BASIC MATHEMTICS

Sample Question Paper

3

Section 'A'

Question numbers 1 to 10 carry 1 mark each

1. For some integer q, every odd integer is of the form :
   (a) q
   (b) $q + 1$
   (c) $2q$
   (d) $2q + 1$ 1

2. The pair of equations $y = 0$ and $y = -7$ has :
   (a) one solution
   (b) two solutions
   (c) infinitely many solutions
   (d) no solution   1

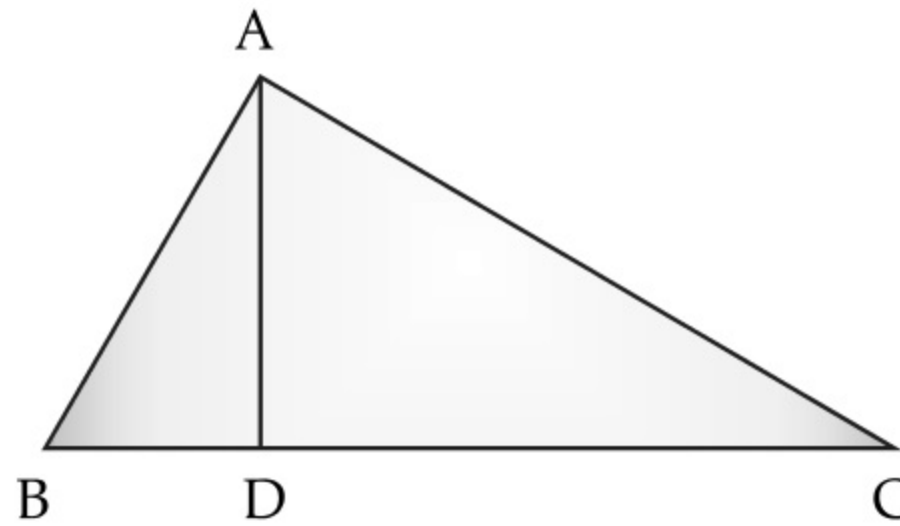3. Which of the following equations has 2 as a root?
   (a) $x^2 - 4x + 5 = 0$
   (b) $x^2 + 3x - 12 = 0$
   (c) $2x^2 - 7x + 6 = 0$
   (d) $3x^2 - 6x - 2 = 0$ 1

   OR

   The sum of first five multiples of 3 is :
   (a) 45
   (b) 55
   (c) 65
   (d) 75   1

4. The distance of the point $P(-6, 8)$ from the origin is :
   (a) 8
   (b) $2\sqrt{7}$
   (c) 10
   (d) 6   1

5. In the figure given below, $\angle BAC = 90°$ and $AD \perp BC$. Then :
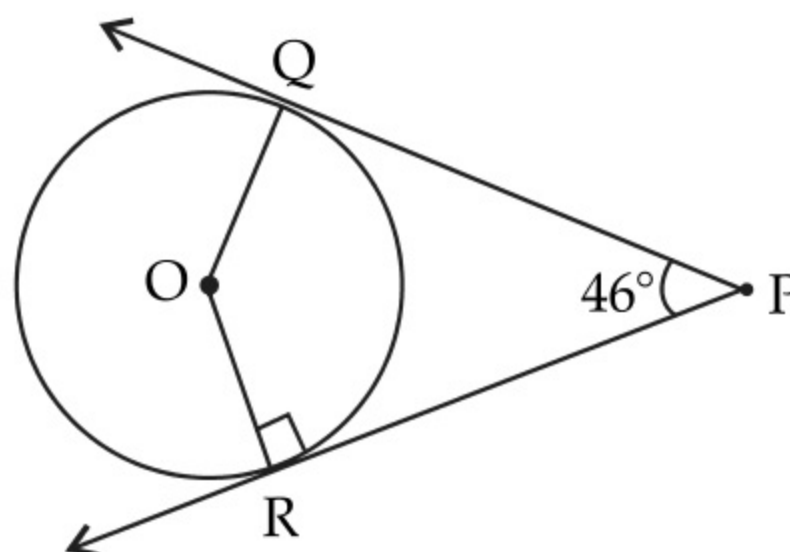

   (a) $BD \times CD = BC^2$
   (b) $AB \times AC = BC^2$
   (c) $BD \times CD = AD^2$
   (d) $AB \times AC = AD^2$ 1

6. If the radii of two concentric circles are 4 cm and 5 cm, then the length of each chord of one circle which is the tangent to the other circle is :
   (a) 3 cm
   (b) 6 cm
   (c) 9 cm
   (d) 1 cm   1

   OR

   AI In figure PQ and PR are two tangents to a circle with centre O. If $\angle QPR = 46°$, then $\angle QOR$ equals :

   (a) 67°
   (b) 134°
   (c) 44°
   (d) 46°

7. If $\triangle ABC$ is right angled at C, then the value of $\cos(A+B)$ is :

    (a) 0   **(b)** 1

    (c) $\dfrac{1}{2}$ **(d)** $\dfrac{\sqrt{3}}{2}$ **1**

8. If the sum of the circumferences of two circles with radii R_1 and R_2 is equal to the circumference of a circle of radius R, then :

    (a) $R_1 + R_2 = R$

    (b) $R_1 + R_2 > R$

    (c) $R_1 + R_2 < R$

    (d) Nothing definite can be said about the relation among R_1, R_2 and R **1**

9. A cylindrical pencil sharpened at one edge is the combination of :

    (a) a cone and a cylinder   **(b)** frustum of a cone and a cylinder

    (c) a hemisphere and a cylinder   **(d)** two cylinders   **1**

10. The probability that a non-leap year selected at random will contain 53 Sundays is :

    (a) $\dfrac{1}{7}$ **(b)** $\dfrac{2}{7}$

    (c) $\dfrac{3}{7}$ **(d)** $\dfrac{5}{7}$ **1**

Question numbers 11 to 20 carry 1 mark each

11. If E be an event such that $P(E) = \dfrac{3}{7}$, what is $P(\text{not } E)$ equal to ?   **1**

12. What is the frustum of a right circular cone of height 16 cm with radii of its circular ends as 8 cm and 20 cm has slant height equal to ?   **1**

13. What is the perimeter of the sector with radius 10.5 cm and sector angle 60° ?   **1**

<div align="center">OR</div>

If the length of the ladder placed against a wall is twice the distance between the foot of the ladder and the wall. Find the angle made by the ladder with the horizontal.

14. In given figure, if AT is a tangent to the circle with centre O, such that $OT = 4$ cm and $\angle OTA = 30°$, then find the length of AT (in cm).   **1**
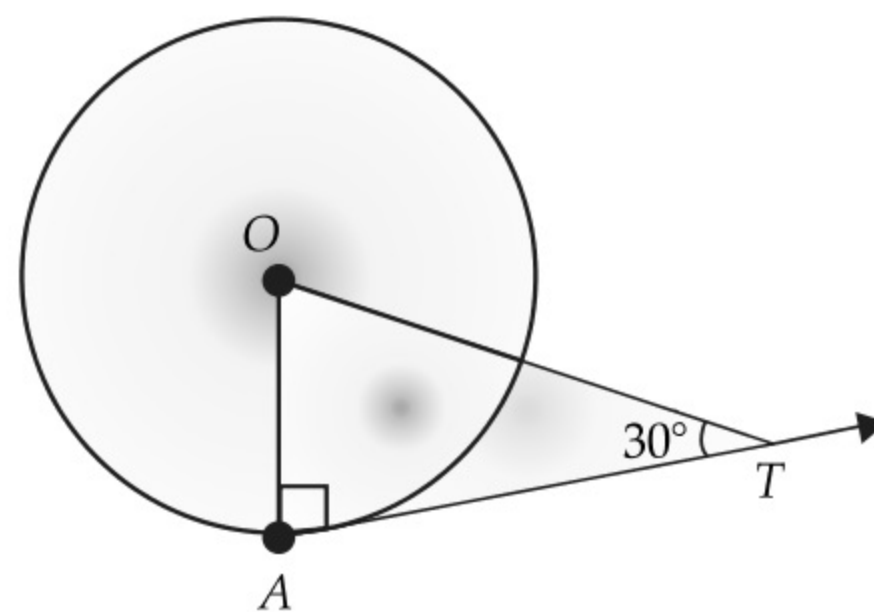
15. If ratio of corresponding sides of two similar triangles is 5 : 6, then find ratio of their areas.   **1**

16. Find the area of the triangle with vertices $(0, 0)$ $(6, 0)$ and $(0, 5)$ **1**

17. What is the sum of first five positive integers divisible by 6.   **1**

18. Find the positive root of $\sqrt{3x^2 + 6} = 9$.   **1**

19. If one root of $5x^2 + 13x + k = 0$ is the reciprocal of the other root, then find value of k.   **1**

20. For some integer q, every odd integer is of the form :

    (a) q **(b)** $q + 1$

    (c) $2q$ **(d)** $2q + 1$ **1**

Section 'B'

Question numbers 21 to 26 carry 2 marks each

21. Using Euclid's algorithm, find the *HCF* of 240 and 228. **2**

AI 22. Find the zeroes of the quadratic polynomial $\sqrt{3}\,x^2 - 8x + 4\sqrt{3}$. **2**

OR

From the top of light house, 40 m above the water, the angle of depression of a small boat is 60°. Find how far the boat is from the base of the light house.

23. Find the mid-point of side *BC* of $\triangle ABC$, with $A(1, -4)$ and the mid-points of the sides through A being $(2, -1)$ and $(0, -1)$. **2**

24. In the given figure *PQ* is chord of length 6 cm of the circle of radius 6 cm. *TP* and *TQ* are tangents to the circle at points *P* and *Q* respectively. Find $\angle PTQ$.

2
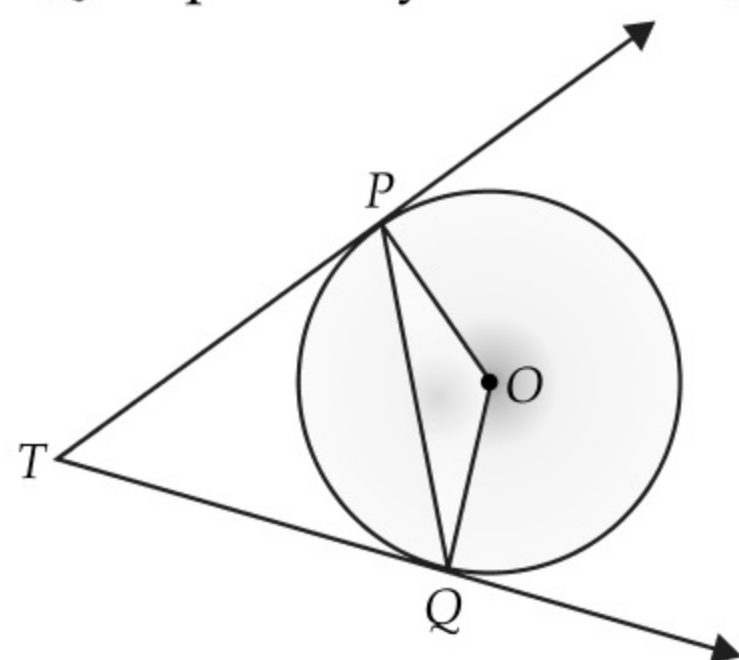
25. If $\tan(A + B) = \sqrt{3}$, $\tan(A - B) = \dfrac{1}{\sqrt{3}}$, $0° < A + B \leq 90°$, $A > B$, then find *A* and *B*. **2**

OR

Find the number of plates. 1.5 cm in diameter and 0.2 cm thick, that can be fitted completely inside a right circular cylinder of height 10 cm and diameter 4.5 cm.

26. Find the arithmetic mean of the following frequency distribution :

x_i	3	4	5	7	10
f_i	3	4	8	5	10

2

Section 'C'

Question numbers 27 to 34 carry 3 marks each

27. Three different coins are tossed together. Find the probability of getting

(i) exactly two heads.

(ii) at least two heads

(iii) at least two tails. **3**

28. A vessel is in the form of a hemispherical bowl surmounted by a hollow cylinder of same diameter. The diameter of the hemispherical bowl is 14 cm and the total height of the vessel is 13 cm. Find the total surface area of the vessel. $\left[\text{Use } \pi = \dfrac{22}{7}\right]$ **3**

OR

In the given figure, *AOB* is a sector of angle 60° of a circle with centre *O* and radius 17 cm. If $AP \perp OB$ and $AP = 15$ cm, find the area of the shaded region.
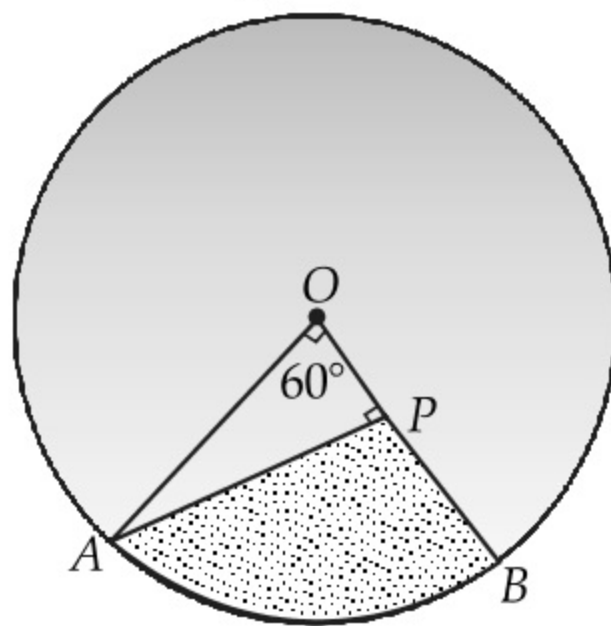
29. Prove that : $\dfrac{\sin\theta - \cos\theta}{\sin\theta + \cos\theta} + \dfrac{\sin\theta + \cos\theta}{\sin\theta - \cos\theta} = \dfrac{2}{2\sin^2\theta - 1}$.　　**3**

30. Prove that the parallelogram circumscribing a circle is a rhombus.　　**3**

OR

Determine the values of *m* and *n* so that the following system of linear equations have infinite number of solutions :

$$(2m - 1)x + 3y - 5 = 0$$
$$\text{and } 3x + (n - 1)y - 2 = 0$$

31. If $\triangle ABC \sim \triangle PQR$ and *AD* and *PS* are bisectors of corresponding angles *A* and *P*, then prove that

$$\dfrac{ar\ (\triangle ABC)}{ar\ (\triangle PQR)} = \dfrac{AD^2}{PS^2}.$$　　**3**

OR

If *A*(– 5, 7), *B*(– 4, – 5), *C*(– 1, – 6) and *D*(4, 5) are the vertices of a quadrilateral, find the area of the quadrilateral *ABCD*.

32. The sum of first 7 terms of an A.P. is 63 and sum of its next 7 terms is 161. Find 28$^{\text{th}}$ term of A.P.　　**3**

33. Find that non-zero value of *k*, for which the quadratic equation $kx^2 + 1 - 2(k - 1)x + x^2 = 0$ has equal roots.　　**3**

AI 34. Prove that $3 + \sqrt{5}$ is an irrational number.　　**3**

Section 'D'

Question numbers 35 to 40 carry 4 marks each

35. Solve the following pair of linear equations graphically :

$$x + 3y = 6 \text{ and } 2x - 3y = 12.$$

Also, shade the region bounded by the line $2x - 3y = 12$ and both the co-ordinate axes.　　**4**
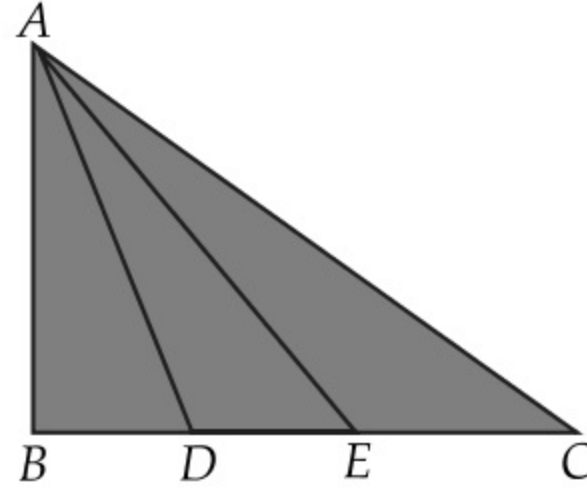
OR

The denominator of a fraction is one more than twice its numerator. If the sum of the fraction and its reciprocal is $2\dfrac{16}{21}$, find the fraction.

36. If $1 + 4 + 7 + 10 \dots + x = 287$, find the value of *x*.　　**4**

37. If the co-ordinates of two points are $A(3, 4)$, $B(5, -2)$ and a point $P(x, 5)$ is such that $PA = PB$, then find the area of ΔPAB. **4**

<div align="center">OR</div>

In the given figure, D and E trisect BC. Prove that $8AE^2 = 3AC^2 + 5AD^2$.

38. In figure, PQ is a chord of length 16 cm, of a circle of radius 10 cm. The tangents at P and Q intersect at a point T. Find the length of TP. **4**

<div align="center">OR</div>

Draw triangle ABC such that $BC = 5$ cm, $\angle ABC = 60°$, $\angle ACB = 30°$. Now construct $\Delta A'BC'$ corresponds to ΔABC with $A'B : AB = 3 : 2$.

39. A moving boat observed from the top of a 150 m high cliff, moving away from the cliff. The angle of depression of the boat changes from $60°$ to $45°$ in 2 minutes. Find the speed of the boat. **4**

40. The radii of circular ends of a bucket of height 24 cm are 15 cm and 5 cm. Find the area of its curved surface. **4**

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