Class VIII Session 2024-25
Subject - Mathematics
Sample Question Paper - 8

Time Allowed: 3 hours **Maximum Marks: 80**

General Instructions:

1. This Question Paper has 4 Sections A-D.
2. Section A has 20 MCQs carrying 1 mark each.
3. Section B has 6 questions carrying 02 marks each.
4. Section C has 8 questions carrying 03 marks each.
5. Section D has 6 questions carrying 04 marks each.
6. All Questions are compulsory.
7. Draw neat figures wherever required. Take π =22/7 wherever required if not stated

Section A

1. Name the property under multiplication used in $\frac{-1}{3} \times (-3) = (-3) \times \frac{-1}{3} = 1$. **[1]**

   a) Associative property
   b) Distributive property
   c) Reciprocal and commutative under multiplication
   d) Multiplicative identity

2. Name the property under multiplication used in $\frac{-1}{3} \times (-3) = 1$. **[1]**

   a) Additive property
   b) Associative property
   c) Reciprocal
   d) Commutative property

3. Solve: $\frac{2x}{3} + 1 = \frac{7x}{15} + 3$ **[1]**

   a) 6
   b) 5
   c) 3
   d) 10

4. Solve the following equation: 4z + 3 = 6 + 2z **[1]**

   a) $\frac{3}{2}$
   b) $\frac{2}{5}$
   c) 2
   d) 5

5. PQRS is a square. PR and SQ intersect at O. Then, ∠POQ is a **[1]**

   a) Complete angle
   b) Right angle
   c) Reflex angle
   d) Straight angle

6. The diagonals of a quadrilateral intersect at right angles and it has exactly one axis of symmetry. The quadrilateral is a: **[1]**

   a) Rectangle
   b) square

c) rhombus d) kite

7. A survey of 300 people found that 30 of them play cricket. In a pie chart, what would be the sector angle of this group? **[1]**

a) 20^o b) 10^o

c) 30^o d) 36^o

8. Which of the following will have 4 at the units place? **[1]**

a) 27^2 b) 35^2

c) 14^2 d) 62^2

9. The hypotenuse of a right triangle with its legs of lengths 3x and 4x is **[1]**

a) 5x b) 16x

c) 7x d) 25x

10. In a number pattern, 8, 27, 64, x, the value of x will be **[1]**

a) 100 b) 216

c) 125 d) 115

11. The number of Zeroes at the end of the cube of the number 20 is **[1]**

a) 2 b) 3

c) 6 d) 1

12. Samir purchased a pair of shoes and paid ₹441, including GST. If the sale price of shoes is ₹420, then the rate of GST is **[1]**

a) 5% b) 8%

c) 12% d) 6%

13. Find the ratio of Rs 6 to 50 paise. **[1]**

a) It is 30:1 b) It is 12:1

c) It is 1:12 d) It is 1:30

14. The product of $\frac{2}{3}xy$ by $\frac{3}{2}xz$ is: **[1]**

a) $\frac{1}{6}xyz$ b) $6\ x^2yz$

c) x^2yz d) $3\ x^2yz$

15. The length and breadth of a rectangular field are l and b metre. If l = $\frac{2}{3}\ xy^2z^3$ and b = $\frac{9}{14}\ x^3y^5z^4$, express the area of the field in powers of x, y and z. **[1]**

a) $\frac{3}{7}x^{10}y^{10}z^{10}$ b) $3x^2y^2$

c) $37x^2z^7z^7$ d) $\frac{3}{7}x^4y^7z^7$

16. The perpendicular distance between the ends of a prism is called the _____ of the prim. **[1]**

a) height b) line

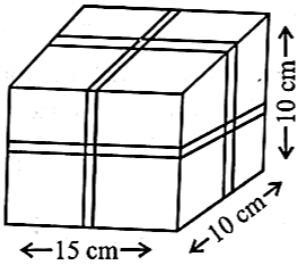
c) square d) base

17. What is the surface area of the drawing box, if its length is 16 cm, width 6 cm, and height 3 cm? **[1]**

a) $162cm^2$ b) $25cm^2$

c) $200cm^2$ d) $324cm^2$

18. A box tied by a ribbon, as shown in the figure, is to be presented as a gift. After allowing an additional length of 10 cm. for the Knot, length of the ribbon required is- **[1]**



a) 80 cm b) 150 cm

c) 70 cm d) 140 cm

19. One of the factors of $x^7 + xy^6$ is: **[1]**

i. $x^2 + y^2$

ii. x

iii. either i or ii

iv. Neither i nor ii

a) Option (iv) b) Option (i)

c) Option (iii) d) Option (ii)

20. The roots of $4x^2 - 20x + 25 = 0$ are **[1]**

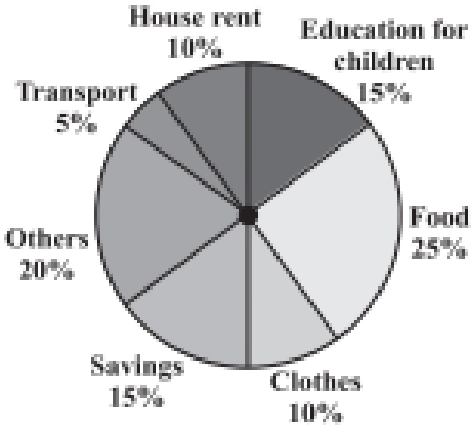
a) $\frac{5}{2}$ and $\frac{3}{2}$ b) $\frac{5}{2}$ and $\frac{5}{2}$

c) $\frac{7}{2}$ and $\frac{7}{2}$ d) $\frac{3}{2}$ and $\frac{3}{2}$

Section B

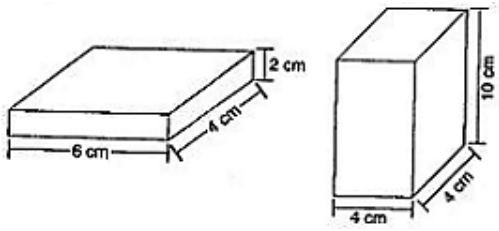
21. How many sides does a regular polygon have if each of its interior angles is 165°? **[2]**

22. Adjoining pie chart figure the expenditure (in percentage) on various items and savings of a family during a month. If the monthly savings of the family is ₹3000, what is the monthly expenditure on clothes? **[2]**



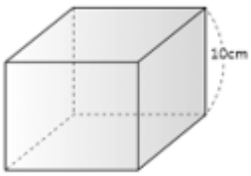
23. Is 216 a perfect cube? **[2]**

24. Find the total surface area of the following cuboids: **[2]**



OR

There is a cuboid whose base is a square and height is 10 cm. If the area of one side face is 120 cm^2. What is the total surface area of the cuboid?



25. Find the multiplicative inverse of $(-7)^{-2} \div (90)^{-1}$ **[2]**

26. The following table shows the distance travelled by one of the new eco-friendly energy-efficient car travelled on gas. **[2]**

Litres of gas	1	0.5	2	2.5	3	5
Distance (in km)	15	7.5	30	37.5	45	75

Which type of properties are indicated by the table? How much distance will be covered by the car in 8 litres of gas?

OR

Decide if the data in the table show direct or inverse variation.

a.

x	**1**	**3**	**5**	**0.5**
y	5	15	25	2.5

b.

x	**1**	**3**	**4**	**0.5**
y	30	10	7.5	60

27. Express $\frac{5}{-3} + \left(\frac{3}{-2}\right) + \left(\frac{-7}{3}\right) + 3$ as a rational number in $\frac{p}{q}$ form. **[3]**

28. Solve: 4(3p + 2) - 5 (6p - 1) = 2 (p - 8) - 6 (7p - 4) **[3]**

OR

Solve: $\frac{1}{2}(x+1) + \frac{1}{3}(x-1) = \frac{5}{12}(x-2)$

29. RENT is a rectangle. Its diagonals meet at O. Find x, if OR = 2x + 4 and OT = 3x + 1. **[3]**

30. Two dices are rolled and the faces obtained are 4 and 6. Find the sum of the numbers on their opposite faces. **[3]**

31. Find the least number which must be added to 252 so as to get a perfect square. Also find the square root of the perfect square so obtained. **[3]**

32. Find the Simple Interest and amount on ₹ 5000 for 6 months at the rate of 5% per annum. **[3]**

OR

A picnic is being planned in a school for Class VII. Girls are 60% of the total number of students and are 18 in number. The picnic site is 55 km from the school and the transport company is charging at the rate of ₹12 per km.

The total cost of refreshments will be ₹4280. If their first stop is at a place 22 km from the school, what per cent of the total distance of 55 km is this? What per cent of the distance is left to be covered?

33. Add: 10mn, $-\frac{3}{8}mn$ and $-\frac{1}{4}mn$ **[3]**

34. Complete the given tables and draw a graph for each. **[3]**

i.

x	0	1	2	3
y = 3x + 1	1	4	-	

ii.

x	1	2	4	6
y = x - 1	0	-	-	-

35. Sunscreens block harmful ultraviolet (UV) rays produced by the sun. Each sunscreen has a Sun Protection Factor (SPF) that tells you how many minutes you can stay in the sun before you receive one minute of burning UV rays. e.g. If you apply sunscreen with SPF 15, you get one minute of UV rays for every 15 minutes you stay in the sun. **[4]**

i. A sunscreen with SPF 15 allows only $\frac{1}{15}$ of the sun's UV rays. What 15 per cent of UV rays does the sunscreen abort?

ii. Suppose, a sunscreen allows 25% of the sun's UV rays.

a. What fraction of UV rays does this sunscreen block? Give your answer in lowest terms.

b. Use your answer from part (a) calculate this sunscreen's SPF. Explain how you found your answer?

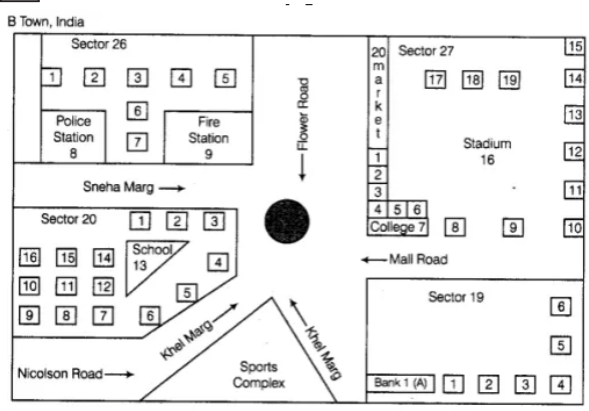
iii. A label on a sunscreen with SPF 30 claims that the sunscreen blocks about 97% of harmful UV rays. Assuming the SPF factor is accurate, is this claim true. Explain.

OR

Raheem runs a readymade garment shop. He mark the garments at such a price that even after allowing a discount of 12.5%, gain a profit of 25%. Find the marked price of a jacket which costs him Rs. 2,100.

36. Look at the map given below. **[4]**

☐ represents House



Now answer the following questions.

a. Name the roads that meet at the roundabout.

b. What is the address of the stadium?

c. On which road is the Police Station situated?

d. If Ritika stays adjacent to bank and you have to send her a card, what address will you write?

e. Which sector has the maximum number of houses?

f. In which sector is Fire Station located?

g. In the map, how many sectors have been shown?

37. Radius of a cylinder is r and the height is h. Find the change in the volume if the **[4]**

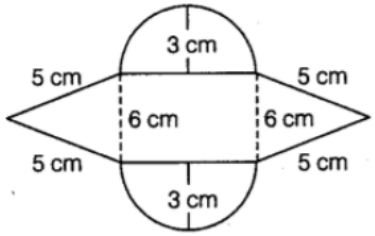
i. height is doubled.

ii. height is doubled and the radius is halved.

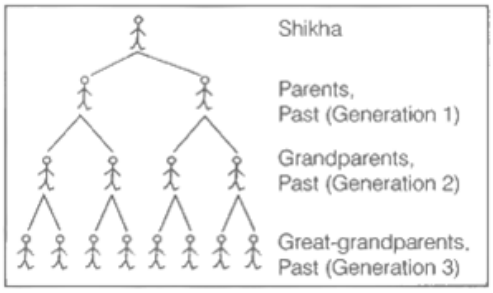
iii. height remains same and the radius is halved.

OR

Find the area of the given figure:



38. While studying her family's history, Shikha discovers records of ancestors 12 generations back. She wonders how many ancestors she had in the past 12 generations. She starts to make a diagram to help her figure this out. The diagram soon becomes very complex. **[4]**



a. Make a table and a graph showing the number of ancestors in each of the 12 generations.

b. Write an equation for the number of ancestors in a given generation n.

39. The table shows the time four elevators take to travel various distances. Find, which elevator is fastest and which is slowest. **[4]**

	Distance (in m)	**Time (in s)**
Elevator A	435	29
Elevator B	448	28
Elevator C	130	10
Elevator D	85	5

How much distance will be travelled elevators B and C separately in 140 sec? Who travelled more and by how much?

40. Factorize $x^2 + 5x - 36$ **[4]**

Soution

Section A

1.

(c) Reciprocal and commutative under multiplication

Explanation: The property used here is both reciprocal and commutativity under multiplication. Reciprocal because both (-3) and its reciprocal $\frac{-1}{3}$ are multiplied. Commutative under multiplication because it follows the rule: a $\times$ b = b $\times$ a

2.

(c) Reciprocal

Explanation: The answer is reciprocal. Because (-3) and its reciprocal $\frac{-1}{3}$ are multiplied to get the answer.

3.

(d) 10

Explanation: $\frac{2x}{3} + 1 = \frac{7x}{15} + 3$

by transposing

or, $\frac{2x}{3}$ - $\frac{7x}{15}$ = 3 - 1

or, $\frac{10x-7x}{15}$ = 2

or, 3x = 30

or, x = 10

4. **(a)** $\frac{3}{2}$

Explanation: 4z + 3 = 6 + 2z

by transposing both sides

or, 4z - 2z = 6 - 3

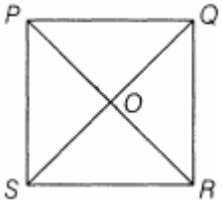
or, 2z = 3

or, z = $\frac{3}{2}$

5.

(b) Right angle

Explanation:



We know that the diagonals of a square intersect each other at a right angle.

Hence, $\angle POQ = 90^o$, i.e. right angle.

6.

(d) kite

Explanation: The diagonals of a quadrilateral intersect at right angles

$\therefore$ This quadrilateral is a square.

But it is also given that this quadrilateral

has exactly one axis of symmetry.

But square has 4 axes of symmetry.

So, this quadrilateral cannot be square and rhombus.

Hence, this quadrilateral is a kite

7.

(d) 36^o

Explanation: According to the question,

Total person = 300

Number of persons playing cricket = 30
Sector angle in pie chart = $\frac{30}{300} \times 360^\circ$ = 36°

8.

(d) 62^2

Explanation: The unit place of the square of $62^2 = 2^2 = 4$ [$\because 2^2 = 4$]

Clearly, 62^2 has 4 at the unit's place.

9. **(a)** 5x

Explanation: Given, the lengths of the legs of the right angle triangle are 3x and 4x.
Now, hypotenuse = $\sqrt{(3x)^2 + (4x)^2}$ [using Pythagoras theorem]
= $\sqrt{9x^2 + 16x^2}$
= $\sqrt{25}x^2$ = 5x

10.

(c) 125

Explanation: Here, we see that $8 = 2^3$, $27 = 3^3$, $64 = 4^3$.
It means given pattern is a cube of consecutive natural number.
$\therefore$ $x = 5^3 = 125$

11.

(b) 3

Explanation: $\because$ Number of zeroes at the end of the number 20 = 1
$\therefore$ Number of zeroes at the end of its cube = $3 \times 1 = 3$.

12. **(a)** 5%

Explanation: Let the rate of GST be x %.
Price including GST = SP + SP $\times \frac{\text{Rate of } GST}{100}$
$\Rightarrow$ 441 = 420 + $420 \times \frac{x}{100}$
$\Rightarrow$ 441 - 420 = $420 \times \frac{x}{100}$
$\Rightarrow$ 21 = $420 \times \frac{x}{100}$
$\Rightarrow$ x = $\frac{21 \times 100}{420}$
$\therefore$ x = 5%

13.

(b) It is 12:1

Explanation: Rs 1 = 100 paise
Rs 6 = 600 paise
So, the ratio is,
600:50
= 12:1

14.

(c) x^2yz

Explanation: $\frac{2}{3}xy \times \frac{3}{2}xz = x^2yz$

15.

(d) $\frac{3}{7}x^4y^7z^7$

Explanation: Area = l $\times$ b
$\therefore$ Required Area = $\frac{3}{7}x^4y^7z^7$

16. **(a)** height

Explanation: height

17.

(d) $324cm^2$

Explanation: length of drawing box= 16 cm , breadth = 6 cm , height = 3 cm
Surface area of drawing box = 2(l $\times$ b + b $\times$ h + h $\times$ l)

$S = 2(16 \times 6 + 6 \times 3 + 3 \times 16)$

$S = 2(96 + 18 + 48)$

$S = 2(162) = 2 \times 162 = 324 cm^2$

18.

(b) 150 cm

Explanation: Length = 15 cm

breadth = 10 cm

height = 10 cm

∴ Total length of Ribbon required

$= (10 + 15) \times 2 + (10 + 15) \times 2 + (10 + 10) + 10$

$= 25 \times 2 + 25 \times 2 + 20 \times 2 + 10$

$= 50 + 50 + 40 + 10$

$= 140 + 10$

$= 150$ cm

19.

(c) Option (iii)

Explanation: $x^7 + xy^6 = x(x^6 + y^6)$

$= x [(x^2)^3 + (y^2)^3]$

$= x(x^2 + y^2)(x^4 - x2y^2 + y^4)$

20.

(b) $\frac{5}{2}$ and $\frac{5}{2}$

Explanation: Given $4x^2 - 20x + 25 = 0$

$\Rightarrow 4x^2 - 10x - 10x + 25 = 0$

$\Rightarrow 2x(2x - 5) - 5(2x - 5) = 0$

$\Rightarrow (2x - 5)(2x - 5) = 0$

$\Rightarrow 2x - 5 = 0$ or $2x - 5 = 0$

$\Rightarrow x = \frac{5}{2}$ or $x = \frac{5}{2}$

∴ The quadratic equation has equal roots

$\frac{5}{2}$ and $\frac{5}{2}$.

Section B

21. ∵ Each interior angle = 165°

∴ Each exterior angle = 180° – 165° = 15°

Let the number of sides be n. Then,

n(15°) = 360°

$\Rightarrow n = \frac{360^\circ}{15^\circ} = 24^\circ$

Hence, the number of sides is 24.

22. From the graph it is clear that 15% represents ₹3000. Therefore, 10% represents ₹$\frac{3000}{15} \times 10$ = ₹ 2000

Thus, the monthly expenditure on clothes is ₹ 2000.

23.

2	216
2	108
2	54
3	27
3	9
3	3
	1

By prime factorisation,

$216 = \underline{2} \times \underline{2} \times \underline{2} \times \underline{3} \times \underline{3} \times \underline{3}$ [grouping the factors in triplets]

$= 2^3 \times 3^3$

$= (2 \times 3)^3$

$= 6^3$ which is a perfect cube.

All the terms form triplets

Therefore, 216 is a perfect cube.

24. A total surface area of the first cuboid$= 2(lb + bh + lh)$

= 2 (6 × 4 + 4 × 2 + 2 × 6)

= 2 (24 + 8 + 12)

= 88 cm^2

Total surface area of the second cuboid

= 2 (4 × 4 + 4 × 10 + 10 × 4)

= 2(16 + 40 + 40)

= 192 cm^2

OR

Since the area of one side face is 120 cm^2 and the height is 10.

So length of the side of base = $\frac{120}{10}$ = 12cm.

Thus the cuboid is a 12 cm × 12 cm × 10 cm cuboid. (as the base is a square)

Hence the surface area of the cuboid is = 2(12 × 12 + 12 × 10 + 12 × 10) = 768 cm^2

25. a is called multiplicative inverse of b, if a × b = 1

We have, $(-7)^{-2} \div (90)^{-1} = \frac{1}{(7)^2} \div \frac{1}{(90)^1} = \frac{1}{49} \div \frac{1}{90} = \frac{1}{49} \times \frac{90}{1} = \frac{90}{49}$ [$\because (-a)^m = a^m$, if m is an even number and $a^{-m} = \frac{1}{a^m}$]

put $b = \frac{90}{49}$

$\therefore \quad a \times \frac{90}{49} = 1$

$\Rightarrow \quad a = \frac{49}{90}$

26. On the basis of the given information in the table, the distance travelled by one of the new eco-friendly energy-efficient cars travelled on gas.

The car travelled 15 km in 1 L of gas. The car travelled 7.5 km in 0.5 L of gas.

The car travelled 30 km in 2 L of gas.

This rate shows a direct proportion between litres of gas and the distance covered

The car can cover the distance in 8 L of gas = 8 × 15 = 120km

OR

1. x/y = 1/5, x/y = 3/15 = 1/5, x/y = 5/25 = 1/5 and x/y = 0.5 /2.5 = 1/5

   here x is directly proportional to y.
2. x/y = 1/30, x/y = 3/10

   x/y ≠ x/y

   Now xy = $1 \times 30 = 30$, $xy = 3 \times 10 = 30$, $xy = 4 \times 7.5 = 30$ and $xy = 0.5 \times 60 = 30$.

   Here x is inversely proportional to y.

27. $\frac{3\times-1}{(-2\times-1)} = \frac{-3}{2}$, $\frac{5\times-1}{(-3\times-1)} = \frac{-5}{3}$

LCM of 3,2,3 and 1 is 6

$= \frac{[-10+(-9)+(-14)+18]}{6}$

$= \frac{[-10-9-14+18]}{6}$

$= \frac{-15}{6} = \frac{-5}{2}$

28. Given, 4 (3p + 2) - 5 (6p - 1) = 2 (p - 8) - 6 (7p - 4)

$\Rightarrow$ 12p + 8 - 30p + 5 = 2p -16 - 42p + 24

$\Rightarrow$ -18 p+ 13 = - 40p + 8

$\Rightarrow$ -18p + 40p = 8 -13 [transposing -40p to LHS and 13 to RHS]

$\Rightarrow$ 22p = - 5

$\Rightarrow \frac{22p}{22} = \frac{-5}{22}$ [dividing both sides by 22]

$\therefore \quad p = \frac{-5}{22}$

OR

Given, $\frac{1}{2}(x+1) + \frac{1}{3}(x-1) = \frac{5}{12}(x-2)$

$\Rightarrow \quad \frac{x}{2} + \frac{1}{2} + \frac{x}{3} - \frac{1}{3} = \frac{5x}{12} - \frac{5}{6}$

$\Rightarrow \quad \frac{x}{2} + \frac{x}{3} - \frac{5x}{12} = \frac{1}{3} - \frac{1}{2} - \frac{5}{6}$ [transposing $\frac{1}{2}, \frac{1}{3}$ to RHS and $\frac{5x}{12}$ to LHS]

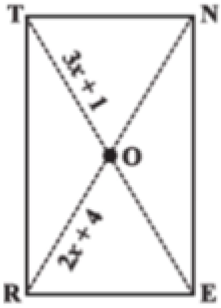
$\Rightarrow \quad \frac{6x+4x-5x}{12} = \frac{2-3-5}{6}$

$\Rightarrow \quad \frac{5x}{12} = \frac{-6}{6}$

$\Rightarrow \quad 5x \times 6 = (-6) \times 12$ [by cross-multiplication]

$\Rightarrow \quad x = \frac{(-6)\times 12}{5\times 6}$

$\therefore \quad x = \frac{-12}{5}$

29. 

Diagonal of rectangle bisect each other

Since diagonals of a rectangle bisect each other, TE = 2TO

= 2 (3x + 1)

= 6x +2

and RN = 2RO = 2(2x +4) = 4x + 8

Diagonals of a rectangle are equal.

So TE = RN

or 6x + 2 = 4x + 8

or 2x = 6

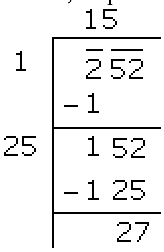
or x = 3

30. We know that the sum of opposite faces of a dice is 7.

So the face opposite to 4 is 7 - 4 = 3

And the face opposite to 6 is 7 - 6 = 1

Hence, required sum of the numbers = 3 + 1 = 4

31. 

This shows that $15^2 < 252$

Next perfect square is $16^2 = 256$

Hence, the number to be added is $16^2 - 252 = 256 - 252 = 4$

Therefore, the perfect square so obtained is 252 + 4 = 256

Hence, $\sqrt{256} = 16$.

32. Principal (P) = ₹ 5000

Time period (T) = 6 months = $\frac{1}{2}$ year

Rate of interest (R) = 5% p.a.

Simple interest (S.I.) $= \frac{P\times T\times R}{100} = \frac{5000\times 1\times 5}{2\times 100} = ₹125$

Amount to be paid after 6 months = Principal + Interest = ₹ 5000 + 125 = ₹ 5125.

OR

We have,

The distance from picnic to school = 55 km

The distance of the place where first stop was made = 22 km

To find the percentage of distance:

$= \frac{22}{55} \times 100$

$= 40\%$

She is multiplying the ratio by $\frac{100}{100} = 1$ and converting to percentage.

Both came out with the same answer that the distance from their school of the place where they stopped at was 40% of the total distance they had to travel.

Therefore, the percent distance left to be travelled = 100% – 40%

= 60%

33. $10mn + \left(-\frac{3}{8}mn\right) + \left(-\frac{1}{4}mn\right)$

$= 10mn - \frac{3}{8}mn - \frac{1}{4}mn$

$= \left(10 - \frac{3}{8} - \frac{1}{4}\right)mn$

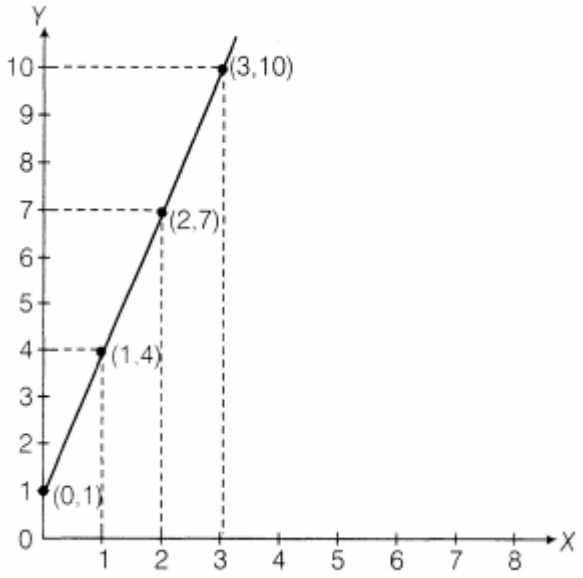
$= \frac{80-3-2}{8}mn$

$= \frac{75}{8}mn$

34. a.

x	0	1	2	3
y = 3x + 1	1	4	7	10

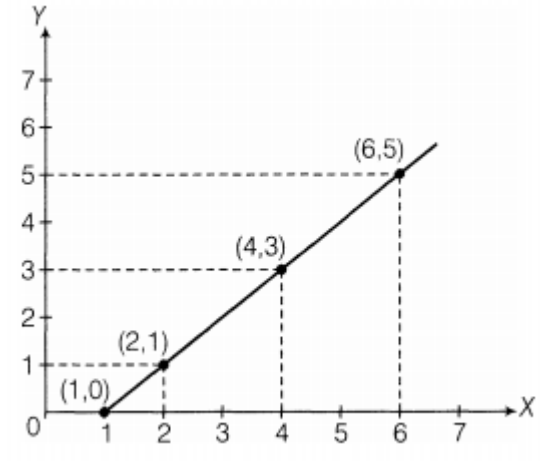
The graph can be drawn as:



b.

x	1	2	4	6
y = x - 1	0	1	3	5

The graph can be drawn as:



35. We have,

i. A sunscreen with SPF 15 allows only $\frac{1}{15}$ of the sun's UV rays.

It means = 1 - $\frac{1}{15}$

= $\frac{14}{15}$ of the sun's UV rays abort by sunscreen.

In percentage = $\frac{14}{15} \times 100$

=$\frac{1400}{15}$

= 93.333%

ii. a. Sunscreen allows 25% of the sun's UV rays.

$\therefore$ It blocks UV rays = 100 - 25

= 75%

= $\frac{75}{100}$

= $\frac{3}{4}$

b. Sunscreen allows 25% on - of UV rays. It means that it protects = 1 - $\frac{3}{4}$

= $\frac{1}{4}$ of UV rays.

Hence, it's an SPF 4,

iii. False,

According to the claim, for $\frac{3}{100}$ effect of UV rays

1 minute = $33\frac{1}{3}\text{SPF}$

Therefore, Affect $\neq$ 30 SPF claim

OR

Let marked price of the garments = ₹ x

Discount% = 12.5%

Discount = 12.5% of x = $\frac{125}{10\times100} \times x = \frac{1}{8} \times x = \frac{x}{8}$

S.P. = M.P. - Discount

$= x - \frac{x}{8} = \frac{8x-x}{8} = \frac{7x}{8}$

C.P. = ₹ 2,100

Gain% = 25%

$S.P. = \frac{100+Profit\%}{100} \times C.P.$

$= \frac{100+25}{100} \times 2100 = \frac{125}{100} \times 2,100 = ₹.2,625$

Therefore, $\frac{7x}{8}$ = ₹ 2,625

$x = \frac{2625\times8}{7} = 375 \times 8 = ₹3,000$

Hence, Marked Price of Garments = ₹3,000.

36. Carefully see the map.

a. Flower road, Khel marg, Mall road and Sneha marg meet at round.

b. The address of the stadium is given below:

Sector 27

BTown, India

c. The police station is situated on Sneha marg.

d. Sneha's address is given below:

H.N-1Nr. Bank 1 (A)

Sector 19, B town, India.

e. Sector 27 has maximum number of houses.

f. Fire station is located in sector 26.

g. In the map, four sectors have been shown.

37. $\because$ We know that Volum e of a cylinder = $\pi r^2 h$

where, h is height and r is the radius of the base of the cylinder.

i. If height is double i.e. h = 2 $\times$ h

= 2h

Then, its volum e = $\pi r^2 \times$ 2 h

= $2\pi r^2 h$

Hence, volume becames double of original volume.

ii. If height is doubled and the radius is halved,

i.e. h = 2h and r = $\frac{r}{2}$

$\therefore$ Volume $= \pi \times \left(\frac{r}{2}\right) \times \left(\frac{r}{2}\right) \times 2h$

$= \pi \times \frac{r^2}{4} \times 2h$

$= \frac{\pi r^2 h}{2}$

Hence, volume becames half of the original volume.

iii. If height remains same and radius is halved,

i.e. h = h and r = $\frac{r}{2}$

$\therefore$ Volume $= \pi \times \frac{r}{2} \times \frac{r}{2} \times h$

Volume $= \pi \times \frac{r^2}{4} \times h$

Hence, volume becames $\frac{1}{4}^{\text{th}}$ of the original volume.

OR

Area of the given figure = Area of two semi-circles + Area of two triangles + Area of a square

$\therefore$ Area of triangle $= \sqrt{s(s-a)(s-b)(s-c)}$ [$\because$ a = 5cm, b = 5 cm and c = 6 cm, given]

Where, $s = \frac{a+b+c}{2} = \frac{5+5+6}{2}$

$= \frac{16}{2} = 8\text{cm}$

$\therefore$ Area of triangle = $\sqrt{8(8-5)(8-5)(8-6)}$

$= \sqrt{8 \times 3 \times 3 \times 2} = \sqrt{144} = 12\text{cm}^2$

$\therefore$ Area of triangle = 2 $\times$12 = 24cm^2

$\therefore$ Area of semi- circles = Area of 1 circle

$\therefore$ Area of circles = $\pi r^2 = \frac{22}{7} \times 3 \times 3 = \frac{9 \times 22}{7} = \frac{198}{7} = 28.28\text{cm}^2$

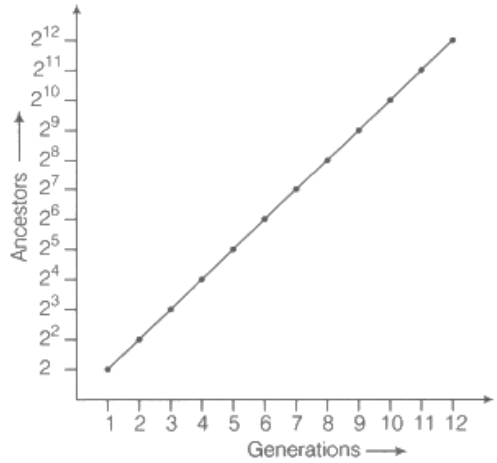
$\therefore$ Area of square = 6 $\times$ 6 = 36 cm^2

Area of the given figure = (24 + 28.28 + 36) = 88.28 cm^2

38. a. On the basis of the given information, we can make a table that shows the number of ancestors in each of the 12 generations.

Generations	Ancestors
1st	2^1
2nd	2^2
3rd	2^3
:	:
12th	2^{12}

Hence, we can draw a graph that shows the relationship between generation and ancestor.



b. On the basis of generation-ancestor graph,

the number of ancestors in n generations will be 2^n.

39. On the basis of given table,

Elevator A takes 29 s to cover 435 m.

$\therefore$ Distance covered by elevator A in 1 s = $\frac{435}{29}$ = 15 m

Elevator B takes 28 s to cover 448 m.

$\therefore$ Distance covered by elevator A in 1 s = $\frac{448}{28}$ = 16 m

Elevator B takes 28 s to cover 130 m.

$\therefore$ Distance covered by elevator A in 1 s = $\frac{130}{13}$ = 13 m

Elevator B takes 28 s to cover 85 m.

$\therefore$ Distance covered by elevator A in 1 s = $\frac{85}{5}$ = 17 m

Hence, in 1s, elevator D covers more distance as compare to elevators A, B and C. So, elevator D is fastest, while elevator C covers least. Hence, elevator C is slowest.

Now, elevator B covers distance in 140 s = 140 $\times$ 16 = 2240 m [distance = speed $\times$ time]

Elevator C covers distance in 140s = 140 $\times$ 13 = 1820m

$\therefore$ Elevator B covers more distance than C = 2240 -1820 = 420m

40. In order to factorize $x^2 + 5x - 36$, we have to find two numbers p and q

Such that p + q = 5 and pq = – 36

Clearly, 9 + (–4) = 5 and 9 × –4 = –36

So we write the middle term 5x of $x^2 + 5x - 36$ as 9x – 4x

$\therefore x^2 + 5x - 36 = x^2 + 9x - 4x - 36$

$= (x^2 + 9x) - (4x + 36)$

$= x(x + 9) - 4(x + 9)$

$= (x + 9)(x - 4)$