

ADCFB

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No. of Pages : 12

HALF YEARLY EXAMINATION-2024-25

CLASS-X

SUBJECT-MATHEMATICS

Time : 3 Hours

M.Marks : 80

General Instructions:

This Question Paper has 5 Sections A, B, C, D, and E. Each section is compulsory. However there are internal choices in some questions.

1. *Section-A has 18 Multiple Choice Questions (MCQs) and two A&R Questions of 1 mark each.*
2. *Section-B has 5 Very Short Answer (VSA)-type questions of 2 marks each.*
3. *Section-C has 6 Short Answer (SA)-type questions of 3 marks each.*
4. *Section-D has 4 Long Answer (LA)-type questions of 5 marks each.*
5. *Section-E has 3 Case Based/Source based/Passage based/integrated units of assessment (4 marks each) with sub-parts.*
6. *Draw neat figures wherever required. Take $\pi = \frac{22}{7}$ wherever required if not stated.*
7. *Q. 35 is a graph question.*

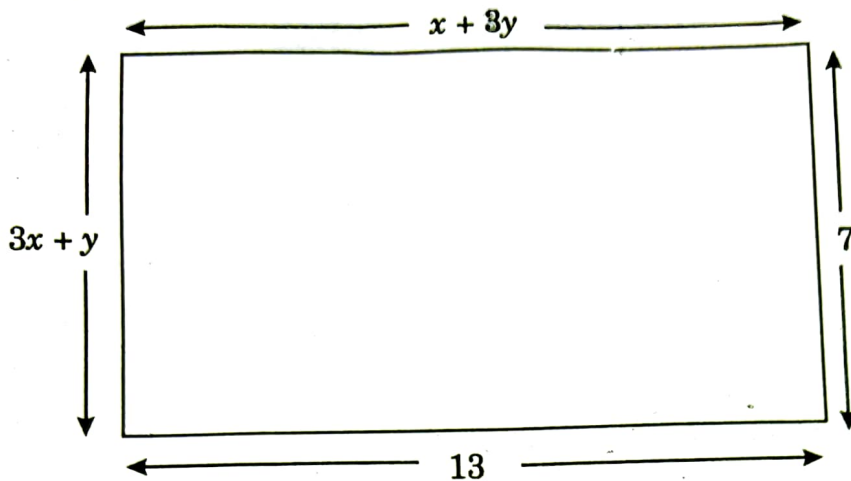
Section-A consists of 20 questions of 1 mark each.

1. The ratio between the LCM and HCF 5,15 and 20 is (1)
(a) 9:1 (b) 4:3 (c) 11:1 (d) 12:1

2. The quadratic polynomial whose zeros are $5 - 2\sqrt{3}$ and $5 + 2\sqrt{3}$ is (1)
(a) $x^2 - 10x - 13$ (b) $x^2 + 10x + 13$
(c) $x^2 + 20x + 13$ (d) $x^2 - 10x + 13$

3. The number of solutions of $3^{x+y} = 243$ and $243^{x-y} = 3$ is (1)
 (a) 0 (b) 1 (c) 2 (d) infinite

4. The values of x and y in the below rectangle are (1)



- (a) 4, 1 (b) 1, 4 (c) 8, 3 (d) 3, 8
5. If one of the zeroes of a Quadratic Polynomial $(k - 1)x^2 + kx + 1$ is -3 then the value of k is (1)

- (a) $\frac{4}{3}$ (b) $-\frac{4}{3}$
 (c) $\frac{2}{3}$ (d) $-\frac{2}{3}$

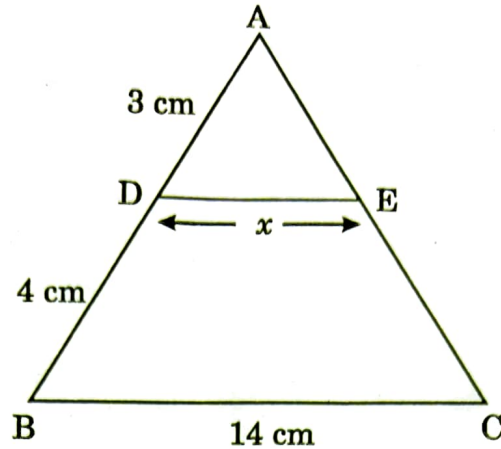
6. The product of two consecutive even Integers is 528. The Quadratic Equation for this statement is (1)

- (a) $x(x + 2) = 528$ (b) $2x(2x + 1) = 528$
 (c) $2x(x + 4) = 528$ (d) $2x(x + 1) = 528$

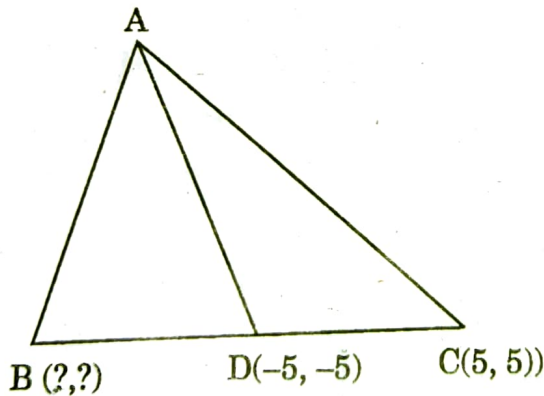
7. Find the ratio in which the line joining the points $(6, 4)$ and $(1, -7)$ divided by x -axis. (1)

- (a) 1:3 (b) 2:7
 (c) 4:7 (d) 1:6

8. In the given figure DE is parallel to BC, then the value of x is: (1)



- (a) 10 cm (b) 8 cm (c) 6 cm (d) 4 cm
9. The value of the given expression $(3 - \cot 30^\circ)(\sqrt{3} + 1) = 2A$, hence A can be replaced by (1)
- (a) $\cot 60^\circ$ (b) $\tan 60^\circ$ (c) $2 \tan 30^\circ$ (d) $2 \tan 60^\circ$
10. In the figure given below AD is the median of triangle ABC, find the coordinates of the point B. (1)



- (a) $(-13, -13)$ (b) $(-11, 10)$
- (c) $(-10, -10)$ (d) $(-15, -15)$
11. If $x \tan 45^\circ \sin 30^\circ = \cos 30^\circ \tan 30^\circ$ then x is equal to (1)
- (a) $\sqrt{3}$ (b) $\frac{1}{\sqrt{2}}$ (c) $\frac{1}{2}$ (d) 1

12. If $2 \tan^2 \beta + \sec^2 \beta = 2$, then β is

(a) 0° (b) 30° (c) 45° (d) 60°

13. If α and β are the zeros of the polynomial $x^2 - 4x + 1$, find the value of

$$\alpha + \frac{1}{\alpha}$$

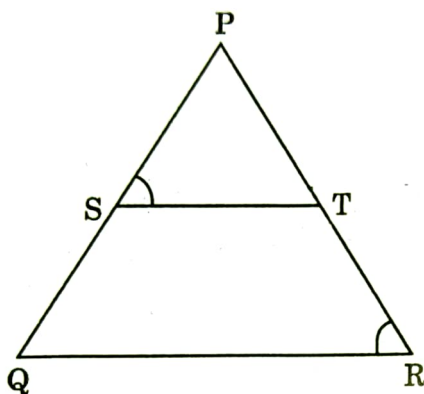
(a) 1

(b) -4

(c) 4

(d) -3

14. In the given figure, $\frac{PS}{SQ} = \frac{PT}{TR}$ and $\angle PST = \angle PRQ$, then ΔPQR is a/an: (1)



(a) Equilateral Triangle

(b) Isosceles Triangle

(c) Scalene Triangle

(d) Right Triangle

15. A box contains cards bearing numbers from 6 to 70. If one card is drawn at random from the box, the probability that it bears a composite number between 50 and 70

(a) $\frac{15}{65}$ (b) $\frac{11}{66}$ (c) $\frac{13}{64}$ (d) $\frac{12}{21}$

16. If a fair coin is tossed twice, the probability of getting 'atmost one head' (1)

(a) $\frac{3}{4}$ (b) $\frac{1}{4}$ (c) $\frac{3}{8}$ (d) $\frac{1}{2}$

17. A card is drawn from a deck of 52 cards. The event E is that card is not an ace of hearts. The number of outcomes favorable to E is (1)

(a) 4

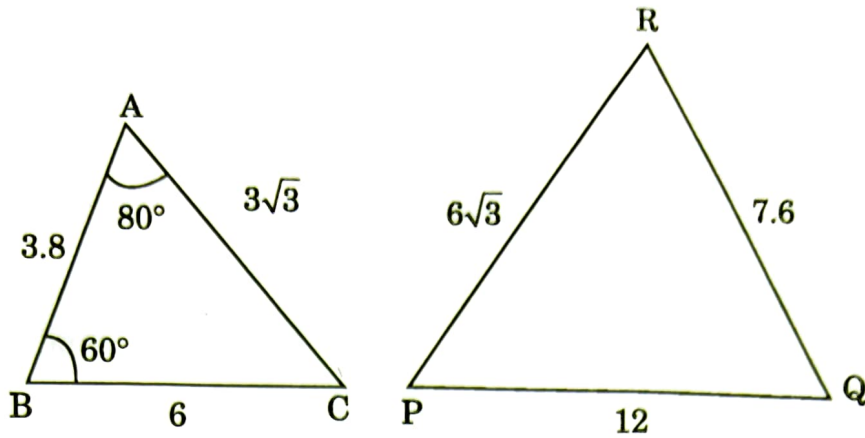
(b) 13

(c) 48

(d) 51

18. Observe the figure and find $\angle P$

(1)



- (a) 40° (b) 60° (c) 80° (d) 140°

DIRECTION: In question number 19 and 20, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct option

- (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
 (b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A).
 (c) Assertion (A) is true but reason (R) is false.
 (d) Assertion (A) is false but reason (R) is true.
19. Statement-A (Assertion): For two numbers x and y , if $xy = 1344$ and $\text{HCF}(x, y) = 8$ and $\text{LCM}(x, y) = 168$ (1)

Statement-R (Reason): LCM is a factor of HCF.

20. Statement-A (Assertion) : Radius of the circle whose endpoints of the diameter are $(-4, 1)$ and $(2, -3)$ is $\sqrt{13}$ (1)

Statement-R (Reason): Distance of the point P (x_1, y_1) and Q (x_2, y_2) is given

$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Section-B consists of 5 questions of 2 marks each.

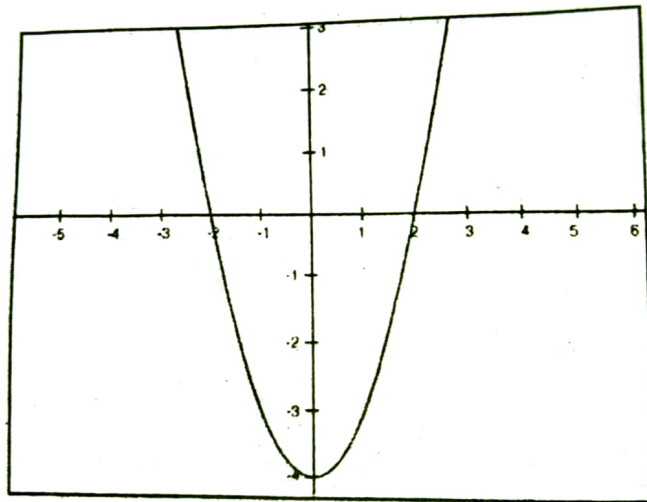
21. If $\sqrt{3}$ is given as an irrational number, then prove that $(\sqrt{3} - \frac{2}{3})$ is an irrational number. (2)

OR

Show that 12^n cannot end with the digit 0 or 5 for any natural number n .

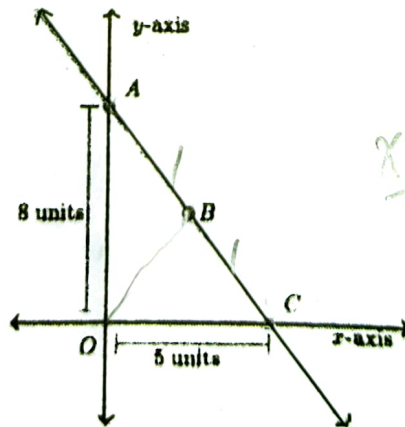
22. Two rails are running along the track whose the equations are $x + y - 14 = 0$ and $x - y = 4$. Will the rails cross each other? If yes, find the values of x and y . (2)
23. Write a quadratic equation from the given graph and hence verify the relation between the coefficients and the zeroes of the polynomial.

$(-2, 0)$
 $(2, 0)$



24. From the given figure, write

- (a) The coordinates of point A and point C.
(b) The coordinates of point B, if B is the midpoint of the line segment AC.



$\frac{x_2 + x_1}{2}$, $\frac{y_2 + y_1}{2}$

OR

The three vertices of a Rhombus PQRS are P (2, -3), Q (6, 5), R (-2, 1).

- (a) Find the coordinates of the point where both the diagonals PR and QS intersect. (2)
- (b) Find the coordinates of the fourth vertex. (2)

25. If $\cos (A + B) = \frac{1}{2}$, $\operatorname{cosec} (A - B) = 2$, $0^\circ < A + B \leq 90^\circ$; $A > B$, then find the values of A and B. (2)

Section-C consists of 6 questions of 3 marks each.

26. If the midpoint of the line segment joining the points A(3, 4) and B (k, 6) is P(x, y) and $x + y - 10 = 0$, find the value of k. (3)

27. If α, β are zeroes of quadratic polynomial $5x^2 + 5x + 1$, find the value of

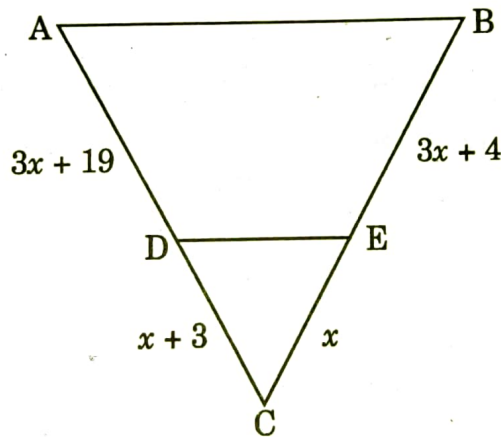
(a) $\alpha^2 + \beta^2$ (3)

(\alpha + \beta)^2 - 2\alpha\beta

(b) $\alpha^{-1} + \beta^{-1}$ (3)

-\frac{1}{\alpha} + \frac{1}{\beta} = \frac{\alpha + \beta}{\alpha\beta}

28. Find the value of x for which DE || AB in the given figure. (3)



29. Find all the possible value(s) of x for the following equation to be true: (3)

$$\sqrt{(15 - 2x)} - x = 0$$

\sqrt{15 - 2x} = x

30. PQRS is a trapezium in which PQ || SR and its diagonals intersect each other at the point O. Show that $\frac{PO}{RO} = \frac{QO}{SO}$ (3)

OR

If AD and PM are medians of triangles ABC and PQR, respectively where $ABC \sim PQR$, prove that $\frac{AB}{AD} = \frac{PQ}{PM}$

31. Had Nikky scored 10 more marks in her mathematics test out of 30 marks, 9 times these marks would have been the square of her actual marks. How many marks did she get in the test?

OR

Find the roots of the following Quadratic Equation $3x^2 + 5\sqrt{5}x - 10 = 0$

Section-D comprises of a long answer-type questions (LA) of 5 marks each)

32. 96 Books of English, 240 books of Hindi and 336 books of Mathematics have to be packed in bundles where each bundle must contain an equal number of books of one subject out of the three subjects.

(a) Find the maximum number of books in each bundle hence.

(b) Find the least number of bundles which can be made.

Handwritten calculations for HCF and LCM of 96, 240, 336:

96	240	336
2 96	2 240	2 336
3 48	3 120	3 168
4 16	4 40	4 42
4 4	4 10	4 10.5
4 1	4 2.5	4 2.625

LCM = $2^4 \times 3^2 \times 4^2 \times 7 = 1680$

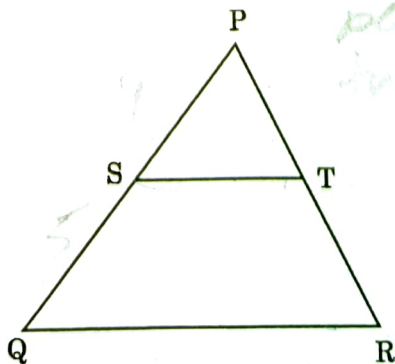
OR

On Diwali Anoop decorates his house with three types of lights. The three lights glow after an interval of 12, 18 and 20 seconds respectively. The lights start glowing together at the same time at 7:30 pm. Now

(a) Find the time after which the lights will glow together again.

(b) Find the greatest number of 6 digits exactly divisible by 12, 18 and 20.

33. (a) State and prove Basic Proportionality Theorem. *If a line draw || to one side of a Δ to intersect the other two sides in distinct points, the other two sides are divided in the same ratio.* (5)
- (b) In the following figure, $ST \parallel QR$, point S divides PQ in the ratio 4:5. If $PT = 1.6$ cm, what is the length of PR?



34. If $\operatorname{cosec} \theta + \cot \theta = P$, prove that $\cos \theta = \frac{P^2 - 1}{P^2 + 1}$. (5)

OR

Prove that $\frac{\sin \theta - \cos \theta + 1}{\sin \theta + \cos \theta - 1} = \frac{1}{\sec \theta - \tan \theta}$

$2x + y = 4$
 $\begin{array}{r|rr} x & 0 & 2 \\ \hline y & 4 & 0 \end{array}$

$2x - y = 4$
 $\begin{array}{r|rr} x & 0 & 2 \\ \hline y & -4 & 0 \end{array}$

35. Draw the graph of the pair of equations $2x + y = 4$ and $2x - y = 4$. Write the vertices of the triangle formed by these lines and the y -axis. Also find the area of this triangle formed. (5)

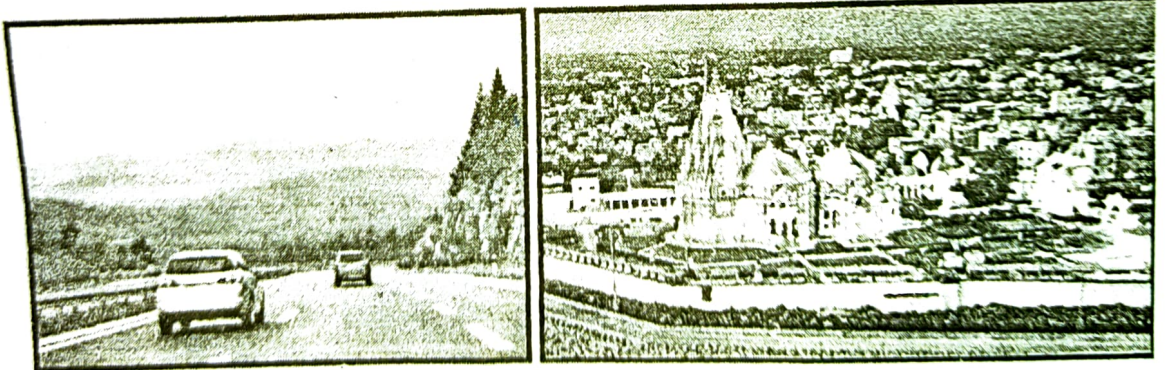
OR

Show the graphical representation of the lines $x = 3$, $y = 4$ and $x = y$ on the graph paper and find the area formed by these lines.

SECTION-E

(This section comprises of 3 case-study/passage-based questions of 4 marks each)

36. Vashita and Bhavika are very close friends. Vashita's parents owns a WRV. Bhavika's parents own a Skoda Slavia. Both the families decide to go for a picnic to Somnath temple in Gujarat by their own cars.



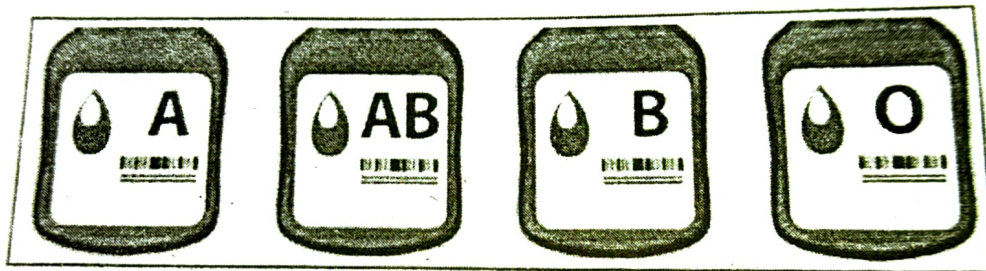
Vashita's car travels x km/h while Bhavika's car travels 5 km/h more than Vashita's car. Vashita's car took 4 hours more than Bhavika's car in covering 400 km. (2)

- (a) Write the quadratic Equation that describes the speed of Vashita's car?
 (b) What is the speed of Vashita's car?

OR

- (b) How much time did Bhavika take to travel 400 km? (1)
 (c) What will be the distance covered by Bhavika's car in two hours? (1)

37. **Blood Group:** Blood type and blood group are medical terms used to classify the type of blood a person has. This classification is based on the presence or absence of specific inherited antigens on the surface of red blood cells. Understanding blood types is crucial as they determine the likelihood of serious reactions during a blood transfusion.



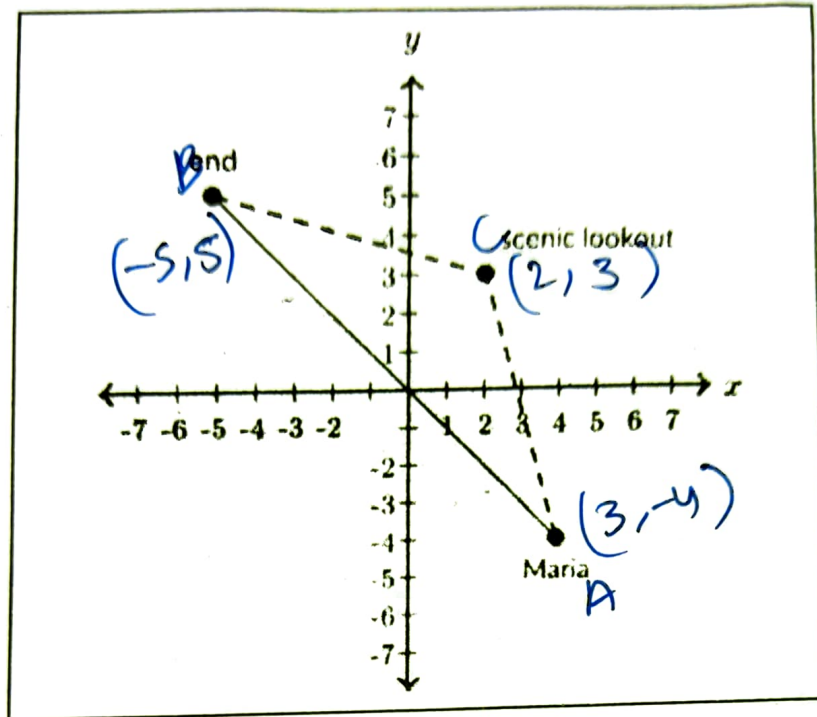
In a sample of 100 people, 51 had type A blood, 20 had type O blood and 13 had type B blood and 16 had type AB blood. Set up a frequency distribution and find the following probabilities:

- (a) What is the probability that a person has type O blood? (1)
 (b) What is the probability that a person has type A or type B blood? (2)
 (c) What is the probability that a person has neither type A nor type O blood? (1)

OR

- (c) What is the probability that a person does not have type AB blood? (1)

38. Maria is on a hike. If she hikes to the scenic lookout on the following map first, she will have to cover more distance than if she went straight to the end of the hike. Coordinate values on the map are in kilometers.



Based on the above information, answer the following questions:

- Find the coordinates of the point which divides the line segment joining the points Maria and end in the ratio 1:2. (1)
- What type of triangle is formed in the given graph? Justify. (2)
- Find the coordinates of the midpoint of the path from maria to the end? (1)

OR

- Find the coordinates of the centroid of the triangle formed.

□□□