Class VIII Session 2023-24
Subject - Maths
Sample Question Paper - 5

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

Section A

1. Which of the following is correct? **[1]**

   a. a + 0 = b

   b. -a × b = b × (-a)

   c. a - b = b - a

   d. $\frac{a}{b} = \frac{b}{a}$

   a) Option (d) b) Option (c)

   c) Option (b) d) Option (a)

2. A number of the form $\frac{p}{q}$ is said to be a rational number, if **[1]**

   a) p, q are integers and p $\neq$ 0 b) p, q are integers

   c) p, q are integers and p $\neq$ 0, also q $\neq$ 0 d) p, q are integers and q $\neq$ 0

3. Solve: $\frac{x}{2} - \frac{1}{5} = \frac{x}{3} + \frac{1}{4}$ **[1]**

   a) 27 b) 10

   c) None of these d) $\frac{27}{10}$

4. For which of the following figures, diagonals are perpendicular to each other? **[1]**

   a) Trapezium b) Kite

   c) Parallelogram d) Rectangle

5. A card is drawn at random from a pack of 52 cards. Find the probability that the card drawn is a black king. **[1]**

   a) $\frac{1}{52}$ b) $\frac{1}{13}$

   c) $\frac{1}{26}$ d) $\frac{1}{2}$

6. If $x^2 + y^2 = 47$ and $xy = \frac{19}{2}$ then the value of $3(x + y)^2 + (x - y)^2$ is **[1]**

   a) 170 b) 226

   c) 270 d) 86

7. How many natural numbers lie between 18^2 and 19^2? **[1]**

   a) 37 b) 30

   c) 36 d) 35

8. Find the smallest number by which the number 100 must be multiplied to obtain a perfect cube. **[1]**

   a) 4 b) 2

c) 10 d) 5

9. The price of a TV is Rs 13,000. The sales tax charged on it is at the rate of 12%. Find the amount that Vinod will have to pay if he buys it. **[1]**

a) Rs 13,560 b) None of these

c) Rs 14,560 d) Rs 15,560

10. 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) None of these

11. A water tank whose dimensions are 1.5 m, 0.75 m and 0.48 m is full. Its contents are emptied into another empty tank whose base area is 1 m^2. How much the water level shall rise? **[1]**

a) 0.34 cm b) 64 cm

c) 5.4 cm d) 0.54 cm

12. The standard form for 234000000 is **[1]**

a) 0.234×10^{-9} b) 2.34×10^{8}

c) 2.34×10^{-8} d) 0.234×10^{9}

13. For a non-zero integer x, $x^7 \div x^{12}$ is equal to **[1]**

a) x^{19} b) x^5

c) x^{-5} d) x^{-19}

14. A gardener uses pipes to water his garden from the tank. For his entire garden he uses 6 pipes to water and it takes him 1 hour 20 minutes to completely empty the tank. Now if he uses only 5 pipes to water his garden, how long it will take him to empty the tank? **[1]**

a) 1 hour 55 min b) 1 hour 45 min

c) 1 hour 36 min d) 1 hour 30 min

15. 36 men complete a piece of work in 18 days. In how many days will 27 men complete the same work? **[1]**

a) 24 b) 42

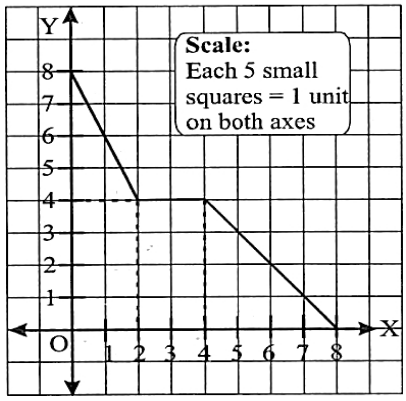
c) 25 d) 20

16. Factors of 2a(x - y) + 3b(5x - 5y) + 4c(2y - 2x) **[1]**

a) (x - y) (2x - 15b - 3c) b) (x - y) (2x - 15b - 9c)

c) (x - y)(2x + 15b - 3c) d) (x + y) (2x + 15b + 3c)

[1]

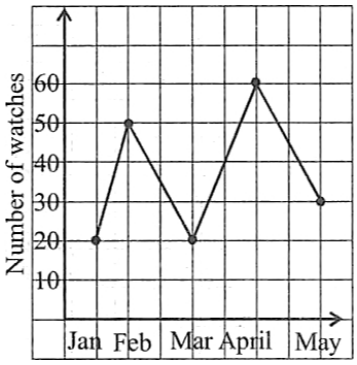
17. 

Change in y when x changes from 2 to 4.

a) 4 b) 0

c) 3 d) 2

18. The line graph shows the sale of watches in a company. How many watches were sold in those 5 months? **[1]**



a) 175 b) 180

c) 160 d) 170

Section B

19. **Assertion (A):** A number is such that it is as much greater than 84 as it is less than 108. The number is 96. **[1]**

Reason (R): Same quantity can be added to both sides of an equation without changing the quality.

a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false. d) A is false but R is true.

20. **Assertion (A):** The number of sides of a quadrilateral is four. **[1]**

Reason (R): In geometry a quadrilateral is a four-sided polygon, having four edges and four vertices.

a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false. d) A is false but R is true.

Section C

21. Verify the property x × (y × z) = (x × y) × z of rational number by using $x = \frac{-2}{7}, y = \frac{-5}{6}$ and $z = \frac{1}{4}$ and **[2]**
What is the name of this property?

22. Solve the linear equation: $m - \frac{m-1}{2} = 1 - \frac{m-2}{3}$ **[2]**

23. Using prime factorization, show that 729 is a perfect cube. **[2]**

24. What will happen to the volume of the cube, if its edge **[2]**

i. Tripled

ii. Reduced to one-fourth?

25. Simplify and express the result in power notation with positive exponent: $(-3)^4 \times \left(\frac{5}{3}\right)^4$ **[2]**

26. 44 cows can graze a field in 9 days. How many less/more cows will graze the same field in 12 days? **[2]**

27. Solve: $-\frac{2}{3} \times \frac{3}{5} + \frac{5}{2} - \frac{3}{5} \times \frac{1}{6}$ **[3]**

28. Solve the linear equation $\frac{3t-2}{4} - \frac{2t+3}{3} = \frac{2}{3} - t$. **[3]**

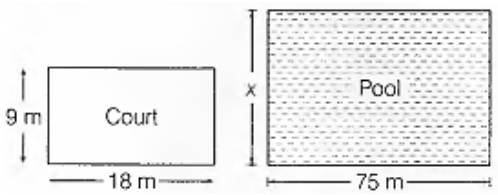
29. Find the least number which must be added to 525 so as to get a perfect square. Also find the square root of the perfect square so obtained. **[3]**

30. A scooter was bought at ₹42,000. Its value depreciated at the rate of 8% per annum. Find its value after one year. **[3]**

31. Find the sum of $4x^2 - 3x + 2$ and $3x^2 + 4x - 8$. **[3]**

32. The lateral surface area of a hollow cylinder is 4224 cm^2. It is cut along its height and formed a rectangular sheet of width 33 cm. Find the perimeter of rectangular sheet? **[3]**

33. A volleyball court is in a rectangular shape and its dimensions are directly proportional to the dimensions of the swimming pool given below. Find the width of the pool. **[3]**



34. Divide as directed: $20(y + 4)(y^2 + 5y + 3) \div 5(y + 4)$ **[3]**

35. PQRS is a rectangle. The perpendicular ST from S on PR divides ∠S in the ratio 2 : 3. Find ∠TPQ. **[4]**

36. We toss a coin 50 times and get a head 26 times. What is the probability of getting (i) a head (ii) a tail **[4]**

37. Given, principal = ₹40000, rate of interest = 8% per annum compounded annually. Find **[4]**

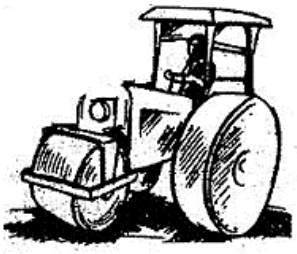
i. Interest if period is one year.

ii. Principal for II^{nd} year.

iii. Interest for II^{nd} year.

iv. Amount if period is two year.

38. A road roller takes 750 complete revolutions to move once over to level a road. Find the area of the road if the diameter of a road roller is 84 cm and length is 1 m. **[4]**



39. Factorize $x^2 + xy + 8x + 8y$. **[4]**

40. Draw a graph for the following. **[4]**

Side of square (in cm)	2	3	3.5	5	6
Perimeter (in cm)	8	12	14	20	24

i. Write the scale along the X axis and Y axis?

ii. What is marked on the horizontal axis?

iii. What is marked on the vertical axis?

iv. What is marked on the points plotted?

v. Is it a line graph?

Solution

Section A

1.

(c) Option (b)

Explanation: -a $\times$ b = b $\times$ (-a)

Because multiplication of two numbers in any order are same.

2.

(d) p, q are integers and q $\neq$ 0

Explanation: A number of the form $\frac{p}{q}$ is said to be a rational number, if p and q are integers and q $\neq$ 0

3.

(d) $\frac{27}{10}$

Explanation: $\frac{x}{2} - \frac{1}{5} = \frac{x}{3} + \frac{1}{4}$

By L.C.M

or, $\frac{(5x-2)}{10} = \frac{(4x+3)}{12}$

by cross multiplication

or, 60x - 24 = 40x + 30

by transposing

or, 60x - 40x = 30 + 24

or, 20x = 54

or, x = $\frac{54}{20}$

in lowest term

or, x = $\frac{27}{10}$

4.

(b) Kite

Explanation: The diagonals of a kite are perpendicular to each other.

5.

(c) $\frac{1}{26}$

Explanation: Total card in pack = 52

Black king = 2

Probability of getting a black king = $\frac{2}{52} = \frac{1}{26}$

6.

(b) 226

Explanation: $x^2 + y^2 = 47$ ....(i)

$xy = \frac{19}{2}$ ... (ii)

$(x + y)^2 = x^2 + y^2 + 2xy$

$= 47 + 2 \times \frac{19}{2} = 47 + 19$

$(x + y)^2 = 66$

Also, $(x - y)^2 = x^2 + y^2 - 2xy$

$= 47 - 19 = 28$

$3(x + y)^2 + (x - y)^2 = 3 \times 66 + 28 = 226$

7.

(c) 36

Explanation: Here is a solution using a sequence approach:

$18^2 = 324$

$19^2 = 361$

The natural numbers between 18^2 and 19^2 are the numbers in the sequence:
325, 326,..., 359, 360
Using the formula for the number of terms, n in and A.P. sequence:
last term = first term + (n -1) $\times$ common difference, we get:
360 = 325 + (n - 1) $\times$ 1
$\Rightarrow$ 360 - 325 = n -1
$\Rightarrow$ 35 = n - 1
$\Rightarrow$ n = 35 +1 = 36.
Therefore, 36 natural numbers lie between 18 squared and 19 squared.
or The natural numbers lie between n squared and (n+1) squared = 2n
hence, natural numbers lie between 18 squared and 19 squared = $2 \times 18 = 36$

8.

(c) 10
Explanation: By resolving 100 into prime factors we get 100 = 2 $\times$ 2 $\times$ 5 $\times$ 5

2	100
2	50
5	25
	5

Here prime factors of '2' and '5' are ungrouped
$\therefore$. Smallest number which is required is 10

9.

(c) Rs 14,560
Explanation: Price of the T.V. = Rs. 13,000
Sale tax = ₹$\frac{13000 \times 12}{100}$
= Rs 1,560
Amount Vinod will have to pay = Rs(13,000 + 1,560)
= Rs.14,560

10.

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

11.

(d) 0.54 cm
Explanation: Volume of I tank = Volume of II tank
$1.5 \times 0.75 \times 0.46 = 1m^2 \times h$
$\Rightarrow h = \frac{1.5 \times 0.75 \times 0.48}{1}$ = 0.54 cm

12.

(b) 2.34×10^8
Explanation: Given, $234000000 = 234 \times 10^6 = 2.34 \times 10^{6+2} = 2.34 \times 10^8$
Hence, standard form of 234000000 is 2.34×10^8

13.

(c) x^{-5}
Explanation: Using law of exponents, $a^m \div a^n = (a)^{m-n}$ [$\because$ a is non-zero integer]
Similarly, $x^7 \div x^{12} = (x)^{7-12} = (x)^{-5}$

14.

(c) 1 hour 36 min
Explanation: Let the time required be x.

No. of pipes	6	5
Time taken (min)	80	x

∴ It is inverse variation.

$\Rightarrow 6 \times 80 = 5 \times x$

$\Rightarrow x = \frac{6 \times 80}{5} = 96$ min

$\Rightarrow$ x = 1 hour 36 min

15. **(a)** 24

Explanation: Let the required number of days be x.

Then, Less men, More days (Indirect Proportion)

$\therefore 27 : 36 :: 18 : x \Rightarrow = \frac{36 \times 18}{27} \Rightarrow x = 24$

16. **(c)** (x - y)(2x + 15b - 3c)

Explanation: 2a(x - y) + 3b(5x - 5y) + 4c(2y - 2x)

$= 2a(x - y) + 3b \times 5(x - y) + 4c(-2)(x - y)$

$= (x - y)(2a + 15b - 8c)$

∴ The factors of

2a (x - y) + 3b(5x - 5y) + 4c(2y - 2x)

are (x - y) and (2x + 15b - 3c)

17. **(b)** 0

Explanation: There is no change in Y

18. **(b)** 180

Explanation: Total watches sold = (20 + 50 + 20 + 60 + 30) = 180

Section B

19. **(b)** Both A and R are true but R is not the correct explanation of A.

Explanation: On forming equation as x - 84 = 108 - x, we find x = 96.

20. **(a)** Both A and R are true and R is the correct explanation of A.

Explanation: The number of sides and angles of a quadrilateral is 4. So, both A and R are true and R is the correct explanation of A.

Section C

21. Given, $x = \frac{-2}{7}, y = \frac{-5}{6}$ and $z = \frac{1}{4}$

Now, LHS = $x \times (y \times z) = \frac{-2}{7} \times (\frac{-5}{6} \times \frac{1}{4}) = \frac{-2}{7} \times \frac{-5}{24} = \frac{5}{84}$

RHS = $(x \times y) \times z = (\frac{-2}{7} \times \frac{-5}{6}) \times \frac{1}{4} = \frac{5}{21} \times \frac{1}{4} = \frac{5}{84}$

LHS = RHS

Hence, $x \times (y \times z) = (x \times y) \times z$

This property is associative property of multiplication.

22. m - $\frac{m-1}{2} = 1 - \frac{m-2}{3}$

It is a linear equation since it involves linear expressions only.

$\therefore m - \frac{m}{2} + \frac{1}{2} = 1 - \frac{m}{3} + \frac{2}{3}$

$\therefore m - \frac{m}{2} + \frac{m}{3} = 1 + \frac{2}{3} - \frac{1}{2}$ ... [Transposing $\frac{-m}{3}$ to L.H.S. and $\frac{1}{2}$ to R.H.S.]

$\therefore \frac{6m-3m+2m}{6} = \frac{6+4-3}{6}$

$\therefore \frac{5m}{6} = \frac{7}{6}$

$\therefore m = \frac{7}{6} \times \frac{6}{5}$ ... [Multiplying both sides by $\frac{6}{5}$]

$\therefore m = \frac{7}{5}$ this is the required solution.

23. We have, $729 = 3 \times 3 \times 3 \times 3 \times 3 \times 3$

Since the prime factors appear in triplets.

So, 729 is a perfect cube.

24. Let each side of the cube be a, then its volume = a^3 [∵ volume of a cube = $(\text{side})^3$]

i. If side became triple, then volume will be = $(3a)^3 = 27\ a^3$

Hence, the new volume of the cube will be 27 times of original volume of the cube.

ii. If side reduced to one fourth = $a \times \frac{1}{4} = \frac{a}{4}$

Now, its volume = $\left(\frac{a}{4}\right)^3 = \frac{a^3}{64}$

Hence, new volume $\frac{1}{64}$ times of original volume.

25. $(-3)^4 \times \left(\frac{5}{3}\right)^4$

$= \{(-1) \times 3\}^4 \times \left(\frac{5}{3}\right)^4$

$= (-1)^4 \times 3^4 \times \frac{5^4}{3^4}$

$= (5)^4$

26. 44 cows can graze a field = 9 days

The number of cows that can graze the same field in 1 day = 44 × 9 cows

In 12 days, the number of cows required = $\frac{44\times9}{12} = \frac{44\times3}{4}$ = 11 × 3 = 33 cows

Hence, (44 - 33) i.e. 11 cows less are required to graze the same field in 12 days

27. $-\frac{2}{3} \times \frac{3}{5} + \frac{5}{2} - \frac{3}{5} \times \frac{1}{6}$

$= -\frac{2}{3} \times \frac{3}{5} - \frac{3}{5} \times \frac{1}{6} + \frac{5}{2}$ [Using Associative property]

$= \frac{3}{5}\left(\frac{-2}{3} - \frac{1}{6}\right) + \frac{5}{2}$ [Using distributive property]

$= \frac{3}{5}\left(\frac{-4-1}{6}\right) + \frac{5}{2}$

$= \frac{3}{5} \times \frac{-5}{6} + \frac{5}{2}$

$= -\frac{1}{2} + \frac{5}{2}$

$= \frac{-1+5}{2} = \frac{4}{2} = 2$

28. $\frac{3t-2}{4} - \frac{2t+3}{3} = \frac{2}{3} - t$ It is a linear equation since it involves linear expressions only.

$\therefore \frac{3}{4}t - \frac{2}{4} - \frac{2}{3}t - \frac{3}{3} = \frac{2}{3} - t$

$\therefore \frac{3}{4}t - \frac{1}{2} - \frac{2}{3}t - 1 = \frac{2}{3} - t$

$\therefore \frac{3}{4}t - \frac{2}{3}t + t = \frac{2}{3} + \frac{1}{2} + 1$ ... [Transposing –t to L.H.S. and $-\frac{1}{2}$ and –1 to R.H.S.]

$\therefore \frac{9t-8t+12t}{12} = \frac{4+3+6}{6}$

$\therefore \frac{13t}{12} = \frac{13}{6}$

$\therefore t = \frac{13}{6} \times \frac{12}{13}$ ... [Multiplying both sides by $\frac{12}{13}$]

$\therefore$ t = 2 this is the required solution.

29.

```
      22
   ┌──────
 2 │ 5 25
   │ -4
   ├──────
42 │ 1 25
   │  -84
   ├──────
   │   41
```

This shows that $22^2 < 525$.

Next perfect square is $23^2 = 529$.

Hence, the number to be added is $23^2 – 525 = 529 – 525 = 4$

Therefore, the perfect square so obtained is 525 + 4 = 529.

Hence, $\sqrt{529}$=23.

30. P = ₹ 42000

R = 8% per annum

n = 1 year

$\therefore A = P\left(1 - \frac{R}{100}\right)^n$

$= 42000\left(1 - \frac{8}{100}\right)^1$

$= 42000\left(1 - \frac{2}{25}\right)$

$= 42000 \times \frac{23}{25}$

= ₹ 38640

Hence, its value after 1 year is ₹ 38640.

31. $(4x^2 – 3x + 2) + (3x^2 + 4x – 8) = 4x^2 – 3x + 2 + 3x^2 + 4x – 8$

$= 4x^2 + 3x^2 + 4x – 3x + 2 – 8$

$= (4 + 3)\, x^2 + (4 – 3)x + (2 – 8)$

$= 7x^2 + x – 6$

32. Lateral surface area of the hollow cylinder = 4224 cm^2

$\therefore$ Area of the rectangular sheet = 4224 cm^2

$\therefore$ Length $\times$ 33 = 4224

$\therefore$ Length $= \frac{4224}{33}$

$\therefore$ Length = 128 cm

$\therefore$ Perimeter of the rectangular sheet

= 2(Length + Breadth)

= 2(128 + 33) cm

= 2(161) cm

= 322 cm

Hence, the perimeter of the rectangular sheet is 322 cm.

33. From the given figures,

Length of volleyball court = 18 m

Breadth of volleyball court = 9m

Length of pool = 75 m

Let the width of the swimming pool = x m

According to the question, the size of volleyball court and swimming pool are in direct proportion to each other.

$\therefore \quad \frac{9}{18} = \frac{x}{75}$

$\Rightarrow \quad x = \frac{75 \times 9}{18} = \frac{75}{2} = 37.5\text{m}$ [by cross-multiplication]

Hence, the width of the swimming pool is 37.5 m.

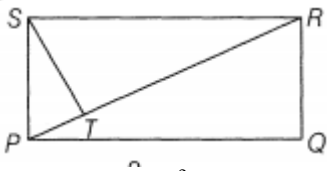
34. $20(y + 4)\,(y^2 + 5y + 3) \div 5(y + 4)$

$= \frac{20(y+4)(y^2+5y+3)}{5(y+4)}$

$= 4(y^2 + 5y + 3)$

35. Given ST is perpendicular on PR and ST divides $\angle S$ in the ratio 2 : 3

So, sum of ratio = 2 + 3 = 5



Now, $\angle TSP = \frac{2}{5} \times 90^\circ = 36^\circ, \angle TSR = \frac{3}{5} \times 90^\circ = 54^\circ$

$\angle TPS = 180^\circ - (\angle STP + \angle TSP)$ [by the angle sum property of a triangle]

= 180°-(90°+ 36°) =54°

We know that, $\angle SPQ = 90^\circ$

$\Rightarrow \angle TPS + \angle TPQ = 90^\circ$

$\Rightarrow \quad 54^\circ + \angle TPQ = 90^\circ$

$\Rightarrow \quad \angle TPQ = 90^\circ - 54^\circ = 36^\circ$

36. i. Total possible outcomes = 50

number of heads = 26

Probability of getting a head $= \frac{Number\ of\ favourable\ outcomes}{Total\ number\ of\ outcomes} = \frac{26}{50} = \frac{13}{25}$

ii. Total possible outcomes = 50

Number of tails = 50 – 26 = 24

Probability of getting a tail $= \frac{Number\ of\ favourable\ outcomes}{Total\ number\ of\ outcomes} = \frac{24}{50} = \frac{12}{25}$

37. We have given that principal (P)= ₹40000

Rate of interest (R) = 8% per annum

i. Compound interest for one year,

We know that, $A = P\left(1 + \frac{R}{100}\right)^n$

,= $40000\left(1 + \frac{8}{100}\right)^1 [\because n = 1yr]$

= $40000 \times \frac{108}{100}$

∴ Amount, A = 400×108

= ₹43200

∴ Compound interest, Cl = A - P

= ₹43200 - ₹40000

= ₹3200

ii. Amount of 1st year = Principal of IInd year

= ₹43200

iii. Now, for IInd year,

Principal = ₹43200

Rate of interest, R= 8% per annum

Time, n = 1 yr

Amount for llnd year = 43200

= $\left(1 + \frac{8}{100}\right)^1$

= $43200 \times \frac{108}{100}$

= ₹46656

Compound interest, Cl = A - P

= ₹46656 - ₹43200

= ₹3456

iv. Now, if period i.e. time (n) = 2 yr,

Principal = ₹ 40000

and rate (R) = 8% per annum

$\because \quad A = P\left(1 + \frac{R}{100}\right)^n$

$\Rightarrow \quad A = 40000\left(1 + \frac{8}{100}\right)^2$

$= 40000 \times \frac{108}{100} \times \frac{108}{100}$

= ₹46656

Therefore the total Amount, A = ₹46656

38. Diameter of the road roller = 84 cm

∴ Radius (r) of the road roller $= \frac{84}{2}$ cm = 42 cm

Length (h) of the road roller = 1m = 100 cm

∴ Lateral surface area of the road roller $= 2\pi rh$

$= 2 \times \frac{22}{7} \times 42 \times 100$

= 26400 cm^2

∴ Area of the road covered in 1 complete revolution = 26400 cm^2

∴ Area of the road covered in 750 complete revolutions

= 26400 $cm^2 \times 750$ cm^2

= 19800000 cm^2

$= \frac{19800000}{100 \times 100} m^2$

= 1980 m^2

39. We observe that there is no common factor among all terms. Also, there are four terms.

$x^2 + xy = x(x+y)$

Also, 8 is a common factor from the last two terms. Taking 8 common from the last two terms, we have

8x +8y = 8(x+y)

Clearly, x + y is common from the two groups.

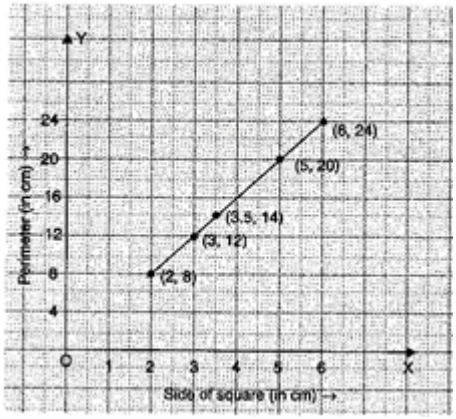
Thus. We group the terms as follows:

$x^2 + xy + 8x + 8y = (x^2 + xy) + (8x + 8y)$

$= x(x + y) + 8(x + y)$

$= (x + 8)(x + y)$

40.



i. Scale :

Horizontal : 1 unit = 1 cm

Vertical : 1 unit = 4 cm

ii. Mark side of the square (in cm) on horizontal axis.

iii. Mark perimeter (in cm) on vertical axis.

iv. Plot the points (2, 8), (3, 12), (3.5, 14), (5, 20) and (6, 24).

v. Join the points.

We get a line graph.