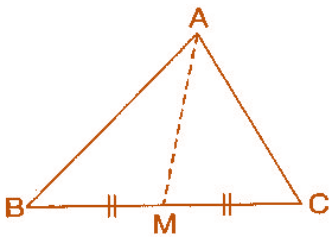
(iii) Is OR + OP > RP ?

Yes, ROP form a triangle.



Question 3:

AM is a median of a triangle ABC. Is AB + BC + CA > 2AM? (Consider the sides of triangles ΔABM and ΔAMC.)



Answer 3:

Since, the sum of lengths of any two sides in a triangle should be greater than the length of third side.

Therefore, In ΔABM, $AB + BM > AM$ ... (i)

In ΔAMC, $AC + MC > AM$ ... (ii)

Adding eq. (i) and (ii),

$AB + BM + AC + MC > AM + AM$

$\Rightarrow$ $AB + AC + (BM + MC) > 2AM$

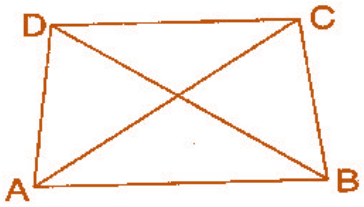
$\Rightarrow$ $AB + AC + BC > 2AM$

Hence, it is true.

APMF

Question 4:

ABCD is a quadrilateral. Is AB + BC + CD + DA > AC + BD?



Answer 4:

Since, the sum of lengths of any two sides in a triangle should be greater than the length of third side.

Therefore, In ΔABC, $AB + BC > AC$ .....(i)

In ΔADC, $AD + DC > AC$ .....(ii)

In ΔDCB, $DC + CB > DB$ .....(iii)

In ΔADB, $AD + AB > DB$ .....(iv)

Adding equations (i), (ii), (iii) and (iv), we get

AB + BC + AD + DC + DC + CB + AD + AB > AC + AC + DB + DB

$\Rightarrow$ (AB + AB) + (BC + BC) + (AD + AD) + (DC + DC) > 2AC + 2DB

$\Rightarrow$ 2AB + 2BC + 2AD + 2DC > 2(AC + DB)

$\Rightarrow$ 2(AB + BC + AD + DC) > 2(AC + DB)

$\Rightarrow$ AB + BC + AD + DC > AC + DB

$\Rightarrow$ AB + BC + CD + DA > AC + DB

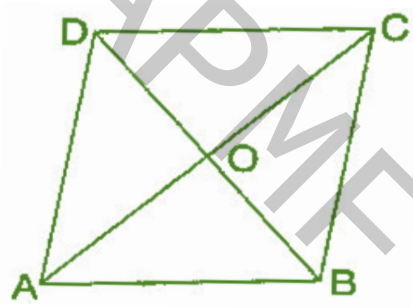
Hence, it is true.

Question 5:

ABCD is quadrilateral. Is AB + BC + CD + DA < 2 (AC + BD)?

Answer 5:

Since, the sum of lengths of any two sides in a triangle should be greater than the length of third side.



Therefore, In ΔAOB, AB < OA + OB .....(i)

In ΔBOC, BC < OB + OC .....(ii)

In ΔCOD, CD < OC + OD .....(iii)

In ΔAOD, DA < OD + OA .....(iv)

Adding equations (i), (ii), (iii) and (iv), we get

AB + BC + CD + DA < OA + OB + OB + OC + OC + OD + OD + OA

$\Rightarrow$ AB + BC + CD + DA < 2OA + 2OB + 2OC + 2OD

$\Rightarrow$ AB + BC + CD + DA < 2[(AO + OC) + (DO + OB)]

$\Rightarrow$ AB + BC + CD + DA < 2(AC + BD)

Hence, it is proved.

Question 6:

The lengths of two sides of a triangle are 12 cm and 15 cm. Between what two measures should the length of the third side fall?

Answer 6:

Since, the sum of lengths of any two sides in a triangle should be greater than the length of third side.

It is given that two sides of triangle are 12 cm and 15 cm.
Therefore, the third side should be less than 12 + 15 = 27 cm.
And also the third side cannot be less than the difference of the two sides.
Therefore, the third side has to be more than 15 – 12 = 3 cm.

Hence, the third side could be the length more than 3 cm and less than 27 cm.

APMF

Exercise 6.5

Question 1:

PQR is a triangle, right angled at P. If PQ = 10 cm and PR = 24 cm, find QR.

Answer 1:

Given: PQ = 10 cm, PR = 24 cm

Let QR be x cm.

In right angled triangle QPR,

(Hypotenuse)^2 = (Base)^2 + (Perpendicular)^2 [By Pythagoras theorem]

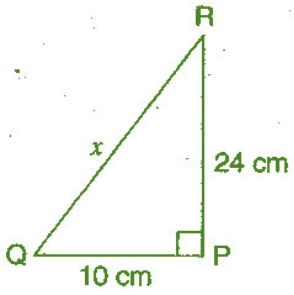
$\Rightarrow$ (QR)^2 = (PQ)^2 + (PR)^2

$\Rightarrow$ $x^2 = (10)^2 + (24)^2$

$\Rightarrow$ x^2 = 100 + 576 = 676

$\Rightarrow$ $x = \sqrt{676}$ = 26 cm

Thus, the length of QR is 26 cm.



Question 2:

ABC is a triangle, right angled at C. If AB = 25 cm and AC = 7 cm, find BC.

Answer 2:

Given: AB = 25 cm, AC = 7 cm

Let BC be x cm.

In right angled triangle ACB,

(Hypotenuse)^2 = (Base)^2 + (Perpendicular)^2 [By Pythagoras theorem]

$\Rightarrow$ (AB)^2 = (AC)^2 + (BC)^2

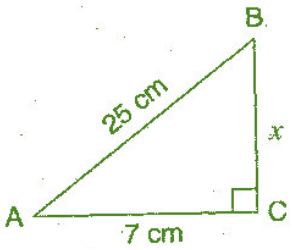
$\Rightarrow$ $(25)^2 = (7)^2 + x^2$

$\Rightarrow$ 625 = 49 + x^2

$\Rightarrow$ x^2 = 625 – 49 = 576

$\Rightarrow$ $x = \sqrt{576}$ = 24 cm

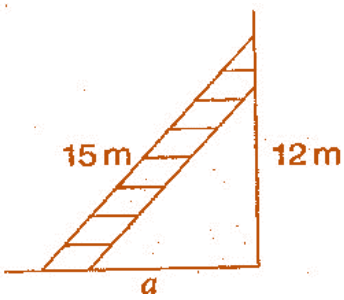
Thus, the length of BC is 24 cm.



APMF

Question 3:

A 15 m long ladder reached a window 12 m high from the ground on placing it against a wall at a distance a. Find the distance of the foot of the ladder from the wall.



Answer 3:

Let AC be the ladder and A be the window.

Given: AC = 15 m, AB = 12 m, CB = a m

In right angled triangle ACB,

(Hypotenuse)^2 = (Base)^2 + (Perpendicular)^2 [By Pythagoras theorem]

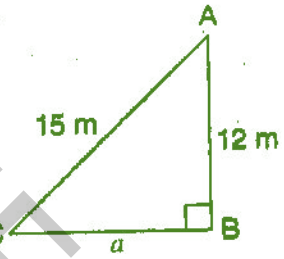
$\Rightarrow$ $(AC)^2 = (CB)^2 + (AB)^2$

$\Rightarrow$ $(15)^2 = (a)^2 + (12)^2$

$\Rightarrow$ $225 = a^2 + 144$

$\Rightarrow$ $a^2 = 225 - 144 = 81$

$\Rightarrow$ $a = \sqrt{81} = 9$ cm



Thus, the distance of the foot of the ladder from the wall is 9 m.

Question 4:

Which of the following can be the sides of a right triangle?

(i) 2.5 cm, 6.5 cm, 6 cm

(ii) 2 cm, 2 cm, 5 cm

(iii) 1.5 cm, 2 cm, 2.5 cm

In the case of right angled triangles, identify the right angles.

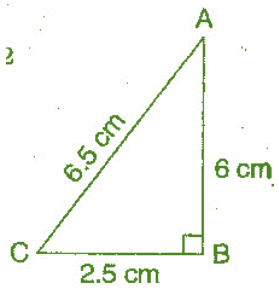
Answer 4:

Let us consider, the larger side be the hypotenuse and also using Pythagoras theorem,

(Hypotenuse)^2 = (Base)^2 + (Perpendicular)^2

APMF

(i) 2.5 cm, 6.5 cm, 6 cm



In ΔABC, $(AC)^2 = (AB)^2 + (BC)^2$

L.H.S. = $(6.5)^2$ = 42.25 cm

R.H.S. = $(6)^2 + (2.5)^2$ = 36 + 6.25 = 42.25 cm

Since, L.H.S. = R.H.S.

Therefore, the given sides are of the right angled triangle.

Right angle lies on the opposite to the greater side 6.5 cm, i.e., at B.

(ii) 2 cm, 2 cm, 5 cm

In the given triangle, $(5)^2 = (2)^2 + (2)^2$

L.H.S. = $(5)^2$ = 25

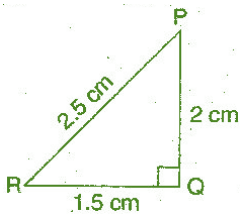
R.H.S. = $(2)^2 + (2)^2$ = 4 + 4 = 8

Since, L.H.S. $\neq$ R.H.S.

Therefore, the given sides are not of the right angled triangle.

(iii) 1.5 cm, 2 cm, 2.5 cm

In ΔPQR, $(PR)^2 = (PQ)^2 + (RQ)^2$



L.H.S. = $(2.5)^2$ = 6.25 cm

R.H.S. = $(1.5)^2 + (2)^2$ = 2.25 + 4 = 6.25 cm

Since, L.H.S. = R.H.S.

Therefore, the given sides are of the right angled triangle.

Right angle lies on the opposite to the greater side 2.5 cm, i.e., at Q.

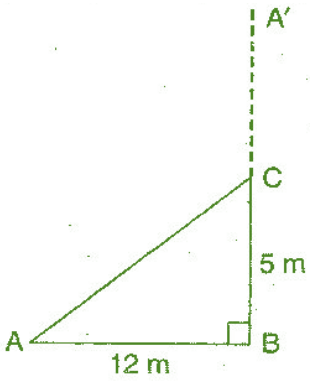
APMF

Question 5:

A tree is broken at a height of 5 m from the ground and its top touches the ground at a distance of 12 m from the base of the tree. Find the original height of the tree.

Answer 5:

Let A'CB represents the tree before it broken at the point C and let the top A' touches the ground at A after it broke. Then ΔABC is a right angled triangle, right angled at B.



AB = 12 m and BC = 5 m

Using Pythagoras theorem, In ΔABC

$(AC)^2 = (AB)^2 + (BC)^2$

$\Rightarrow \quad (AC)^2 = (12)^2 + (5)^2$

$\Rightarrow \quad (AC)^2 = 144 + 25$

$\Rightarrow \quad (AC)^2 = 169$

$\Rightarrow \quad AC = 13$ m

Hence, the total height of the tree = AC + CB = 13 + 5 = 18 m.

Question 6:

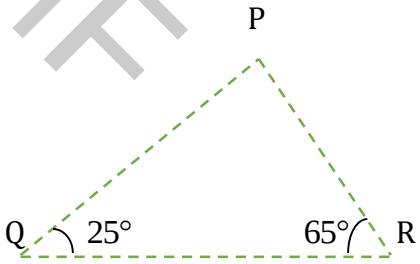
Angles Q and R of a ΔPQR are $25°$ and $65°$.

Write which of the following is true:

(i) $PQ^2 + QR^2 = RP^2$

(ii) $PQ^2 + RP^2 = QR^2$

(iii) $RP^2 + QR^2 = PQ^2$



Answer 6:

In ΔPQR,

$\angle PQR + \angle QRP + \angle RPQ = 180°$ [By Angle sum property of a Δ]

$\Rightarrow \quad 25° + 65° + \angle RPQ = 180°$

$\Rightarrow \quad 90° + \angle RPQ = 180°$

$\Rightarrow \quad \angle RPQ = 180° - 90° = 90°$

Thus, ΔPQR is a right angled triangle, right angled at P.

$\therefore$ (Hypotenuse)^2 = (Base)^2 + (Perpendicular)^2 [By Pythagoras theorem]

$\Rightarrow \quad (QR)^2 = (PR)^2 + (QP)^2$

Hence, Option (ii) is correct.

APMF

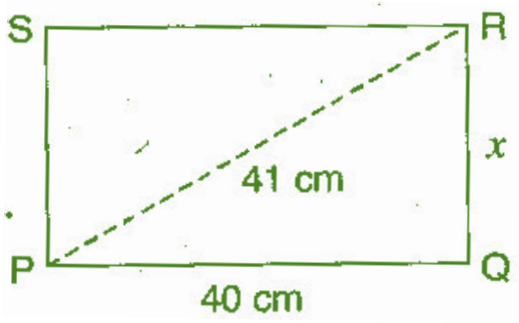
Question 7:

Find the perimeter of the rectangle whose length is 40 cm and a diagonal is 41 cm.

Answer 7:

Given diagonal (PR) = 41 cm, length (PQ) = 40 cm

Let breadth (QR) be x cm.



Now, in right angled triangle PQR,

$(PR)^2 = (RQ)^2 + (PQ)^2$ [By Pythagoras theorem]

$\Rightarrow \quad (41)^2 = x^2 + (40)^2$

$\Rightarrow \quad 1681 = x^2 + 1600$

$\Rightarrow \quad x^2 = 1681 - 1600$

$\Rightarrow \quad x^2 = 81$

$\Rightarrow \quad x = \sqrt{81} = 9$ cm

Therefore the breadth of the rectangle is 9 cm.

Perimeter of rectangle = 2(length + breadth)

= 2 (9 + 49)

= 2 x 49 = 98 cm

Hence, the perimeter of the rectangle is 98 cm.

APMF

Question 8:

The diagonals of a rhombus measure 16 cm and 30 cm. Find its perimeter.

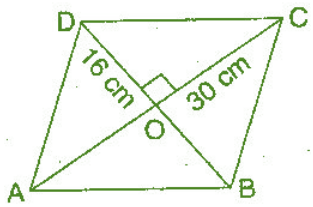
Answer 8:

Given: Diagonals AC = 30 cm and DB = 16 cm.

Since the diagonals of the rhombus bisect at right angle to each other.

Therefore, OD = $\frac{DB}{2} = \frac{16}{2}$ = 8 cm

And OC = $\frac{AC}{2} = \frac{30}{2}$ = 15 cm



Now, In right angle triangle DOC,

$(DC)^2 = (OD)^2 + (OC)^2$ [By Pythagoras theorem]

$\Rightarrow \quad (DC)^2 = (8)^2 + (15)^2$

$\Rightarrow \quad (DC)^2$ = 64 + 225 = 289

$\Rightarrow \quad$ DC = $\sqrt{289}$ = 17 cm

Perimeter of rhombus = 4 x side = 4 x 17 = 68 cm

Thus, the perimeter of rhombus is 68 cm.

APMF

Mathematics

(Chapter – 7) (Congruence of Triangles)

(Class – VII)

Exercise 7.1

Question 1:

Complete the following statements:

(a) Two line segments are congruent if _____.

(b) Among two congruent angles, one has a measure of 70°, the measure of other angle is _____.

(c) When we write $\angle A = \angle B$, we actually mean _____.

Answer 1:

(a) they have the same length

(b) 70°

(c) $m\angle A = m\angle B$

APME

Question 2:

Give any two real time examples for congruent shapes.

Answer 2:

(i) Two footballs (ii) Two teacher's tables

Question 3:

If $\Delta ABC \cong \Delta FED$ under the correspondence ABC ↔ FED, write all the corresponding congruent parts of the triangles.

Answer 3:

Given: $\Delta ABC \cong \Delta FED$.

The corresponding congruent parts of the triangles are:

(i) $\angle A \leftrightarrow \angle F$

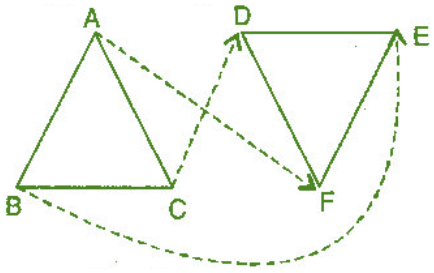
(ii) $\angle B \leftrightarrow \angle E$

(iii) $\angle C \leftrightarrow \angle D$

(iv) $\overline{AB} \leftrightarrow \overline{FE}$

(v) $\overline{BC} \leftrightarrow \overline{ED}$

(vi) $\overline{AC} \leftrightarrow \overline{FD}$



Question 4:

If $\Delta DEF \cong \Delta BCA$, write the part(s) of ΔBCA that correspond to:

(i) $\angle E$

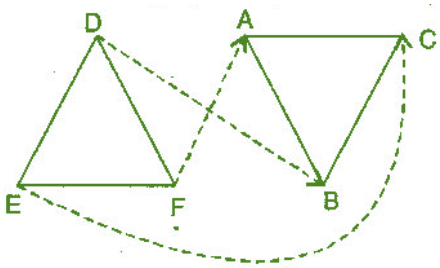
(ii) $\overline{EF}$

(iii) $\angle F$

(iv) $\overline{DF}$

Answer 4:

Given: $\Delta DEF \cong \Delta BCA$.



(i) $\angle E \leftrightarrow \angle C$

(ii) $\overline{EF} \leftrightarrow \overline{CA}$

(iii) $\angle F \leftrightarrow \angle A$

(iv) $\overline{DF} \leftrightarrow \overline{BA}$

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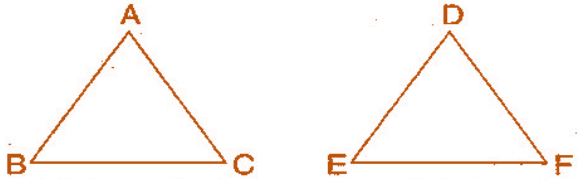
Exercise 7.2

Question 1:

Which congruence criterion do you use in the following?

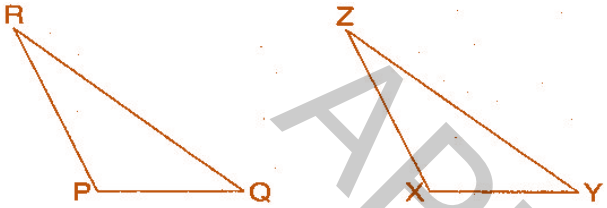
(a) Given: AC = DF, AB = DE, BC = EF

So $\Delta ABC \cong \Delta DEF$



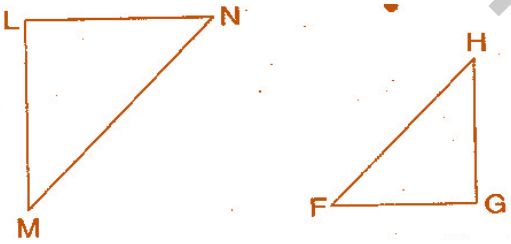
(b) Given: RP = ZX, RQ = ZY, $\angle PRQ = \angle XZY$

So $\Delta PQR \cong \Delta XYZ$



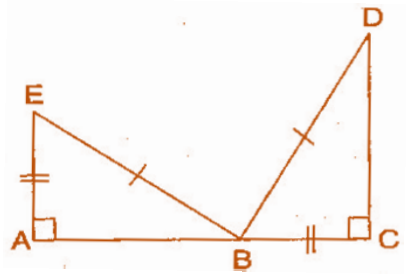
(c) Given: $\angle MLN = \angle FGH$, $\angle NML = \angle HFG$, ML = FG

So $\Delta LMN \cong \Delta GFH$



(d) Given: EB = BD, AE = CB, $\angle A = \angle C = 90^\circ$

So $\Delta ABE \cong \Delta CDB$



APMF

Answer 1:

(a) By SSS congruence criterion,

since it is given that AC = DF, AB = DE, BC = EF

The three sides of one triangle are equal to the three corresponding sides of another triangle.

Therefore, $\Delta ABC \cong \Delta DEF$

(b) By SAS congruence criterion,

since it is given that RP = ZX, RQ = ZY and $\angle PRQ = \angle XZY$

The two sides and one angle in one of the triangle are equal to the corresponding sides and the angle of other triangle.

Therefore, $\Delta PQR \cong \Delta XYZ$

(c) By ASA congruence criterion,

since it is given that $\angle MLN = \angle FGH$, $\angle NML = \angle HFG$, ML = FG.

The two angles and one side in one of the triangle are equal to the corresponding angles and side of other triangle.

Therefore, $\Delta LMN \cong \Delta GFH$

(d) By RHS congruence criterion,

since it is given that EB = BD, AE = CB, $\angle A = \angle C = 90^\circ$

Hypotenuse and one side of a right angled triangle are respectively equal to the hypotenuse and one side of another right angled triangle.

Therefore, $\Delta ABE \cong \Delta CDB$

APME

Question 2:

You want to show that $\Delta ART \cong \Delta PEN$:

(a) If you have to use SSS criterion, then you need to show:

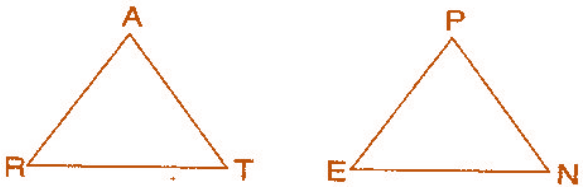
(i) AR = (ii) RT = (iii) AT =

(b) If it is given that $\angle T = \angle N$ and you are to use SAS criterion, you need to have:

(i) RT = and (ii) PN =

(c) If it is given that AT = PN and you are to use ASA criterion, you need to have:

(i) ? (ii) ?



Answer 2:

(a) Using SSS criterion, $\Delta ART \cong \Delta PEN$

(i) AR = PE (ii) RT = EN (iii) AT = PN

(b) Given: $\angle T = \angle N$

Using SAS criterion, $\Delta ART \cong \Delta PEN$

(i) RT = EN (ii) PN = AT

(c) Given: AT = PN

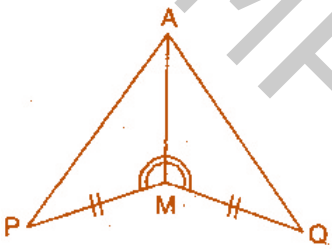
Using ASA criterion, $\Delta ART \cong \Delta PEN$

(i) $\angle RAT = \angle EPN$ (ii) $\angle RTA = \angle ENP$

APMF

Question 3:

You have to show that $\Delta AMP \cong \Delta AMQ$. In the following proof, supply the missing reasons:



Steps	Reasons
(i) PM = QM	(i) _____
(ii) $\angle$ PMA = $\angle$ QMA	(ii) _____
(iii) AM = AM	(iii) _____
(iv) ΔAMP $\cong \Delta$AMQ	(iv) _____

Answer 3:

Steps	Reasons
(i) PM = QM	(i) Given
(ii) $\angle$ PMA = $\angle$ QMA	(ii) Given
(iii) AM = AM	(iii) Common
(iv) ΔAMP $\cong \Delta$AMQ	(iv) SAS congruence rule

Question 4:

In ΔABC, $\angle A = 30^\circ$, $\angle B = 40^\circ$ and $\angle C = 110^\circ$.

In ΔPQR, $\angle P = 30^\circ$, $\angle Q = 40^\circ$ and $\angle R = 110^\circ$.

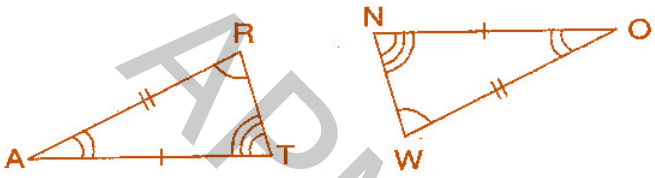
A student says that $\Delta ABC \cong \Delta PQR$ by AAA congruence criterion. Is he justified? Why or why not?

Answer 4:

No, because the two triangles with equal corresponding angles need not be congruent. In such a correspondence, one of them can be an enlarged copy of the other.

Question 5:

In the figure, the two triangles are congruent. The corresponding parts are marked. We can write $\Delta RAT \cong$?



Answer 5:

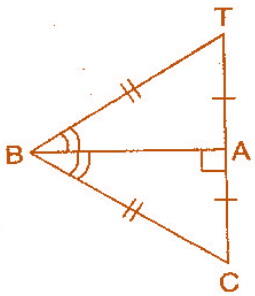
In the figure, given two triangles are congruent. So, the corresponding parts are:

$A \leftrightarrow O$, $R \leftrightarrow W$, $T \leftrightarrow N$.

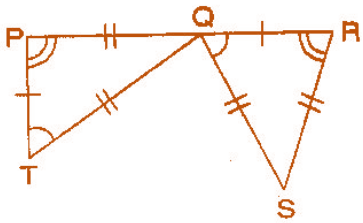
We can write, $\Delta RAT \cong \Delta WON$ [By SAS congruence rule]

Question 6:

Complete the congruence statement:



$\Delta BCA \cong$?



$\Delta QRS \cong$?

ADMF

Answer 6:

In ΔBAT and ΔBAC, given triangles are congruent so the corresponding parts are:

$B \leftrightarrow B$, $A \leftrightarrow A$, $T \leftrightarrow C$

Thus, $\Delta BCA \cong \Delta BTA$ [By SSS congruence rule]

In ΔQRS and ΔTPQ, given triangles are congruent so the corresponding parts are:

$P \leftrightarrow R$, $T \leftrightarrow Q$, $Q \leftrightarrow S$

Thus, $\Delta QRS \cong \Delta TPQ$ [By SSS congruence rule]

Question 7:

In a squared sheet, draw two triangles of equal area such that:

(i) the triangles are congruent.

(ii) the triangles are not congruent.

What can you say about their perimeters?

Answer 7:

In a squared sheet, draw ΔABC and ΔPQR.

When two triangles have equal areas and

(i) these triangles are congruent, i.e., $\Delta ABC \cong \Delta PQR$ [By SSS congruence rule] Then, their perimeters are same because length of sides of first triangle are equal to the length of sides of another triangle by SSS congruence rule.

(ii) But, if the triangles are not congruent, then their perimeters are not same because lengths of sides of first triangle are not equal to the length of corresponding sides of another triangle.

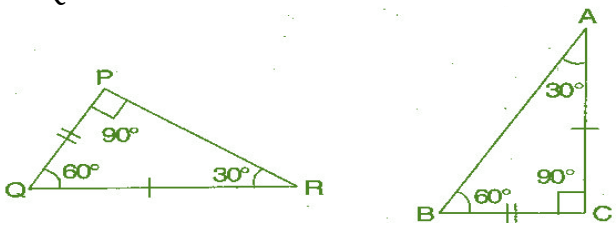
APME

Question 8:

Draw a rough sketch of two triangles such that they have five pairs of congruent parts but still the triangles are not congruent.

Answer 8:

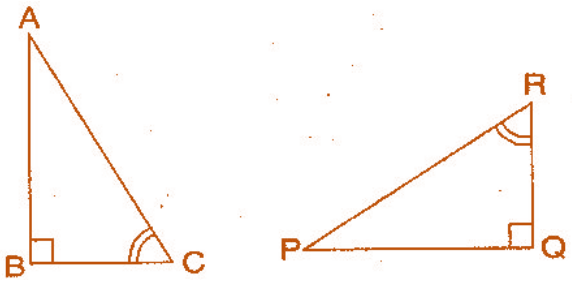
Let us draw two triangles PQR and ABC.



All angles are equal, two sides are equal except one side. Hence, ΔPQR are not congruent to ΔABC.

Question 9:

If ΔABC and ΔPQR are to be congruent, name one additional pair of corresponding parts. What criterion did you use?



Answer 9:

ΔABC and ΔPQR are congruent. Then one additional pair is $\overline{BC} = \overline{QR}$.

Given: $\angle B = \angle Q = 90^\circ$

$\angle C = \angle R$

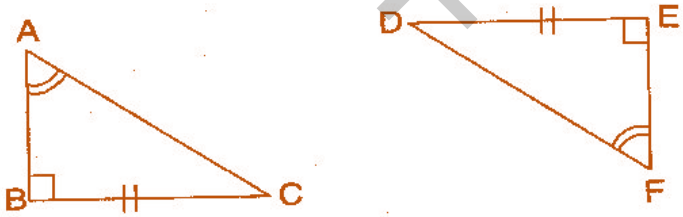
$\overline{BC} = \overline{QR}$

Therefore, $\Delta ABC \cong \Delta PQR$ [By ASA congruence rule]

APME

Question 10:

Explain, why $\Delta ABC \cong \Delta FED$.



Answer 10:

Given: $\angle A = \angle F$, $BC = ED$, $\angle B = \angle E$

In ΔABC and ΔFED,

$\angle B = \angle E = 90^\circ$

$\angle A = \angle F$

$BC = ED$

Therefore, $\Delta ABC \cong \Delta FED$ [By RHS congruence rule]

Mathematics

(Chapter – 8) (Comparing Quantities)

(Class – VII)

Exercise 8.1

Question 1:

Find the ratio of:

(a) ₹5 to 50 paise

(b) 15 kg to 210 g

(c) 9 m to 27 cm

(d) 30 days to 36 hours

Answer 1:

To find ratios, both quantities should be in same unit.

(a) ₹5 to 50 paise

$\Rightarrow$ 5 x 100 paise to 50 paise [$\because$ ₹ 1 = 100 paise]

$\Rightarrow$ 500 paise to 50 paise

Thus, the ratio is = $\frac{500}{50} = \frac{10}{1}$ = 10 : 1

(b) 15 kg to 210 g

$\Rightarrow$ 15 x 1000 g to 210 g [$\because$ 1 kg = 1000 g]

$\Rightarrow$ 15000 g to 210 g

Thus, the ratio is = $\frac{15000}{210} = \frac{500}{7}$ = 500 : 7

(c) 9 m to 27 cm

$\Rightarrow$ 9 x 100 cm to 27 cm [$\because$ 1 m = 100 cm]

$\Rightarrow$ 900 cm to 27 cm

Thus, the ratio is = $\frac{900}{27} = \frac{100}{3}$ = 100 : 3

(d) 30 days to 36 hours

$\Rightarrow$ 30 x 24 hours to 36 hours [$\because$ 1 day = 24 hours]

$\Rightarrow$ 720 hours to 36 hours

Thus, the ratio is = $\frac{720}{36} = \frac{20}{1}$ = 20 : 1

APMF

Question 2:

In a computer lab, there are 3 computers for every 6 students. How many computers will be needed for 24 students?

Answer 2:

$\because$ 6 students need = 3 computers

$\therefore$ 1 student needs = $\frac{3}{6}$ computers

$\therefore$ 24 students need = $\frac{3}{6} \times 24$ = 12 computers

Thus, 12 computers will be needed for 24 students.

Question 3:

Population of Rajasthan = 570 lakhs and population of U.P. = 1660 lakhs. Area of Rajasthan = 3 lakh km^2 and area of U.P. = 2 lakh km^2.

(i) How many people are there per km^2 in both states?

(ii) Which state is less populated?

Answer 3:

(i) People present per km^2 = $\frac{\text{Population}}{\text{Area}}$

In Rajasthan = $\frac{570 \text{ lakhs}}{3 \text{ lakhs per km}^2}$ = 190 people km^2

In U.P. = $\frac{1660 \text{ lakhs}}{2 \text{ lakh per km}^2}$ = 830 people per km^2

(ii) Rajasthan is less populated.

RPMF

Exercise 8.2

Question 1:

Convert the given fractional numbers to percent:

(a) $\frac{1}{8}$ (b) $\frac{5}{4}$ (c) $\frac{3}{40}$ (d) $\frac{2}{7}$

Answer 1:

(a) $\frac{1}{8} = \frac{1}{8}\times 100\% = \frac{25}{2}\% = 12.5\%$

(b) $\frac{5}{4} = \frac{5}{4}\times 100\% = 5 \text{ x } 25\% = 125\%$

(c) $\frac{3}{40} = \frac{3}{40}\times 100\% = \frac{3}{2}\times 5\% = \frac{15}{2}\% = 7.5\%$

(d) $\frac{2}{7} = \frac{2}{7}\times 100\% = \frac{200}{7}\% = 28\frac{4}{7}\%$

APMF

Question 2:

Convert the given decimal fractions to per cents:

(a) 0.65 (b) 2.1 (c) 0.02 (d) 12.35

Answer 2:

(a) $0.65 = \frac{65}{100}\times 100\% = 65\%$

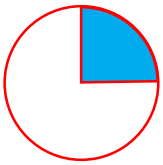
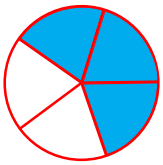
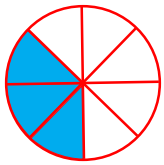
(b) $2.1 = \frac{2.1}{100}\times 100\% = 210\%$

(c) $0.02 = \frac{2}{100}\times 100\% = 2\%$

(b) $12.35 = \frac{12.35}{100}\times 100\% = 1235\%$

Question 3:

Estimate what part of the figures is coloured and hence find the percent which is coloured.

Answer 3:

(i) Coloured part = $\frac{1}{4}$

$\therefore$ Percent of coloured part = $\frac{1}{4} \times 100\% = 25\%$

(ii) Coloured part = $\frac{3}{5}$

$\therefore$ Percent of coloured part = $\frac{3}{5} \times 100\% = 60\%$

(iii) Coloured part = $\frac{3}{8}$

$\therefore$ Percent of coloured part = $\frac{3}{8} \times 100\% = \frac{3}{2} \times 25\%$

$= 37.5\%$

APMF

Question 4:

Find:

(a) 15% of 250 (b) 1% of 1 hour

(c) 20% of ₹2500 (d) 75% of 1 kg

Answer 4:

(a) 15% of 250 $= \frac{15}{100} \times 250 = 15 \text{ x } 2.5 = 37.5$

(b) 1% of 1 hours = 1% of 60 minutes = 1% of (60 x 60) seconds

$= \frac{1}{100} \times 60 \times 60 = 6 \text{ x } 6 = 36$ seconds

(c) 20% of ₹2500 = $\frac{20}{100} \times 2500$ = 20 x 25 = ₹ 500

(d) 75% of 1 kg = 75% of 1000 g = $\frac{75}{100} \times 1000$ = 750 g = 0.750 kg

Question 5:

Find the whole quantity if:

(a) 5% of it is 600

(b) 12% of it is ₹1080

(c) 40% of it is 500 km

(d) 70% of it is 14 minutes

(e) 8% of it is 40 litres

Answer 5:

Let the whole quantity be x in given questions:

(a) 5% of x = 600

$\Rightarrow \quad \frac{5}{100} \times x = 600$

$\Rightarrow \quad x = \frac{600 \times 100}{5}$ = 12,000

(b) 12% of x = ₹1080

$\Rightarrow \quad \frac{12}{100} \times x = 1080$

$\Rightarrow \quad x = \frac{1080 \times 100}{12}$ = ₹ 9,000

(c) 40% of x = 500 km

$\Rightarrow \quad \frac{40}{100} \times x = 500$

$\Rightarrow \quad x = \frac{500 \times 100}{40}$ = 1,250 km

(d) 70% of x = 14 minutes

$\Rightarrow \quad \frac{70}{100} \times x = 14$

$\Rightarrow \quad x = \frac{14 \times 100}{70}$ = 20 minutes

(e) 8% of x = 40 litres

$\Rightarrow \quad \frac{8}{100} \times x = 40$

$\Rightarrow \quad x = \frac{40 \times 100}{8}$ = 500 litres

APMF

Question 6:

Convert given per cents to decimal fractions and also to fractions in simplest forms:

(a) 25% (b) 150% (c) 20% (d) 5%

Answer 6:

S. No.	Per cents	Fractions	Simplest form	Decimal form
(a)	25%	$\frac{25}{100}$	$\frac{1}{4}$	0.25
(b)	150%	$\frac{150}{100}$	$\frac{3}{2}$	1.5
(c)	20%	$\frac{20}{100}$	$\frac{1}{5}$	0.2
(d)	5%	$\frac{5}{100}$	$\frac{1}{20}$	0.05

Question 7:

In a city, 30% are females, 40% are males and remaining are children. What percent are children?

Answer 7:

Given: Percentage of females = 30%

Percentage of males = 40%

Total percentage of females and males = 30 + 40 = 70%

Percentage of children = Total percentage – Percentage of males and females

= 100% – 70%

= 30%

Hence, 30% are children.

Question 8:

Out of 15,000 voters in a constituency, 60% voted. Find the percentage of voters who did not vote. Can you now find how many actually did not vote?

Answer 8:

Total voters = 15,000

Percentage of voted candidates = 60%

Percentage of not voted candidates = 100 – 60 = 40%

Actual candidates, who did not vote = 40% of 15000

$$= \frac{40}{100} \times 15000 = 6{,}000$$

Hence, 6,000 candidates did not vote.

APME

Question 9:

Meeta saves ₹ 400 from her salary. If this is 10% of her salary. What is her salary?

Answer 9:

Let Meera's salary be ₹ x.

Now, 10% of salary = ₹ 400

$\Rightarrow$ 10% of x = ₹ 400

$\Rightarrow \frac{10}{100} \times x = 400$

$\Rightarrow x = \frac{400 \times 100}{10}$

$\Rightarrow x = 4{,}000$

Hence, Meera's salary is ₹ 4,000.

Question 10:

A local cricket team played 20 matches in one season. It won 25% of them. How many matches did they win?

Answer 10:

Number of matches played by cricket team = 20

Percentage of won matches = 25%

Total matches won by them = 25% of 20

$= \frac{25}{100} \times 20$

$= 5$

Hence, they won 5 matches.

APME

Exercise 8.3

Question 1:

Tell what is the profit or loss in the following transactions. Also find profit percent or loss percent in each case.

(a) Gardening shears bought for ₹ 250 and sold for ₹ 325.

(b) A refrigerator bought ₹12,000 and sold at ₹ 13,500.

(c) A cupboard bought for ₹ 2,500 and sold at ₹ 3,000.

(d) A skirt bought for ₹ 250 and sold at ₹ 150.

Answer 1:

(a) Cost price of gardening shears = ₹ 250

Selling price of gardening shears = ₹ 325

Since, S.P. > C.P., therefore here is profit.

$\therefore$ Profit = S.P. – C.P. = ₹325 – ₹250 = ₹ 75

Now $\text{Profit\%} = \frac{\text{Profit}}{\text{C.P.}} \times 100$

$= \frac{75}{250} \times 100 = 30\%$

Therefore, Profit = ₹75 and Profit% = 30%

(b) Cost price of refrigerator = ₹ 12,000

Selling price of refrigerator = ₹13,500

Since, S.P. > C.P., therefore here is profit.

$\therefore$ Profit = S.P. – C.P. = ₹13500 – ₹12000 = ₹1,500

Now $\text{Profit\%} = \frac{\text{Profit}}{\text{C.P.}} \times 100$

$= \frac{1500}{12000} \times 100 = 12.5\%$

Therefore, Profit = ₹1,500 and Profit% = 12.5%

(c) Cost price of cupboard = ₹ 2,500

Selling price of cupboard = ₹ 3,000

Since, S.P. > C.P., therefore here is profit.

$\therefore$ Profit = S.P. – C.P. = ₹3,000 – ₹2,500 = ₹ 500

Now $\text{Profit\%} = \frac{\text{Profit}}{\text{C.P.}} \times 100$

$= \frac{500}{2500} \times 100 = 20\%$

Therefore, Profit = ₹ 500 and Profit% = 20%

APME

(d) Cost price of skirt = ₹ 250

Selling price of skirt = ₹ 150

Since, C.P. > S.P., therefore here is loss.

$\therefore$ Loss = C.P. – S.P. =₹250 – ₹150 = ₹100

Now Loss% = $\frac{\text{Loss}}{\text{C.P.}} \times 100$

$= \frac{100}{250} \times 100 = 40\%$

Therefore, Profit = ₹ 100 and Profit% = 40%

Question 2:

Convert each part of the ratio to percentage:

(a) 3 : 1 (b) 2 : 3 : 5 (c) 1 : 4 (d) 1 : 2 : 5

Answer 2:

(a) 3 : 1

Total part = 3 + 1 = 4

Therefore, Fractional part = $\frac{3}{4} : \frac{1}{4}$

$\Rightarrow$ Percentage of parts = $\frac{3}{4} \times 100 : \frac{1}{4} \times 100$

$\Rightarrow$ Percentage of parts = 75% : 25%

(b) 2 : 3 : 5

Total part = 2 + 3 + 5 = 10

Therefore, Fractional part = $\frac{2}{10} : \frac{3}{10} : \frac{5}{10}$

$\Rightarrow$ Percentage of parts = $\frac{2}{10} \times 100 : \frac{3}{10} \times 100 : \frac{5}{10} \times 100$

$\Rightarrow$ Percentage of parts = 20% : 30% : 50%

(c) 1 : 4

Total part = 1 + 4 = 5

Therefore, Fractional part = $\frac{1}{5} : \frac{4}{5}$

$\Rightarrow$ Percentage of parts = $\frac{1}{5} \times 100 : \frac{4}{5} \times 100$

$\Rightarrow$ Percentage of parts = 20% : 80%

APME

(d) 1 : 2 : 5

Total part = 1 + 2 + 5 = 8

Therefore, Fractional part = $\frac{1}{8}:\frac{2}{8}:\frac{5}{8}$

$\Rightarrow$ Percentage of parts = $\frac{1}{8}\times 100:\frac{2}{8}\times 100:\frac{5}{8}\times 100$

$\Rightarrow$ Percentage of parts = 12.5% : 25% : 62.5%

Question 3:

The population of a city decreased from 25,000 to 24,500. Find the percentage decrease.

Answer 3:

The decreased population of a city from 25,000 to 24,500.

Population decreased = 25,000 – 24,500 = 500

Decreased Percentage = $\frac{\text{Population decreased}}{\text{Original population}}\times 100$

$= \frac{500}{25000}\times 100 = 2\%$

Hence, the percentage decreased is 2%.

RPMF

Question 4:

Arun bought a car for ₹3,50,000. The next year, the price went up to ₹3,70,000. What was the percentage of price increase?

Answer 4:

Increased in price of a car from ₹ 3,50,000 to ₹ 3,70,000.

Amount change = ₹ 3,70,000 – ₹ 3,50,000 = ₹ 20,000.

Therefore, Increased percentage = $\frac{\text{Amount of change}}{\text{Original amount}}\times 100$

$= \frac{20000}{350000}\times 100 = 5\frac{5}{7}\%$

Hence, the percentage of price increased is $5\frac{5}{7}\%$.

Question 5:

I buy a T.V. for ₹10,000 and sell it at a profit of 20%. How much money do I get for it?

Answer 5:

The cost price of T.V. = ₹ 10,000

Profit percent = 20%

Now, Profit = Profit% of C.P.

$$= \frac{20}{100} \times 10000$$

= ₹ 2,000

Selling price = C.P. + Profit = ₹10,000 + ₹2,000 = ₹ 12,000

Hence, he gets ₹12,000 on selling his T.V.

Question 6:

Juhi sells a washing machine for ₹13,500. She loses 20% in the bargain. What was the price at which she bought it?

Answer 6:

Selling price of washing machine = ₹13,500

Loss percent = 20%

Let the cost price of washing machine be ₹ x.

Since, Loss = Loss% of C.P.

$\Rightarrow$ Loss = 20% of ₹ x = $\frac{20}{100} \times x = \frac{x}{5}$

Therefore, S.P. = C.P. – Loss

$\Rightarrow$ $13500 = x - \frac{x}{5}$

$\Rightarrow$ $13500 = \frac{4x}{5}$

$\Rightarrow$ $x = \frac{13500 \times 5}{4}$ = ₹16,875

Hence, the cost price of washing machine is ₹16,875.

APME

Question 7

(i) Chalk contains Calcium, Carbon and Oxygen in the ratio 10:3:12. Find the percentage of Carbon in chalk.

(ii) If in a stick of chalk, Carbon is 3 g, what is the weight of the chalk stick?

Answer 7:

(i) Given ratio = 10 : 3 : 12

Total part = 10 + 3 + 12 = 25

Part of Carbon = $\frac{3}{25}$

Percentage of Carbon part in chalk = $\frac{3}{25} \times 100 = 12\%$

(ii) Quantity of Carbon in chalk stick = 3 g

Let the weight of chalk be x g.

Then, 12% of x = 3

$\Rightarrow \quad \frac{12}{100} \times x = 3$

$\Rightarrow \quad x = \frac{3 \times 100}{12} = 25$ g

Hence, the weight of chalk stick is 25 g.

APMF

Question 8:

Amina buys a book for ₹275 and sells it at a loss of 15%. How much does she sell it for?

Answer 8:

The cost of a book = ₹275

Loss percent = 15%

Loss = Loss% of C.P. = 15% of ₹275

$= \frac{15}{100} \times 275 = ₹\ 41.25$

Therefore, S.P. = C.P. – Loss = ₹275 – ₹41.25 = ₹233.75

Hence, Amina sells a book for ₹233.75.

Question 9:

Find the amount to be paid at the end of 3 years in each case:

(a) Principal = ₹1,200 at 12% p.a.

(b) Principal = ₹ 7,500 at 5% p.a.

Answer 9:

(a) Here, Principal (P) = ₹1,200, Rate (R) = 12% p.a., Time (T) = 3 years

$$\text{Simple Interest} = \frac{P \times R \times T}{100} = \frac{1200 \times 12 \times 3}{100}$$

$$= ₹\ 432$$

Now, Amount = Principal + Simple Interest

= ₹1200 + ₹432

= ₹1,632

(b) Here, Principal (P) = ₹7,500, Rate (R) = 5% p.a., Time (T) = 3 years

$$\text{Simple Interest} = \frac{P \times R \times T}{100} = \frac{7500 \times 5 \times 3}{100}$$

= ₹1,125

Now, Amount = Principal + Simple Interest

= ₹7,500 + ₹1,125

= ₹ 8,625

APMF

Question 10:

What rate gives ₹ 280 as interest on a sum of ₹ 56,000 in 2 years?

Answer 10:

Here, Principal (P) = ₹56,000, Simple Interest (S.I.) = ₹280, Time (T) = 2 years

$$\text{Simple Interest} = \frac{P \times R \times T}{100}$$

$$\Rightarrow \quad 280 = \frac{56000 \times R \times 2}{100}$$

$$\Rightarrow \quad R = \frac{280 \times 100}{56000 \times 2}$$

$$\Rightarrow \quad R = 0.25\%$$

Hence, the rate of interest on sum is 0.25%.

Question 11:

If Meena gives an interest of ₹45 for one year at 9% rate p.a. What is the sum she has borrowed?

Answer 11:

Simple Interest = ₹45, Rate (R) = 9% p.a., Time (T) = 1 years

$$\text{Simple Interest} = \frac{P \times R \times T}{100}$$

$$\Rightarrow \quad 45 = \frac{P \times 9 \times 1}{100}$$

$$\Rightarrow \quad P = \frac{45 \times 100}{9 \times 1}$$

$$\Rightarrow \quad P = ₹\ 500$$

Hence, she borrowed ₹ 500.

APMF

Mathematics

(Chapter – 9) (Rational Numbers)

(Class – VII)

Exercise 9.1

Question 1:

List five rational numbers between:

(i) -1 and 0

(ii) -2 and -1

(iii) $\frac{-4}{5}$ and $\frac{-2}{3}$

(iv) $\frac{-1}{2}$ and $\frac{2}{3}$

Answer 1:

(i) -1 and 0

Let us write -1 and 0 as rational numbers with denominator 6.

$\Rightarrow \quad -1 = \frac{-6}{6}$ and $0 = \frac{0}{6}$

$\therefore \quad \frac{-6}{6} < \frac{-5}{6} < \frac{-4}{6} < \frac{-3}{6} < \frac{-2}{6} < \frac{-1}{6} < 0$

$\Rightarrow \quad -1 < \frac{-5}{6} < \frac{-2}{3} < \frac{-1}{2} < \frac{-1}{3} < \frac{-1}{6} < 0$

Therefore, five rational numbers between -1 and 0 would be

$\frac{-5}{6}, \frac{-2}{3}, \frac{-1}{2}, \frac{-1}{3}, \frac{-1}{6}$

(ii) -2 and -1

Let us write -2 and -1 as rational numbers with denominator 6.

$\Rightarrow \quad -2 = \frac{-12}{6}$ and $-1 = \frac{-6}{6}$

$\therefore \quad \frac{-12}{6} < \frac{-11}{6} < \frac{-10}{6} < \frac{-9}{6} < \frac{-8}{6} < \frac{-7}{6} < \frac{-6}{6}$

$\Rightarrow \quad -2 < \frac{-11}{6} < \frac{-5}{3} < \frac{-3}{2} < \frac{-4}{3} < \frac{-7}{6} < -1$

Therefore, five rational numbers between -2 and -1 would be

$\frac{-11}{6}, \frac{-5}{3}, \frac{-3}{2}, \frac{-4}{3}, \frac{-7}{6}$

APMF

(iii) $\frac{-4}{5}$ and $\frac{-2}{3}$

Let us write $\frac{-4}{5}$ and $\frac{-2}{3}$ as rational numbers with the same denominators.

$\Rightarrow \quad \frac{-4}{5}=\frac{-36}{45}$ and $\frac{-2}{3}=\frac{-30}{45}$

$\therefore \quad \frac{-36}{45}<\frac{-35}{45}<\frac{-34}{45}<\frac{-33}{45}<\frac{-32}{45}<\frac{-31}{45}<\frac{-30}{45}$

$\Rightarrow \quad \frac{-4}{5}<\frac{-7}{9}<\frac{-34}{45}<\frac{-11}{15}<\frac{-32}{45}<\frac{-31}{45}<\frac{-2}{3}$

Therefore, five rational numbers between $\frac{-4}{5}$ and $\frac{-2}{3}$ would be

$\frac{-7}{9},\frac{-34}{45},\frac{-11}{15},\frac{-32}{45},\frac{-31}{45},\frac{-2}{3}$

APMF

(iv) $\frac{-1}{2}$ and $\frac{2}{3}$

Let us write $\frac{-1}{2}$ and $\frac{2}{3}$ as rational numbers with the same denominators.

$\Rightarrow \quad \frac{-1}{2}=\frac{-3}{6}$ and $\frac{2}{3}=\frac{4}{6}$

$\therefore \quad \frac{-3}{6}<\frac{-2}{6}<\frac{-1}{6}<0<\frac{1}{6}<\frac{2}{6}<\frac{3}{6}<\frac{4}{6}$

$\Rightarrow \quad \frac{-1}{2}<\frac{-1}{3}<\frac{-1}{6}<0<\frac{1}{6}<\frac{1}{3}<\frac{1}{2}<\frac{2}{3}$

Therefore, five rational numbers between $\frac{-1}{2}$ and $\frac{2}{3}$ would be

$\frac{-1}{3},\frac{-1}{6},0,\frac{1}{6},\frac{1}{3}$.

Question 2:

Write four more rational numbers in each of the following patterns:

(i) $\frac{-3}{5}, \frac{-6}{10}, \frac{-9}{15}, \frac{-12}{20}, \ldots\ldots\ldots$

(ii) $\frac{-1}{4}, \frac{-2}{8}, \frac{-3}{12}, \ldots\ldots\ldots$

(iii) $\frac{-1}{6}, \frac{2}{-12}, \frac{3}{-18}, \frac{4}{-24}, \ldots\ldots\ldots$

(iv) $\frac{-2}{3}, \frac{2}{-3}, \frac{4}{-6}, \frac{6}{-9}, \ldots\ldots\ldots$

Answer 2:

(i) $\frac{-3}{5}, \frac{-6}{10}, \frac{-9}{15}, \frac{-12}{20}, \ldots\ldots\ldots$

$\Rightarrow \frac{-3\times1}{5\times1}, \frac{-3\times2}{5\times2}, \frac{-3\times3}{5\times3}, \frac{-3\times4}{5\times4}, \ldots\ldots\ldots$

Therefore, the next four rational numbers of this pattern would be

$\frac{-3\times5}{5\times5}, \frac{-3\times6}{5\times6}, \frac{-3\times7}{5\times7}, \frac{-3\times8}{5\times8} = \frac{-15}{25}, \frac{-18}{30}, \frac{-21}{35}, \frac{-24}{40}$

(ii) $\frac{-1}{4}, \frac{-2}{8}, \frac{-3}{12}, \ldots\ldots\ldots$

$\Rightarrow \frac{-1\times1}{4\times1}, \frac{-1\times2}{4\times2}, \frac{-1\times3}{4\times3}, \ldots\ldots\ldots$

Therefore, the next four rational numbers of this pattern would be

$\frac{-1\times4}{4\times4}, \frac{-1\times5}{4\times5}, \frac{-1\times6}{4\times6}, \frac{-1\times7}{4\times7} = \frac{-4}{16}, \frac{-5}{20}, \frac{-6}{24}, \frac{-7}{28}$

(iii) $\frac{-1}{6}, \frac{2}{-12}, \frac{3}{-18}, \frac{4}{-24}, \ldots\ldots\ldots$

$\Rightarrow \frac{-1\times1}{6\times1}, \frac{1\times2}{-6\times2}, \frac{1\times3}{-6\times3}, \frac{1\times4}{-6\times4}, \ldots\ldots\ldots$

Therefore, the next four rational numbers of this pattern would be

$\frac{1\times5}{-6\times5}, \frac{1\times6}{-6\times6}, \frac{1\times7}{-6\times7}, \frac{1\times8}{-6\times8} = \frac{5}{-30}, \frac{6}{-36}, \frac{7}{-42}, \frac{8}{-48}$

ADMF

(iv) $\frac{-2}{3}, \frac{2}{-3}, \frac{4}{-6}, \frac{6}{-9}, \ldots\ldots\ldots$

$\Rightarrow \frac{-2\times1}{3\times1}, \frac{2\times1}{-3\times1}, \frac{2\times2}{-3\times2}, \frac{2\times3}{-3\times3}, \ldots\ldots\ldots$

Therefore, the next four rational numbers of this pattern would be

$\frac{2\times4}{-3\times4}, \frac{2\times5}{-3\times5}, \frac{2\times6}{-3\times6}, \frac{2\times7}{-3\times7} = \frac{8}{-12}, \frac{10}{-15}, \frac{12}{-18}, \frac{14}{-21}$

Question 3:

Give four rational numbers equivalent to:

(i) $\frac{-2}{7}$ (ii) $\frac{5}{-3}$ (iii) $\frac{4}{9}$

Answer 3:

(i) $\frac{-2}{7}$

$\frac{-2\times2}{7\times2} = \frac{-4}{14}, \frac{-2\times3}{7\times3} = \frac{-6}{21}, \frac{-2\times4}{7\times4} = \frac{-8}{28}, \frac{-2\times5}{7\times5} = \frac{-10}{35}$

Therefore, four equivalent rational numbers are $\frac{-4}{14}, \frac{-6}{21}, \frac{-8}{28}, \frac{-10}{35}$.

(ii) $\frac{5}{-3}$

$\frac{5\times2}{-3\times2} = \frac{10}{-6}, \frac{5\times3}{-3\times3} = \frac{15}{-9}, \frac{5\times4}{-3\times4} = \frac{20}{-12}, \frac{5\times5}{-3\times5} = \frac{25}{-15}$

Therefore, four equivalent rational numbers are $\frac{10}{-6}, \frac{15}{-9}, \frac{20}{-12}, \frac{25}{-15}$.

(iii) $\frac{4}{9}$

$\frac{4\times2}{9\times2} = \frac{8}{18}, \frac{4\times3}{9\times3} = \frac{12}{27}, \frac{4\times4}{9\times4} = \frac{16}{36}, \frac{4\times5}{9\times5} = \frac{20}{45}$

Therefore, four equivalent rational numbers are $\frac{8}{18}, \frac{12}{27}, \frac{16}{36}, \frac{20}{45}$.

APME

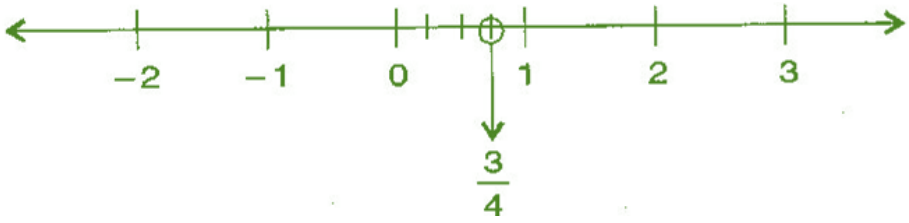
Question 4:

Draw the number line and represent the following rational numbers on it:

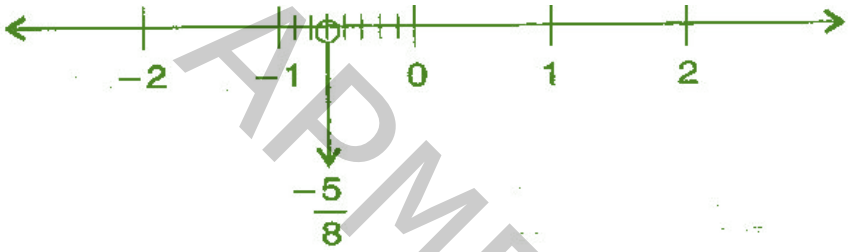
(i) $\frac{3}{4}$ (ii) $\frac{-5}{8}$ (iii) $\frac{-7}{4}$ (iv) $\frac{7}{8}$

Answer 4:

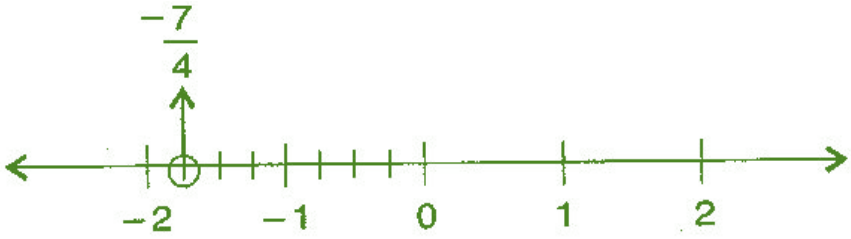
(i) $\frac{3}{4}$



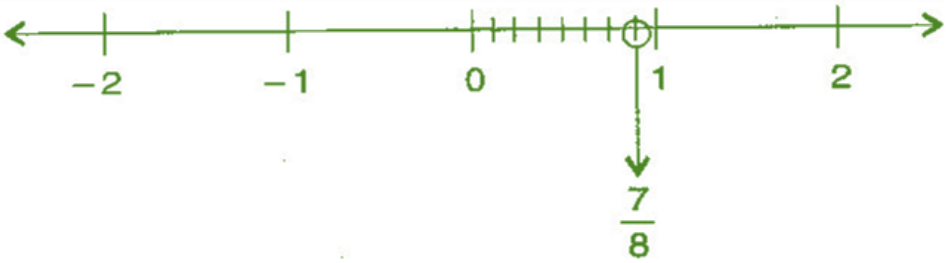
(ii) $\frac{-5}{8}$



(iii) $\frac{-7}{4}$



(iv) $\frac{7}{8}$



APME

Question 5:

The points P, Q, R, S, T, U, A and B on the number line are such that, TR = RS = SU and AP = PQ = QB. Name the rational numbers represented by P, Q, R and S.

Answer 5:

Each part which is between the two numbers is divided into 3 parts.

Therefore, $A = \frac{6}{3}$, $P = \frac{7}{3}$, $Q = \frac{8}{3}$ and $B = \frac{9}{3}$

Similarly $T = \frac{-3}{3}$, $R = \frac{-4}{3}$, $S = \frac{-5}{3}$ and $U = \frac{-6}{3}$

Thus, the rational numbers represented P, Q, R and S are $\frac{7}{3}, \frac{8}{3}, \frac{-4}{3}$ and $\frac{-5}{3}$ respectively.

APMF

Question 6:

Which of the following pairs represent the same rational numbers:

(i) $\frac{-7}{21}$ and $\frac{3}{9}$

(ii) $\frac{-16}{20}$ and $\frac{20}{-25}$

(iii) $\frac{-2}{-3}$ and $\frac{2}{3}$

(iv) $\frac{-3}{5}$ and $\frac{-12}{20}$

(v) $\frac{8}{-5}$ and $\frac{-24}{15}$

(vi) $\frac{1}{3}$ and $\frac{-1}{9}$

(vii) $\frac{-5}{-9}$ and $\frac{5}{-9}$

Answer 6:

(i) $\frac{-7}{21}$ and $\frac{3}{9}$

$\Rightarrow \frac{-7}{21} = \frac{-1}{3}$ and $\frac{3}{9} = \frac{1}{3}$ [Converting into lowest term]

$\because \frac{-1}{3} \neq \frac{1}{3}$

$\therefore \frac{-7}{21} \neq \frac{3}{9}$

(ii) $\frac{-16}{20}$ and $\frac{20}{-25}$

$\Rightarrow \frac{-16}{20} = \frac{-4}{5}$ and $\frac{20}{-25} = \frac{4}{-5} = \frac{-4}{5}$ [Converting into lowest term]

$\because \frac{-4}{5} = \frac{-4}{5}$

$\therefore \frac{-16}{20} = \frac{20}{-25}$

(iii) $\frac{-2}{-3}$ and $\frac{2}{3}$

$\Rightarrow \frac{-2}{-3} = \frac{2}{3}$ and $\frac{2}{3} = \frac{2}{3}$ [Converting into lowest term]

$\because \frac{2}{3} = \frac{2}{3}$

$\therefore \frac{-2}{-3} = \frac{2}{3}$

(iv) $\frac{-3}{5}$ and $\frac{-12}{20}$

$\Rightarrow \frac{-3}{5} = \frac{-3}{5}$ and $\frac{-12}{20} = \frac{-3}{5}$ [Converting into lowest term]

$\because \frac{-3}{5} = \frac{-3}{5}$

$\therefore \frac{-3}{5} = \frac{-12}{20}$

APMF

(v) $\frac{8}{-5}$ and $\frac{-24}{15}$

$\Rightarrow \frac{8}{-5} = \frac{-8}{5}$ and $\frac{-24}{15} = \frac{-8}{5}$ [Converting into lowest term]

$\because \frac{-8}{5} = \frac{-8}{5}$

$\therefore \frac{8}{-5} = \frac{-24}{15}$

(vi) $\frac{1}{3}$ and $\frac{-1}{9}$

$\Rightarrow \frac{1}{3} = \frac{1}{3}$ and $\frac{-1}{9} = \frac{-1}{9}$ [Converting into lowest term]

$\because \frac{1}{3} \neq \frac{-1}{9}$

$\therefore \frac{1}{3} \neq \frac{-1}{9}$

(vii) $\frac{-5}{-9}$ and $\frac{5}{-9}$

$\Rightarrow \frac{-5}{-9} = \frac{5}{9}$ and $\frac{5}{-9} = \frac{5}{9}$ [Converting into lowest term]

$\because \frac{5}{9} \neq \frac{5}{-9}$

$\therefore \frac{-5}{-9} \neq \frac{5}{-9}$

Question 7:

Rewrite the following rational numbers in the simplest form:

(i) $\frac{-8}{6}$ (ii) $\frac{25}{45}$ (iii) $\frac{-44}{72}$ (iv) $\frac{-8}{10}$

Answer 7:

(i) $\frac{-8}{6} = \frac{-8 \div 2}{6 \div 2} = \frac{-4}{3}$ [H.C.F. of 8 and 6 is 2]

APMF

(ii) $\frac{25}{45} = \frac{25\div5}{45\div5} = \frac{5}{9}$ [H.C.F. of 25 and 45 is 5]

(iii) $\frac{-44}{72} = \frac{-44\div4}{72\div4} = \frac{-11}{18}$ [H.C.F. of 44 and 72 is 4]

(iv) $\frac{-8}{10} = \frac{-8\div2}{10\div2} = \frac{-4}{5}$ [H.C.F. of 8 and 10 is 2]

Question 8:

Fill in the boxes with the correct symbol out of <, > and =:

(i) $\frac{-5}{7}\square\frac{2}{3}$ (ii) $\frac{-4}{5}\square\frac{-5}{7}$ (iii) $\frac{-7}{8}\square\frac{14}{-16}$ (iv) $\frac{-8}{5}\square\frac{-7}{4}$

(v) $\frac{1}{-3}\square\frac{-1}{4}$ (vi) $\frac{5}{-11}\square\frac{-5}{11}$ (vii) $0\square\frac{-7}{6}$

Answer 8:

(i) $\frac{-5}{7}\boxed{<}\frac{2}{3}$ Since, the positive number if greater than negative number.

(ii) $\frac{-4\times7}{5\times7}\square\frac{-5\times5}{7\times5} \Rightarrow \frac{-28}{35}\boxed{<}\frac{-25}{35} \Rightarrow \frac{-4}{5}\boxed{<}\frac{-5}{7}$

(iii) $\frac{-7\times2}{8\times2}\square\frac{14\times(-1)}{-16\times(-1)} \Rightarrow \frac{-14}{16}\boxed{=}\frac{-14}{16} \Rightarrow \frac{-7}{8}\boxed{=}\frac{14}{-16}$

(iv) $\frac{-8\times4}{5\times4}\square\frac{-7\times5}{4\times5} \Rightarrow \frac{-32}{20}\boxed{>}\frac{-35}{20} \Rightarrow \frac{-8}{5}\boxed{>}\frac{-7}{4}$

(v) $\frac{1}{-3}\square\frac{-1}{4} \Rightarrow \frac{1}{-3}\boxed{<}\frac{-1}{4}$

(vi) $\frac{5}{-11}\square\frac{-5}{11} \Rightarrow \frac{5}{-11}\boxed{=}\frac{-5}{11}$

(vii) $0\boxed{>}\frac{-7}{6}$ Since, 0 is greater than every negative number.

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Question 9:

Which is greater in each of the following:

(i) $\frac{2}{3}, \frac{5}{2}$ (ii) $\frac{-5}{6}, \frac{-4}{3}$ (iii) $\frac{-3}{4}, \frac{2}{-3}$ (iv) $\frac{-1}{4}, \frac{1}{4}$

(v) $-3\frac{2}{7}, -3\frac{4}{5}$

Answer 9:

(i) $\frac{2\times2}{3\times2}=\frac{4}{6}$ and $\frac{5\times3}{2\times3}=\frac{15}{6}$

Since $\frac{4}{6}\boxed{<}\frac{15}{6}$ Therefore $\frac{2}{3}\boxed{<}\frac{5}{2}$

(ii) $\frac{-5\times1}{6\times1}=\frac{-5}{6}$ and $\frac{-4\times2}{3\times2}=\frac{-8}{6}$

Since $\frac{-5}{6}\boxed{>}\frac{-8}{6}$ Therefore $\frac{-5}{6}\boxed{>}\frac{-4}{3}$

(iii) $\frac{-3\times3}{4\times3}=\frac{-9}{12}$ and $\frac{2\times(-4)}{-3\times(-4)}=\frac{-8}{12}$

Since $\frac{-9}{12}\boxed{<}\frac{-8}{12}$ Therefore $\frac{-3}{4}\boxed{<}\frac{2}{-3}$

(iv) $\frac{-1}{4}\boxed{<}\frac{1}{4}$ Since positive number is always greater than negative number.

(v) $-3\frac{2}{7}=\frac{-23}{7}=\frac{-23\times5}{7\times5}=\frac{-115}{35}$ and $-3\frac{4}{5}=\frac{-19}{5}=\frac{-19\times7}{5\times7}=\frac{-133}{35}$

Since $\frac{-115}{35}\boxed{>}\frac{-133}{35}$ Therefore $-3\frac{2}{7}\boxed{>}-3\frac{4}{5}$

Question 10:

Write the following rational numbers in ascending order:

(i) $\frac{-3}{5}, \frac{-2}{5}, \frac{-1}{5}$

(ii) $\frac{1}{3}, \frac{-2}{9}, \frac{-4}{3}$

(iii) $\frac{-3}{7}, \frac{-3}{2}, \frac{-3}{4}$

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Answer 10:

(i) $\frac{-3}{5}, \frac{-2}{5}, \frac{-1}{5}$

$\Rightarrow \quad \frac{-3}{5} < \frac{-2}{5} < \frac{-1}{5}$

(ii) $\frac{1}{3}, \frac{-2}{9}, \frac{-4}{3} \quad \Rightarrow \quad \frac{3}{9}, \frac{-2}{9}, \frac{-12}{9}$ [Converting into same denominator]

Now $\frac{-12}{9} < \frac{-2}{9} < \frac{3}{9} \quad \Rightarrow \quad \frac{-4}{3} < \frac{-2}{9} < \frac{1}{3}$

(iii) $\frac{-3}{7}, \frac{-3}{2}, \frac{-3}{4}$

$\Rightarrow \quad \frac{-3}{2} < \frac{-3}{4} < \frac{-3}{7}$

APMF

Exercise 9.2

Question 1:

Find the sum:

(i) $\frac{5}{4}+\left(\frac{-11}{4}\right)$

(ii) $\frac{5}{3}+\frac{3}{5}$

(iii) $\frac{-9}{10}+\frac{22}{15}$

(iv) $\frac{-3}{-11}+\frac{5}{9}$

(v) $\frac{-8}{19}+\frac{(-2)}{57}$

(vi) $\frac{-2}{3}+0$

(vii) $-2\frac{1}{3}+4\frac{3}{5}$

Answer 1:

(i) $\frac{5}{4}+\left(\frac{-11}{4}\right)=\frac{5-11}{4}=\frac{-6}{4}=\frac{-3}{2}$

(ii) $\frac{5}{3}+\frac{3}{5}=\frac{5\times5}{3\times5}+\frac{3\times3}{5\times3}=\frac{25}{15}+\frac{9}{15}$ [L.C.M. of 3 and 5 is 15]

$=\frac{25+9}{15}=\frac{34}{15}=2\frac{4}{15}$

(iii) $\frac{-9}{10}+\frac{22}{15}=\frac{-9\times3}{10\times3}+\frac{22\times2}{15\times2}=\frac{-27}{30}+\frac{44}{30}$ [L.C.M. of 10 and 15 is 30]

$=\frac{-27+44}{30}=\frac{17}{30}$

(iv) $\frac{-3}{-11}+\frac{5}{9}=\frac{-3\times9}{-11\times9}+\frac{5\times11}{9\times11}=\frac{27}{99}+\frac{55}{99}$ [L.C.M. of 11 and 9 is 99]

$=\frac{27+55}{99}=\frac{82}{99}$

(v) $\frac{-8}{19}+\frac{(-2)}{57}=\frac{-8\times3}{19\times3}+\frac{(-2)\times1}{57\times1}=\frac{-24}{57}+\frac{(-2)}{57}$ [L.C.M. of 19 and 57 is 57]

$=\frac{-24-2}{57}=\frac{-26}{57}$

(vi) $\frac{-2}{3}+0=\frac{-2}{3}$

APME

(vii) $-2\frac{1}{3}+4\frac{3}{5}=\frac{-7}{3}+\frac{23}{5}=\frac{-7\times5}{3\times5}+\frac{23\times3}{5\times3}=\frac{-35}{15}+\frac{69}{15}$ [L.C.M. of 3 and 5 is 15]

$=\frac{-35+69}{15}=\frac{34}{15}=2\frac{4}{15}$

Question 2:

Find:

(i) $\frac{7}{24}-\frac{17}{36}$ (ii) $\frac{5}{63}-\left(\frac{-6}{21}\right)$

(iii) $\frac{-6}{13}-\left(\frac{-7}{15}\right)$ (iv) $\frac{-3}{8}-\frac{7}{11}$

(v) $-2\frac{1}{9}-6$

Answer 2:

(i) $\frac{7}{24}-\frac{17}{36}=\frac{7\times3}{24\times3}-\frac{17\times2}{36\times2}=\frac{21}{72}-\frac{34}{72}$ [L.C.M. of 24 and 36 is 72]

$=\frac{21-34}{72}=\frac{-13}{72}$

(ii) $\frac{5}{63}-\left(\frac{-6}{21}\right)=\frac{5\times1}{63\times1}-\left(\frac{-6\times3}{21\times3}\right)=\frac{5}{63}-\frac{-18}{63}$ [L.C.M. of 63 and 21 is 63]

$=\frac{5-(-18)}{63}=\frac{5+18}{63}=\frac{23}{63}$

(iii) $\frac{-6}{13}-\left(\frac{-7}{15}\right)=\frac{-6\times15}{13\times15}-\left(\frac{-7\times13}{15\times13}\right)=\frac{-90}{195}-\left(\frac{-91}{195}\right)$ [L.C.M. of 13 and 15 is 195]

$=\frac{-90-(-91)}{195}=\frac{-90+91}{195}=\frac{1}{195}$

(iv) $\frac{-3}{8}-\frac{7}{11}=\frac{-3\times11}{8\times11}-\frac{7\times8}{11\times8}=\frac{-33}{88}-\frac{56}{88}$ [L.C.M. of 8 and 11 is 88]

$=\frac{-33-56}{88}=\frac{-89}{88}=-1\frac{1}{88}$

(v) $-2\frac{1}{9}-6=\frac{-19}{9}-\frac{6}{1}=\frac{-19\times1}{9\times1}-\frac{6\times9}{1\times9}$ [L.C.M. of 9 and 1 is 9]

$=\frac{-19}{9}-\frac{54}{9}=\frac{-19-54}{9}=\frac{-73}{9}=-8\frac{1}{9}$

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Question 3:

Find the product:

(i) $\frac{9}{2}\times\left(\frac{-7}{4}\right)$

(ii) $\frac{3}{10}\times(-9)$

(iii) $\frac{-6}{5}\times\frac{9}{11}$

(iv) $\frac{3}{7}\times\left(\frac{-2}{5}\right)$

(v) $\frac{3}{11}\times\frac{2}{5}$

(vi) $\frac{3}{-5}\times\frac{5}{3}$

Answer 3:

(i) $\frac{9}{2}\times\left(\frac{-7}{4}\right)=\frac{9\times(-7)}{2\times4}=\frac{-63}{8}=-7\frac{7}{8}$

(ii) $\frac{3}{10}\times(-9)=\frac{3\times(-9)}{10}=\frac{-27}{10}=-2\frac{7}{10}$

(iii) $\frac{-6}{5}\times\frac{9}{11}=\frac{(-6)\times9}{5\times11}=\frac{-54}{55}$

(iv) $\frac{3}{7}\times\left(\frac{-2}{5}\right)=\frac{3\times(-2)}{7\times5}=\frac{-6}{35}$

(v) $\frac{3}{11}\times\frac{2}{5}=\frac{3\times2}{11\times5}=\frac{6}{55}$

(vi) $\frac{3}{-5}\times\left(\frac{-5}{3}\right)=\frac{3\times(-5)}{-5\times3}=1$

APMF

Question 4:

Find the value of:

(i) $(-4)\div\frac{2}{3}$

(ii) $\frac{-3}{5}\div2$

(iii) $\frac{-4}{5}\div(-3)$

(iv) $\frac{-1}{8}\div\frac{3}{4}$

(v) $\frac{-2}{13}\div\frac{1}{7}$

(vi) $\frac{-7}{12}\div\left(\frac{2}{13}\right)$

(vii) $\frac{3}{13}\div\left(\frac{-4}{65}\right)$

Answer 4:

(i) $(-4)\div\frac{2}{3}=(-4)\times\frac{3}{2}=(-2)\times 3=-6$

(ii) $\frac{-3}{5}\div 2=\frac{-3}{5}\times\frac{1}{2}=\frac{(-3)\times 1}{5\times 2}=\frac{-3}{10}$

(iii) $\frac{-4}{5}\div(-3)=\frac{(-4)}{5}\times\frac{1}{(-3)}=\frac{(-4)\times 1}{5\times(-3)}=\frac{4}{15}$

(iv) $\frac{-1}{8}\div\frac{3}{4}=\frac{-1}{8}\times\frac{4}{3}=\frac{(-1)\times 1}{2\times 3}=\frac{-1}{6}$

(v) $\frac{-2}{13}\div\frac{1}{7}=\frac{-2}{13}\times\frac{7}{1}=\frac{(-2)\times 7}{13\times 1}=\frac{-14}{13}=-1\frac{1}{13}$

(vi) $\frac{-7}{12}\div\left(\frac{-2}{13}\right)=\frac{-7}{12}\times\frac{13}{(-2)}=\frac{(-7)\times 13}{12\times(-2)}=\frac{-91}{24}=3\frac{19}{24}$

(vii) $\frac{3}{13}\div\left(\frac{-4}{65}\right)=\frac{3}{13}\times\frac{65}{(-4)}=\frac{3\times(-5)}{1\times 4}=\frac{-15}{4}=-3\frac{3}{4}$

APMF

Mathematics

(Chapter – 10) (Practical Geometry)

(Class – VII)

Exercise 10.1

Question 1:

Draw a line, say AB, take a point C outside it. Through C, draw a line parallel to AB using ruler and compasses only.

Answer 1:

To construct: A line, parallel to given line by using ruler and compasses.

Steps of construction:

(a) Draw a line-segment AB and take a point C outside AB.

(b) Take any point D on AB and join C to D.

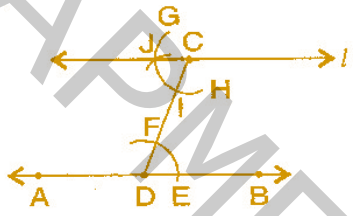
(c) With D as centre and take convenient radius, draw an arc cutting AB at E and CD at F.

(d) With C as centre and same radius as in step 3, draw an arc GH cutting CD at I.

(e) With the same arc EF, draw the equal arc cutting GH at J.

(f) Join JC to draw a line l.

This the required line $AB \parallel l$.



Question 2:

Draw a line l. Draw a perpendicular to l at any point on l. On this perpendicular choose a point X, 4 cm away from l. Through X, draw a line m parallel to l.

Answer 2:

To construct: A line parallel to given line when perpendicular line is also given.

Steps of construction:

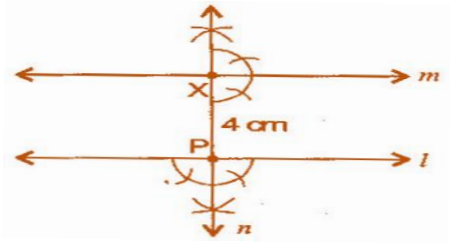
(a) Draw a line l and take a point P on it.

(b) At point P, draw a perpendicular line n.

(c) Take PX = 4 cm on line n.

(d) At point X, again draw a perpendicular line m.

It is the required construction.



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Question 3:

Let l be a line and P be a point not on l. Through P, draw a line m parallel to l. Now join P to any point Q on l. Choose any other point R on m. Through R, draw a line parallel to PQ. Let this meet l at S. What shape do the two sets of parallel lines enclose?

Answer 3:

To construct: A pair of parallel lines intersecting other part of parallel lines.

Steps of construction:

(a) Draw a line l and take a point P outside of l.

(b) Take point Q on line l and join PQ.

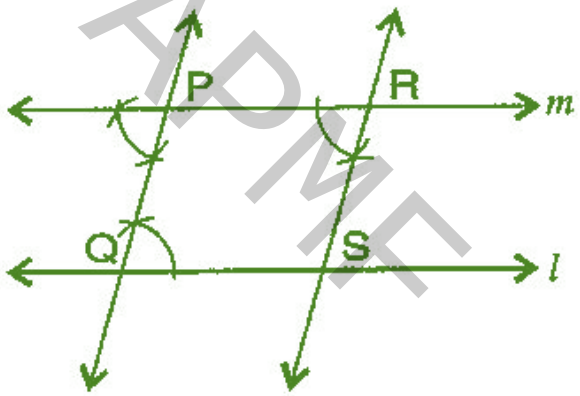
(c) Make equal angle at point P such that $\angle Q = \angle P$.

(d) Extend line at P to get line m.

(e) Similarly, take a point R online m, at point R, draw angles such that $\angle P = \angle R$.

(f) Extended line at R which intersects at S online l. Draw line RS.

Thus, we get parallelogram PQRS.



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Exercise 10.2

Question 1:

Construct ΔXYZ in which XY = 4.5 cm, YZ = 5 cm and ZX = 6 cm.

Answer 1:

To construct: ΔXYZ, where XY = 4.5 cm, YZ = 5 cm and ZX = 6 cm.

Steps of construction:

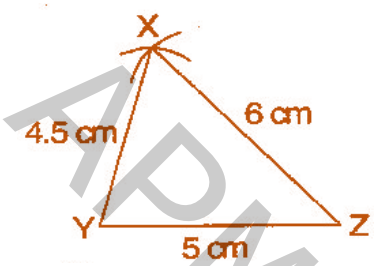
(a) Draw a line segment YZ = 5 cm.

(b) Taking Z as centre and radius 6 cm, draw an arc.

(c) Similarly, taking Y as centre and radius 4.5 cm, draw another arc which intersects first arc at point X.

(d) Join XY and XZ.

It is the required ΔXYZ.



Question 2:

Construct an equilateral triangle of side 5.5 cm.

Answer 2:

To construct: A ΔABC where AB = BC = CA = 5.5 cm

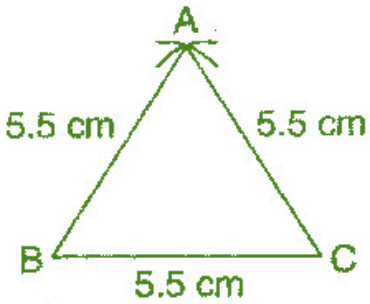
Steps of construction:

(a) Draw a line segment BC = 5.5 cm

(b) Taking points B and C as centers and radius 5.5 cm, draw arcs which intersect at point A.

(c) Join AB and AC.

It is the required ΔABC.



Question 3:

Draw ΔPQR with PQ = 4 cm, QR = 3.5 cm and PR = 4 cm. What type of triangle is this?

Answer 3:

To construction: ΔPQR, in which PQ = 4 cm, QR = 3.5 cm and PR = 4 cm.

Steps of construction:

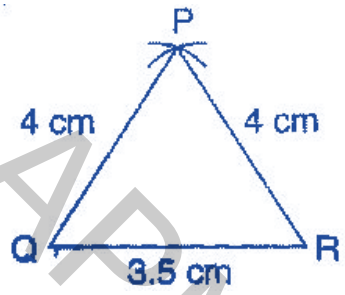
(a) Draw a line segment QR = 3.5 cm.

(b) Taking Q as centre and radius 4 cm, draw an arc.

(c) Similarly, taking R as centre and radius 4 cm, draw an another arc which intersects first arc at P.

(d) Join PQ and PR.

It is the required isosceles ΔPQR.



Question 4:

Construct ΔABC such that AB = 2.5 cm, BC = 6 cm and AC = 6.5 cm. Measure $\angle B$.

Answer 4:

To construct: ΔABC in which AB = 2.5 cm, BC = 6 cm and AC = 6.5 cm.

Steps of construction:

(a) Draw a line segment BC = 6 cm.

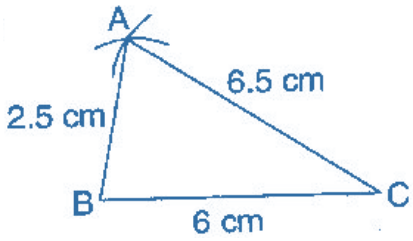
(b) Taking B as centre and radius 2.5 cm, draw an arc.

(c) Similarly, taking C as centre and radius 6.5 cm, draw another arc which intersects first arc at point A.

(d) Join AB and AC.

(e) Measure angle B with the help of protractor.

It is the required ΔABC where $\angle B = 80°$.



APMF

Exercise 10.3

Question 1:

Construct ΔDEF such that DE = 5 cm, DF = 3 cm and $m\angle EDF = 90^\circ$.

Answer 1:

To construct: ΔDEF where DE = 5 cm, DF = 3 cm and $m\angle EDF = 90^\circ$.

Steps of construction:

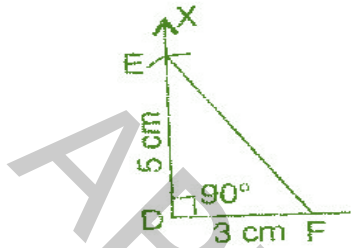
(a) Draw a line segment DF = 3 cm.

(b) At point D, draw an angle of 90° with the help of compass i.e., $\angle XDF = 90^\circ$.

(c) Taking D as centre, draw an arc of radius 5 cm, which cuts DX at the point E.

(d) Join EF.

It is the required right angled triangle DEF.



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Question 2:

Construct an isosceles triangle in which the lengths of each of its equal sides is 6.5 cm and the angle between them is 110°.

Answer 2:

To construct: An isosceles triangle PQR where PQ = RQ = 6.5 cm and $\angle Q = 110^\circ$.

Steps of construction:

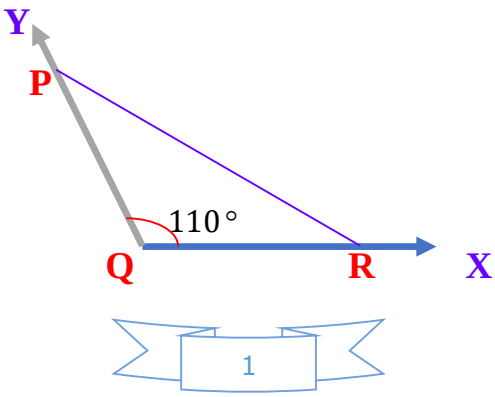
(a) Draw a line segment QR = 6.5 cm.

(b) At point Q, draw an angle of 110° with the help of protractor, i.e., $\angle YQR = 110^\circ$.

(c) Taking Q as centre, draw an arc with radius 6.5 cm, which cuts QY at point P.

(d) Join PR

It is the required isosceles triangle PQR.



Question 3:

Construct ΔABC with BC = 7.5 cm, AC = 5 cm and $m\angle C = 60^\circ$.

Answer 3:

To construct: ΔABC where BC = 7.5 cm, AC = 5 cm and $m\angle C = 60^\circ$.

Steps of construction:

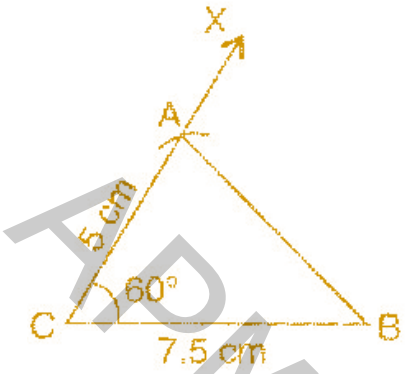
(a) Draw a line segment BC = 7.5 cm.

(b) At point C, draw an angle of 60° with the help of protractor, i.e., $\angle XCB = 60^\circ$.

(c) Taking C as centre and radius 5 cm, draw an arc, which cuts XC at the point A.

(d) Join AB

It is the required triangle ABC.



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Exercise 10.4

Question 1:

Construct ΔABC, given $m\angle A = 60^\circ$, $m\angle B = 30^\circ$ and AB = 5.8 cm.

Answer 1:

To construct: ΔABC where $m\angle A = 60^\circ$, $m\angle B = 30^\circ$ and AB = 5.8 cm.

Steps of construction:

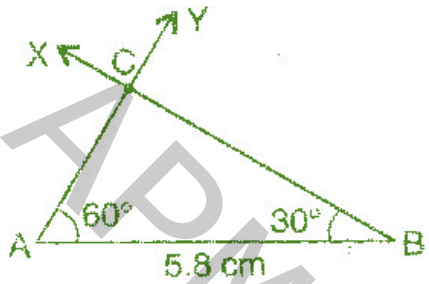
(a) Draw a line segment AB = 5.8 cm.

(b) At point A, draw an angle $\angle YAB = 60^\circ$ with the help of compass.

(c) At point B, draw $\angle XBA = 30^\circ$ with the help of compass.

(d) AY and BX intersect at the point C.

It is the required triangle ABC.



Question 2:

Construct ΔPQR if PQ = 5 cm, $m\angle PQR = 105°$ and $m\angle QRP = 40°$.

Answer 2:

Given: $m\angle PQR = 105°$ and $m\angle QRP = 40°$

We know that sum of angles of a triangle is 180°.

$\therefore \quad m\angle PQR + m\angle QRP + m\angle QPR = 180°$

$\Rightarrow \quad 105° + 40° + m\angle QPR = 180°$

$\Rightarrow \quad 145° + m\angle QPR = 180°$

$\Rightarrow \quad m\angle QPR = 180° - 145°$

$\Rightarrow \quad m\angle QPR = 35°$

To construct: ΔPQR where $m\angle P = 35°$, $m\angle Q = 105°$ and PQ = 5 cm.

Steps of construction:

(a) Draw a line segment PQ = 5 cm.

(b) At point P, draw $\angle XPQ = 35°$ with the help of protractor.

(c) At point Q, draw $\angle YQP = 105°$ with the help of protractor.

(d) XP and YQ intersect at point R.

It is the required triangle PQR.

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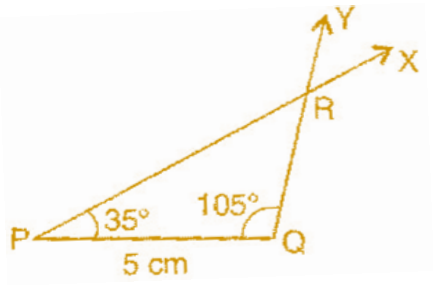

Question 3:

Examine whether you can construct ΔDEF such that EF = 7.2 cm, $m\angle$E = 110° and $m\angle$F = 80°. Justify your answer.

Answer 3:

Given: In ΔDEF, $m\angle$E = 110° and $m\angle$F = 80°.

Using angle sum property of triangle

$$\angle D + \angle E + \angle F = 180^\circ$$
$$\Rightarrow \angle D + 110^\circ + 80^\circ = 180^\circ$$
$$\Rightarrow \angle D + 190^\circ = 180^\circ$$
$$\Rightarrow \angle D = 180^\circ - 190^\circ = -10^\circ$$

Which is not possible.

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Exercise 10.5

Question 1:

Construct the right angled ΔPQR, where $m\angle Q = 90^\circ$, QR = 8 cm and PR = 10 cm.

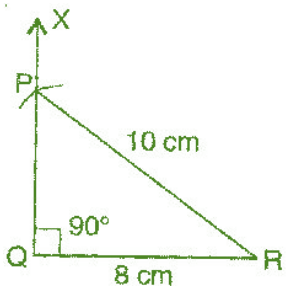
Answer 1:

To construct:

A right angled triangle PQR where $m\angle Q = 90^\circ$, QR = 8 cm and PQ = 10 cm.

Steps of construction:

(a) Draw a line segment QR = 8 cm.
(b) At point Q, draw QX $\perp$ QR.
(c) Taking R as centre, draw an arc of radius 10 cm.
(d) This arc cuts QX at point P.
(e) Join PQ.
It is the required right angled triangle PQR.



Question 2:

Construct a right angled triangle whose hypotenuse is 6 cm long and one the legs is 4 cm long.

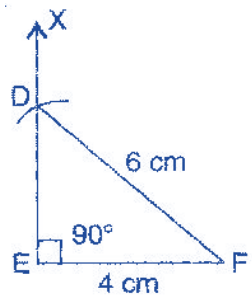
Answer 2:

To construct:

A right angled triangle DEF where DF = 6 cm and EF = 4 cm

Steps of construction:

(a) Draw a line segment EF = 4 cm.
(b) At point Q, draw EX $\perp$ EF.
(c) Taking F as centre and radius 6 cm, draw an arc. (Hypotenuse)
(d) This arc cuts the EX at point D.
(e) Join DF.
It is the required right angled triangle DEF.



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Question 3:

Construct an isosceles right angled triangle ABC, where $m\angle ACB = 90^\circ$ and AC = 6 cm.

Answer 3:

To construct:

An isosceles right angled triangle ABC where $m\angle C = 90^\circ$, AC = BC = 6 cm.

Steps of construction:

(a) Draw a line segment AC = 6 cm.

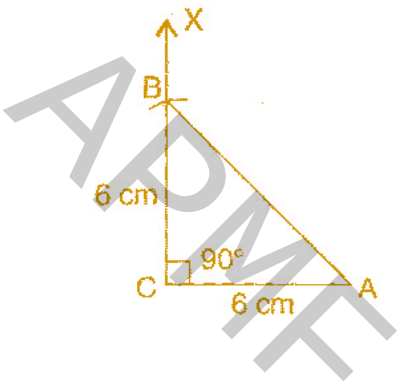
(b) At point C, draw XC $\perp$ CA.

(c) Taking C as centre and radius 6 cm, draw an arc.

(d) This arc cuts CX at point B.

(e) Join BA.

It is the required isosceles right angled triangle ABC.



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Miscellaneous Questions

Questions:

Below are given the measures of certain sides and angles of triangles. Identify those which cannot be constructed and say why you cannot construct them. Construct rest of the triangle.

	Triangle	Given measurements		
1.	ΔABC	$m\angle A = 85°$;	$m\angle B = 115°$;	AB = 5 cm
2.	ΔPQR	$m\angle Q = 30°$;	$m\angle R = 60°$;	QR = 4.7 cm
3.	ΔABC	$m\angle A = 70°$;	$m\angle B = 50°$;	AC = 3 cm
4.	ΔLMN	$m\angle L = 60°$;	$m\angle N = 120°$;	LM = 5 cm
5.	ΔABC	BC = 2 cm;	AB = 4 cm;	AC = 2 cm
6.	ΔPQR	PQ = 3.5 cm;	QR = 4 cm;	PR = 3.5 cm
7.	ΔXYZ	XY = 3 cm;	YZ = 4 cm;	XZ = 5 cm
8.	ΔDEF	DE = 4.5 cm;	EF = 5.5 cm;	DF = 4 cm

Answer 1:

In ΔABC, $m\angle A = 85°, m\angle B = 115°$, AB = 5 cm

Construction of ΔABC is not possible because $m\angle A = 85° + m\angle B = 200°$, and we know that the sum of angles of a triangle should be 180°.

Answer 2:

To construct: ΔPQR where $m\angle Q = 30^\circ$, $m\angle R = 60^\circ$ and QR = 4.7 cm.

Steps of construction:

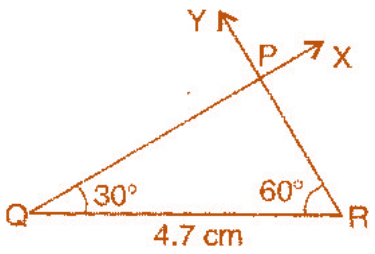
(a) Draw a line segment QR = 4.7 cm.

(b) At point Q, draw $\angle XQR = 30^\circ$ with the help of compass.

(c) At point R, draw $\angle YRQ = 60^\circ$ with the help of compass.

(d) QX and RY intersect at point P.

It is the required triangle PQR.



Answer 3:

We know that the sum of angles of a triangle is 180°.

$\therefore \quad m\angle A + m\angle B + m\angle C = 180°$

$\Rightarrow \quad 70° + 50° + m\angle C = 180°$

$\Rightarrow \quad 120° + m\angle C = 180°$

$\Rightarrow \quad m\angle C = 180° - 120°$

$\Rightarrow \quad m\angle C = 60°$

To construct: ΔABC where $m\angle A = 70°$, $m\angle C = 60°$ and AC = 3 cm.

Steps of construction:

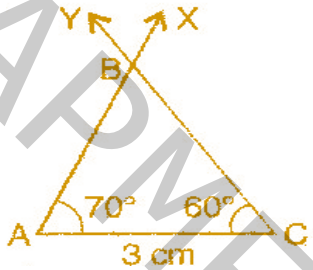
(a) Draw a line segment AC = 3 cm.

(b) At point C, draw $\angle YCA = 60°$.

(c) At point A, draw $\angle XAC = 70°$.

(d) Rays XA and YC intersect at point B

It is the required triangle ABC.



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Answer 4:

In ΔLMN, $m\angle L = 60°$, $m\angle N = 120°$, LM = 5 cm

This ΔLMN is not possible to construct because $m\angle L + m\angle N = 60° + 120° = 180°$ which forms a linear pair.

Answer 5:

ΔABC, BC = 2 cm, AB = 4 cm and AC = 2 cm

This ΔABC is not possible to construct because the condition is

Sum of lengths of two sides of a triangle should be greater than the third side.

$AB < BC + AC$

$\Rightarrow \quad 4 < 2 + 2$

$\Rightarrow \quad 4 = 4,$

Answer 6:

To construct: ΔPQR where PQ = 3.5 cm, QR = 4 cm and PR = 3.5 cm

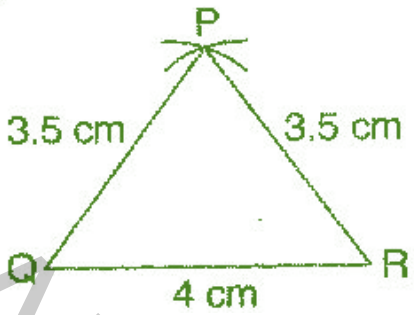
Steps of construction:

(a) Draw a line segment QR = 4 cm.

(b) Taking Q as centre and radius 3.5 cm, draw an arc.

(c) Similarly, taking R as centre and radius 3.5 cm, draw an another arc which intersects the first arc at point P.

It is the required triangle PQR.



Answer 7:

To construct: A triangle whose sides are XY = 3 cm, YZ = 4 cm and XZ = 5 cm.

Steps of construction:

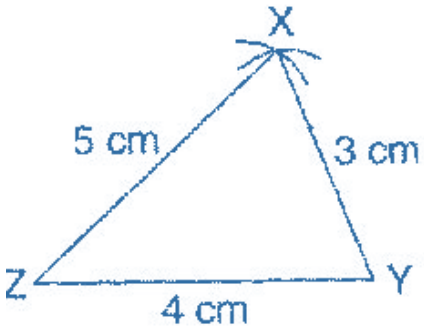
(a) Draw a line segment ZY = 4 cm.

(b) Taking Z as centre and radius 5 cm, draw an arc.

(c) Taking Y as centre and radius 3 cm, draw another arc.

(d) Both arcs intersect at point X.

It is the required triangle XYZ.



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Answer 8:

To construct:

A triangle DEF whose sides are DE = 4.5 cm, EF = 5.5 cm and DF = 4 cm.

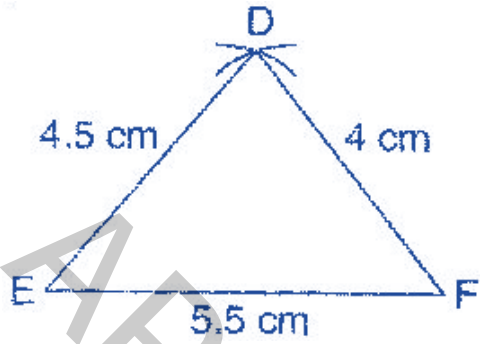
Steps of construction:

(a) Draw a line segment EF = 5.5 cm.

(b) Taking E as centre and radius 4.5 cm, draw an arc.

(c) Taking F as centre and radius 4 cm, draw an another arc which intersects the first arc at point D.

It is the required triangle DEF.



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Mathematics

(Chapter – 11) (Perimeter and Area)

(Class – VII)

Exercise 11.1

Question 1:

The length and breadth of a rectangular piece of land are 500 m and 300 m respectively. Find:

(i) Its area.

(ii) The cost of the land, if 1 m^2 of the land costs ₹10,000.

Answer 1:

Given: Length of a rectangular piece of land = 500 m and
Breadth of a rectangular piece of land = 300 m

(i) Area of a rectangular piece of land = Length x Breadth
= 500 x 300
= 1,50,000 m^2

(ii) Since, the cost of 1 m^2 land = ₹10,000
Therefore, the cost of 1,50,000 m^2 land = 10,000 x 1,50,000
= ₹1,50,00,00,000

Question 2:

Find the area of a square park whose perimeter is 320 m.

Answer 2:

Given: Perimeter of square park = 320 m

$\Rightarrow$ 4 x side = 320

$\Rightarrow$ side = $\frac{320}{4}$ = 80 m

Now, Area of square park = side x side = 80 x 80 = 6400 m^2

Thus, the area of square park is 6400 m^2.

Question 3:

Find the breadth of a rectangular plot of land, if its area is 440 m^2 and the length is 22 m. Also find its perimeter.

Answer 3:

Area of rectangular park = 440 m^2

$\Rightarrow$ length x breadth = 440 m^2

$\Rightarrow$ 22 x breadth = 440

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$\Rightarrow$ breadth = $\frac{440}{22}$ = 20 m

Now, Perimeter of rectangular park = 2 (length + breadth)
= 2 (22 + 20)
= 2 x 42 = 84 m

Thus, the perimeter of rectangular park is 84 m.

Question 4:

The perimeter of a rectangular sheet is 100 cm. If the length is 35 cm, find its breadth. Also find the area.

Answer 4:

Perimeter of the rectangular sheet = 100 cm

$\Rightarrow$ 2 (length + breadth) = 100 cm

$\Rightarrow$ 2 (35 + breadth) = 100

$\Rightarrow$ 35 + breadth = $\frac{100}{2}$

$\Rightarrow$ 35 + breadth = 50

$\Rightarrow$ breadth = 50 – 35

$\Rightarrow$ breadth = 15 cm

Now, Area of rectangular sheet = length x breadth
= 35 x 15 = 525 cm^2

Thus, breadth and area of rectangular sheet are 15 cm and 525 cm^2 respectively.

Question 5:

The area of a square park is the same as of a rectangular park. If the side of the square park is 60 m and the length of the rectangular park is 90 cm, find the breadth of the rectangular park.

Answer 5:

Given: The side of the square park = 60 m

The length of the rectangular park = 90 m

According to the question,

Area of square park = Area of rectangular park

$\Rightarrow$ side x side = length x breadth

$\Rightarrow$ 60 x 60 = 90 x breadth

$\Rightarrow$ breadth = $\frac{60 \times 60}{90}$ = 40 m

Thus, the breadth of the rectangular park is 40 m.

APMF

Question 6:

A wire is in the shape of a rectangle. Its length is 40 cm and breadth is 22 cm. If the same wire is rebent in the shape of a square, what will be the measure of each side. Also find which shape encloses more area?

Answer 6:

According to the question,

Perimeter of square = Perimeter of rectangle

$\Rightarrow$ 4 x side = 2 (length + breadth)

$\Rightarrow$ 4 x side = 2 (40 + 22)

$\Rightarrow$ 4 x side = 2 x 62

$\Rightarrow$ side = $\frac{2\times 62}{4}$ = 31 cm

Thus, the side of the square is 31 cm.

Now, Area of rectangle = length x breadth = 40 x 22 = 880 cm^2

And Area of square = side x side = 31 x 31 = 961 cm^2

Therefore, on comparing, the area of square is greater than that of rectangle.

APME

Question 7:

The perimeter of a rectangle is 130 cm. If the breadth of the rectangle is 30 cm, find its length. Also, find the area of the rectangle.

Answer 7:

Perimeter of rectangle = 130 cm

$\Rightarrow$ 2 (length + breadth) = 130 cm

$\Rightarrow$ 2 (length + 30) = 130

$\Rightarrow$ length + 30 = $\frac{130}{2}$

$\Rightarrow$ length + 30 = 65

$\Rightarrow$ length = 65 – 30 = 35 cm

Now area of rectangle = length x breadth = 35 x 30 = 1050 cm^2

Thus, the area of rectangle is 1050 cm^2.

Question 8:

A door of length 2 m and breadth 1 m is fitted in a wall. The length of the wall is 4.5 m and the breadth is 3.6 m. Find the cost of white washing the wall, if the rate of white washing the wall is ₹ 20 per m^2.

Answer 8:

Area of rectangular door = length x breadth = 2 m x 1 m = 2 m^2

Area of wall including door = length x breadth = 4.5 m x 3.6 m = 16.2 m^2

Now, Area of wall excluding door

= Area of wall including door – Area of door

= 16.2 – 2 = 14.2 m^2

Since, The rate of white washing of 1 m^2 the wall = ₹20

Therefore, the rate of white washing of 14.2 m^2 the wall = 20 x 14.2

= ₹284

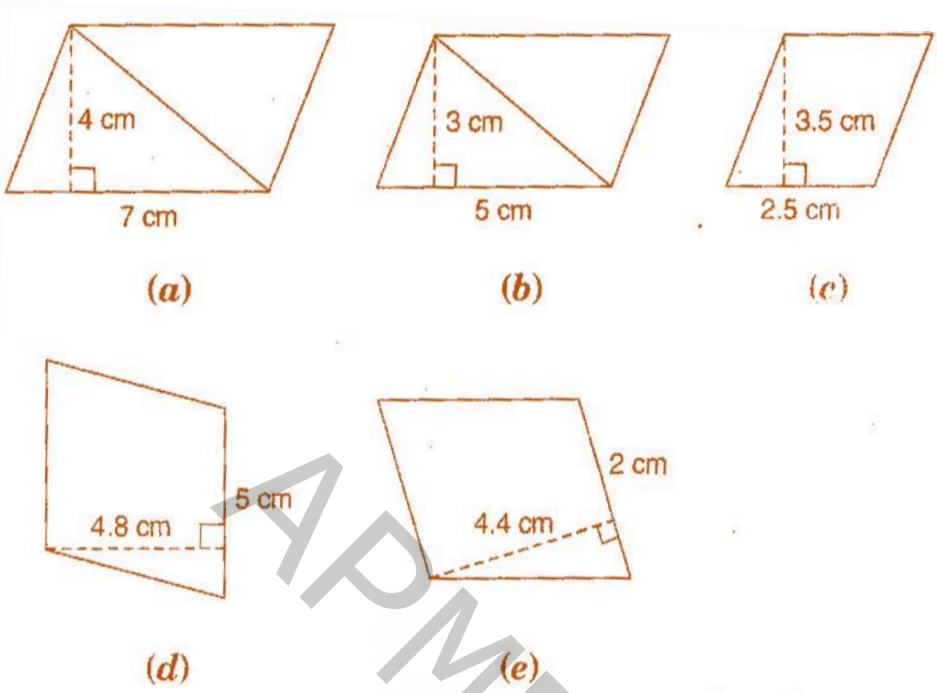
Thus, the cost of white washing the wall excluding the door is ₹284.

APMF

Exercise 11.2

Question 1:

Find the area of each of the following parallelograms:



APME

Answer 1:

We know that the area of parallelogram = base x height

(a) Here base = 7 cm and height = 4 cm

∴ Area of parallelogram = 7 x 4 = 28 cm^2

(b) Here base = 5 cm and height = 3 cm

∴ Area of parallelogram = 5 x 3 = 15 cm^2

(c) Here base = 2.5 cm and height = 3.5 cm

∴ Area of parallelogram = 2.5 x 3.5 = 8.75 cm^2

(d) Here base = 5 cm and height = 4.8 cm

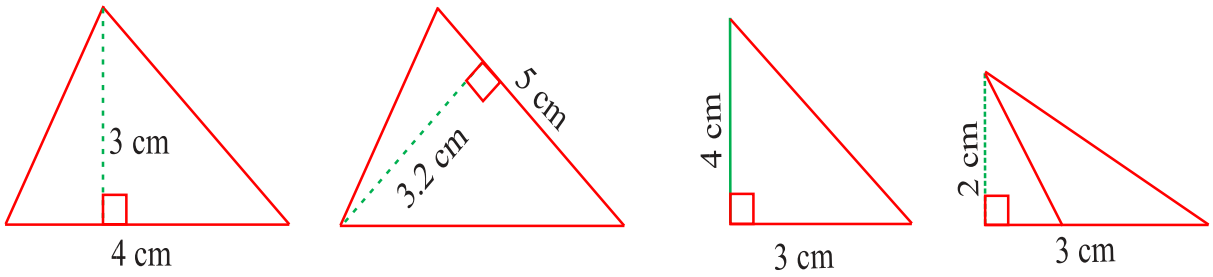
∴ Area of parallelogram = 5 x 4.8 = 24 cm^2

(e) Here base = 2 cm and height = 4.4 cm

∴ Area of parallelogram = 2 x 4.4 = 8.8 cm^2

Question 2:

Find the area of each of the following triangles:



(a) (b) (c) (d)

Answer 2:

We know that the area of triangle = $\frac{1}{2}$ x base x height

(a) Here, base = 4 cm and height = 3 cm

$\therefore$ Area of triangle = $\frac{1}{2}$ x 4 x 3 = 6 cm^2

(b) Here, base = 5 cm and height = 3.2 cm

$\therefore$ Area of triangle = $\frac{1}{2}$ x 5 x 3.2 = 8 cm^2

(c) Here, base = 3 cm and height = 4 cm

$\therefore$ Area of triangle = $\frac{1}{2}$ x 3 x 4 = 6 cm^2

(d) Here, base = 3 cm and height = 2 cm

$\therefore$ Area of triangle = $\frac{1}{2}$ x 3 x 2 = 3 cm^2

APMF

Question 3:

Find the missing values:

S. No.	Base	Height	Area of the parallelogram
a.	20 cm		246 cm^2
b.		15 cm	154.5 cm^2
c.		84 cm	48.72 cm^2
d.	15.6 cm		16.38 cm^2

Answer 3:

We know that the area of parallelogram = base x height

(a) Here, base = 20 cm and area = 246 cm^2

$\therefore$ Area of parallelogram = base x height

$\Rightarrow$ 246 = 20 x height

$\Rightarrow$ height = $\frac{246}{20}$ = 12.3 cm

(b) Here, height = 15 cm and area = 154.5 cm^2

$\therefore$ Area of parallelogram = base x height

$\Rightarrow$ 154.5 = base x 15

$\Rightarrow$ base = $\frac{154.5}{15}$ = 10.3 cm

(c) Here, height = 8.4 cm and area = 48.72 cm^2

$\therefore$ Area of parallelogram = base x height

$\Rightarrow$ 48.72 = base x 8.4

$\Rightarrow$ base = $\frac{48.72}{8.4}$ = 5.8 cm

(d) Here, base = 15.6 cm and area = 16.38 cm^2

$\therefore$ Area of parallelogram = base x height

$\Rightarrow$ 16.38 = 15.6 x height

$\Rightarrow$ height = $\frac{16.38}{15.6}$ = 1.05 cm

Thus, the missing values are:

S. No.	Base	Height	Area of the parallelogram
a.	20 cm	**12.3 cm**	246 cm^2
b.	**10.3 cm**	15 cm	154.5 cm^2
c.	**5.8 cm**	84 cm	48.72 cm^2
d.	15.6 cm	**1.05**	16.38 cm^2

APME

Question 4:

Find the missing values:

Base	Height	Area of triangle
15 cm	-----	87 cm^2
-----	31.4 mm	1256 mm^2
22 cm	-----	170.5 cm^2

Answer 4:

We know that the area of triangle = $\frac{1}{2}$ x base x height

In first row, base = 15 cm and area = 87 cm^2

$\therefore$ $87 = \frac{1}{2} \times 15 \times \text{height}$

$\Rightarrow$ $\text{height} = \frac{87 \times 2}{15}$ 11.6 cm

In second row, height = 31.4 mm and area = 1256 mm^2

$\therefore$ $1256 = \frac{1}{2} \times \text{base} \times 31.4$

$\Rightarrow$ $\text{base} = \frac{1256 \times 2}{31.4}$ 80 mm

In third row, base = 22 cm and area = 170.5 cm^2

$\therefore$ $170.5 = \frac{1}{2} \times 22 \times \text{height}$

$\Rightarrow$ $\text{height} = \frac{170.5 \times 2}{22}$ 15.5 cm

Thus, the missing values are:

Base	Height	Area of triangle
15 cm	**11.6 cm**	87 cm^2
80 mm	31.4 mm	1256 mm^2
22 cm	**15.5 cm**	170.5 cm^2

Question 5:

PQRS is a parallelogram (Fig 11.23). QM is the height from Q to SR and QN is the height from Q to PS. If SR = 12 cm and QM = 7.6 cm. Find:

(a) the area of the parallelogram PRS

(b) QN, if PS = 8 cm

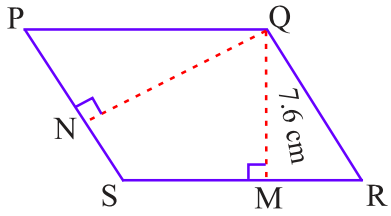


Fig 11.23

Answer 5:

Given: SR = 12 cm, QM= 7.6 cm, PS = 8 cm.

(a) Area of parallelogram = base x height

= 12 x 7.6 = 91.2 cm^2

(b) Area of parallelogram = base x height

$\Rightarrow$ 91.2 = 8 x QN

$\Rightarrow$ $QN = \frac{91.2}{8} = 11.4$ cm

APMF

Question 6:

DL and BM are the heights on sides AB and AD respectively of parallelogram ABCD (Fig 11.24). If the area of the parallelogram is 1470 cm^2, AB = 35 cm and AD = 49 cm, find the length of BM and DL.

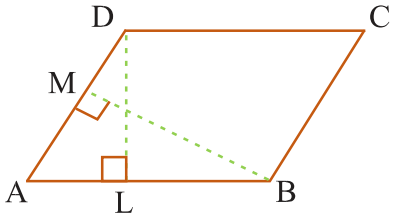


Fig 11.24

Answer 6:

Given: Area of parallelogram = 1470 cm^2

Base (AB) = 35 cm and base (AD) = 49 cm

Since Area of parallelogram = base x height

$\Rightarrow$ 1470 = 35 x DL

$\Rightarrow$ $DL = \frac{1470}{35}$

$\Rightarrow$ $DL = 42$ cm

Again, Area of parallelogram = base x height

$\Rightarrow$ $1470 = 49 \times BM$

$\Rightarrow$ $BM = \frac{1470}{49}$

$\Rightarrow$ $BM = 30$ cm

Thus, the lengths of DL and BM are 42 cm and 30 cm respectively.

Question 7:

ΔABC is right angled at A (Fig 11.25). AD is perpendicular to BC. If AB = 5 cm, BC = 13 cm and AC = 12 cm, find the area of ΔABC. Also, find the length of AD.

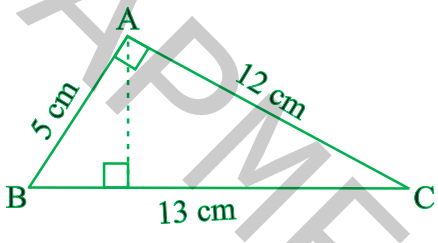


Fig 11.25

Answer 7:

In right angles triangle BAC, AB = 5 cm and AC = 12 cm

Area of triangle = $\frac{1}{2}$ x base x height = $\frac{1}{2}$ x AB x AC

$= \frac{1}{2} \times 5 \times 12 = 30$ cm^2

Now, in ΔABC,

Area of triangle ABC = $\frac{1}{2}$ x BC x AD

$\Rightarrow$ $30 = \frac{1}{2} \times 13 \times AD$

$\Rightarrow$ $AD = \frac{30 \times 2}{13} = \frac{60}{13}$ cm

APME

Question 8:

ΔABC is isosceles with AB = AC = 7.5 cm and BC = 9 cm (Fig 11.26). The height AD from A to BC, is 6 cm. Find the area of ΔABC. What will be the height from C to AB i.e., CE?

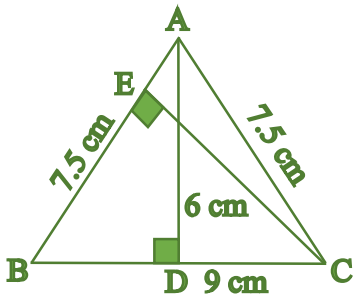


Fig 11.26

Answer 8:

In ΔABC, AD = 6 cm and BC = 9 cm

Area of triangle = $\frac{1}{2}$ x base x height = $\frac{1}{2}$ x BC x AD

= $\frac{1}{2}$ x 9 x 6 = 27 cm^2

Again, Area of triangle = $\frac{1}{2}$ x base x height = $\frac{1}{2}$ x AB x CE

$\Rightarrow$ 27 = $\frac{1}{2}$ x 7.5 x CE

$\Rightarrow$ CE = $\frac{27 \times 2}{7.5}$

$\Rightarrow$ CE = 7.2 cm

Thus, height from C to AB i.e., CE is 7.2 cm.

APMF

Exercise 11.3

Question 1:

Find the circumference of the circles with the following radius: $\left(\text{Take } \pi = \frac{22}{7}\right)$

(a) 14 cm (b) 28 mm (c) 21 cm

Answer 1:

(a) Circumference of the circle = $2\pi r = 2 \times \frac{22}{7} \times 14 = 88$ cm

(b) Circumference of the circle = $2\pi r = 2 \times \frac{22}{7} \times 28 = 176$ mm

(c) Circumference of the circle = $2\pi r = 2 \times \frac{22}{7} \times 21 = 132$ cm

Question 2:

Find the area of the following circles, given that: $\left(\text{Take } \pi = \frac{22}{7}\right)$

(a) radius = 14 mm (b) diameter = 49 m (c) radius 5 cm

Answer 2:

(a) Area of circle = $\pi r^2 = \frac{22}{7} \times 14 \times 14$

$= 22 \times 2 \times 14$

$= 616 \text{ mm}^2$

(b) Diameter = 49 m

$\therefore$ radius = $\frac{49}{2} = 24.5$ m

$\therefore$ Area of circle = $\pi r^2 = \frac{22}{7} \times 24.5 \times 24.5$

$= 22 \times 3.5 \times 24.5$

$= 1886.5 \text{ m}^2$

(c) Area of circle = $\pi r^2 = \frac{22}{7} \times 5 \times 5$

$= \frac{550}{7} \text{ cm}^2$

APMF

Question 3:

If the circumference of a circular sheet is 154 m, find its radius. Also find the area of the sheet. $\left(\text{Take } \pi = \frac{22}{7}\right)$

Answer 3:

Circumference of the circular sheet = 154 m

$\Rightarrow \quad 2\pi r = 154$ m

$\Rightarrow \quad r = \frac{154}{2\pi}$

$\Rightarrow \quad r = \frac{154 \times 7}{2 \times 22} = 24.5$ m

Now Area of circular sheet = $\pi r^2 = \frac{22}{7} \times 24.5 \times 24.5$

$= 22 \times 3.5 \times 24.5 = 1886.5 \text{ m}^2$

Thus, the radius and area of circular sheet are 24.5 m and 1886.5 m^2 respectively.

APME

Question 4:

A gardener wants to fence a circular garden of diameter 21 m. Find the length of the rope he needs to purchase, if he makes 2 rounds of fence. Also, find the costs of the rope, if it cost ₹4 per meter. $\left(\text{Take } \pi = \frac{22}{7}\right)$

Answer 4:

Diameter of the circular garden = 21 m

$\therefore$ Radius of the circular garden = $\frac{21}{2}$ m

Now Circumference of circular garden $= 2\pi r = 2 \times \frac{22}{7} \times \frac{21}{2}$

$= 22 \times 3 = 66$ m

The gardener makes 2 rounds of fence so the total length of the rope of fencing

$= 2 \times 2\pi r$

$= 2 \times 66 = 132$ m

Since, the cost of 1 meter rope = ₹ 4

Therefore, cost of 132 meter rope = 4 x 132 = ₹ 528

Question 5:

From a circular sheet of radius 4 cm, a circle of radius 3 cm is removed. Find the area of the remaining sheet. $(\text{Take } \pi = 3.14)$

Answer 5:

Radius of circular sheet (R) = 4 cm and

radius of removed circle (r) = 3 cm

Area of remaining sheet

= Area of circular sheet – Area of removed circle

$= \pi R^2 - \pi r^2 = \pi\left(R^2 - r^2\right)$

$= \pi\left(4^2 - 3^2\right) = \pi(16-9)$

= 3.14 x 7 = 21.98 cm^2

Thus, the area of remaining sheet is 21.98 cm^2.

APME

Question 6:

Saima wants to put a lace on the edge of a circular table cover of diameter 1.5 m. Find the length of the lace required and also find its cost if one meter of the lace costs ₹15. $(\text{Take } \pi = 3.14)$

Answer 6:

Diameter of the circular table cover = 1.5 m

$\therefore$ Radius of the circular table cover = $\frac{1.5}{2}$ m

Circumference of circular table cover = $2\pi r$

$= 2 \times 3.14 \times \frac{1.5}{2}$

= 4.71 m

Therefore the length of required lace is 4.71 m.

Now the cost of 1 m lace = ₹ 15

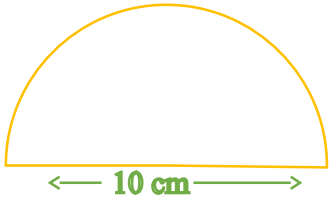
Then the cost of 4.71 m lace = 15 x 4.71

= ₹ 70.65

Hence, the cost of 4.71 m lace is ₹ 70.65.

Question 7:

Find the perimeter of the adjoining figure, which is a semicircle including its diameter.



Answer 7:

Diameter = 10 cm

$\therefore$ Radius = $\frac{10}{2}$ = 5 cm

According to question,

Perimeter of figure = Circumference of semi-circle + diameter

$= \pi r + D$

$= \frac{22}{7} \times 5 + 10 = \frac{110}{7} + 10$

$= \frac{110 + 70}{7} = \frac{180}{7} = 25.71$ cm

Thus, the perimeter of the given figure is 25.71 cm.

APMF

Question 8:

Find the cost of polishing a circular table-top of diameter 1.6 m, if the rate of polishing is ₹15/m^2. (Take $\pi = 3.14$)

Answer 8:

Diameter of the circular table top = 1.6 m

$\therefore$ Radius of the circular table top = $\frac{1.6}{2}$ = 0.8 m

Area of circular table top $= \pi r^2$

$= 3.14 \times 0.8 \times 0.8$

$= 2.0096$ m^2

Now cost of 1 m^2 polishing = ₹15

Then cost of 2.0096 m^2 polishing = 15 x 2.0096 = ₹ 30.14 (approx.)

Thus, the cost of polishing a circular table top is ₹ 30.14 (approx.)

Question 9:

Shazli took a wire of length 44 cm and bent it into the shape of a circle. Find the radius of that circle. Also find its area. If the same wire is bent into the shape of a square, what will be the length of each of its sides? Which figure encloses more area, the circle or the square? $\left(\text{Take } \pi = \frac{22}{7}\right)$

Answer 9:

Total length of the wire = 44 cm

$\therefore$ the circumference of the circle = $2\pi r$ = 44 cm

$\Rightarrow \quad 2 \times \frac{22}{7} \times r = 44$

$\Rightarrow \quad r = \frac{44 \times 7}{2 \times 22}$ = 7 cm

Now Area of the circle = πr^2

$= \frac{22}{7} \times 7 \times 7$ = 154 cm^2

Now the wire is converted into square.

Then perimeter of square = 44 cm

$\Rightarrow$ 4 x side = 44

$\Rightarrow$ side = $\frac{44}{4}$ = 11 cm

Now area of square = side x side = 11 x 11 = 121 cm^2

Therefore, on comparing, the area of circle is greater than that of square, so the circle enclosed more area.

Question 10:

From a circular card sheet of radius 14 cm, two circles of radius 3.5 cm and a rectangle of length 3 cm and breadth 1 cm are removed (as shown in the adjoining figure). Find the area of the remaining sheet. $\left(\text{Take } \pi = \frac{22}{7}\right)$

APME

Answer 10:

Radius of circular sheet (R) = 14 cm and Radius of smaller circle (r) = 3.5 cm

Length of rectangle (l) = 3 cm and breadth of rectangle (b) = 1 cm

According to question,

Area of remaining sheet=Area of circular sheet– (Area of two smaller circle + Area of rectangle)

$$= \pi R^2 - \left[2(\pi r^2) + (l \times b)\right]$$

$$= \frac{22}{7} \times 14 \times 14 - \left[\left(2 \times \frac{22}{7} \times 3.5 \times 3.5\right) - (3 \times 1)\right]$$

= 22 x 14 x 2 – [44 x 0.5 x 3.5 + 3]

= 616 – 80

= 536 cm^2

Therefore the area of remaining sheet is 536 cm^2.

APMF

Question 11:

A circle of radius 2 cm is cut out from a square piece of an aluminium sheet of side 6 cm. What is the area of the left over aluminium sheet? $(\text{Take } \pi = 3.14)$

Answer 11:

Radius of circle = 2 cm and side of aluminium square sheet = 6 cm

According to question,

Area of aluminium sheet left = Total area of aluminium sheet – Area of circle

= side x side - πr^2

= 6 x 6 – $\frac{22}{7}$ x 2 x 2

= 36 – 12.56

= 23.44 cm^2

Therefore, the area of aluminium sheet left is 23.44 cm^2.

Question 12:

The circumference of a circle is 31.4 cm. Find the radius and the area of the circle. $(\text{Take } \pi = 3.14)$

Answer 12:

The circumference of the circle = 31.4 cm

$\Rightarrow \quad 2\pi r = 31.4$

$\Rightarrow \quad 2 \times 3.14 \times r = 31.4$

$\Rightarrow \quad r = \frac{31.4}{2 \times 3.14} = 5$ cm

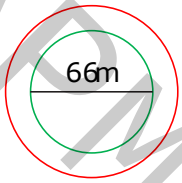
Then area of the circle = $\pi r^2 = 3.14 \times 5 \times 5$

$= 78.5 \text{ cm}^2$

Therefore, the radius and the area of the circle are 5 cm and 78.5 cm^2 respectively.

Question 13:

A circular flower bed is surrounded by a path 4 m wide. The diameter of the flower bed is 66 m. What is the area of this path? (Take $\pi = 3.14$)

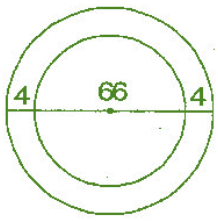


Answer 13:

Diameter of the circular flower bed = 66 m

$\therefore \quad$ Radius of circular flower bed $(r) = \frac{66}{2} = 33$ m

$\therefore \quad$ Radius of circular flower bed with 4 m wide path (R) = 33 + 4 = 37 m



According to the question,

Area of path = Area of bigger circle – Area of smaller circle

$= \pi R^2 - \pi r^2 = \pi\left(R^2 - r^2\right)$

$= \pi\left[(37)^2 - (33)^2\right]$

$= 3.14\ [(37 + 33)(37 - 33)] \qquad \left[\because a^2 - b^2 = (a+b)(a-b)\right]$

= 3.14 x 70 x 4

= 879.20 m^2

Therefore, the area of the path is 879.20 m^2.

Question 14:

A circular flower garden has an area of 314 m^2. A sprinkler at the centre of the garden can cover an area that has a radius of 12 m. Will the sprinkler water the entire garden? (Take $\pi = 3.14$)

Answer 14:

Circular area by the sprinkler = πr^2

= 3.14 x 12 x 12

= 3.14 x 144

= 452.16 m^2

Area of the circular flower garden = 314 m^2

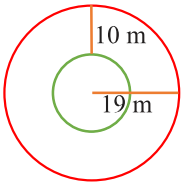
Since Area of circular flower garden is smaller than area by sprinkler.

Therefore, the sprinkler will water the entire garden.

APMF

Question 15:

Find the circumference of the inner and the outer circles, shown in the adjoining figure. (Take $\pi = 3.14$)



Answer 15:

Radius of outer circle (r) = 19 m

$\therefore$ Circumference of outer circle = $2\pi r$ = 2 x 3.14 x 19

= 119.32 m

Now radius of inner circle (r') = 19 – 10 = 9 m

$\therefore$ Circumference of inner circle = $2\pi r'$ = 2 x 3.14 x 9

= 56.52 m

Therefore, the circumferences of inner and outer circles are 56.52 m and 119.32 m respectively.

Question 16:

How many times a wheel of radius 28 cm must rotate to go 352 m? $\left(\text{Take } \pi = \frac{22}{7}\right)$

Answer 16:

Let wheel must be rotate n times of its circumference.

Radius of wheel = 28 cm and Total distance = 352 m = 35200 cm

$\therefore$ Distance covered by wheel = n x circumference of wheel

$\Rightarrow$ $35200 = n \times 2\pi r$

$\Rightarrow$ $35200 = n \times 2 \times \frac{22}{7} \times 28$

$\Rightarrow$ $n = \frac{35200 \times 7}{2 \times 22 \times 28}$

$\Rightarrow$ n = 200 revolutions

Thus, wheel must rotate 200 times to go 352 m.

APMF

Question 17:

The minute hand of a circular clock is 15 cm long. How far does the tip of the minute hand move in 1 hour? $\left(\text{Take } \pi = 3.14\right)$

Answer 17:

In 1 hour, minute hand completes one round means makes a circle.

Radius of the circle $\left(r\right)$ = 15 cm

Circumference of circular clock = $2\pi r$

= 2 x 3.14 x 15

= 94.2 cm

Therefore, the tip of the minute hand moves 94.2 cm in 1 hour.

Exercise 11.4

Question 1:

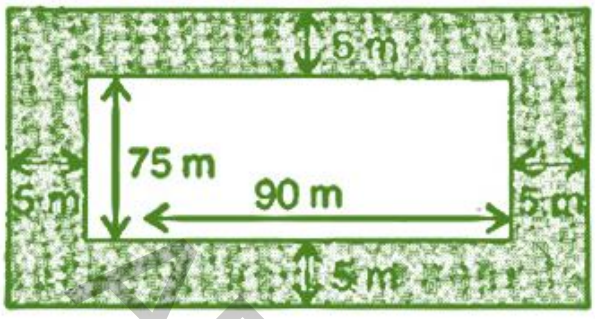
A garden is 90 m long and 75 m broad. A path 5 m wide is to be built outside and around it. Find the area of the path. Also find the area of the garden in hectares.

Answer 1:

Length of rectangular garden = 90 m and breadth of rectangular garden = 75 m

Outer length of rectangular garden with path = 90 + 5 + 5 = 100 m

Outer breadth of rectangular garden with path = 75 + 5 + 5 = 85 m



Outer area of rectangular garden with path = length x breadth = 100 x 85 = 8,500 m^2

Inner area of garden without path = length x breadth = 90 x 75 = 6,750 m^2

Now, Area of path = Area of garden with path – Area of garden without path

= 8,500 – 6,750

= 1,750 m^2

Since, $1\ m^2 = \frac{1}{10000}$ hectares

Therefore, $6{,}750\ m^2 = \frac{6750}{10000} = 0.675$ hectares

Question 2:

A 3 m wide path runs outside and around a rectangular park of length 125 m and breadth 65 m. Find the area of the path.

Answer 2:

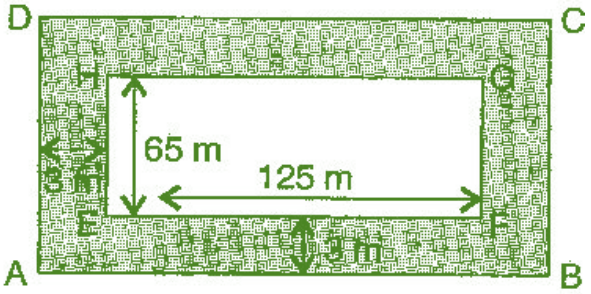
Length of rectangular park = 125 m,

Breadth of rectangular park = 65 m and

Width of the path = 3 m

Length of rectangular park with path = 125 + 3 + 3 = 131 m

Breadth of rectangular park with path = 65 + 3 + 3 = 71 m



∴ Area of path = Area of park with path – Area of park without path

= (AB x AD) – (EF x EH)

= (131 x 71) – (125 x 65)

= 9301 – 8125

= 1,176 m^2

Thus, area of path around the park is 1,176 m^2.

Question 3:

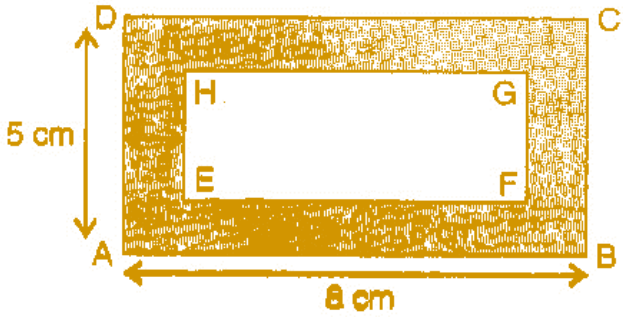
A picture is painted on a cardboard 8 cm long and 5 cm wide such that there is a margin of 1.5 cm along each of its sides. Find the total area of the margin.

Answer 3:

Length of painted cardboard = 8 cm and breadth of painted card = 5 cm

Since, there is a margin of 1.5 cm long from each of its side.

Therefore reduced length = 8 – (1.5 + 1.5) = 8 – 3 = 5 cm



And reduced breadth = 5 – (1.5 + 1.5) = 5 – 3 = 2 cm

∴ Area of margin = Area of cardboard (ABCD) – Area of cardboard (EFGH)

= (AB x AD) – (EF x EH)

= (8 x 5) – (5 x 2)

= 40 – 10

= 30 cm^2

Thus, the total area of margin is 30 cm^2.

Question 4:

A *verandah* of width 2.25 m is constructed all along outside a room which is 5.5 m long and 4 m wide. Find:

(i) the area of the *verandah*.

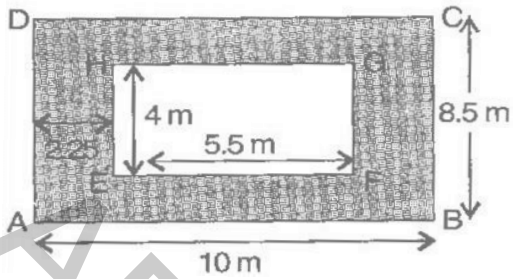
(ii) the cost of cementing the floor of the *verandah* at the rate of ₹200 per m^2.

Answer 4:

(i) The length of room = 5.5 m and width of the room = 4 m

The length of room with verandah = 5.5 + 2.25 + 2.25 = 10 m

The width of room with verandah = 4 + 2.25 + 2.25 = 8.5 m



Area of verandah

= Area of room with verandah – Area of room without verandah

= Area of ABCD – Area of EFGH

= (AB x AD) – (EF x EH)

= (10 x 8.5) – (5.5 x 4)

= 85 – 22

= 63 m^2

(ii) The cost of cementing 1 m^2 the floor of verandah = ₹ 200

The cost of cementing 63 m^2 the floor of verandah = 200 x 63 = ₹12,600

Question 5:

A path 1 m wide is built along the border and inside a square garden of side 30 m. Find:

(i) the area of the path.

(ii) the cost of planting grass in the remaining portion of the garden at the rate of ₹ 40 per m^2.

Answer 5:

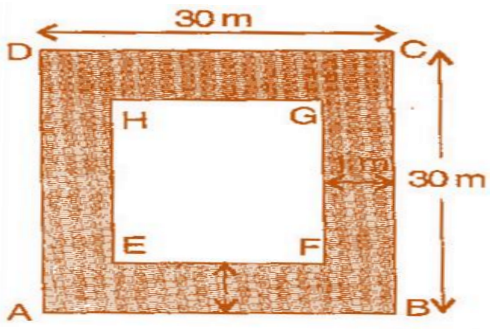
(i) Side of the square garden = 30 m and

Width of the path along the border = 1 m

Side of square garden without path = 30 – (1 + 1) = 30 – 2 = 28 m

APME

Now Area of path = Area of ABCD – Area of EFGH
= (AB x AD) – (EF x EH)
= (30 x 30) – (28 x 28)
= 900 – 784
= 116 m^2



(ii) Area of remaining portion = 28 x 28 = 784 m^2
The cost of planting grass in 1 m^2 of the garden = ₹ 40
The cost of planting grass in 784 m^2 of the garden = ₹40 x 784 = ₹ 31,360

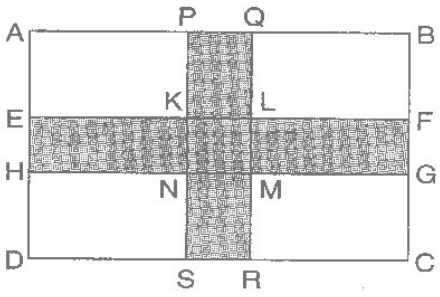
APMF

Question 6:

Two cross roads, each of width 10 m, cut at right angles through the centre of a rectangular park of length 700 m and breadth 300 m and parallel to its sides. Find the area of the roads. Also find the area of the park excluding cross roads. Give the answer in hectares.

Answer 6:

Here, PQ = 10 m and PS = 300 m, EH = 10 m and EF = 700 m
And KL = 10 m and KN = 10 m



Area of roads = Area of PQRS + Area of EFGH – Area of KLMN
[∵ KLMN is taken twice, which is to be subtracted]
= PS x PQ + EF x EH – KL x KN

= (300 x 10) + (700 x 10) – (10 x 10)
= 3000 + 7000 – 100
= 9,900 m^2

Area of road in hectares, $1\ m^2 = \frac{1}{10000}$ hectares

$\therefore$ $9{,}900\ m^2 = \frac{9900}{10000} = 0.99$ hectares

Now, Area of park excluding cross roads
= Area of park – Area of road
= (AB x AD) – 9,900
= (700 x 300) – 9,900
= 2,10,000 – 9,900
= 2,00,100 m^2
$= \frac{200100}{10000}$ hectares = 20.01 hectares

APME

Question 7:

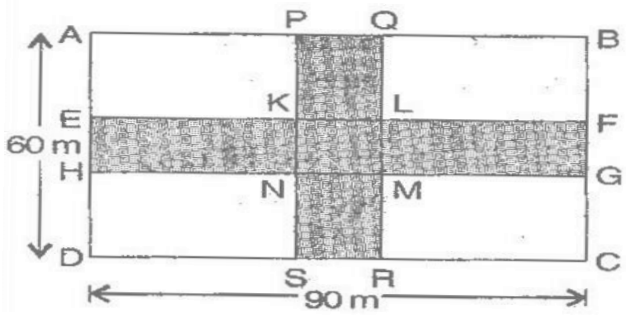
Through a rectangular field of length 90 m and breadth 60 m, two roads are constructed which are parallel to the sides and cut each other at right angles through the centre of the fields. If the width of each road is 3 m, find:

(i) the area covered by the roads.

(ii) the cost of constructing the roads at the rate of ₹110 per m^2.

Answer 7:

(i) Here, PQ = 3 m and PS = 60 m, EH = 3 m and
EF = 90 m and KL = 3 m and KN = 3 m



Area of roads = Area of PQRS + Area of EFGH – Area of KLMN
[$\because$ KLMN is taken twice, which is to be subtracted]
= PS x PQ + EF x EH – KL x KN

= (60 x 3) + (90 x 3) – (3 x 3)
= 180 + 270 – 9
= 441 m^2

(ii) The cost of 1 m^2 constructing the roads = ₹110
The cost of 441 m^2 constructing the roads = ₹110 x 441 = ₹48,510
Therefore, the cost of constructing the roads = ₹48,510

Question 8:

Pragya wrapped a cord around a circular pipe of radius 4 cm (adjoining figure) and cut off the length required of the cord. Then she wrapped it around a square box of side 4 cm (also shown). Did she have any cord left? (Take $\pi = 3.14$)

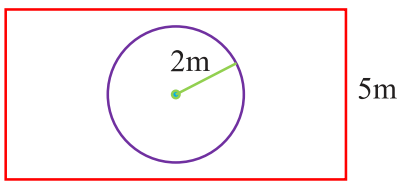
Answer 8:

Radius of pipe = 4 cm
Wrapping cord around circular pipe = $2\pi r$
= 2 x 3.14 x 4 = 25.12 cm
Again, wrapping cord around a square = 4 x side
= 4 x 4 = 16 cm
Remaining cord = Cord wrapped on pipe – Cord wrapped on square
= 25.12 – 16
= 9.12 cm
Thus, she has left 9.12 cm cord.

APMF

Question 9:

The adjoining figure represents a rectangular lawn with a circular flower bed in the middle. Find:



(i) the area of the whole land.
(ii) the area of the flower bed.
(iii) the area of the lawn excluding the area of the flower bed.
(iv) the circumference of the flower bed.

Answer 9:

Length of rectangular lawn = 10 m,
breadth of the rectangular lawn = 5 m
And radius of the circular flower bed = 2 m

(i) Area of the whole land = length x breadth
= 10 x 5 = 50 m^2

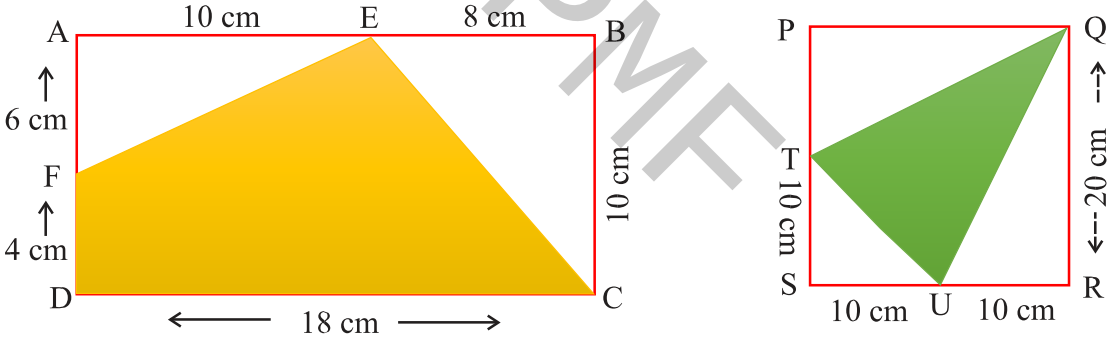
(ii) Area of flower bed = πr^2
= 3.14 x 2 x 2 = 12.56 m^2

(iii) Area of lawn excluding the area of the flower bed
= area of lawn – area of flower bed
= 50 – 12.56
= 37.44 m^2

(iv) The circumference of the flower bed = $2\pi r$
= 2 x 3.14 x 2 = 12.56 m

Question 10:

In the following figures, find the area of the shaded portions:



Answer 10:

(i) Here, AB = 18 cm, BC = 10 cm, AF = 6 cm, AE = 10 cm and BE = 8 cm
Area of shaded portion
= Area of rectangle ABCD – (Area of ΔFAE + area of ΔEBC)
= (AB x BC) – ($\frac{1}{2}$ x AE x AF + $\frac{1}{2}$ x BE x BC)
= (18 x 10) – ($\frac{1}{2}$ x 10 x 6 + $\frac{1}{2}$ x 8 x 10)
= 180 – (30 + 40)
= 180 – 70
= 110 cm^2

(ii) Here, SR = SU + UR = 10 + 10 = 20 cm, QR = 20 cm
PQ = SR = 20 cm, PT = PS – TS = 20 – 10 cm
TS = 10 cm, SU = 10 cm, QR = 20 cm and UR = 10 cm
Area of shaded region
= Area of square PQRS – Area of ΔQPT – Area of ΔTSU – Area of ΔUQR

$$= (SR \times QR) - \frac{1}{2} \times PQ \times PT - \frac{1}{2} \times ST \times SU - \frac{1}{2}$$

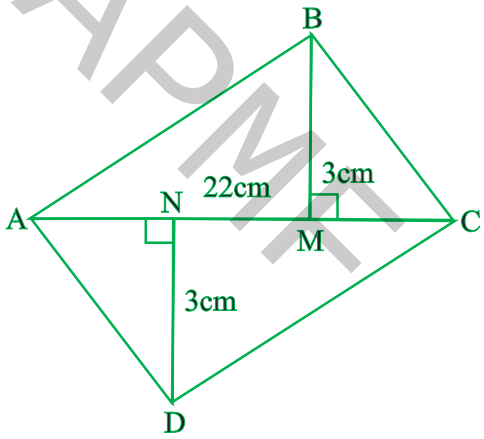
$$= 20 \times 20 - \frac{1}{2} \times 20 \times 10 - \frac{1}{2} \times 10 \times 10 - \frac{1}{2} \times 20 \times 10$$

$$= 400 - 100 - 50 - 100$$

$$= 150 \text{ cm}^2$$

Question 11:

Find the area of the equilateral ABCD. Here, AC = 22 cm, BM = 3 cm, DN = 3 cm and BM $\perp$ AC, DN $\perp$ AC.



APMF

Answer 11:

Here, AC = 22 cm, BM = 3 cm, DN = 3 cm
Area of quadrilateral ABCDF = Area of ΔABC + Area of ΔADC

$$= \frac{1}{2} \times AC \times BM + \frac{1}{2} \times AC \times DN$$

$$= \frac{1}{2} \times 22 \times 3 + \frac{1}{2} \times 22 \times 3$$

$$= 3 \times 11 + 3 \times 11$$

$$= 33 + 33$$

$$= 66 \text{ cm}^2$$

Thus, the area of quadrilateral ABCD is cm^2.

Mathematics

(Chapter – 12) (Algebraic Expressions)

(Class – VII)

Exercise 12.1

Question 1:

Get the algebraic expressions in the following cases using variables, constants and arithmetic operations:

(i) Subtraction of z from y.

(ii) One-half of the sum of numbers x and y.

(iii) The number z multiplied by itself.

(iv) One-fourth of the product of numbers p and q.

(v) Numbers x and y both squared and added.

(vi) Number 5 added to three times the product of m and n.

(vii) Product of numbers y and z subtracted from 10.

(viii) Sum of numbers a and b subtracted from their product.

Answer 1:

(i) $y-z$ (ii) $\frac{x+y}{2}$

(iii) z^2 (iv) $\frac{pq}{4}$

(v) x^2+y^2 (vi) $3mn+5$

(vii) $10-yz$ (viii) $ab-(a+b)$

APME

Question 2:

(i) Identify the terms and their factors in the following expressions, show the terms and factors by tree diagram:

(a) $x-3$ (b) $1+x+x^2$ (c) $y-y^3$

(d) $5xy^2+7x^2y$ (e) $-ab+2b^2-3a^2$

(ii) Identify the terms and factors in the expressions given below:

(a) $-4x+5$ (b) $-4x+5y$ (c) $5y+3y^2$

(d) $xy+2x^2y^2$ (e) $pq+q$ (f) $1.2ab-2.4b+3.6a$

(g) $\frac{3}{4}x+\frac{1}{4}$ (h) $0.1p^2+0.2q^2$

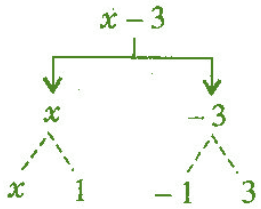
Answer 2:

(i) (a) $x-3$

Expression

Terms

Factors

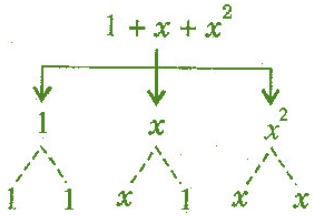


(b) $1+x+x^2$

Expression

Terms

Factors

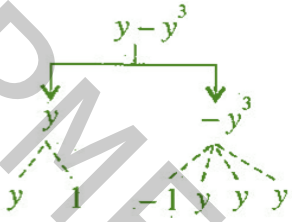


(c) $y-y^3$

Expression

Terms

Factors

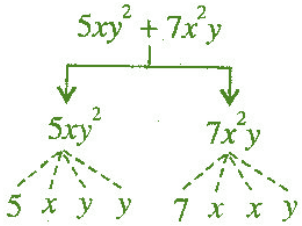


(d) $5xy^2+7x^2y$

Expression

Terms

Factors

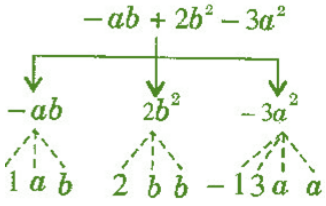


(e) $-ab+2b^2-3a^2$

Expression

Terms

Factors



APMF

(ii) (a) $-4x+5$

Terms: $-4x, 5$

Factors: $-4, x$; 5

(b) $-4x+5y$

Terms: $-4x, 5y$

Factors: $-4, x$; $5, y$

(c) $5y+3y^2$

Terms: $5y, 3y^2$

Factors: $5, y$; $3, y, y$

(d) $xy+2x^2y^2$

Terms: $xy, 2x^2y^2$

Factors: x, y ; $2x, x, y, y$

(e) $pq+q$

Terms: pq, q

Factors: p, q ; q

(f) $1.2ab-2.4b+3.6a$

Terms: $1.2ab, -2.4b, 3.6a$

Factors: $1.2, a, b$; $-2.4, b$; $3.6, a$

(g) $\frac{3}{4}x+\frac{1}{4}$

Terms: $\frac{3}{4}x, \frac{1}{4}$

Factors: $\frac{3}{4}, x$; $\frac{1}{4}$

(h) $0.1p^2+0.2q^2$

Terms: $0.1p^2, 0.2q^2$

Factors: $0.1, p, p$; $0.2, q, q$

APME

Question 3:

Identify the numerical coefficients of terms (other than constants) in the following expressions:

(i) $5-3t^2$ (ii) $1+t+t^2+t^3$ (iii) $x+2xy+3y$

(iv) $100m+1000n$ (v) $-p^2q^2+7pq$ (vi) $1.2a+0.8b$

(vii) $3.14r^2$ (viii) $2(l+b)$ (ix) $0.1y+0.01y^2$

Answer 3:

S.No.	Expression	Terms	Numerical Coefficient
(i)	$5-3t^2$	$-3t^2$	-3
(ii)	$1+t+t^2+t^3$	t	1
		t^2	1
		t^3	1
(iii)	$x+2xy+3y$	x	1
		$2xy$	2
		$3y$	3
(iv)	$100m+1000n$	$100m$	100
		$1000n$	1000
(v)	$-p^2q^2+7pq$	$-p^2q^2$	-1
		$7pq$	7
(vi)	$1.2a+0.8b$	$1.2a$	1.2
		$0.8b$	0.8
(vii)	$3.14r^2$	$3.14r^2$	3.14
(viii)	$2(l+b)=2l+2b$	$2l$	2
		$2b$	2
(ix)	$0.1y+0.01y^2$	$0.1y$	0.1
		$0.01y^2$	0.01

APME

Question 4:

(a) Identify terms which contain x and give the coefficient of x.

(i) y^2x+y (ii) $13y^2-8yx$ (iii) $x+y+2$

(iv) $5+z+zx$ (v) $1+x+xy$ (vi) $12xy^2+25$

(vii) $7x+xy^2$

(b) Identify terms which contain y^2 and give the coefficient of y^2.

(i) $8-xy^2$ (ii) $5y^2+7x$ (iii) $2x^2y-15xy^2+7y^2$

Answer 4:

(a)

S.No.	Expression	Term with factor x	Coefficient of x
(i)	y^2x+y	y^2x	y^2
(ii)	$13y^2-8yx$	$-8yx$	$-8y$
(iii)	$x+y+2$	x	1
(iv)	$5+z+zx$	zx	z
(v)	$1+x+xy$	x	1
		xy	y
(vi)	$12xy^2+25$	$12xy^2$	$12y^2$
(vii)	$7x+xy^2$	xy^2	y^2
		$7x$	7

(b)

S.No.	Expression	Term contains y^2	Coefficient of y^2
(i)	$8-xy^2$	$-xy^2$	$-x$
(ii)	$5y^2+7x$	$5y^2$	5
(iii)	$2x^2y-15xy^2+7y^2$	$-15xy^2$	$-15x$
		$7y^2$	7

APMF

Question 5:

Classify into monomials, binomials and trinomials:

(i)	$4y-7x$	(ii)	y^2	(iii)	$x+y-xy$
(iv)	100	(v)	$ab-a-b$	(vi)	$5-3t$
(vii)	$4p^2q-4pq^2$	(viii)	$7mn$	(ix)	z^2-3z+8
(x)	a^2+b^2	(xi)	z^2+z	(xii)	$1+x+x^2$

Answer 5:

S.No.	Expression	Type of Polynomial
(i)	$4y-7z$	Binomial
(ii)	y^2	Monomial
(iii)	$x+y-xy$	Trinomial
(iv)	100	Monomial
(v)	$ab-a-b$	Trinomial
(vi)	$5-3t$	Binomial
(vii)	$4p^2q-4pq^2$	Binomial
(viii)	$7mn$	Monomial
(ix)	z^2-3z+8	Trinomial
(x)	a^2+b^2	Binomial
(xi)	z^2+z	Binomial
(xii)	$1+x+x^2$	Trinomial

APMF

Question 6:

State whether a given pair of terms is of like or unlike terms:

(i)	1, 100	(ii)	$-7x, \frac{5}{2}x$	(iii)	$-29x, -29y$
(iv)	$14xy, 42yx$	(v)	$4m^2p, 4mp^2$	(vi)	$12xz, 12x^2z^2$

Answer 6:

S.No.	Pair of terms	Like / Unlike terms
(i)	1, 100	Like terms
(ii)	$-7x, \frac{5}{2}x$	Like terms
(iii)	$-29x, -29y$	Unlike terms
(iv)	$14xy, 42yx$	Like terms
(v)	$4m^2p, 4mp^2$	Unlike terms
(vi)	$12xz, 12x^2z^2$	Unlike terms

Question 7:

Identify like terms in the following:

(a) $-xy^2, -4yx^2, 8x^2, 2xy^2, 7y, -11x^2 - 100x, -11yx, 20x^2y, -6x^2, y, 2xy, 3x$

(b) $10pq, 7p, 8q, -p^2q^2, -7qp, -100q, -23, 12q^2p^2, -5p^2, 41, 2405p, 78qp, 13p^2q, qp^2, 701p^2$

Answer 7:

(a) Like terms are:

(i) $-xy^2, 2xy^2$ (ii) $-4yx^2, 20x^2y$ (iii) $8x^2, -11x^2, -6x^2$

(iv) $7y, y$ (v) $-100x, 3x$ (vi) $-11yx, 2xy$

(b) Like terms are:

(i) $10pq, -7pq, 78pq$ (ii) $7p, 2405p$ (iii) $8q, -100q$

(iv) $-p^2q^2, 12p^2q^2$ (v) $-12, 41$ (vi) $-5p^2, 701p^2$

(vii) $13p^2q, qp^2$

APMF

Exercise 12.2

Question 1:

Simplify combining like terms:

(i) $21b-32+7b-20b$

(ii) $-z^2+13z^2-5x+7z^3-15z$

(iii) $p-(p-q)-q-(q-p)$

(iv) $3a-2b-ab-(a-b+ab)+3ab+b-a$

(v) $5x^2y-5x^2+3yx^2-3y^2+x^2-y^2+8xy^2-3y^2$

(vi) $(3y^2+5y-4)-(8y-y^2-4)$

Answer 1:

(i) $21b-32+7b-20b=21b+7b-20b-32$

$= 28b-20b-32 = 8b-32$

(ii) $-z^2+13z^2-5z+7z^3-15z=7z^3+(-z^2+13z^2)-(5z+15z)$

$= 7z^3+12z^2-20z$

(iii) $p-(p-q)-q-(q-p)=p-p+q-q-q+p$

$= p-p+p+q-q-q = p-q$

(iv) $3a-2b-ab-(a-b+ab)+3ab+b-a=3a-2b-ab-a+b-ab+3ab+b-a$

$= 3a-a-a-2b+b+b-ab-ab+3ab$

$= (3a-a-a)-(2b-b-b)-(ab+ab-3ab)$

$= a-0-(-ab)$

$= a+ab$

(v)

$5x^2y-5x^2+3yx^2-3y^2+x^2-y^2+8xy^2-3y^2=5x^2y+3yx^2+8xy^2-5x^2+x^2-3y^2-y^2-3y^2$

$= (5x^2y+3x^2y)+8xy^2-(5x^2-x^2)-(3y^2+y^2+3y^2)$

$= 8x^2y+8xy^2-4x^2-7y^2$

(vi) $(3y^2+5y-4)-(8y-y^2-4)=3y^2+5y-4-8y+y^2+4$

$= (3y^2+y^2)+(5y-8y)-(4-4)$

$= 4y^2-3y-0 = 4y^2-3y$

APMF

Question 2:

Add:

(i) $3mn, -5mn, 8mn - 4mn$

(ii) $t - 8tz, 3tz - z, z - t$

(iii) $-7mn + 5, 12mn + 2, 9mn - 8, -2mn - 3$

(iv) $a + b - 3, b - a + 3, a - b + 3$

(v) $14x + 10y - 12xy - 13, 18 - 7x - 10y + 8xy, 4xy$

(vi) $5m - 7n, 3n - 4m + 2, 2m - 3mn - 5$

(vii) $4x^2y, -3xy^2, -5xy^2, 5x^2y$

(viii) $3p^2q^2 - 4pq + 5, -10p^2q^2, 15 + 9pq + 7p^2q^2$

(ix) $ab - 4a, 4b - ab, 4a - 4b$

(x) $x^2 - y^2 - 1, y^2 - 1 - x^2, 1 - x^2 - y^2$

Answer 2:

(i) $3mn, -5mn, 8mn, -4mn = 3mn + (-5mn) + 8mn + (-4mn)$

$= (3 - 5 + 8 - 4)mn = 2mn$

(ii) $t - 8tz, 3tz - z, z - t = t - 8tz + 3tz - z + z - t$

$= t - t - 8tz + 3tz - z + z$

$= (1 - 1)t + (-8 + 3)tz + (-1 + 1)z$

$= 0 - 5tz + 0 = -5tz$

(iii) $-7mn + 5, 12mn + 2, 9mn - 8, -2mn - 3 = -7mn + 5 + 12mn + 2 + 9mn - 8 + (-2mn) - 3$

$= -7mn + 12mn + 9mn - 2mn + 5 + 2 - 8 - 3$

$= (-7 + 12 + 9 - 2)mn + 7 - 11$

$= 12mn - 4$

(iv) $a + b - 3, b - a + 3, a - b + 3 = a + b - 3 + b - a + 3 + a - b + 3$

$= (a - a + a) + (b + b - b) - 3 + 3 + 3$

$= a + b + 3$

(v)

$14x + 10y - 12xy - 13, 18 - 7x - 10y + 8xy, 4xy = 14x + 10y - 12xy - 13 + 18 - 7x - 10y + 8xy + 4xy$

$= 14x - 7x + 10y - 10y - 12xy + 8xy + 4xy - 13 + 18$

$= 7x + 0y + 0xy + 5 = 7x + 5$

APMF

(vi) $5m-7n, 3n-4m+2, 2m-3mn-5 = 5m-7n+3n-4m+2+2m-3mn-5$

$= 5m-4m+2m-7n+3n-3mn+2-5$

$= (5-4+2)m+(-7+3)n-3mn-3$

$= 3m-4n+3mn-3$

(vii) $4x^2y, -3xy^2, -5xy^2, 5x^2y = 4x^2y+(-3xy^2)+(-5xy^2)+5x^2y$

$= 4x^2y+5x^2y-3xy^2-5xy^2$

$= 9x^2y-8xy^2$

(viii) $3p^2q^2-4pq+5, -10p^2q^2, 15+9pq+7p^2q^2$

$= 3p^2q^2-4pq+5+(-10p^2q^2)+15+9pq+7p^2q^2$

$= 3p^2q^2-10p^2q^2+7p^2q^2+4pq+9pq+5+15$

$= (3-10+7)p^2q^2+(-4+9)pq+20$

$= 0p^2q^2+5pq+20 = 5pq+20$

(ix) $ab-4a, 4b-ab, 4a-ab = ab-4a+4b-ab+4a-ab$

$= -4a+4a+4b-4b+ab-ab$

$= 0+0+0=0$

(x) $x^2-y^2-1, y^2-1-x^2, 1-x^2-y^2$

$= x^2-y^2-1+y^2-1-x^2+1-x^2-y^2$

$= x^2-x^2-x^2-y^2+y^2-y^2-1-1+1$

$= (1-1-1)x^2+(-1+1-1)y^2-1-1+1$

$= -x^2-y^2-1$

ARMF

Question 3:

Subtract:

(i) $-5y^2$ from y^2

(ii) $6xy$ from $-12xy$

(iii) $(a-b)$ from $(a+b)$

(iv) $a(b-5)$ from $b(5-a)$

(v) $-m^2+5mn$ from $4m^2-3mn+8$

(vi) $-x^2+10x-5$ from $5x-10$

(vii) $5a^2-7ab+5b^2$ from $3ab-2a^2-2b^2$

(viii) $4pq-5q^2-3p^2$ from $5p^2+3q^2-pq$

Answer 3:

(i) $y^2-\left(-5y^2\right) = y^2+5y^2$

$= 6y^2$

(ii) $-12xy-\left(6xy\right) = -12xy-6xy$

$= -18xy$

(iii) $\left(a+b\right)-\left(a-b\right) = a+b-a+b$

$= a-a+b+b$

$= 2b$

(iv) $b\left(5-a\right)-a\left(b-5\right)$

$= 5b-ab-ab+5a$

$= 5b-2ab+5a$

$= 5a+5b-2ab$

(v) $4m^2-3mn+8-\left(-m^2+5mn\right)$

$= 4m^2-3mn+8+m^2-5mn$

$= 4m^2+m^2-3mn-5mn+8$

$= 5m^2-8mn+8$

(vi) $5x-10-\left(-x^2+10x-5\right)$

$= 5x-10+x^2-10x+5$

$= x^2+5x-10x-10+5$

$= x^2-5x-5$

(vii) $3ab-2a^2-2b^2-\left(5a^2-7ab+5b^2\right)$

$= 3ab-2a^2-2b^2-5a^2+7ab-5b^2$

$= 3ab+7ab-2a^2-5a^2-2b^2-5b^2$

$= 10ab-7a^2-7b^2$

$= -7a^2-7b^2+10ab$

(viii) $5p^2+3q^2-pq-\left(4pq-5q^2-3p^2\right)$

$= 5p^2+3q^2-pq-4pq+5q^2+3p^2$

$= 5p^2+3p^2+3q^2+5q^2-pq-4pq$

$= 8p^2+8q^2-5pq$

APME

Question 4:

(a) What should be added to x^2+xy+y^2 to obtain $2x^2+3xy$?

(b) What should be subtracted from $2a+8b+10$ to get $-3a+7b+16$?

Answer 4:

(a) Let p should be added.

Then according to question,

$x^2+xy+y^2+p=2x^2+3xy$

$\Rightarrow \quad p=2x^2+3xy-\left(x^2+xy+y^2\right)$

$\Rightarrow \quad p=2x^2+3xy-x^2-xy-y^2$

$\Rightarrow \quad p=2x^2-x^2-y^2+3xy-xy$

$\Rightarrow \quad p=x^2-y^2+2xy$

Hence, x^2-y^2+2xy should be added.

(b) Let q should be subtracted.

Then according to question,

$2a+8b+10-q=-3a+7b+16$

$\Rightarrow \quad -q=-3a+7b+16-\left(2a+8b+10\right)$

$\Rightarrow \quad -q=-3a+7b+16-2a-8b-10$

$\Rightarrow \quad -q=-3a-2a+7b-8b+16-10$

$\Rightarrow \quad -q=-5a-b+6$

$\Rightarrow \quad q=-\left(-5a-b+6\right)$

$\Rightarrow \quad q=5a+b-6$

Question 5:

What should be taken away from $3x^2-4y^2+5xy+20$ to obtain $-x^2-y^2+6xy+20$?

Answer 5:

Let q should be subtracted.

Then according to question,

$3x^2-4y^2+5xy+20-q=-x^2-y^2+6xy+20$

$\Rightarrow \quad q=3x^2-4y^2+5xy+20-\left(-x^2-y^2+6xy+20\right)$

$\Rightarrow \quad q=3x^2-4y^2+5xy+20+x^2+y^2-6xy-20$

$\Rightarrow \quad q=3x^2+x^2-4y^2+y^2+5xy-6xy+20-20$

$\Rightarrow \quad q=4x^2-3y^2-xy+0$

Hence, $4x^2-3y^2-xy$ should be subtracted.

APMF

Question 6:

(a) From the sum of $3x - y + 11$ and $-y - 11$, subtract $3x - y - 11$.

(b) From the sum of $4 + 3x$ and $5 - 4x + 2x^2$, subtract the sum of $3x^2 - 5x$ and $-x^2 + 2x + 5$.

Answer 6:

(a) According to question,

$$(3x - y + 11) + (-y - 11) - (3x - y - 11) = 3x - y + 11 - y - 11 - 3x + y + 11$$

$$= 3x - 3x - y - y + y + 11 - 11 + 11$$

$$= (3-3)x - (1+1-1)y + 11 + 11 - 11$$

$$= 0x - y + 11 = -y + 11$$

(b) According to question,

$$\left[(4 + 3x) + (5 - 4x + 2x^2)\right] - \left[(3x^2 - 5x) + (-x^2 + 2x + 5)\right]$$

$$= \left[4 + 3x + 5 - 4x + 2x^2\right] - \left[3x^2 - 5x - x^2 + 2x + 5\right]$$

$$= \left[2x^2 + 3x - 4x + 5 + 4\right] - \left[3x^2 - x^2 + 2x - 5x + 5\right]$$

$$= \left[2x^2 - x + 9\right] - \left[2x^2 - 3x + 5\right]$$

$$= 2x^2 - x + 9 - 2x^2 + 3x - 5$$

$$= 2x^2 - 2x^2 - x + 3x + 9 - 5$$

$$= 2x + 4$$

APMF

Exercise 12.3

Question 1:

If $m = 2$, find the value of:

(i) $m-2$ (ii) $3m-5$ (iii) $9-5m$

(iv) $3m^2-2m-7$ (v) $\frac{5m}{2}-4$

Answer 1:

(i) $m-2 = 2-2$ [Putting $m=2$]

$= 0$

(ii) $3m-5 = 3\times 2-5$ [Putting $m=2$]

$= 6-5 = 1$

(iii) $9-5m = 9-5 \text{ x } 2$ [Putting $m=2$]

$= 9-10 = -1$

(iv) $3m^2-2m-7$

$= 3(2)^2-2(2)-7$ [Putting $m=2$]

$= 3 \text{ x } 4-2 \text{ x } 2-7$

$= 12-4-7$

$= 12-11 = 1$

(v) $\frac{5m}{2}-4 = \frac{5\times 2}{2}-4$ [Putting $m=2$]

$= 5-4 = 1$

Question 2:

If $p = -2$, find the value of:

(i) $4p+7$ (ii) $-3p^2+4p+7$ (iii) $-2p^3-3p^2+4p+7$

Answer 2:

(i) $4p+7 = 4(-2)+7$ [Putting $p=-2$]

$= -8+7 = -1$

(ii) $-3p^2+4p+7$

$= -3(-2)^2+4(-2)+7$ [Putting $p=-2$]

$= -3\times 4-8+7$

$= -12-8+7$

$= -20+7 = -13$

APMF

(iii) $-2p^3-3p^2+4p+7$

$= -2(-2)^3-3(-2)^2+4(-2)+7$ [Putting $p=-2$]

$= -2\times(-8)-3\times4-8+7$

$= 16-12-8+7$

$= -20+23 = 3$

Question 3:

Find the value of the following expressions, when $x=-1$:

(i) $2x-7$ (ii) $-x+2$ (iii) x^2+2x+1

(iv) $2x^2-x-2$

Answer 3:

(i) $2x-7 = 2(-1)-7$ [Putting $x=-1$]

$= -2-7 = -9$

(ii) $-x+2 = -(-1)+2$ [Putting $x=-1$]

$= 1 + 2 = 3$

(iii) $x^2+2x+1 = (-1)^2+2(-1)+1$ [Putting $x=-1$]

$= 1 - 2 + 1$

$= 2 - 2 = 0$

(iv) $2x^2-x-2 = 2(-1)^2-(-1)-2$ [Putting $x=-1$]

$= 2 \text{ x } 1 + 1 - 2$

$= 2 + 1 - 2$

$= 3 - 2 = 1$

Question 4:

If $a=2, b=-2,$ find the value of:

(i) a^2+b^2 (ii) a^2+ab+b^2 (iii) a^2-b^2

Answer 4:

(i) $a^2+b^2 = (2)^2+(-2)^2$ [Putting $a=2, b=-2$]

$= 4 + 4 = 8$

(ii) a^2+ab+b^2

$= (2)^2+(2)(-2)+(-2)^2$ [Putting $a=2, b=-2$]

$= 4 - 4 + 4 = 4$

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(iii) $a^2 - b^2 = (2)^2 - (-2)^2$ [Putting $a = 2, b = -2$]

$= 4 - 4 = 0$

Question 5:

When $a = 0, b = -1,$ find the value of the given expressions:

(i) $2a + 2b$ (ii) $2a^2 + b^2 + 1$

(iii) $2a^2b + 2ab^2 + ab$ (iv) $a^2 + ab + 2$

Answer 5:

(i) $2a + 2b = 2(0) + 2(-1)$ [Putting $a = 0, b = -1$]

$= 0 - 2 = -2$

(ii) $2a^2 + b^2 + 1 = 2(0)^2 + (-1)^2 + 1$ [Putting $a = 0, b = -1$]

$= 2 \times 0 + 1 + 1 = 0 + 2 = 2$

(iii) $2a^2b + 2ab^2 + ab = 2(0)^2(-1) + 2(0)(-1)^2 + (0)(-1)$ [Putting $a = 0, b = -1$]

$= 0 + 0 + 0 = 0$

(iv) $a^2 + ab + 2 = (0)^2 + (0)(-1) + 2$ [Putting $a = 0, b = -1$]

$= 0 + 0 + 2 = 2$

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Question 6:

Simplify the expressions and find the value if x is equal to 2:

(i) $x + 7 + 4(x - 5)$ (ii) $3(x + 2) + 5x - 7$

(iii) $6x + 5(x - 2)$ (iv) $4(2x - 1) + 3x + 11$

Answer 6:

(i) $x + 7 + 4(x - 5) = x + 7 + 4x - 20 = x + 4x + 7 - 20$

$= 5x - 13 = 5 \times 2 - 13$ [Putting $x = 2$]

$= 10 - 13 = -3$

(ii) $3(x + 2) + 5x - 7 = 3x + 6 + 5x - 7 = 3x + 5x + 6 - 7$

$= 8x - 1 = 8 \times 2 - 1$ [Putting $x = -1$]

$= 16 - 1 = 15$

(iii) $6x + 5(x - 2) = 6x + 5x - 10 = 11x - 10$

$= 11 \times 2 - 10$ [Putting $x = -1$]

$= 22 - 10 = 12$

(iv) $4(2x-1)+3x+11 = 8x-4+3x+11 = 8x+3x-4+11$

$= 11x+7 = 11 \text{ x } 2 + 7$ [Putting $x=-1$]

$= 22 + 7 = 29$

Question 7:

Simplify these expressions and find their values if $x=3, a=-1, b=-2$:

(i) $3x-5-x+9$ (ii) $2-8x+4x+4$

(iii) $3a+5-8a+1$ (iv) $10-3b-4-5b$

(v) $2a-2b-4-5+a$

Answer 7:

(i) $3x-5-x+9 = 3x-x-5+9 = 2x+4$

$= 2\times3+4$ [Putting $x=3$]

$= 6 + 4 = 10$

(ii) $2-8x+4x+4 = -8x+4x+2+4 = -4x+6$

$= -4\times3+6$ [Putting $x=3$]

$= -12+6=-12$

(iii) $3a+5-8a+1 = 3a-8a+5+1 = -5a+6$

$= -5(-1)+6$ [Putting $a=-1$]

$= 5 + 6 = 11$

(iv) $10-3b-4-5b = -3b-5b+10-4 = -8b+6$

$= -8(-2)+6$ [Putting $b=-2$]

$= 16 + 6 = 22$

(v) $2a-2b-4-5+a = 2a+a-2b-4-5$

$= 3a-2b-9 = 3(-1)-2(-2)-9$ [Putting $a=-1$, $b=-2$]

$= -3+4-9 = -8$

Question 8:

(i) If $z=10$, find the value of $z^3-3(z-10)$.

(ii) If $p=-10$, find the value of $p^2-2p-100$.

Answer 8:

(i) $z^3-3(z-10) = (10)^3-3(10-10)$ [Putting $z=10$]

$= 1000 - 3 \text{ x } 0 = 1000 - 0$

$= 1000$

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(ii) $p^2-2p-100 = (-10)^2-2(-10)-100$ [Putting $p=-10$]

$= 100+20-100 = 20$

Question 9:

What should be the value of a if the value of $2x^2+x-a$ equals to 5, when $x=0$?

Answer 9:

Given: $2x^2+x-a=5$

$\Rightarrow$ $2(0)^2+0-a=5$ [Putting $x=0$]

$\Rightarrow$ $0+0-a=5$

$\Rightarrow$ $a=-5$

Hence, the value of a is -5.

Question 10:

Simplify the expression and find its value when $a=5$ and $b=-3$: $2(a^2+ab)+3-ab$

Answer 10:

Given: $2(a^2+ab)+3-ab$

$\Rightarrow$ $2a^2+2ab+3-ab$

$\Rightarrow$ $2a^2+2ab-ab+3$

$\Rightarrow$ $2a^2+ab+3$

$\Rightarrow$ $2(5)^2+(5)(-3)+3$ [Putting $a=5$, $b=-3$]

$\Rightarrow$ 2 x 25 – 15 + 3

$\Rightarrow$ 50 – 15 + 3

$\Rightarrow$ 38

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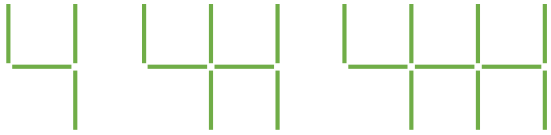
Exercise 12.4

Question 1:

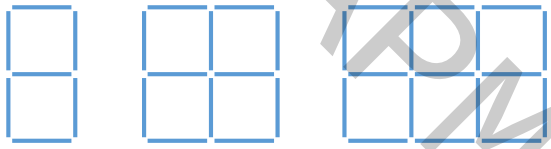
Observe the patterns of digits made from line segments of equal length. You will find such segmented digits on the display of electronic watches or calculators.

(a) 

6 11 16 21... $(5n+1)$...

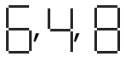
(b) 

4 7 10 13... $(3n+1)$...

(c) 

7 12 17 22... $(5n+2)$...

If the number of digits formed is taken to be n, the number of segments required to form n digits is given by the algebraic expression appearing on the right of each pattern.

How many segments are required to form 5, 10, 100 digits of the kind 

Answer 1:

S. No.	Symbol	Digit's number	Pattern's Formulae	No. of Segments
(i)		5	$5n+1$	26
		10		51
		100		501
(ii)		5	$3n+1$	16
		10		31
		100		301

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(iii)		5	$5n+2$	27
		10		52
		100		502

(i) $5n+1$

Putting $n=5$, 5 x 5 + 1 = 25 + 1 = 26

Putting $n=10$, 5 x 10 + 1 = 50 + 1 = 51

Putting $n=100$, 5 x 100 + 1 = 500 + 1 = 501

(ii) $3n+1$

Putting $n=5$, 3 x 5 + 1 = 15 + 1 = 16

Putting $n=10$, 3 x 10 + 1 = 30 + 1 = 31

Putting $n=100$, 3 x 100 + 1 = 300 + 1 = 301

(iii) $5n+2$

Putting $n=5$, 5 x 5 + 2 = 25 + 2 = 27

Putting $n=10$, 5 x 10 + 2 = 50 + 2 = 52

Putting $n=100$, 5 x 100 + 2 = 500 + 2 = 502

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Question 2:

Use the given algebraic expression to complete the table of number patterns:

S.No.	**Expression**	**Terms**									
		1^{st}	2^{nd}	3^{rd}	4^{th}	5^{th}	...	10^{th}	...	100^{th}	...
(i)	$2n-1$	1	3	5	7	9	---	19	---	---	---
(ii)	$3n+2$	2	5	8	11	---	---	---	---	---	---
(iii)	$4n+1$	5	9	13	17	---	---	---	---	---	---
(iv)	$7n+20$	27	34	41	48	---	---	---	---	---	---
(v)	n^2+1	2	5	10	17	---	---	---	---	10001	---

Answer 2:

(i) $2n-1$

Putting $n=100$, 2 x 100 – 1 = 200 – 1 = 199

(ii) $3n+2$

Putting $n=5$, 3 x 5 + 2 = 15 + 2 = 17

Putting $n = 10$, 3 x 10 + 2 = 30 + 2 = 32

Putting $n = 100$, 3 x 100 + 2 = 300 + 2 = 302

(iii) $4n+1$

Putting $n = 5$, 4 x 5 + 1 = 20 + 1 = 21

Putting $n = 10$, 4 x 10 + 1 = 40 + 1 = 41

Putting $n = 100$, 4 x 100 + 1 = 400 + 1 = 401

(iv) $7n+20$

Putting $n = 5$, 7 x 5 + 20 = 25 + 20 = 55

Putting $n = 10$, 7 x 10 + 20 = 70 + 20 = 90

Putting $n = 100$, 7 x 100 + 20 = 700 + 20 = 720

(v) n^2+1

Putting $n = 5$, 5 x 5 + 1 = 25 + 1 = 26

Putting $n = 10$, 10 x 10 + 1 = 100 + 1 = 101

Putting $n = 100$, 100 x 100 + 1 = 10000 + 1 = 10001

Now complete table is,

S.No.	Expression	Terms									
		1st	2nd	3rd	4th	5th	...	10th	...	100th	...
(i)	$2n-1$	1	3	5	7	9	---	19	---	**199**	---
(ii)	$3n+2$	2	5	8	11	**17**	---	**32**	---	**302**	---
(iii)	$4n+1$	5	9	13	17	**21**	---	**41**	---	**401**	---
(iv)	$7n+20$	27	34	41	48	**55**	---	**90**	---	**720**	---
(v)	n^2+1	2	5	10	17	**26**	---	**101**	---	10001	---

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Mathematics

(Chapter – 13) (Exponents and Powers)

(Class – VII)

Exercise 13.1

Question 1:

Find the value of:

(i) 2^6 (ii) 9^3 (iii) 11^2 (iv) 5^4

Answer 1:

(i) $2^6 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 64$

(ii) $9^3 = 9 \times 9 \times 9 = 729$

(iii) $11^2 = 11 \times 11 = 121$

(iv) $5^4 = 5 \times 5 \times 5 \times 5 = 625$

Question 2:

Express the following in exponential form:

(i) $6 \times 6 \times 6 \times 6$ (ii) $t \times t$

(iii) $b \times b \times b \times b$ (iv) $5 \times 5 \times 7 \times 7 \times 7$

(v) $2 \times 2 \times a \times a$ (vi) $a \times a \times a \times c \times c \times c \times c \times d$

Answer 2:

(i) $6 \times 6 \times 6 \times 6 = 6^4$

(ii) $t \times t = t^2$

(iii) $b \times b \times b \times b = b^4$

(iv) $5 \times 5 \times 7 \times 7 \times 7 = 5^2 \times 7^3$

(v) $2 \times 2 \times a \times a = 2^2 \times a^2$

(vi) $a \times a \times a \times c \times c \times c \times c \times d = a^3 \times c^4 \times d$

Question 3:

Express each of the following numbers using exponential notation:

(i) 512 (ii) 343 (iii) 729 (iv) 3125

Answer 3:

(i) 512

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$512 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 2^9$

2	**512**
2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

(ii) 343

$343 = 7 \times 7 \times 7 = 7^3$

7	**343**
7	49
7	7
	1

(iii) 729

$729 = 3 \times 3 \times 3 \times 3 \times 3 \times 3 = 3^6$

3	**729**
3	243
3	81
3	27
3	9
3	3
	1

(iv) 3125

$3125 = 5 \times 5 \times 5 \times 5 \times 5$

5	**3125**
5	625
5	125
5	25
5	5
	1

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Question 4:

Identify the greater number, wherever possible, in each of the following:

(i) 4^3 and 3^4 (ii) 5^3 or 3^5

(iii) 2^8 or 8^2 (iv) 100^2 or 2^{100}

(v) 2^{10} or 10^2

Answer 4:

(i) $4^3 = 4 \times 4 \times 4 = 64$

$3^4 = 3 \times 3 \times 3 \times 3 = 81$

Since $64 < 81$

Thus, 3^4 is greater than 4^3.

(ii) $5^3 = 5 \times 5 \times 5 = 125$

$3^5 = 3 \times 3 \times 3 \times 3 \times 3 = 243$

Since, $125 < 243$

Thus, 3^4 is greater than 5^3.

(iii) $2^8 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 256$

$8^2 = 8 \times 8 = 64$

Since, $256 > 64$

Thus, 2^8 is greater than 8^2.

(iv) $100^2 = 100 \times 100 = 10{,}000$

$2^{100} = 2 \times 2 \times 2 \times 2 \times 2 \times$ .....14 times x ..... $\times 2 = 16{,}384 \times$ ..... $\times 2$

Since, $10{,}000 < 16{,}384 \times$ ..... $\times 2$

Thus, 2^{100} is greater than 100^2.

(v) $2^{10} = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 1{,}024$

$10^2 = 10 \times 10 = 100$

Since, $1{,}024 > 100$

Thus, $2^{10} > 10^2$

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Question 5:

Express each of the following as product of powers of their prime factors:

(i) 648 (ii) 405 (iii) 540 (iv) 3,600

Answer 5:

(i) $648 = 2^3 \times 3^4$

2	**648**
2	324
2	162
3	81
3	27
3	9
3	3
	1

(ii) $405 = 5 \times 3^4$

5	**405**
3	81
3	27
3	9
3	3
	1

(iii) $540 = 2^2 \times 3^3 \times 5$

2	**540**
2	270
3	135
3	45
3	15
5	5
	1

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(iv) $3,600 = 2^4 \times 3^2 \times 5^2$

2	**3600**
2	1800
2	900
2	450
3	225
3	75
5	25
5	5
	1

Question 6:

Simplify:

(i) 2×10^3 (ii) $7^2 \times 2^2$

(iii) $2^3 \times 5$ (iv) 3×4^4

(v) 0×10^2 (vi) $5^2 \times 3^3$

(vii) $2^4 \times 3^2$ (viii) $3^2 \times 10^4$

Answer 6:

(i)	2×10^3	$= 2 \times 10 \times 10 \times 10$	$= 2,000$
(ii)	$7^2 \times 2^2$	$= 7 \times 7 \times 2 \times 2$	$= 196$
(iii)	$2^3 \times 5$	$= 2 \times 2 \times 2 \times 5$	$= 40$
(iv)	3×4^4	$= 3 \times 4 \times 4 \times 4 \times 4$	$= 768$
(v)	0×10^2	$= 0 \times 10 \times 10$	$= 0$
(vi)	$5^3 \times 3^3$	$= 5 \times 5 \times 3 \times 3 \times 3$	$= 675$
(vii)	$2^4 \times 3^2$	$= 2 \times 2 \times 2 \times 2 \times 3 \times 3$	$= 144$
(viii)	$3^2 \times 10^4$	$= 3 \times 3 \times 10 \times 10 \times 10 \times 10$	$= 90,000$

Question 7:

Simplify:

(i) $(-4)^3$ (ii) $(-3) \times (-2)^3$

(iii) $(-3)^2 \times (-5)^2$ (iv) $(-2)^3 \times (-10)^3$

Answer 7:

(i) $(-4)^3 = (-4) \times (-4) \times (-4) = -64$

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(ii) $(-3)\times(-2)^3 = (-3)\times(-2)\times(-2)\times(-2) = 24$

(iii) $(-3)^2\times(-5)^2 = (-3)\times(-3)\times(-5)\times(-5) = 225$

(iv) $(-2)^3\times(-10)^3 = (-2)\times(-2)\times(-2)\times(-10)\times(-10)\times(-10)$

Question 8:

Compare the following numbers:

(i) 2.7×10^{12}; 1.5×10^{8} (ii) 4×10^{14}; 3×10^{17}

Answer 8:

(i) 2.7×10^{12} and 1.5×10^{8}

On comparing the exponents of base 10,

$2.7 \times 10^{12} > 1.5 \times 10^{8}$

(ii) 4×10^{14} and 3×10^{17}

On comparing the exponents of base 10,

$4 \times 10^{14} < 3 \times 10^{17}$

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Exercise 13.2

Question 1:

Using laws of exponents, simplify and write the answer in exponential form:

(i) $3^2 \times 3^4 \times 3^8$ (ii) $6^{15} \div 6^{10}$

(iii) $a^3 \times a^2$ (iv) $7^x \times 7^2$

(v) $(5^2)^2 \div 5^3$ (vi) $2^5 \times 5^5$

(vii) $a^4 \times b^4$ (viii) $(3^4)^3$

(ix) $(2^{20} \div 2^{15}) \times 2^3$ (x) $8^t \div 8^2$

Answer 1:

(i) $3^2 \times 3^4 \times 3^8 = 3^{(2+4+8)} = 3^{14}$ $\left[\because a^m \times a^n = a^{m+n}\right]$

(ii) $6^{15} \div 6^{10} = 6^{15-10} = 6^5$ $\left[\because a^m \div a^n = a^{m-n}\right]$

(iii) $a^3 \times a^2 = a^{3+2} = a^5$ $\left[\because a^m \times a^n = a^{m+n}\right]$

(iv) $7^x \times 7^2 = 7^{x+2}$ $\left[\because a^m \times a^n = a^{m+n}\right]$

(v) $\left(5^2\right)^3 \div 5^3 = 5^{2\times3} \div 5^3 = 5^6 \div 5^3$ $\left[\because \left(a^m\right)^n = a^{m\times n}\right]$

$= 5^{6-3} = 5^3$ $\left[\because a^m \div a^n = a^{m-n}\right]$

(vi) $2^5 \times 5^5 = (2\times5)^5 = 10^5$ $\left[\because a^m \times b^m = (a\times b)^m\right]$

(vii) $a^4 \times b^4 = (a\times b)^4$ $\left[\because a^m \times b^m = (a\times b)^m\right]$

(viii) $\left(3^4\right)^3 = 3^{4\times3} = 3^{12}$ $\left[\because \left(a^m\right)^n = a^{m\times n}\right]$

(ix) $\left(2^{20} \div 2^{15}\right) \times 2^3 = \left(2^{20-15}\right) \times 2^3$ $\left[\because a^m \div a^n = a^{m-n}\right]$

$= 2^5 \times 2^3 = 2^{5+3} = 2^8$ $\left[\because a^m \times a^n = a^{m+n}\right]$

(x) $8^t \div 8^2 = 8^{t-2}$ $\left[\because a^m \div a^n = a^{m-n}\right]$

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Question 2:

Simplify and express each of the following in exponential form:

(i) $\dfrac{2^3\times 3^4\times 4}{3\times 32}$

(ii) $\left[\left(5^2\right)^3\times 5^4\right]\div 5^7$

(iii) $25^4\div 5^3$

(iv) $\dfrac{3\times 7^2\times 11^8}{21\times 11}$

(v) $\dfrac{3^7}{3^4\times 3^3}$

(vi) $2^0+3^0+4^0$

(vii) $2^0\times 3^0\times 4^0$

(viii) $\left(3^0+2^0\right)\times 5^0$

(ix) $\dfrac{2^8\times a^5}{4^3\times a^3}$

(x) $\left(\dfrac{a^5}{a^3}\right)\times a^8$

(xi) $\dfrac{4^5\times a^8b^3}{4^5\times a^5b^2}$

(xii) $\left(2^3\times 2\right)^2$

Answer 2:

(i) $\dfrac{2^3\times 3^4\times 4}{3\times 32}=\dfrac{2^3\times 3^4\times 2^2}{3\times 2^5}=\dfrac{2^{3+2}\times 3^4}{3\times 2^5}$ $\left[\because a^m\times a^n=a^{m+n}\right]$

$=\dfrac{2^5\times 3^4}{3\times 2^5}=2^{5-5}\times 3^{4-3}$ $\left[\because a^m\div a^n=a^{m-n}\right]$

$=2^0\times 3^3=1\times 3^3=3^3$

(ii) $\left[\left(5^2\right)^3\times 5^4\right]\div 5^7=\left[5^6\times 5^4\right]\div 5^7$ $\left[\because \left(a^m\right)^n=a^{m\times n}\right]$

$=\left[5^{6+4}\right]\div 5^7=5^{10}\div 5^7$ $\left[\because a^m\times a^n=a^{m+n}\right]$

$=5^{10-7}=5^3$ $\left[\because a^m\div a^n=a^{m-n}\right]$

(iii) $25^4\div 5^3=\left(5^2\right)^4\div 5^3=5^8\div 5^3$ $\left[\because \left(a^m\right)^n=a^{m\times n}\right]$

$=5^{8-3}=5^5$ $\left[\because a^m\div a^n=a^{m-n}\right]$

(iv) $\dfrac{3\times 7^2\times 11^8}{21\times 11^3}=\dfrac{3\times 7^2\times 11^8}{3\times 7\times 11^3}=3^{1-1}\times 7^{2-1}\times 11^{8-3}$ $\left[\because a^m\div a^n=a^{m-n}\right]$

$=3^0\times 7^1\times 11^5=7\times 11^5$

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(v) $\dfrac{3^7}{3^4\times 3^3}=\dfrac{3^7}{3^{4+3}}=\dfrac{3^7}{3^7}$ $\left[\because\ a^m\times a^n=a^{m+n}\right]$

$=3^{7-7}=3^0=1$ $\left[\because\ a^m\div a^n=a^{m-n}\right]$

(vi) $2^0+3^0+4^0=1+1+1=3$ $\left[\because\ a^0=1\right]$

(vii) $2^0\times 3^0\times 4^0=1\times 1\times 1=1$ $\left[\because\ a^0=1\right]$

(viii) $\left(3^0+2^0\right)\times 5^0=(1+1)\times 1=2\times 1=2$ $\left[\because\ a^0=1\right]$

(ix) $\dfrac{2^8\times a^5}{4^3\times a^3}=\dfrac{2^8\times a^5}{\left(2^2\right)^3\times a^3}=\dfrac{2^8\times a^5}{2^6\times a^3}$ $\left[\because\ \left(a^m\right)^n=a^{m\times n}\right]$

$=2^{8-6}\times a^{5-2}=2^2\times a^2$ $\left[\because\ a^m\div a^n=a^{m-n}\right]$

$=(2a)^2$ $\left[\because\ a^m\times b^m=(a\times b)^m\right]$

(x) $\left(\dfrac{a^5}{a^3}\right)\times a^8=\left(a^{5-3}\right)\times a^8=a^2\times a^8$ $\left[\because\ a^m\div a^n=a^{m-n}\right]$

$=a^{2+8}=a^{10}$ $\left[\because\ a^m\times a^n=a^{m+n}\right]$

(xi) $\dfrac{4^5\times a^8b^3}{4^5\times a^5b^2}=4^{5-5}\times a^{8-5}\times b^{3-2}=4^0\times a^3\times b$ $\left[\because\ a^m\div a^n=a^{m-n}\right]$

$=1\times a^3\times b=a^3b$ $\left[\because\ a^0=1\right]$

(xii) $\left(2^3\times 2\right)^2=\left(2^{3+1}\right)^2=\left(2^4\right)^2$ $\left[\because\ a^m\times a^n=a^{m+n}\right]$

$=2^{4\times 2}=2^8$

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Question 3:

Say true or false and justify your answer:

(i) $10 \times 10^{11} = 100^{11}$ (ii) $2^3 > 5^2$

(iii) $2^3 \times 3^2 = 6^5$ (iv) $3^0 = (1000)^0$

Answer 3:

(i) $10 \times 10^{11} = 100^{11}$

L.H.S. $10^{1+11} = 10^{12}$ and R.H.S. $\left(10^2\right)^{11} = 10^{22}$

Since, L.H.S. $\neq$ R.H.S.

Therefore, it is false.

(ii) $2^3 > 5^2$

L.H.S. $2^3 = 8$ and R.H.S. $5^2 = 25$

Since, L.H.S. is not greater than R.H.S.

Therefore, it is false.

(iii) $2^3 \times 3^2 = 6^5$

L.H.S. $2^3 \times 3^2 = 8 \times 9 = 72$ and R.H.S. $6^5 = 7,776$

Since, L.H.S. $\neq$ R.H.S.

Therefore, it is false.

(iv) $3^0 = (1000)^0$

L.H.S. $3^0 = 1$ and R.H.S. $(1000)^0 = 1$

Since, L.H.S. = R.H.S.

Therefore, it is true.

Question 4:

Express each of the following as a product of prime factors only in exponential form:

(i) 108 x 192 (ii) 270

(iii) 729 x 64 (iv) 768

Answer 4:

(i) 108 x 192

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108 x 192 $= \left(2^2 \times 3^3\right) \times \left(2^6 \times 3\right)$

$= 2^{2+6} \times 3^{3+1}$

$= 2^8 \times 3^4$

2	**192**
2	96
2	48
2	24
2	12
2	6
3	3
	1

2	**108**
2	54
3	27
3	9
3	3
	1

APMF

(ii) 270

270 $= 2 \times 3^5 \times 5$

2	**270**
3	135
3	45
3	15
5	5
	1

(iii) 729 x 64

729 x 64 $= 3^6 \times 2^6$

2	**64**
2	32
2	16
2	8

2	4
2	2
	1

3	**729**
3	243
3	81
3	27
3	9
3	3
	1

(iv) 768

768 $= 2^8 \times 3$

2	**768**
2	384
2	192
2	96
2	48
2	24
2	12
2	6
3	3
	1

APMF

Question 5:

Simplify:

(i) $\dfrac{\left(2^5\right)^2 \times 7^3}{8^3 \times 7}$

(ii) $\dfrac{25 \times 5^2 \times t^8}{10^3 \times t^4}$

(iii) $\dfrac{3^5 \times 10^5 \times 25}{5^7 \times 6^5}$

Answer 5:

(i) $\dfrac{(2^5)^2 \times 7^3}{8^3 \times 7} = \dfrac{2^{5\times2} \times 7^3}{(2^3)^3 \times 7}$

$= \dfrac{2^{10} \times 7^3}{2^9 \times 7}$

$= 2^{10-9} \times 7^{3-1} = 2 \times 7^2$

$= 2 \text{ x } 49$

$= 98$

(ii) $\dfrac{25 \times 5^2 \times t^8}{10^3 \times t^4} = \dfrac{5^2 \times 5^2 \times t^8}{(5\times2)^3 \times t^4}$

$= \dfrac{5^{2+2} \times t^{8-4}}{2^3 \times 3^3}$

$= \dfrac{5^4 \times t^4}{2^3 \times 5^3}$

$= \dfrac{5^{4-3} \times t^4}{2^3}$

$= \dfrac{5t^4}{8}$

(iii) $\dfrac{3^5 \times 10^5 \times 25}{5^7 \times 6^5} = \dfrac{3^5 \times (2\times5)^5 \times 5^2}{5^7 \times (2\times3)^5}$

$= \dfrac{3^5 \times 2^5 \times 5^5 \times 5^2}{5^7 \times 2^5 \times 3^5}$

$= \dfrac{3^5 \times 2^5 \times 5^{5+2}}{5^7 \times 2^5 \times 3^5}$

$= \dfrac{3^5 \times 2^5 \times 5^7}{5^7 \times 2^5 \times 3^5}$

$= 2^{5-5} \times 3^{5-5} \times 5^{5-5}$

$= 2^0 \times 3^0 \times 5^0$

$= 1 \text{ x } 1 \text{ x } 1$

$= 1$

APMF

Exercise 13.3

Question 1:

Write the following numbers in the expanded form:

279404, 3006194, 2806196, 120719, 20068

Answer 1:

(i) 2,79,404 = 2,00,000 + 70,000 + 9,000 + 400 + 00 + 4

= 2 x 100000 + 7 x 10000 + 9 x 1000 + 4 x 100 + 0 x 10 + 4 x 1

= $2\times10^5+7\times10^4+9\times10^3+4\times10^2+0\times10^1+4\times10^0$

(ii) 30,06,194 = 30,00,000 + 0 + 0 + 6,000 + 100 + 90 + 4

= 3 x 1000000 + 0 x 100000 + 0 x 10000 + 6 x 1000 + 1 x 100 + 9 x 10 + 4 x 1

= $3\times10^6+0\times10^5+0\times10^4+6\times10^3+1\times10^2+9\times10+4\times10^0$

(iii) 28,06,196 = 20,00,000 + 8,00,000 + 0 + 6,000 + 100 + 90 + 6

= 2 x 1000000 + 8 x 100000 + 0 x 10000 + 6 x 1000 + 1 x 100 + 9 x 10 + 6 x 1

= $2\times10^6+8\times10^5+0\times10^4+6\times10^3+1\times10^2+9\times10+6\times10^0$

(iv) 1,20,719 = 1,00,000 + 20,000 + 0 + 700 + 10 + 9

= 1 x 100000 + 2 x 10000 + 0 x 1000 + 7 x 100 + 1 x 10 + 9 x 1

= $1\times10^5+2\times10^4+0\times10^3+7\times10^2+1\times10^1+9\times10^0$

(v) 20,068 = 20,000 + 00 + 00 + 60 + 8

= 2 x 10000 + 0 x 1000 + 0 x 100 + 6 x 10 + 8 x 1

= $2\times10^4+0\times10^3+0\times10^2+6\times10^1+8\times10^0$

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Question 2:

Find the number from each of the following expanded forms:

(a) $8 \times 10^4 + 6 \times 10^3 + 0 \times 10^2 + 4 \times 10^1 + 5 \times 10^0$

(b) $4 \times 10^5 + 5 \times 10^3 + 3 \times 10^2 + 2 \times 10^0$

(c) $3 \times 10^4 + 7 \times 10^2 + 5 \times 10^0$

(d) $9 \times 10^5 + 2 \times 10^2 + 3 \times 10^1$

Answer 2:

(a) $8 \times 10^4 + 6 \times 10^3 + 0 \times 10^2 + 4 \times 10^1 + 5 \times 10^0$

= 8 x 10000 + 6 x 1000 + 0 x 100 + 4 x 10 + 5 x 1

= 80000 + 6000 + 0 + 40 + 5

= 86,045

(b) $4 \times 10^5 + 5 \times 10^3 + 3 \times 10^2 + 2 \times 10^0$

= 4 x 100000 + 0 x 10000 + 5 x 1000 + 3 x 100 + 0 x 10 + 2 x 1

= 400000 + 0 + 5000 + 3000 + 0 + 2

= 4,05,302

(c) $3 \times 10^4 + 7 \times 10^2 + 5 \times 10^0$

$= 3 \times 10000 + 0 \times 1000 + 7 \times 100 + 0 \times 10 + 5 \times 1$

$= 30000 + 0 + 700 + 0 + 5$

$= 30,705$

(d) $9 \times 10^5 + 2 \times 10^2 + 3 \times 10^1$

$= 9 \times 100000 + 0 \times 10000 + 0 \times 1000 + 2 \times 100 + 3 \times 10 + 0 \times 1$

$= 900000 + 0 + 0 + 200 + 30 + 0$

$= 9,00,230$

Question 3:

Express the following numbers in standard form:

(i)	5,00,00,000	(ii)	70,00,000
(iii)	3,18,65,00,000	(iv)	3,90,878
(v)	39087.8	(vi)	3908.78

Answer 3:

(i) 5,00,00,000 $= 5 \times 1,00,00,000 = 5 \times 10^7$

(ii) 70,00,000 $= 7 \times 10,00,000 = 7 \times 10^6$

(iii) 3,18,65,00,000 $= 31865 \times 100000$

$= 3.1865 \times 10000 \times 100000 = 3.1865 \times 10^9$

(iv) 3,90,878 $= 3.90878 \times 100000 = 3.90878 \times 10^5$

(v) 39087.8 $= 3.90878 \times 10000 = 3.90878 \times 10^4$

(vi) 3908.78 $= 3.90878 \times 1000 = 3.90878 \times 10^3$

APNI

Question 4:

Express the number appearing in the following statements in standard form:

(a) The distance between Earth and Moon is 384,000,000 m.

(b) Speed of light in vacuum is 300,000,000 m/s.

(c) Diameter of Earth id 1,27,56,000 m.

(d) Diameter of the Sun is 1,400,000,000 m.

(e) In a galaxy there are on an average 100,000,000,0000 stars.

(f) The universe is estimated to be about 12,000,000,000 years old.

(g) The distance of the Sun from the centre of the Milky Way Galaxy is estimated to be 300,000,000,000,000,000,000 m.

(h) 60,230,000,000,000,000,000,000 molecules are contained in a drop of water weighing 1.8 gm.

(i) The Earth has 1,353,000,000 cubic km of sea water.

(j) The population of India was about 1,027,000,000 in march, 2001.

Answer 4:

(a) The distance between Earth and Moon = 384,000,000 m
= 384 x 1000000 m
= 3.84 x 100 x 1000000
= 3.84×10^{8} m

(b) Speed of light in vacuum = 300,000,000 m/s
= 3 x 100000000 m/s
= 3×10^{8} m/s

(c) Diameter of the Earth = 1,27,56,000 m
= 12756 x 1000 m
= 1.2756 x 10000 x 1000 m
= 1.2756×10^{7} m

(d) Diameter of the Sun = 1,400,000,000 m
= 14 x 100,000,000 m
= 1.4 x 10 x 100,000,000 m
= 1.4×10^{9} m

(e) Average of Stars = 100,000,000,000
= 1 x 100,000,000,000
= 1×10^{11}

(f) Years of Universe = 12,000,000,000 years
= 12 x 1000,000,000 years
= 1.2 x 10 x 1000,000,000 years
= 1.2×10^{10} years

(g) Distance of the Sun from the centre of the Milky Way Galaxy
= 300,000,000,000,000,000,000 m
= 3 x 100,000,000,000,000,000,000 m
= 3×10^{20} m

(h) Number of molecules in a drop of water weighing 1.8 gm
= 60,230,000,000,000,000,000,000
= 6023 x 10,000,000,000,000,000,000
= 6.023 x 1000 x 10,000,000,000,000,000,000
= 6.023×10^{22}

APPF

(i) The Earth has Sea water = 1,353,000,000 km^3
= 1,353 x 1000000 km^3
= 1.353 x 1000 x 1000,000 km^3
= 1.353×10^9 km^3

(j) The population of India = 1,027,000,000
= 1027 x 1000000
= 1.027 x 1000 x 1000000
= 1.027×10^9

APMF

Mathematics

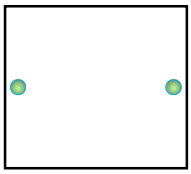
(Chapter – 14) (Symmetry)

(Class – VII)

Exercise 14.1

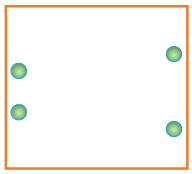
Question 1:

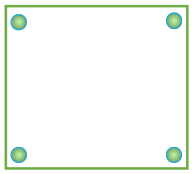
Copy the figures with punched holes and find the axes of symmetry for the following:

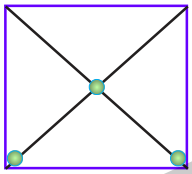

(a)

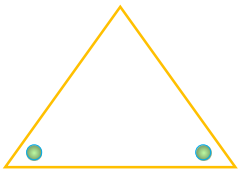

(b)

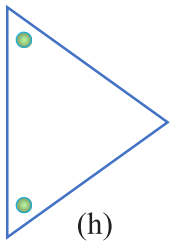

(c)

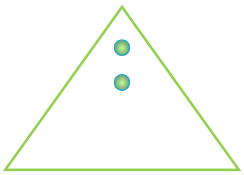

(d)

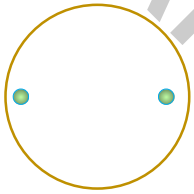

(e)

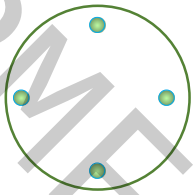

(f)

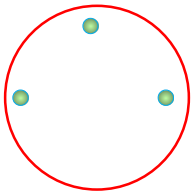

(g)


(h)


(i)

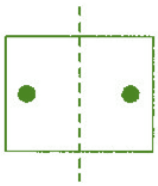
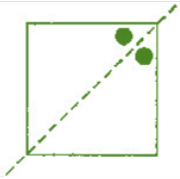

(j)

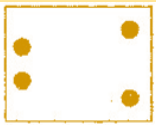
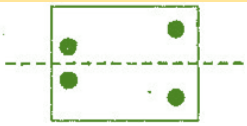
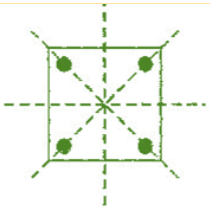
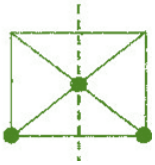
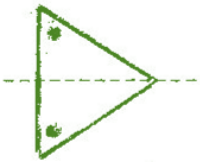
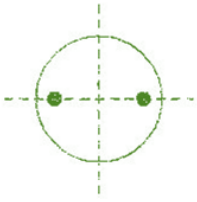

(k)


(l)

APMF

Answer 1:

S.No.	Punched holed figures	The axes of symmetry
(a)		 (rectangle)
(b)		 (square)

(c)		
(d)		
(e)		 (square)
(f)		
(g)		
(h)		
(i)		
(j)		

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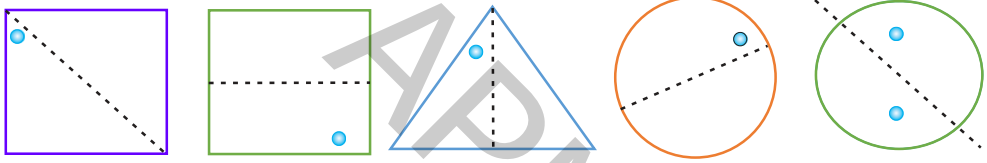
(k)		
(l)		

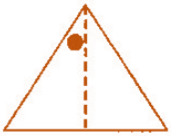
Question 2:

Express the following in exponential form:



(a) (b) (c) (d) (e)

Answer 2:

S.No.	Line(s) of symmetry	Other holes on figures
(a)		
(b)		
(c)		
(d)		

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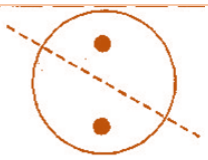
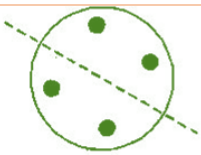
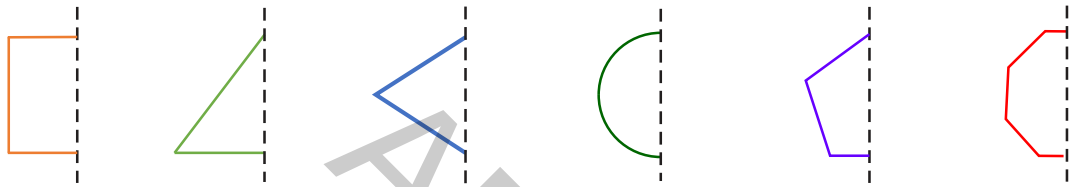
(e)		

Question 3:

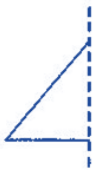
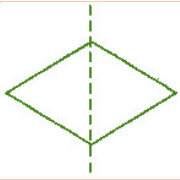
In the following figures, the mirror line (i.e., the line of symmetry) is given as a dotted line. Complete each figure performing reflection in the dotted (mirror) line. (You might perhaps place a mirror along the dotted line and look into the mirror for the image). Are you able to recall the name of the figure you complete?

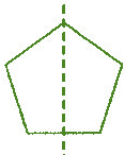
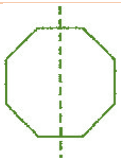


(a) (b) (c) (d) (e) (f)

APMF

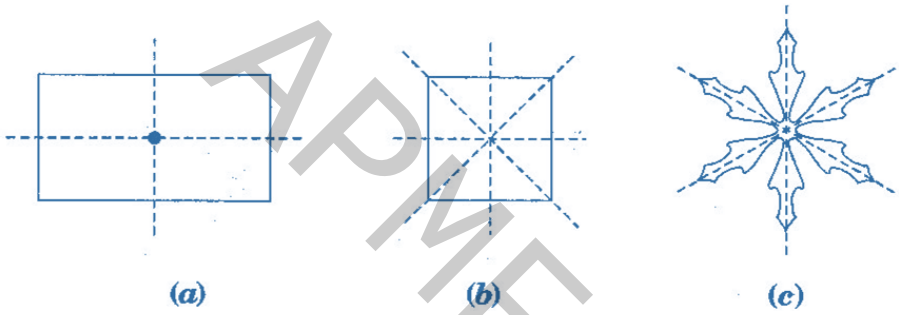
Answer 3:

S.No.	Question figures	Complete figures	Names of the figure
(a)			Square
(b)			Triangle
(c)			Rhombus
(d)			Circle

(e)			Pentagon
(f)			Octagon

Question 4:

The following figures have more than one line of symmetry. Such figures are said to have multiple lines of symmetry:



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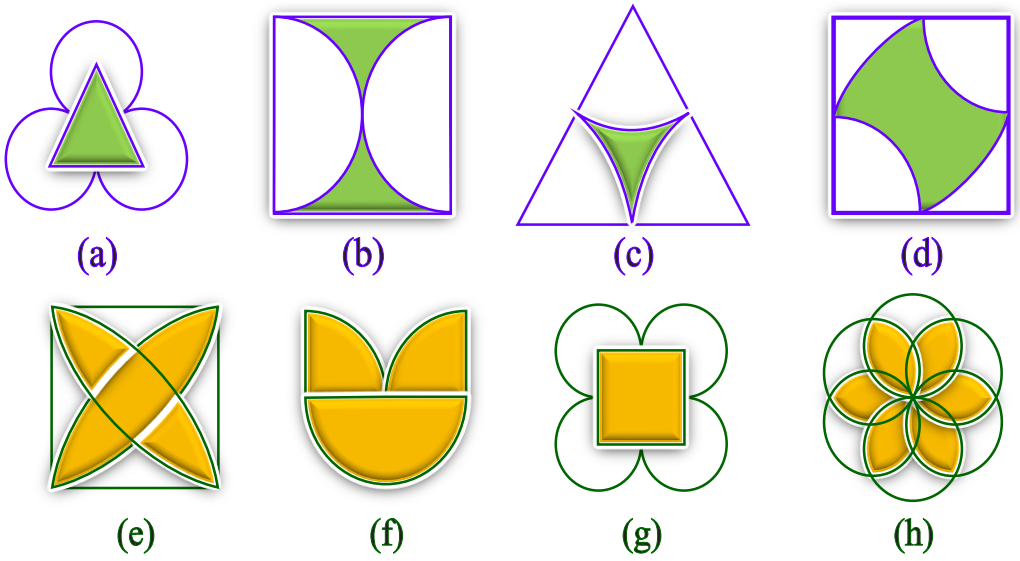
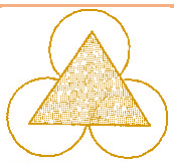
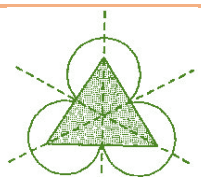
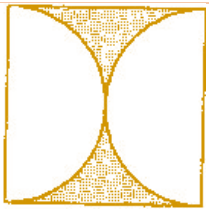
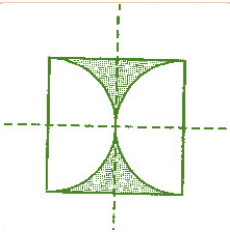
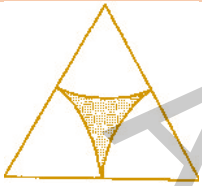
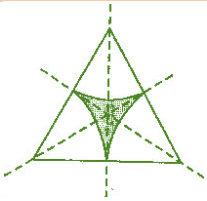
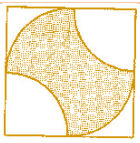
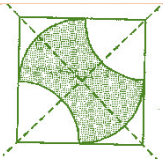
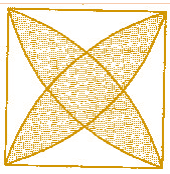
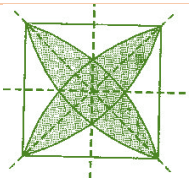
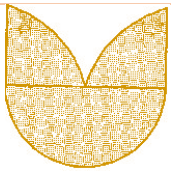
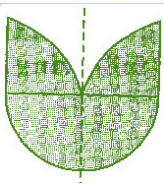
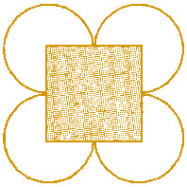
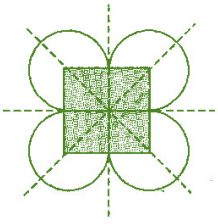
Identify multiple lines of symmetry, if any, in each of the following figures:



Answer 4:

S.No.	Problem Figures	Lines of symmetry
(a)		
(b)		
(c)		
(d)		
(e)		
(f)		
(g)		

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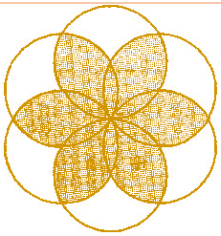
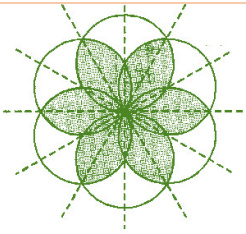
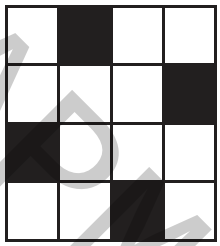
(h)		

Question 5:

Copy the figure given here:

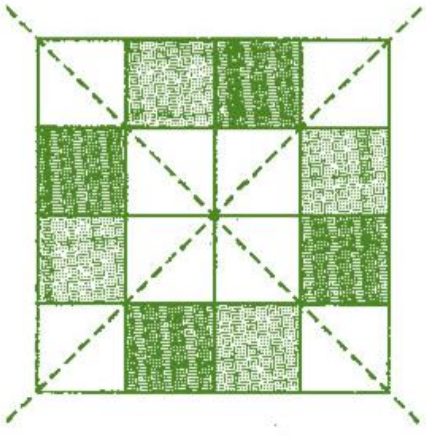
Take any one diagonal as a line of symmetry and shade a few more squares to make the figure symmetric about a diagonal. Is there more than one way to do that? Will the figure be symmetric about both the diagonals?

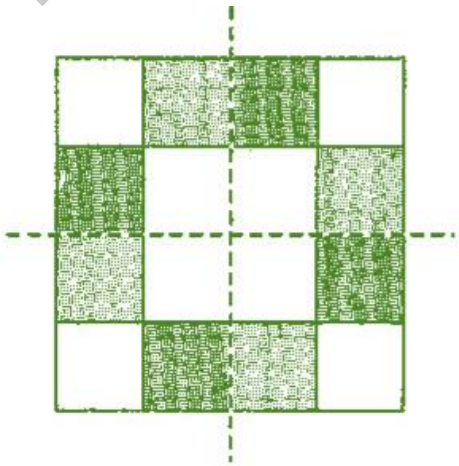


ARME

Answer 5:

Answer figures are:



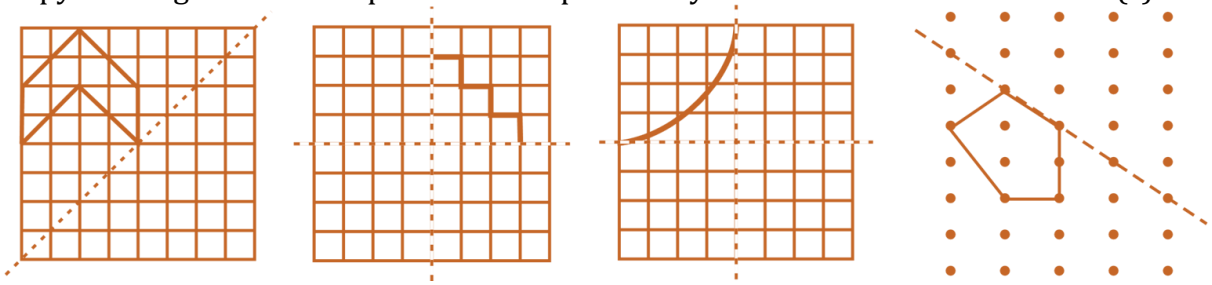


Yes, there is more than one way.

Yes, this figure will be symmetric about both the diagonals.

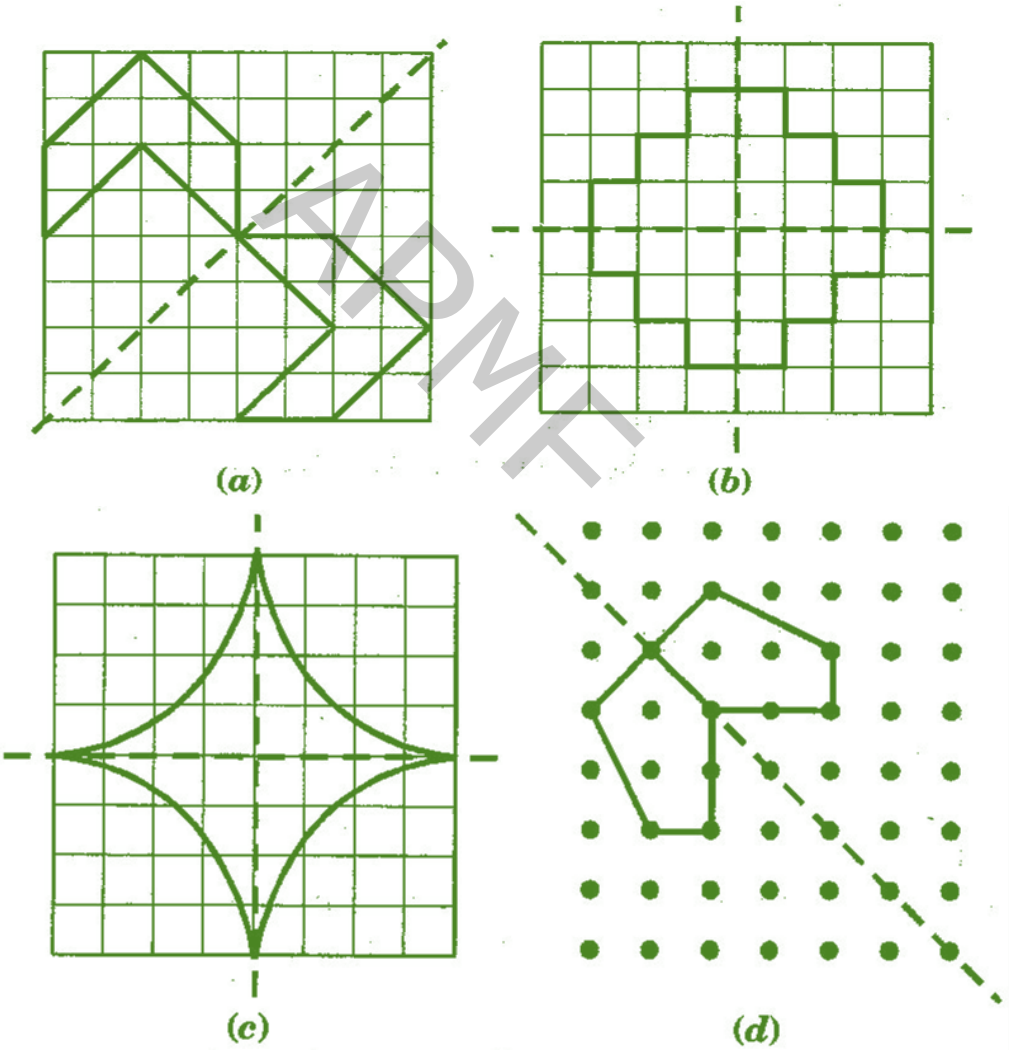
Question 6:

Copy the diagram and complete each shape to be symmetric about the mirror line(s):



(a) (b) (c) (d)

Answer 6:



(a) (b) (c) (d)

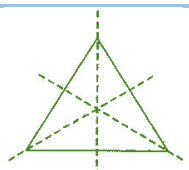
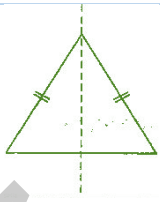
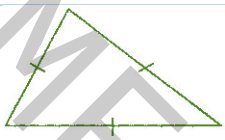
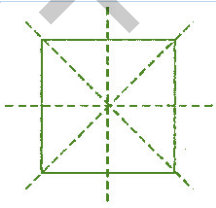
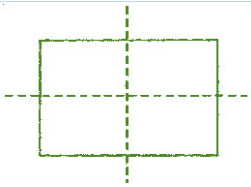
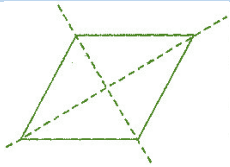
RPMF

Question 7:

State the number of lines of symmetry for the following figures:

(a) An equilateral triangle (b) An isosceles triangle (c) A scalene triangle
(d) A square (e) A rectangle (f) A rhombus
(g) A parallelogram (h) A quadrilateral (i) A regular hexagon
(j) A circle

Answer 7:

S.No.	Figure's name	Diagram with symmetry	Number of lines
(a)	Equilateral triangle		3
(b)	Isosceles triangle		1
(c)	Scalene triangle		0
(d)	Square		4
(e)	Rectangle		2
(f)	Rhombus		2
(g)	Parallelogram		0

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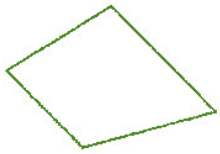
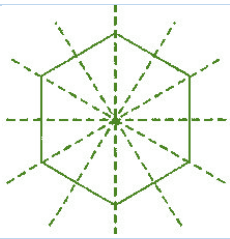
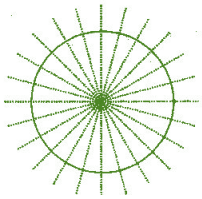
(h)	Quadrilateral		0
(i)	Regular Hexagon		6
(j)	Circle		Infinite

APMF

Question 8:

What letters of the English alphabet have reflectional symmetry (i.e., symmetry related to mirror reflection) about.

(a) a vertical mirror

(b) a horizontal mirror

(c) both horizontal and vertical mirrors

Answer 8:

(a) Vertical mirror – A, H, I, M, O, T, U, V, W, X and Y

mirror

A	A
H	H
I	I
M	M
O	O
T	T

mirror

U	U
V	V
W	W
X	X
Y	Y

(b) Horizontal mirror – B, C, D, E, H, I, O and X

B C D E H I O X

mirror

B C D E H I O X

(c) Both horizontal and vertical mirror – H, I, O and X

Question 9:

Give three examples of shapes with no line of symmetry.

Answer 9:

The three examples are:

- Quadrilateral
- Scalene triangle
- Parallelogram

Question 10:

What other name can you give to the line of symmetry of:

(a) an isosceles triangle?

(b) a circle?

Answer 10:

(a) The line of symmetry of an isosceles triangle is median or altitude.

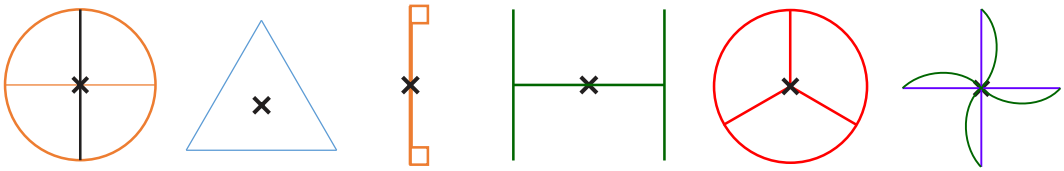
(b) The line of symmetry of a circle is diameter.

APMF

Exercise 14.2

Question 1:

Which of the following figures have rotational symmetry of order more than 1:



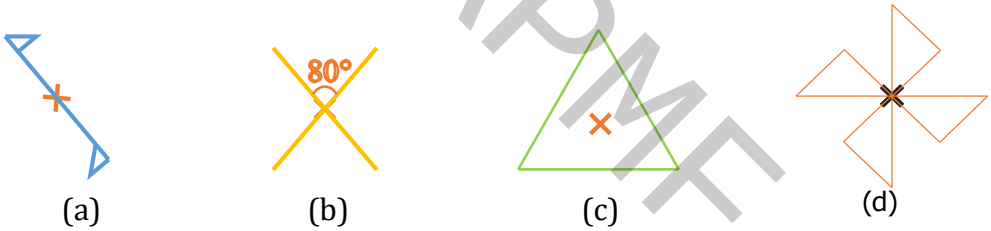
(a) (b) (c) (d) (e) (f)

Answer 1:

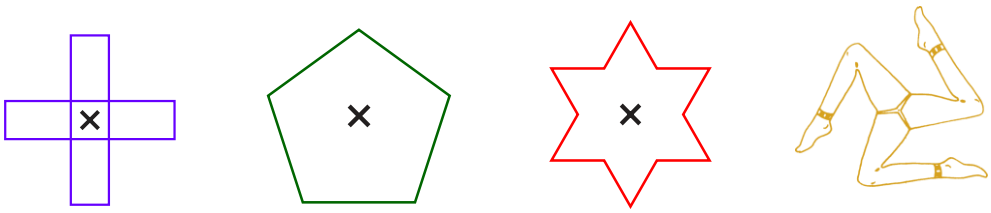
Rotational symmetry of order more than 1 are $(a),(b),(d),(e)$ and (f) because in these figures, a complete turn, more than 1 number of times, an object looks exactly the same.

Question 2:

Give the order the rotational symmetry for each figure:

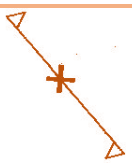
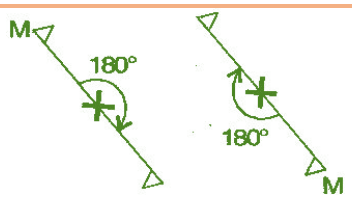


(a) (b) (c) (d)



(e) (f) (g) (h)

Answer 2:

S.No.	Problem figures	Rotational figures	Order of rotational symmetry
(a)			2

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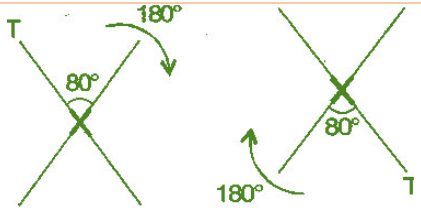
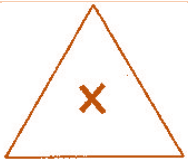
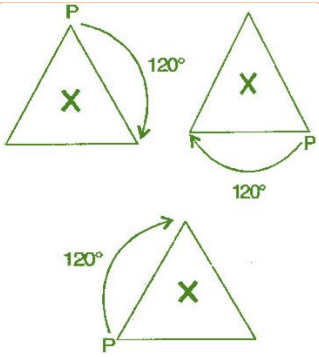
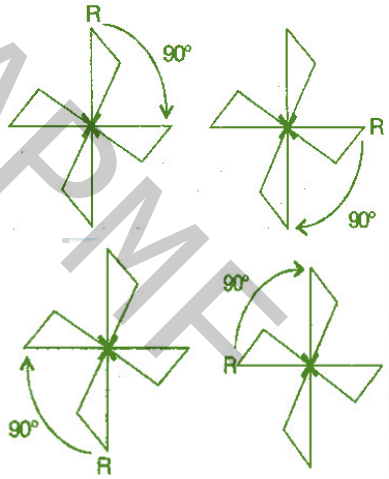
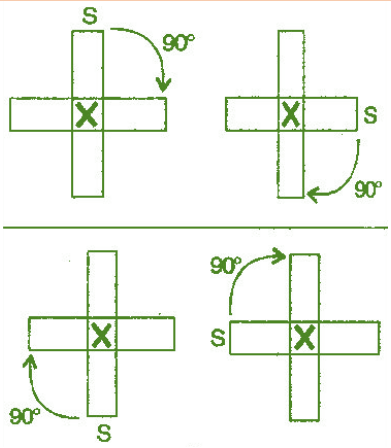
(b)			2
(c)			3
(d)			4
(e)			4

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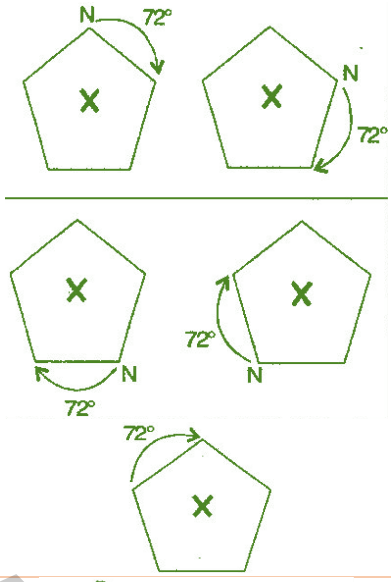
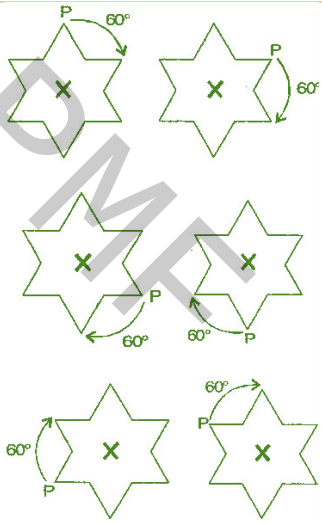
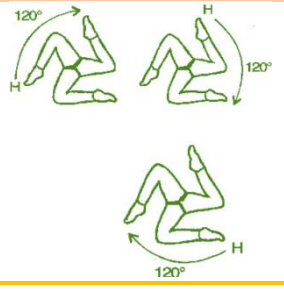
(f)		 N 72° N 72° 72° N 72° N 72° 72°	5
(g)		 P 60° P 60° P 60° 60° P 60° P 60° P	6
(h)		 120° H H 120° H 120°	3

APME

Exercise 14.3

Question 1:

Name any two figures that have both line symmetry and rotational symmetry.

Answer 1:

Circle and Square.

Question 2:

Draw, wherever possible, a rough sketch of:

(i) a triangle with both line and rotational symmetries of order more than 1.

(ii) a triangle with only line symmetry and no rotational symmetry of order more than 1.

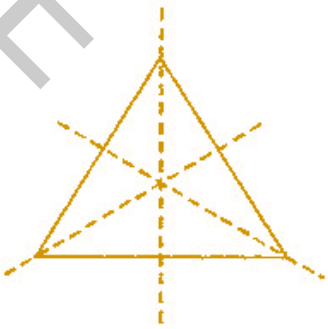
(iii) a quadrilateral with a rotational symmetry of order more than 1 but not a line symmetry.

(iv) a quadrilateral with line symmetry but not a rotational symmetry of order more than 1.

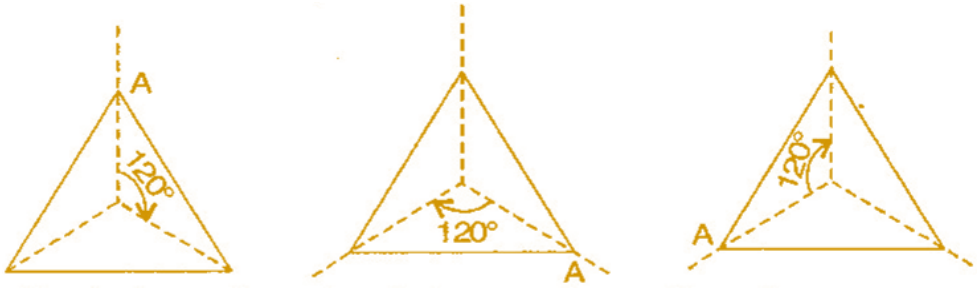
Answer 2:

(i) An equilateral triangle has both line and rotational symmetries of order more than 1.

Line symmetry:



Rotational symmetry:



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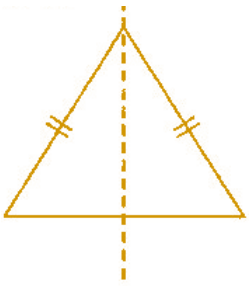
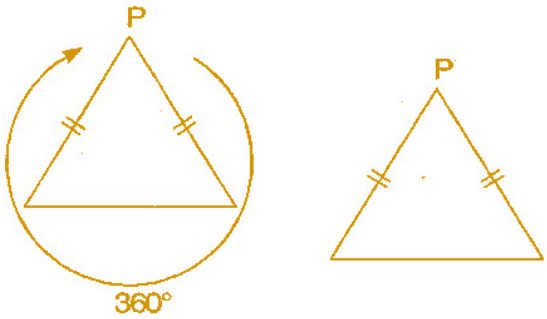
(ii) An isosceles triangle has only one line of symmetry and no rotational symmetry of order more than 1.

Line symmetry:



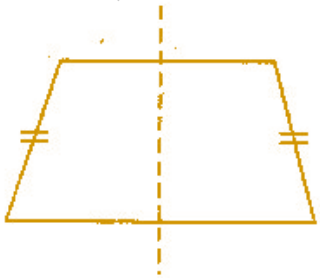
Rotational symmetry:



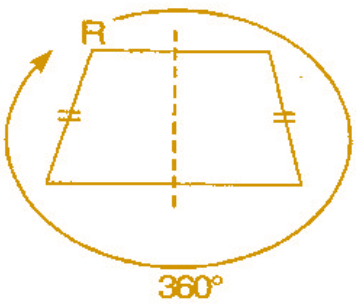
(iii) It is not possible because order of rotational symmetry is more than 1 of a figure, most acertain the line of symmetry.

(iv) A trapezium which has equal non-parallel sides, a quadrilateral with line symmetry but not a rotational symmetry of order more than 1.

Line symmetry:



Rotational symmetry:



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Question 3:

In a figure has two or more lines of symmetry, should it have rotational symmetry of order more than 1?

Answer 3:

Yes, because every line through the centre forms a line of symmetry and it has rotational symmetry around the centre for every angle.

Question 4:

Fill in the blanks:

Shape	Centre of Rotation	Order of Rotation	Angle of Rotation
Square			
Rectangle			
Rhombus			
Equilateral triangle			
Regular hexagon			
Circle			
Semi-circle			

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Answer 4:

Shape	Centre of Rotation	Order of Rotation	Angle of Rotation
Square	Intersecting point of diagonals.	4	90°
Rectangle	Intersecting point of diagonals.	2	180°
Rhombus	Intersecting point of diagonals.	2	180°
Equilateral triangle	Intersecting point of medians.	3	120°
Regular hexagon	Intersecting point of diagonals.	6	60°
Circle	Centre	infinite	At every point
Semi-circle	Mid-point of diameter	1	360°

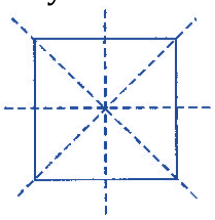
Question 5:

Name the quadrilateral which has both line and rotational symmetry of order more than 1.

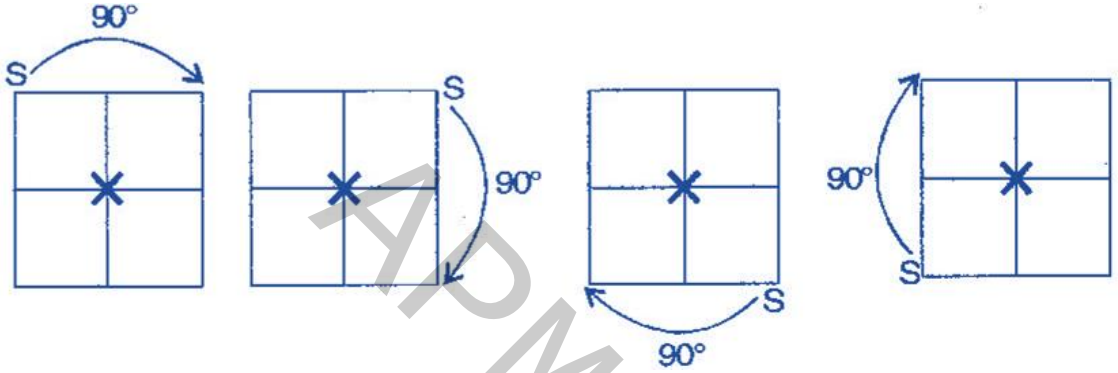
Answer 5:

Square has both line and rotational symmetry of order more than 1.

Line symmetry:



Rotational symmetry:



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Question 6:

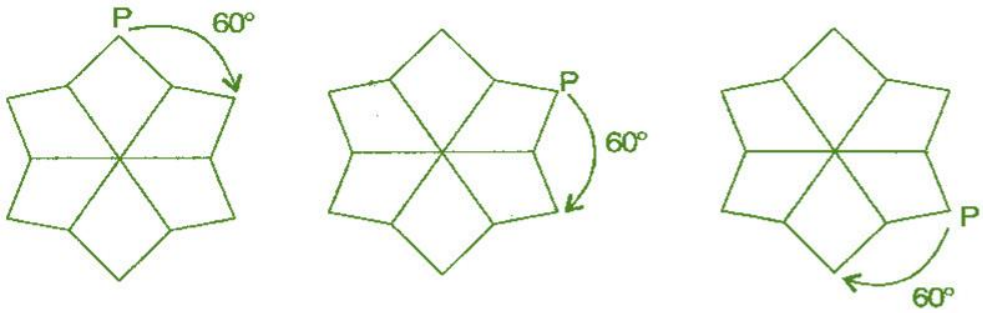
After rotating by 60° about a centre, a figure looks exactly the same as its original position. At what other angles will this happen for the figure?

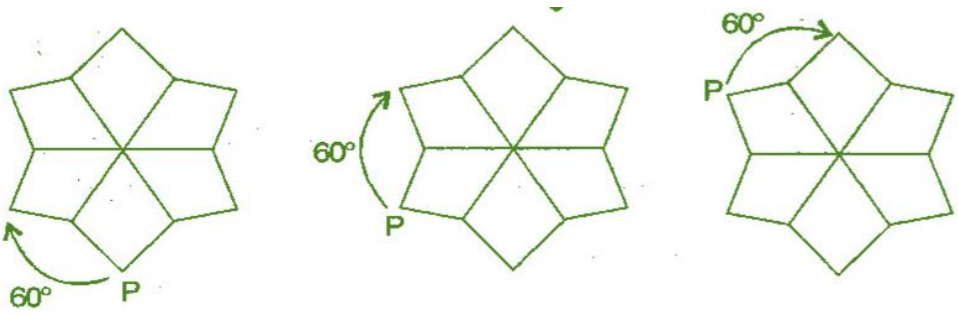
Answer 6:

Other angles will be $120^\circ, 180^\circ, 240^\circ, 300^\circ, 360^\circ$.

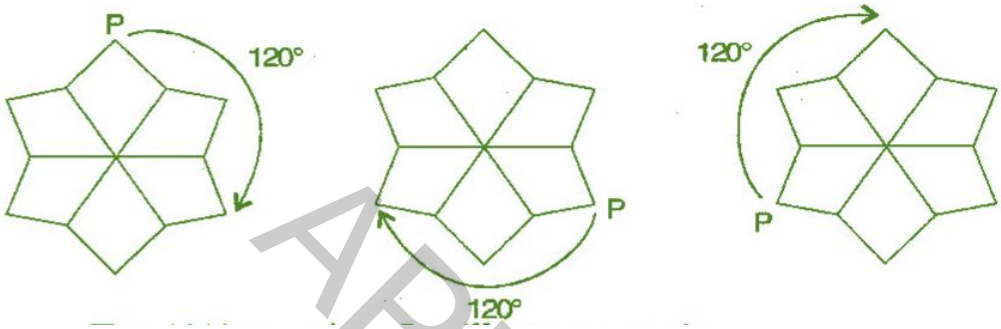
For 60° rotation:

It will rotate six times.





For 120° rotation:
It will rotate three times.



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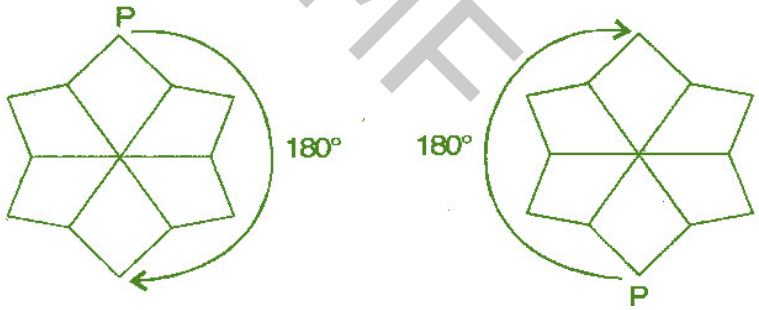
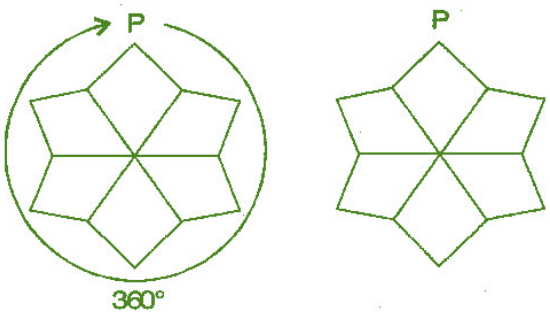
For 180° rotation:
It will rotate two times.



For 360° rotation:
It will rotate one time.



Question 7:

Can we have a rotational symmetry of order more than 1 whose angle of rotation is:

(i) 45° (ii) 17° ?

Answer 7:

(i) If the angle of rotation is 45°, then symmetry of order is possible and would be 8 rotations.

(ii) If the angle of rotational is 17°, then symmetry of order is not possible because 360° is not complete divided by 17°.

APMF

Mathematics

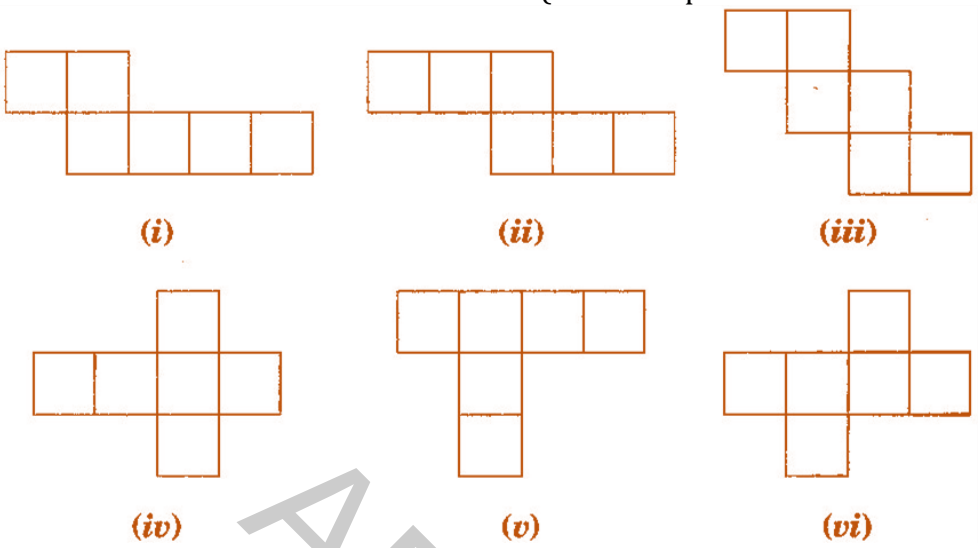
(Chapter – 15) (Visualising Solid Shapes)

(Class – VII)

Exercise 15.1

Question 1:

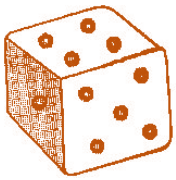
Identify the nets which can be used to make cubes (cut out copies of the nets and try it):



Answer 1:

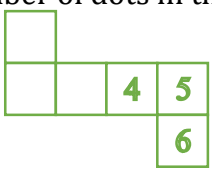
Cube's nets are (ii), (iii), (iv) and (vi).

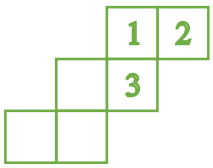
Question 2:



Dice are cubes with dots on each face. Opposite faces of a die always have a total of seven dots on them.

Here are two nets to make dice (cubes); the numbers inserted in each square indicate the number of dots in that box.

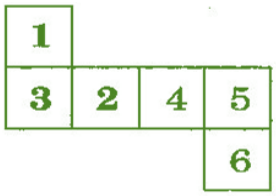




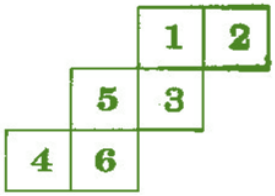
Insert suitable numbers in the blanks, remembering that the number on the opposite faces should total to 7.

Answer 2:

(i)



(ii)



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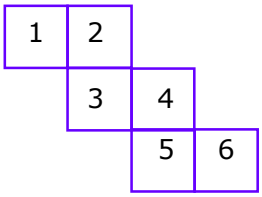
Question 3:

Can this be a net for a die? Explain your answer.



Answer 3:

No, this cannot be a net for a die.
Because one pair of opposite faces will have 1 and 4 on them and another pair of opposite faces will have 3 and 6 on them whose total is not equal to 7.

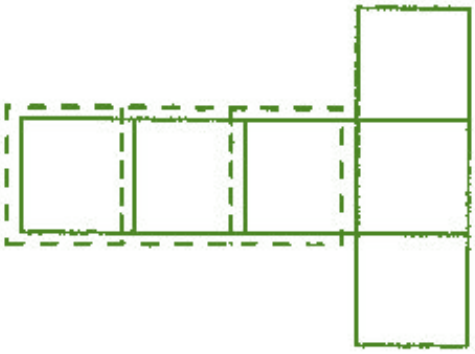
Question 4:

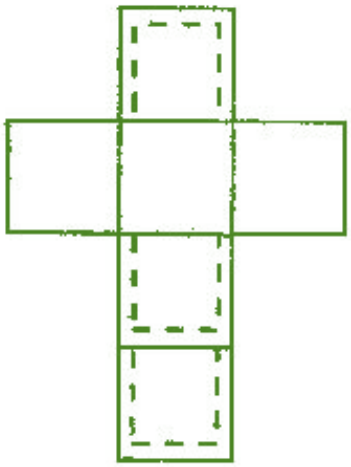
Here is an incomplete net for making a cube. Complete it in at least two different ways. Remember that a cube has six faces. How many faces are there in the net here? (Give two separate diagrams. If you like, you may use a squared sheet for easy manipulation.)

ARMF

Answer 4:

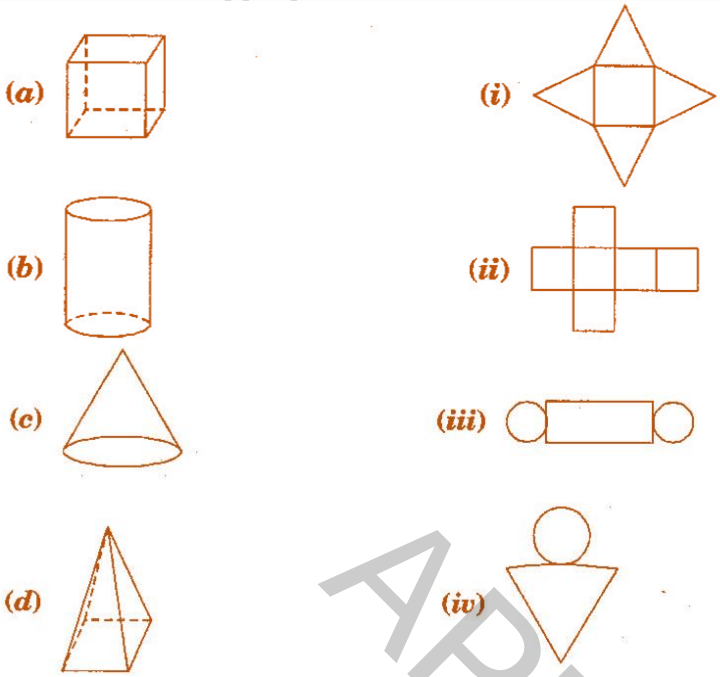
There three faces are given:





Question 5:

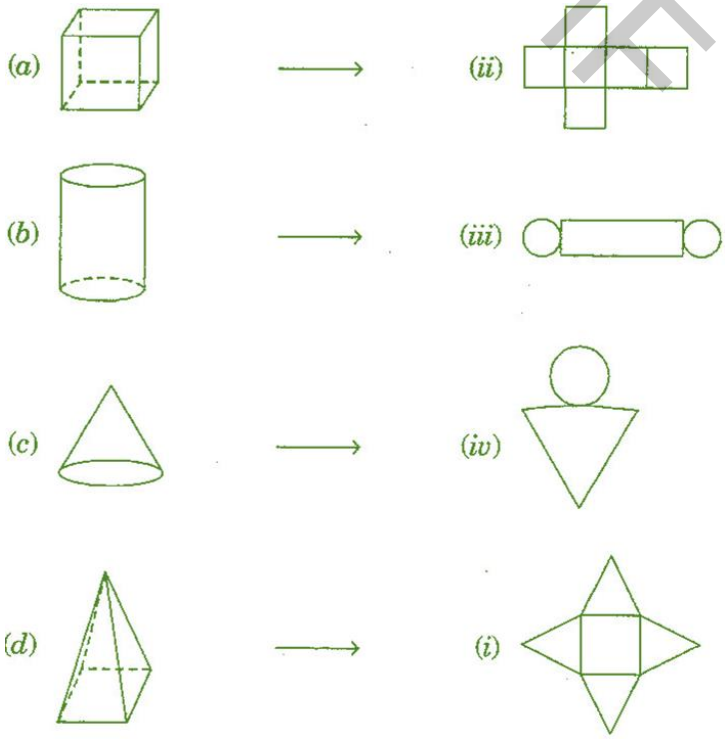
Match the nets with appropriate solids:



APME

Answer 5:

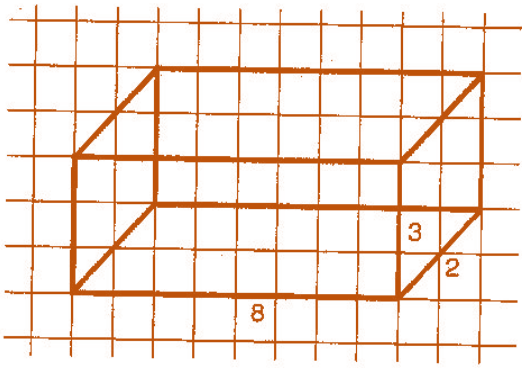
Solids Their nets



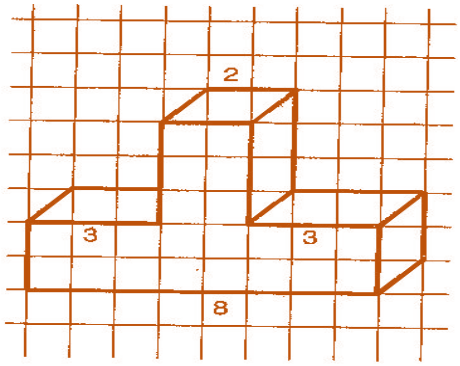
Exercise 15.2

Question 1:

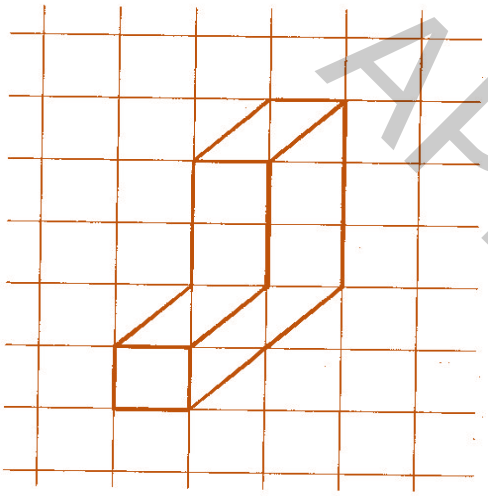
Use isometric dot paper and make an isometric sketch for each one of the given shapes:



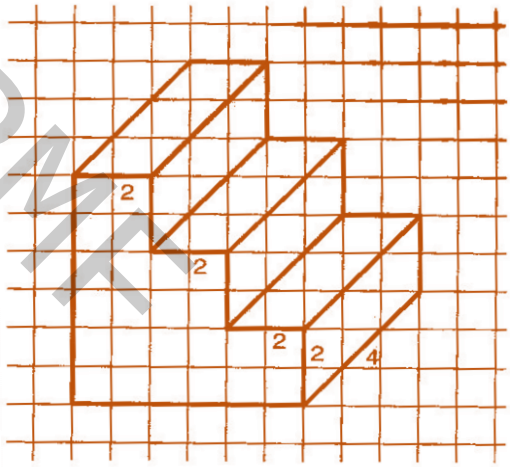
(i)



(ii)



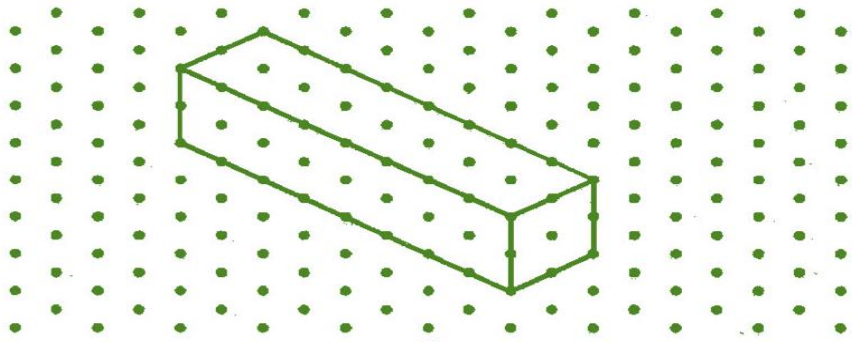
(iii)



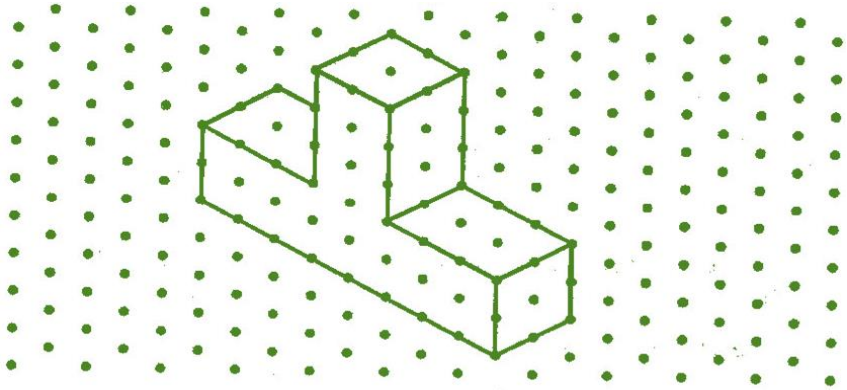
(iv)

APMT

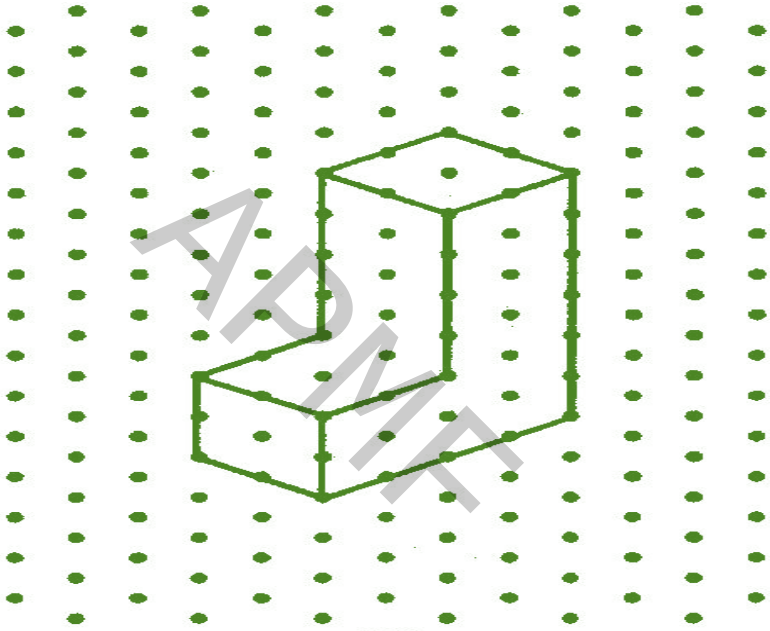
Answer 1:



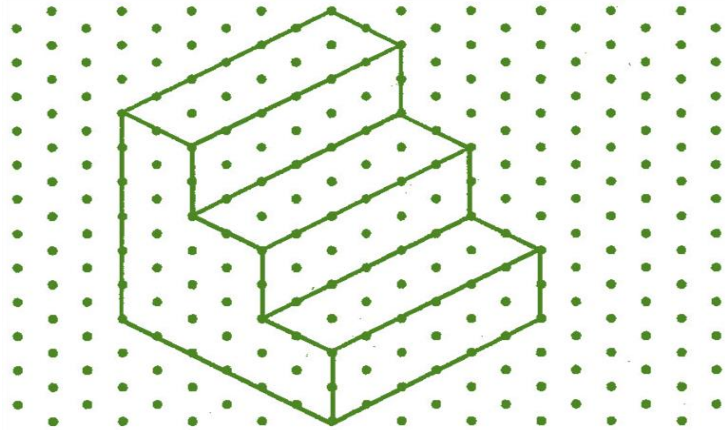
(i)



(ii)



(iii)



(iv)

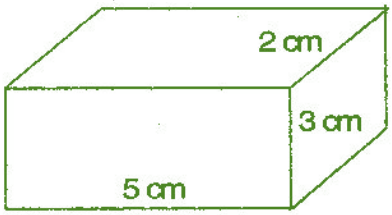
APMK

Question 2:

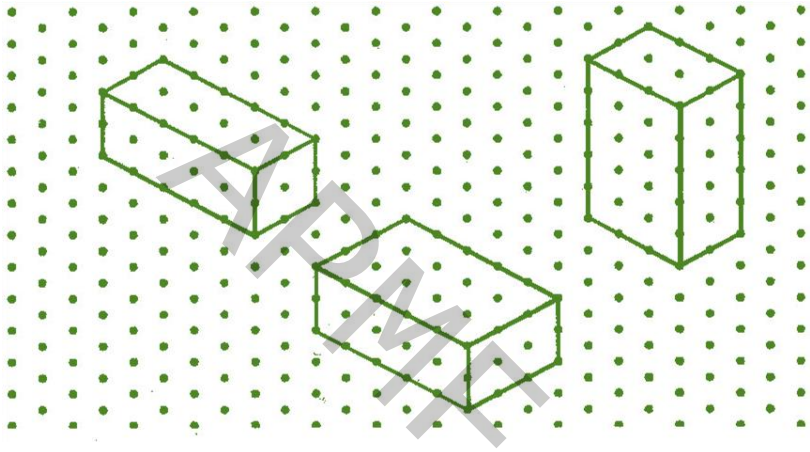
The dimensions of a cuboid are 5 cm, 3 cm and 2 cm. Draw three different isometric sketches of this cuboid.

Answer 2:

The dimensions of given cuboid are 5 cm, 3 cm and 2 cm:



Three different isometric sketches are:

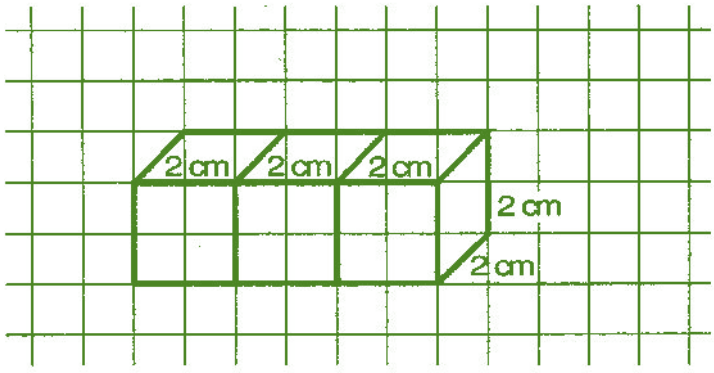


Question 3:

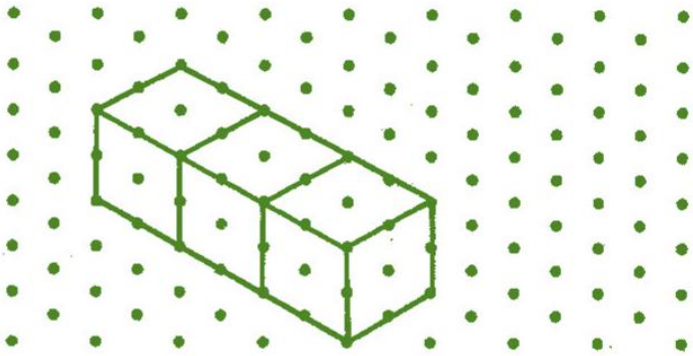
Three cubes each with 2 cm edge are placed side by side to form a cuboid. Sketch an oblique or isometric sketch of this cuboid.

Answer 3:

Oblique sketch:

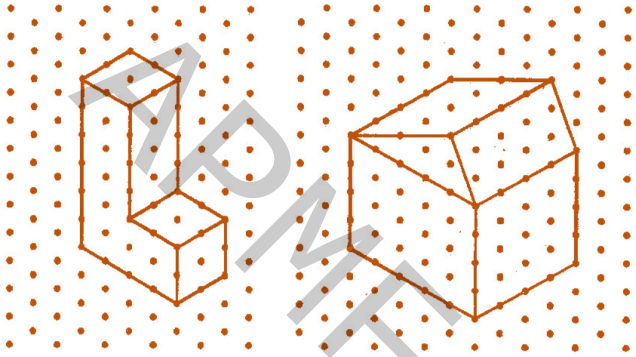


Isometric sketch



Question 4:

Make an oblique sketch for each one of the given isometric shapes:



(a) (b)

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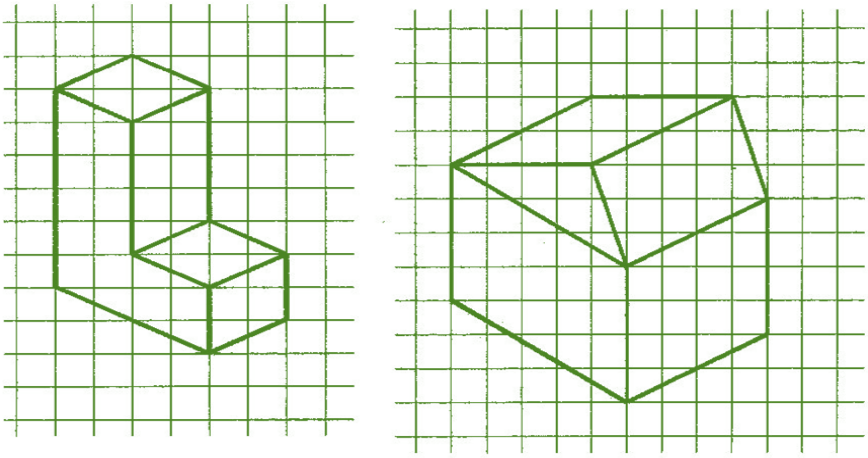
Answer 4:

Oblique sketches:



(a) (b)

Question 5:

Give (i) an oblique sketch and (ii) an isometric sketch for each of the following:

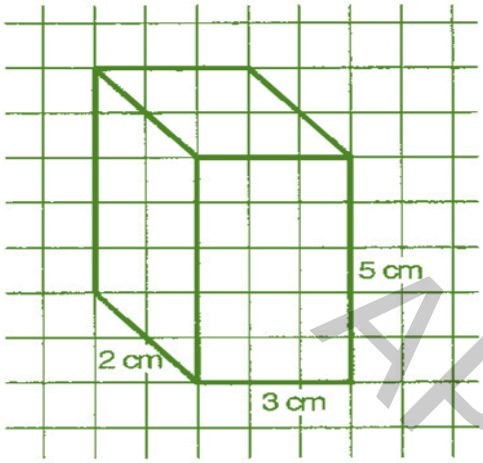
(a) A cuboid of dimensions 5 cm, 3 cm and 2 cm. (Is your sketch unique?)

(b) A cube with an edge 4 cm long.

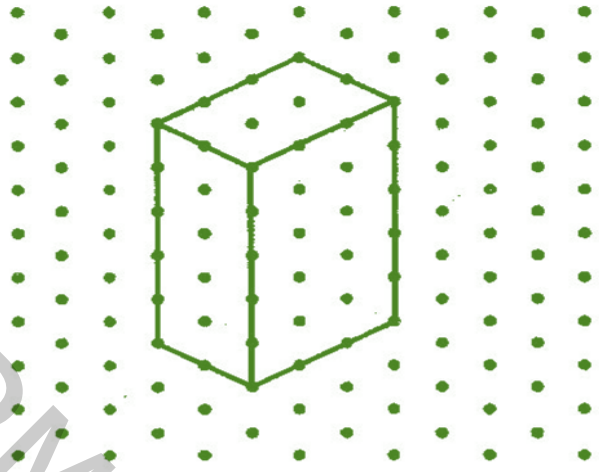
Answer 5:

(a) A cuboid of dimension 5 cm, 3 cm and 2 cm.

(i) Oblique sketch

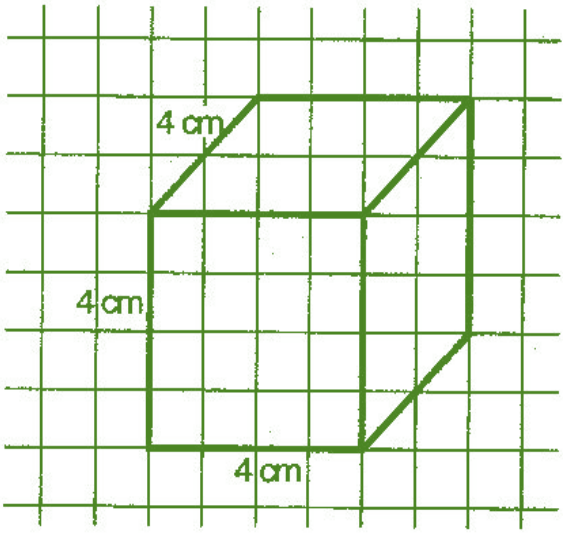


(ii) Isometric sketch

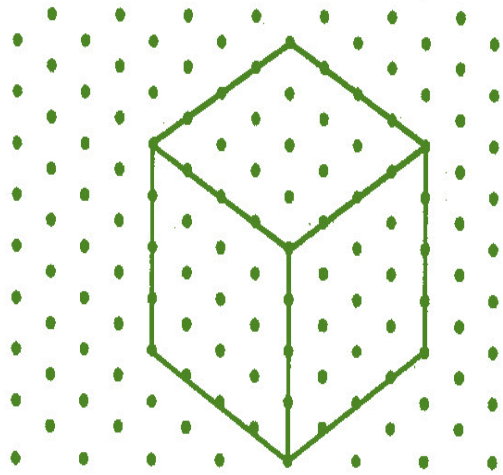


(b) A cube with an edge 4 cm long.

(i) Oblique sketch



(ii) Isometric sketch



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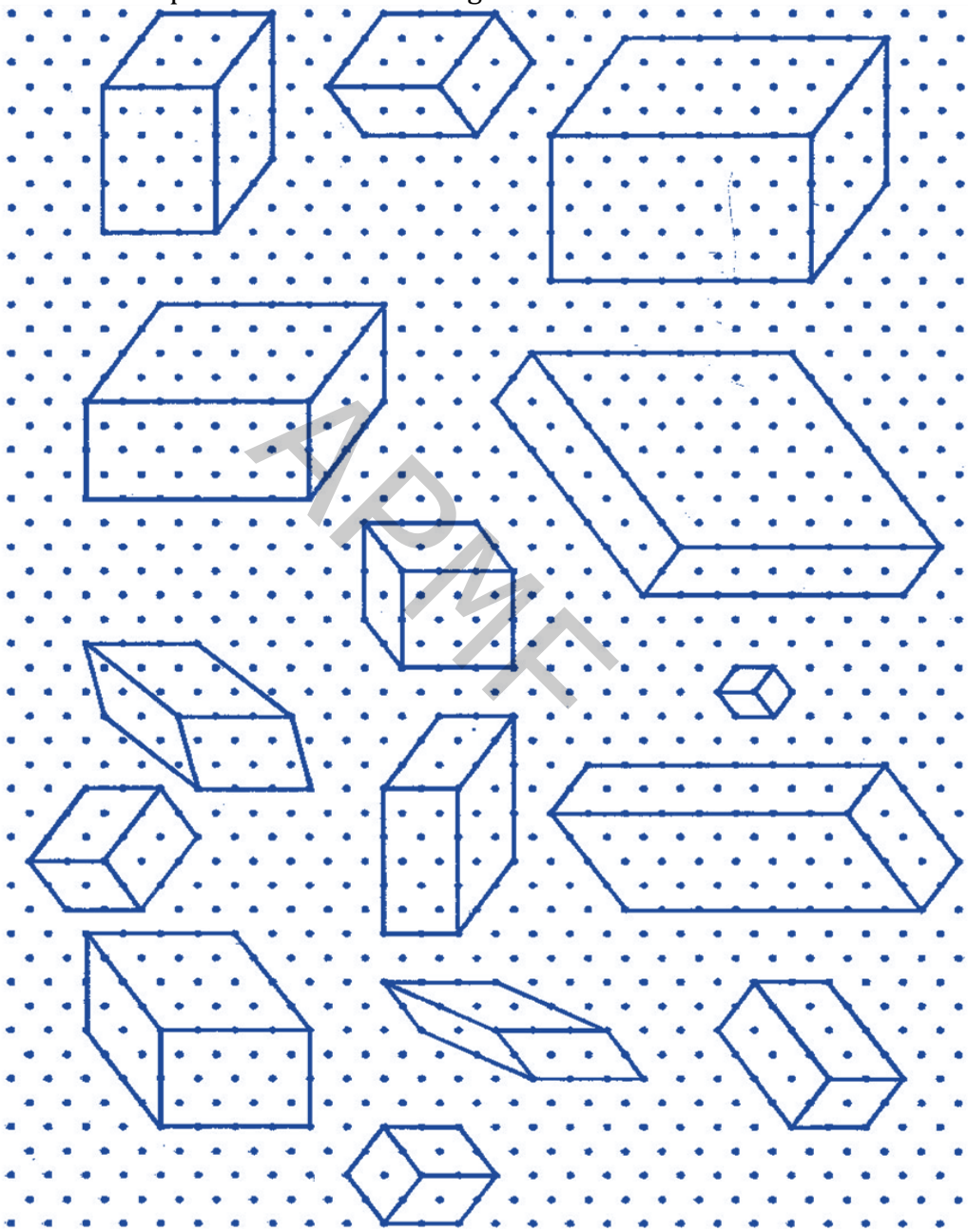
Question 6:

An isometric sheet is attached at the end of the book. You could try to make on it some cubes or cuboids of dimensions specified by your friend.

Answer 6:

Cubes and cuboids shapes on isometric sheet given below:



You can also draw more shapes of cubes and cuboids.

Exercise 15.3

Question 1:

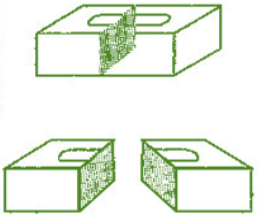
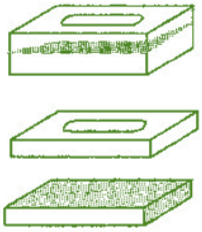
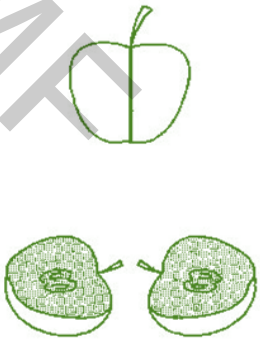
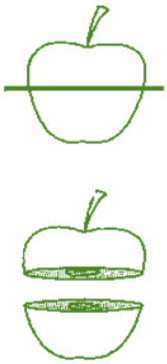
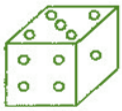
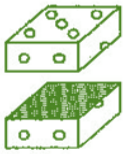
What cross-sections do you get when you give a:

(i) vertical cut (ii) horizontal cut to the following solids?

(a) A brick (b) A round apple (c) A die

(d) A circular pipe (e) An ice-cream cone.

Answer 1:

S.No.	Name of article	Figure	Vertical cut	Horizontal cut
(a)	A brick			
(b)	A round apple			
(c)	A die			
(d)	A circular pipe			

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(*e*)	An ice-cream cone			

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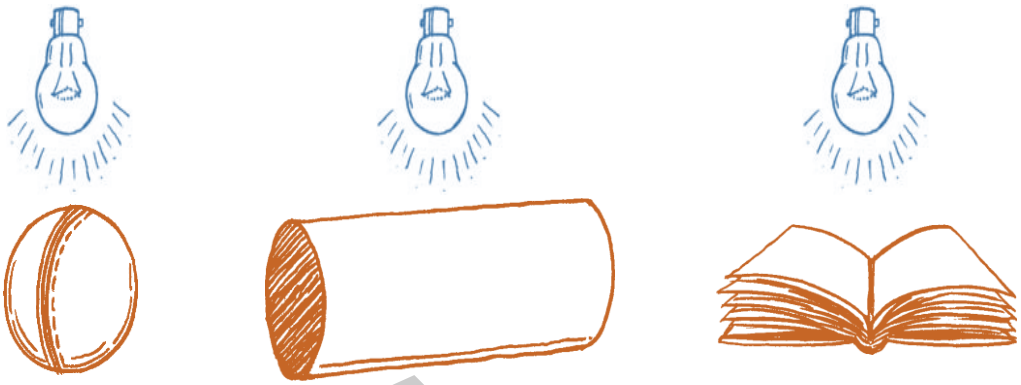
Exercise 15.4

Question 1:

A bulb is kept burning just right above the following solids. Name the shape of the shadows obtained in each case. Attempt to give a rough sketch of the shadow.
(You may try to experiment first and then answer these questions).



A ball (i)

A cylindrical pipe (ii)

A book (iii)

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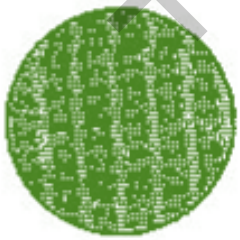
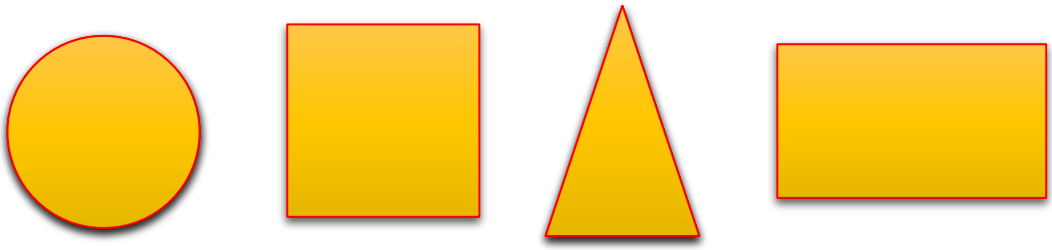
Answer 1:

S.No.	Object	Shadow	Shape's name
(i)	A ball		Circle
(ii)	A cylindrical pipe		Line
(iii)	A book		Rectangle

Question 2:

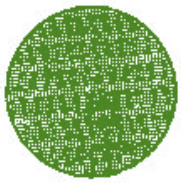
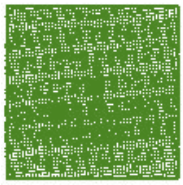
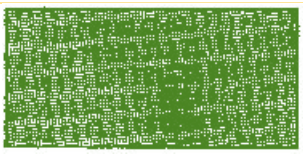
Here are the shadows of some 3-D objects, when seen under the lamp of the overhead projector. Identify the solid (s) that match each shadow.
(There may be multiple answers for these!)

A circle | A square | A triangle | A rectangle



(i) (ii) (iii) (iv)

Answer 2:

S. No.	Shadow	Shape's Name	3-D objects
(i)		Circle	Chapatti, Football, Disc, Plate etc.
(ii)		Square	Die, Square paper sheet, cubical magic box, Chalk box etc.
(iii)		Triangle	Ice-cream cone, Birthday cap, etc.
(iv)		Rectangle	Geometry box, Book, Table etc.

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Question 3:

Examine if the following are true statements:

(i) The cube can cast a shadow in the shape of a rectangle.

(ii) The cube can cast a shadow in the shape of a hexagon.

Answer 3:

(i) True

(ii) False

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