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**General Instructions:**

1. This question paper has 5 sections A to E.
2. **Section A** has 20 questions carrying 1 mark each.
3. **Section B** has 5 questions carrying 2 marks each.
4. **Section C** has 6 questions carrying 3 marks each.
5. **Section D** has 4 questions carrying 5 marks each.
6. **Section E** has 3 case based integrated units of assessment (4 marks each) with sub – parts of the values of 1, 1 and 2 marks each respectively.
7. All questions are compulsory. However, an internal choice in 2 questions of 5 marks, 2 questions of 3 marks and 2 questions of 2 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E.
8. Draw neat figures wherever required. Take $\pi = \frac{22}{7}$ wherever required if not stated.

Section A

Section A consists of 20 questions of 1 mark each.

1. Is $\left(\sqrt{2} - \frac{1}{\sqrt{2}}\right)^2$ rational? Justify.
2. Write an irrational number between 2.11 and 2.13
3. What is the value of x if $(2)^{x+4} \cdot (3)^{x+1} = 288$.
4. Find the point whose ordinate is (-5) and which lies on the $y - axis$.
5. What is the perpendicular distance of the point $P(4, 3)$ from the $x - axis$?
6. Find the coordinates of a point which is a reflection of $(3, -5)$ in the $y - axis$.
7. An angle is eight times its complement. Find the angle.
8. In the given figure, twice of x is $30°$ less than y. Find the value of x.
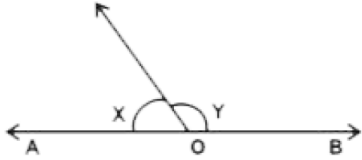
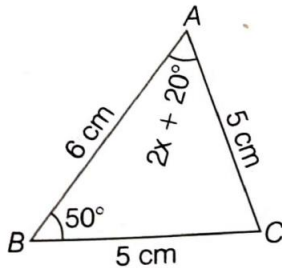9. In the given figure, AB || CD. What is the value of x?
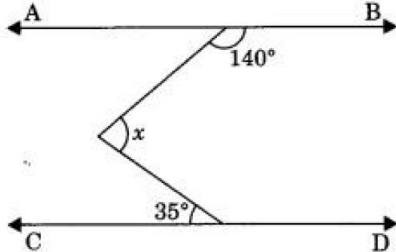
10. If the sides of a triangle are $x, x + 1, 2x - 1$ and its semi – perimeter is 14 cm, then find the value of x.

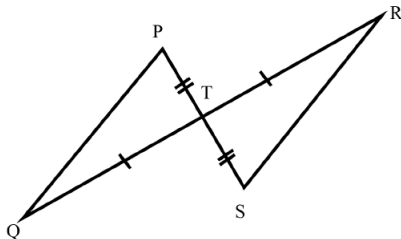11. An isosceles right triangle has area 8 cm². What is the length of its hypotenuse?

12. It is given that $\Delta ABC \cong \Delta FDE$ and AB = 5 cm, $\angle B = 40°, \angle A = 80°$. What is the measure of $\angle E$?
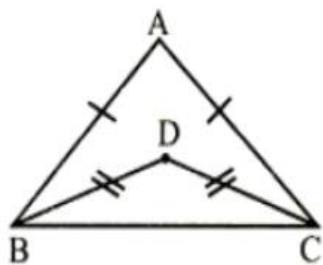
13. In the given figure, find the value of x.

14. The area of an equilateral triangle is $16\sqrt{3} \; m^2$. What is the perimeter of the triangle?

15. For the given triangles, write the corresponding parts, if they are congruent.

16. The perimeter of a triangle is 30 cm. Its sides are in the ratio 1 : 3 : 2. Find the smallest side.

17. In the given figure, what is the ratio of $\angle ABD$ and $\angle ACD$?

18. A is the same age as B. C is also the same age as B. State Euclid's axiom that illustrates the relative ages of A and C.

Directions: In question number 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R).

Choose the correct option:

19. Assertion (A): $\left(2 + \sqrt{6}\right)$ is an irrational number.

Reason (R): Sum of a rational number and an irrational number is always an irrational number.

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 but 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. Assertion (A): The bisectors of the angles of a linear pair are right angles.
Reason (R): If the sum of two adjacent angles is 180°, then the non – common arms of the angles are in a straight 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 but 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
Section B consists of 5 questions of 2 marks each.

21. Express 1.4191919…. in the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$.

22. Simplify: $8\sqrt{242} - 5\sqrt{50} + 3\sqrt{98}$

23. Find the perimeter of an isosceles right angled triangle having an area of $5000 \ m^2$. $\left(Use \ \sqrt{2} = 1.41\right)$

OR

Find the area of an isosceles triangle whose one side is 10 cm greater than each of its equal sides and perimeter is 100 cm.
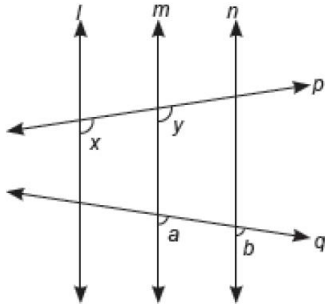
24. In the given figure, AB = BC, M is the mid – point of AB and N is the mid – point of BC. Show that AM = NC using Euclid's axiom.
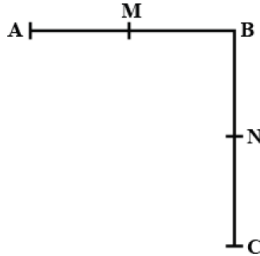
OR

Two salesman make equal sales during the month of August. In September, each salesman doubles his sales for the month of August. Compare their sales in September. Solve using Euclid's axiom.

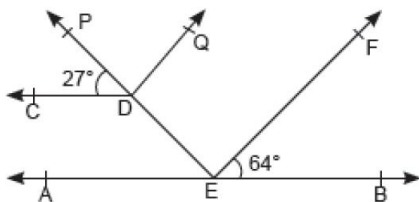25. In the given figure, if $a = b$ and $x = y$, prove that $l \parallel n$.

Section C

Section C consists of 6 questions of 3 marks each.

26. If $a = 5 + 2\sqrt{6}$ and $b = \frac{1}{a}$, then find the value of $a^2 + b^2$.

27. In the given figure, EF || DQ and AB || CD. If $\angle FEB = 64°, \angle PDC = 27°$, then find the value of $\angle PDQ, \angle AED$ and $\angle DEF$.

28. Write the coordinates of the following points:
(i) lying on neither axes, to the right of origin above $x-axis$ at a distance of 3 units from the $x-axis$ and 5 units from the $y-axis$.
(ii) lying on $y-axis$, at a distance of 3 units from the origin, below $x-axis$.
(iii) where both coordinate axes meet.

OR

Plot the points $P(1, 0), Q(4, 0)$ and $S(1, 3)$. Find the coordinates of the point R such that PQRS is a square.

29. In the given figure, AB and CD are two parallel lines intersected by a transversal EF. Bisector of interior angles BPQ and DQP intersect at R. Prove that $\angle PRQ = 90°$.
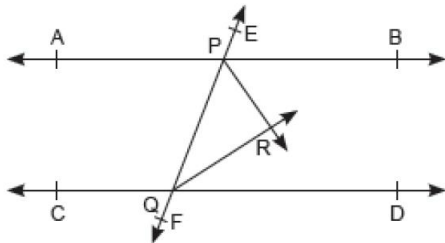
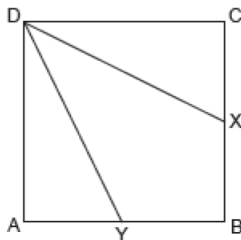**OR**

In the given figure, bisectors GM and HL of alternate angles AGH and DHG respectively are parallel to each other. Prove that AB ∥ CD.
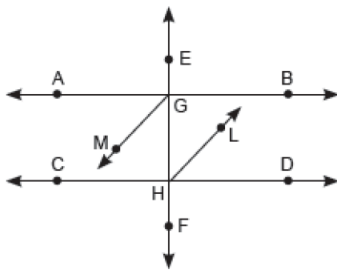
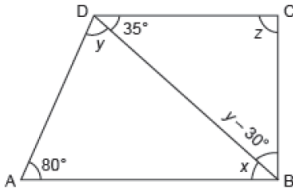30. ABCD is a square and BX = BY. Prove that:
(i) $\Delta DCX \cong \Delta DAY$
(ii) $\angle DXC = \angle DYA$

31. In the given figure, AB ∥ DC, $\angle BDC = 35°$ and $\angle BAD = 80°$. Find the value of x, y, z.

Section D

Section D consists of 4 questions of 5 marks each.

32. If $p = \dfrac{\sqrt{3} - \sqrt{2}}{\sqrt{3} + \sqrt{2}}$ and $q = \dfrac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}}$, then find the value of $p^2 + q^2$.
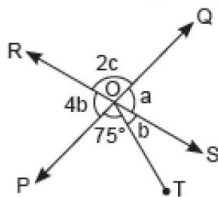
OR

If x is a positive real number and the exponents are rational numbers, then simplify: $\left(\dfrac{x^b}{x^c}\right)^{b+c-a} \times \left(\dfrac{x^c}{x^a}\right)^{c+a-b} \times \left(\dfrac{x^a}{x^b}\right)^{a+b-c}$

33. (i) If two lines intersect each other, then show that the vertically opposite angles are equal.

(ii) In the given figure, two straight lines PQ and RS intersect each other at O. If $\angle POT = 75°$, find the value of a, b and c.   (2 + 3)

34. A gardener has to put a double fence all around a triangular field with sides 120 m, 80 m and 60 m. In the middle of each of the sides, there is a gate of width 10 m.

(i)   Find the length of wire needed for fencing.

(ii)   Find the cost of fencing at the rate of ₹ 6 per metre.

(iii)   Find the area of the triangular field.

35. AB is a line segment C and D are points on opposite sides of AB such that each of them is equidistant from the point A and B as shown in the figure. Show that the line CD is the perpendicular bisector of AB.

OR
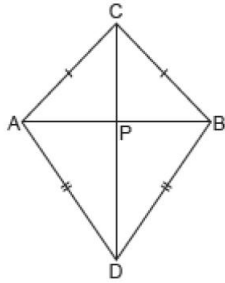
In ΔABC, E and D are two points on BC such that CE = DB and $\angle AEC = \angle ADB$. Prove that:

(i) ΔAED is an isosceles triangle.

(ii) $\Delta CAD \cong \Delta BAE$.

Section E
Case study bases questions are compulsory.

36. A villager has a field in the form of a quadrilateral with sides 6 m, 10 m and 5 m. He divided the land into two parts along one of its diagonals as shown in the figure. He gives part I to his son, while part II is equally divided amongst his two daughters. He wants his children to work together on the land and produce different crops.
   Based on the information given, answer the following questions:
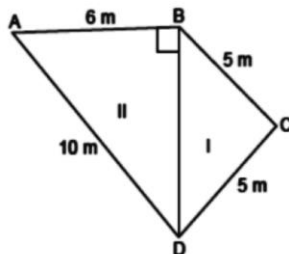
(i) What is the length of BD?

(ii) What is the area of the part given to both the daughters?

(iii) What is the share of the son?

   OR

   What is the total area of the land owned by the villager?

37. To introduce the concept of Coordinate Geometry, a board game was designed where each student moved the specific counter to the position given by the teacher in terms of x and y coordinate. The counters marked as A, B, C, D, E, F, G and H are positioned as shown in the figure at a particular time. Based on the given figure, answer the following questions:
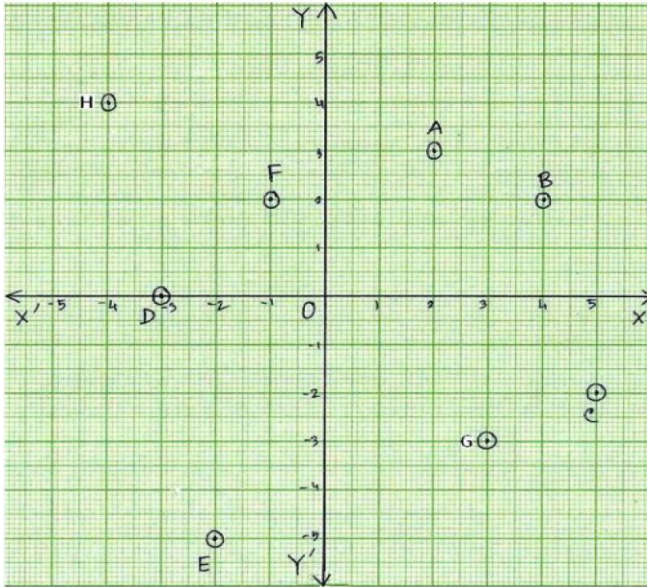
(i) What is the distance between points B and F?

(ii) What are the coordinates of a point which is a reflection of point G on the $x - axis$?

(iii) What is the area of the triangle formed by joining points F, B and A?

OR

What is the difference between the abscissa of point C and the ordinate of point H?

38. In a forest a big tree broke down due to heavy rain and wind. As a result, the big branches AB and AC with length 5 m fell down on the ground. Branch AC makes an angle of 30° with the main tree AP. The distance of point B from P is 4 metre .
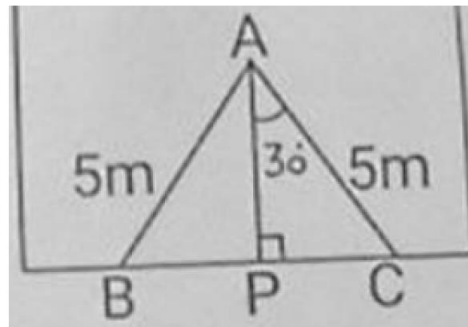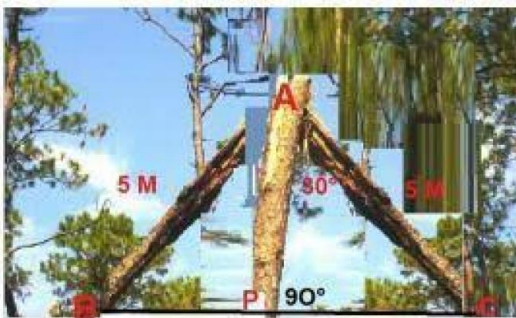
(i) Show that $\Delta ABP \cong \Delta ACP$.

(ii) Find the value of $\angle BAP$.

(iii) Find the value of $\angle ACP$.

OR

What is the total height of the tree?