

General Instructions:

Read the following instructions carefully and strictly follow them.

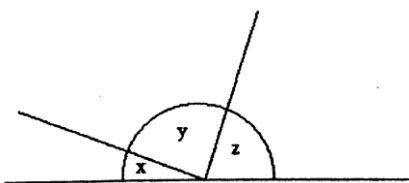
1. This question paper contains 38 questions. All questions are compulsory.
2. This question paper is divided into five sections – A, B, C, D and E.
3. In Section – A, question numbers 1 to 18 are multiple choice questions (MCQs) and question numbers 19 and 20 are Assertion – Reason based questions of 1 mark each.
4. In Section – B, question numbers 21 to 25 are very short answer (VSA) type of questions, carrying 2 marks each.
5. In Section – C, question numbers 26 to 31 are short answer (SA) type questions, carrying 3 marks each.
6. In Section – D, question numbers 32 to 35 are long answer (LA) type questions, carrying 5 marks each.
7. In Section – E, question numbers 36 to 38 are case study based questions carrying 4 marks each with sub – parts of values 1, 1 and 2 respectively.
8. There is no overall choice.
9. Draw neat figures wherever required. Take $\pi = \frac{22}{7}$ wherever required if not stated.
10. Use of calculator is not allowed.

Section – A

This section comprises of multiple-choice questions (MCQs) of 1 mark each.

1. Simplest rationalising factor for $\sqrt{50}$ is:
a. $\sqrt{2}$ b. $5\sqrt{2}$ c. $\sqrt{50}$ d. $\sqrt{5}$
2. The value of $\sqrt[4]{(64)^{-2}}$ is:
a. $\frac{1}{8}$ b. $\frac{1}{2}$ c. 8 d. $\frac{1}{64}$
3. The quotient obtained when $\sqrt{3000}$ is divided by $5\sqrt{30}$ is:
a. 5 b. 10 c. 20 d. 2
4. If $x^2 + kx + 5 = (x - 1)(x - 5)$, then the value of k is:
a. 5 b. 1 c. -6 d. none of these

5. If $x + y + 2 = 0$, then $x^3 + y^3 + 8$ is equal to:
 a. $-6xy$ b. $6xy$ c. $(x + y + 2)^3$ d. 0
6. If $(x + y)^3 - (x - y)^3 - 6y(x^2 - y^2) = ky^3$, then $k =$
 a. 1 b. 2 c. 4 d. 8
7. P is a point on the $x - axis$ at a distance of 8 units from the $y - axis$ to its right. The co - ordinates of P are:
 a. $(0, 8)$ b. $(8, 0)$ c. $(-8, 0)$ d. $(0, -8)$
8. If the co - ordinates of two points are $P(-2, 3)$ and $Q(-3, 5)$, then (abscissa of P) - (abscissa of Q) is:
 a. -5 b. 1 c. -1 d. -2
9. The co - ordinates of two points A and B are $(4, 3)$ and $(4, -5)$ respectively. The co - ordinates of the point at which the line segment AB meets the $x - axis$ are:
 a. $(0, 4)$ b. $(4, 0)$ c. $(3, 0)$ d. $(5, 0)$
10. If x years represents the present age of father and y years represents the present age of son, then the statement "present age of father is 5 years more than 4 times the age of son" in mathematical form is:
 a. $4x + y + 5 = 0$
 b. $x - 4y = 5$
 c. $y - 4x = 5$
 d. $x - y = 20$
11. The equation of $x - axis$ is of the form
 a. $x = 0$ b. $y = 0$ c. $x + y = 0$ d. $x = y$
12. Geometry comes from Greek words 'geo' and 'metrein' means
 a. globe and meter
 b. go and measure
 c. earth and measure
 d. geography and measure
13. How many propositions were proved by Euclid, in a logical chain using his axioms, postulates, definitions and theorems proved earlier in the chain?
 a. 465 b. 365 c. 315 d. 427
14. In Indus Valley Civilization (about 300 B.C.), the bricks used for construction work were having dimensions in the ratio
 a. $1 : 3 : 4$ b. $4 : 2 : 1$ c. $4 : 4 : 1$ d. $4 : 3 : 2$
15. In the given figure, if $\frac{y}{x} = 5$ and $\frac{z}{x} = 4$, then the value of x is:



- a. 8° b. 18° c. 12° d. 15°
16. Two complementary angles are such that two times the measure of one is equal to three times the measure of the other. The measure of the smaller angle is:
- a. 45° b. 30° c. 36° d. none of these
17. Which one is denoted as area of an isosceles triangle with equal sides b and base a ?
- a. $\frac{a}{2}\sqrt{b^2 - a^2}$
 b. $\frac{a}{2}\sqrt{4b^2 - a^2}$
 c. $\frac{a}{4}\sqrt{b^2 - a^2}$
 d. $\frac{a}{4}\sqrt{4b^2 - a^2}$
18. ABC is an equilateral triangle with side a . Its altitude will be
- a. $\frac{\sqrt{3}}{4}a^2$ b. $\frac{\sqrt{3}}{4}a$ c. $\frac{\sqrt{3}}{2}a^2$ d. $\frac{\sqrt{3}}{2}a$

Directions: In question numbers 19 and 20, a statement of assertion (A) is followed by a statement of reason (R). Choose the correct option.

19. Statement A (Assertion): Through two distinct points there can be only one line that can be drawn.
 Statement B (Reason): From this point we can draw only one line.
- 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.
20. Statement A (Assertion) : The graph of $y = b$ is always parallel to $x - axis$.
 Statement B (Reason): The graph of $y = 6$ is a line that passes through the origin.
- 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.

Section – B

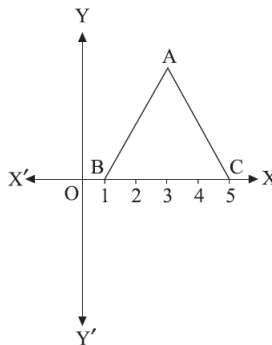
This section comprises of very short answer type questions (VSA) of 2 marks each.

21. Simplify $\frac{b^2}{\sqrt{a^2+b^2+a}}$
22. Factorise $(x + 2)(x^2 + 25) - 10x^2 - 20x$
23. Factorise $x^2 + 2\sqrt{3}x - 24$
24. In the ordered pair $(a, -12)$, if the ordinate is 4 times the abscissa, then what is the missing number a ?
25. Prove that the bisectors of the angles forming a linear pair, include a right angle.

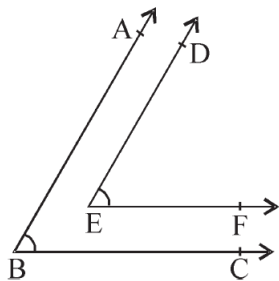
Section – C

This section comprises of short answer type questions (SA) of 3 marks each.

26. If $x = 3 + 2\sqrt{2}$, then find the value of $\sqrt{x} - \frac{1}{\sqrt{x}}$.
27. Factorise $7(x - 2y)^2 - 25(x - 2y) + 12$
28. In the given figure, ΔABC is an equilateral triangle with co – ordinates of B and C as $(1, 0)$ and $(5, 0)$ respectively. Find the co - ordinates of the vertex A.



29. Find three solutions of the equations $2(x + 3) - 3(y - 1) = 0$.
30. In the given figure, $BA \parallel ED$ and $BC \parallel EF$. Show that $\angle ABC = \angle DEF$.



31. The measure of one side of a right triangular field is 4.2 m. If the difference of the lengths of hypotenuse and the other is 14 m, find the sides of the triangle and its area.

Section – D

This section comprises of long answer type questions (LA) of 5 marks each.

32. If $x = 1 + 2^{\frac{1}{3}} + 2^{\frac{2}{3}}$, show that $x^3 - 3x^2 - 3x - 1 = 0$.

33. Factorise $(x^2 + \frac{1}{x^2}) - 4(x + \frac{1}{x}) + 6$.

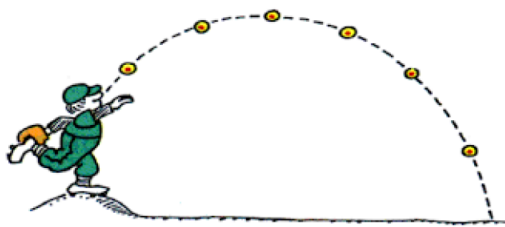
34. If the arms of one angle are parallel respectively to the arms of another angle, then show that the two angles are either equal or supplementary.

35. Find the percentage increase in the area of a triangle, if its sides are doubled.

Section – E

This section comprises of 3 case study-based questions of 4 marks each.

36. An object which is thrown or projected into the air, subject to only the acceleration of gravity is called a projectile and its path is called its trajectory. The curve is called parabola. The parabola is represented by a polynomial. If the polynomial to represent the distance covered is $p(t) = -5t^2 + 40t + 1$, answer the following questions:



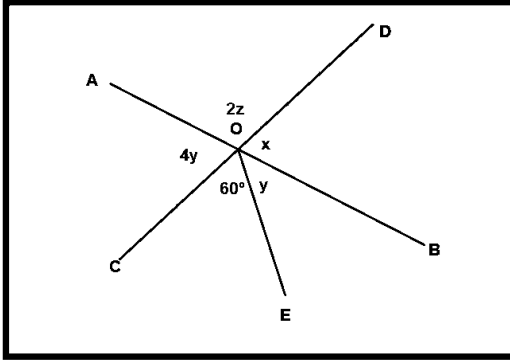
- (i) What is the value of $p(4)$?
- (ii) Write the general form of a quadratic polynomial.
- (iii) If the parabola is given by $x^2 - 5x + 6$, find the factors.

37. On his birthday, Manoj planned that this time he celebrates his birthday in a small orphanage centre. He bought apples to give to the children and adults working there. Manoj donated 2 apples to each child and 3 apples to each adult working there along with the birthday cake. He distributed 60 apples in all.



- (i) Find the value of b , if $x = 5$ and $y = 0$ is a solution of the equation $3x + 5y = b$.
- (ii) Write $y - x = 5$ in the standard form.
- (iii) If the above situation is represented by the equation $2x + 3y = 60$, where x is the number of children and y is the number of adults, find the number of children if the number of adults is 12.

38. A mathematics teacher draws a straight line AB as shown on the blackboard as per the following figure.



Now he told Raju to draw another line CD as shown in the figure. The teacher told Ajay to mark $\angle AOD$ as $2z$. Suraj was told to mark $\angle AOC$ as $4y$. Clive made an angle $\angle COE = 60^\circ$. Peter marked $\angle BOE$ and $\angle BOD$ as y and x respectively.

Answer the following questions based on the information given:

- (i) What is the value of x ?
- (ii) What is the value of y ?
- (iii) What is the value of z ?