



SAMPLE PAPER 2 2024-25 BASIC

Class 10 - Mathematics

Time Allowed: 3 hours

Maximum Marks: 80

General Instructions:

Read the following instructions carefully and follow them:

1. This question paper contains 38 questions.
2. This Question Paper is divided into 5 Sections A, B, C, D and E.
3. In Section A, Questions no. 1-18 are multiple choice questions (MCQs) and questions no. 19 and 20 are Assertion-Reason based questions of 1 mark each.
4. In Section B, Questions no. 21-25 are very short answer (VSA) type questions, carrying 02 marks each.
5. In Section C, Questions no. 26-31 are short answer (SA) type questions, carrying 03 marks each.
6. In Section D, Questions no. 32-35 are long answer (LA) type questions, carrying 05 marks each.
7. In Section E, Questions no. 36-38 are case study-based questions carrying 4 marks each with sub-parts of the values of 1,1 and 2 marks each respectively.
8. All Questions are compulsory. However, an internal choice in 2 Questions of Section B, 2 Questions of Section C and 2 Questions of Section D has been provided. An internal choice has been provided in all the 2 marks questions of Section E.
9. Draw neat and clean figures wherever required.
10. Take $\pi = 22/7$ wherever required if not stated.
11. Use of calculators is not allowed.

Section A

1. $(1 + \sqrt{2}) + (1 - \sqrt{2})$ is **[1]**
 - a) a rational number
 - b) a non-terminating decimal
 - c) terminating decimal
 - d) an irrational number
2. A number when divided by 61 gives 27 as quotient and 32 as the remainder, then the number is: **[1]**
 - a) 1796
 - b) 1569
 - c) 1679
 - d) 1967
3. If the sum of the roots of the equation $kx^2 + 2x + 3k = 0$ is equal to their product then the value of k is **[1]**
 - a) $\frac{1}{3}$
 - b) $-\frac{1}{3}$
 - c) $-\frac{2}{3}$
 - d) $\frac{2}{3}$
4. The ratio of a 2-digit number to the sum of digits of that number is 4 : 1. If the digit in the units place is 3 more **[1]**

than the digit in the tens place, then what is the number?

- a) 63
- b) 36
- c) 24
- d) 40

5. If the discriminant of the quadratic equation $3x^2 - 2x + c = 0$ is 16, then the value of c is: [1]

- a) $\sqrt{2}$
- b) 0
- c) 1
- d) -1

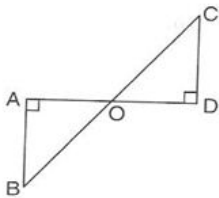
6. The distance of the point (4, 5) from x-axis is: [1]

- a) 1
- b) 9
- c) 5
- d) 4

7. If a tree casts a 18 feet shadow and at the same time, a child of height 3 feet casts a 2 feet shadow, then the height of the tree is [1]

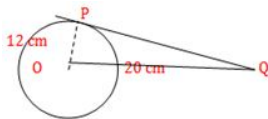
- a) 36 feet
- b) 27 feet
- c) 45 feet
- d) 32 feet

8. In the given figure $\triangle ABO \sim \triangle DCO$. If $CD = 2\text{ cm}$, $AB = 3\text{ cm}$, $OC = 3.2\text{ cm}$, $OD = 2.4\text{ cm}$, then [1]



- a) $OA = 3\text{ cm}$, $OB = 4\text{ cm}$.
- b) $OA = 4.3\text{ cm}$, $OB = 3.5\text{ cm}$.
- c) $OA = 3.6\text{ cm}$, $OB = 4.8\text{ cm}$.
- d) $OA = 3.2\text{ cm}$, $OB = 4.6\text{ cm}$

9. A tangent PQ at point of contact P to a circle of radius 12 cm meets the line through centre O to a point Q such that $OQ = 20\text{ cm}$, length of tangent PQ is: [1]



- a) 15 cm
- b) 12 cm
- c) 13 cm
- d) 16 cm

10. If $\sin A = \frac{2}{3}$, then value of $\cot A$ is: [1]

- a) $\frac{\sqrt{5}}{2}$
- b) $\frac{3}{2}$
- c) $\frac{2}{3}$
- d) $\frac{5}{4}$

11. The angle of depression of a car parked on the road from the top of a 150 m high tower is 30° . The distance of the car from the tower (in metres) is [1]

- a) 75
- b) $150\sqrt{3}$
- c) $50\sqrt{3}$
- d) $150\sqrt{2}$

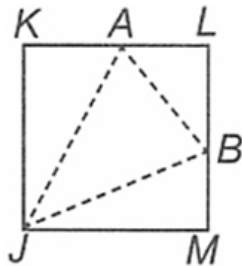
12. If $\sin^2 \theta = \frac{1}{2}$, then the value of $\tan^2 \theta$ is: [1]

- a) $\frac{1}{\sqrt{3}}$
- b) $\sqrt{3}$

- c) 0 d) 1
13. A sector of a circle of radius 8 cm contains an angle of 135° . Find the area of the sector. [1]
- a) $14\pi \text{ cm}^2$ b) $25\pi \text{ cm}^2$
 c) $24\pi \text{ cm}^2$ d) $20\pi \text{ cm}^2$

14. A chord of a circle subtends an angle of 60° at the centre. If the length of the chord is 100 cm, find the area of the major segment. [1]
- a) 30391.7 cm^2 b) 30720.5 cm^2
 c) 30520.61 cm^2 d) 31021.42 cm^2

15. In the given figure. JKLM is a square with sides of length 6 units. Points A and B are the mid-points of sides KL and LM respectively. If a point is selected at random from the interior of the square. What is the probability that the point will be chosen from the interior of $\triangle JAB$? [1]



- a) $\frac{5}{8}$ b) $\frac{3}{8}$
 c) $\frac{7}{8}$ d) $\frac{3}{4}$
16. The mean of first n odd natural number is: [1]
- a) n b) n^2
 c) $\frac{n+1}{2}$ d) $\frac{n}{2}$

17. A sphere of radius 6 cm is dropped into a cylindrical vessel partly filled with water. The radius of the vessel is 8 cm. If the sphere is submerged completely, then the surface of the water rises by [1]
- a) 4.5 cm b) 4 cm
 c) 2 cm d) 3 cm

18. Mode is: [1]
- a) least frequent value b) less frequent value
 c) middle most value d) most frequent value

19. **Assertion (A):** Point P(0, 2) is the point of intersection of y-axis with the line $3x + 2y = 4$. [1]
Reason (R): The distance of point P(0, 2) from x-axis is 2 units.
- 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):** H.C.F. of smallest prime and smallest composite is 2. [1]
Reason (R): Smallest prime is 2 and smallest composite is 4 so their H.C.F. is 2.
- a) Both A and R are true and R is the correct b) Both A and R are true but R is not the

explanation of A.

correct explanation of A.

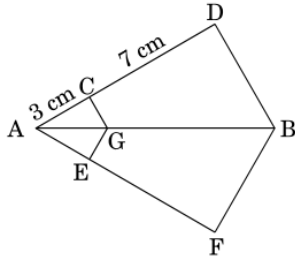
c) A is true but R is false.

d) A is false but R is true.

Section B

21. On comparing the ratios $\frac{a_1}{a_2}$, $\frac{b_1}{b_2}$ and $\frac{c_1}{c_2}$, find out whether the pair of linear equation is consistent, or inconsistent: [2]
 $5x - 3y = 11$; $-10x + 6y = -22$

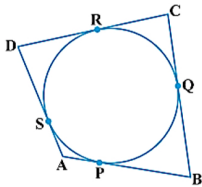
22. In figure, $GC \parallel BD$ and $GE \parallel BF$. If $AC = 3$ cm and $CD = 7$ cm, then find the value of $\frac{AE}{AF}$ [2]



OR

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

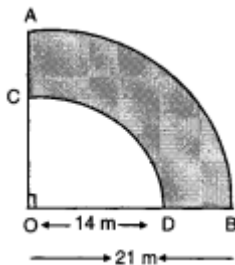
23. A quadrilateral ABCD is drawn to circumscribe a circle. Prove that $AB + CD = AD + BC$ [2]



24. Prove that $(\sec\theta + \tan\theta)(1 - \sin\theta) = \cos\theta$ [2]
 25. Find the area of a sector of a circle with radius 6 cm, if the angle of the sector is 60° . [2]

OR

ABCD is a flower bed. If $OA = 21$ m and $OC = 14$ m, find the area of the bed.



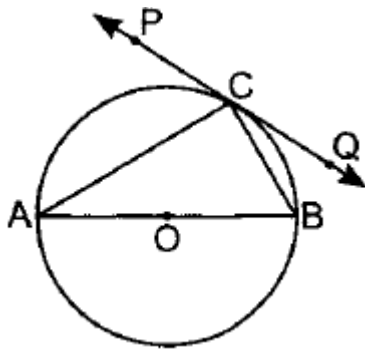
Section C

26. Prove that $3 + 2\sqrt{5}$ is irrational. [3]
 27. Find a quadratic polynomial, the sum and product of whose zeroes are $\frac{1}{4}$ and -1 , respectively. [3]
 28. Solve the pair of linear equations $s - t = 3$ and $\frac{s}{3} + \frac{t}{2} = 6$ by substitution method. [3]

OR

Seven times a two digit number is equal to four times the number obtained by reversing the order of its digits. If the difference between the digits is 3, determine the number.

29. In figure, PQ is a tangent at a point C to a circle with centre O. If AB is a diameter and $\angle CAB = 30^\circ$, find $\angle PCA$. [3]



30. If $\cot \theta = \frac{7}{8}$, evaluate: $\cot^2 \theta$ [3]

OR

If $\tan A = n \tan B$ and $\sin A = m \sin B$, then prove that $\cos^2 A = \frac{m^2 - 1}{n^2 - 1}$

31. A bag contains cards numbered 1 to 49. Find the probability that the number on the drawn card is : [3]
- an odd number
 - a multiple of 5
 - Even prime

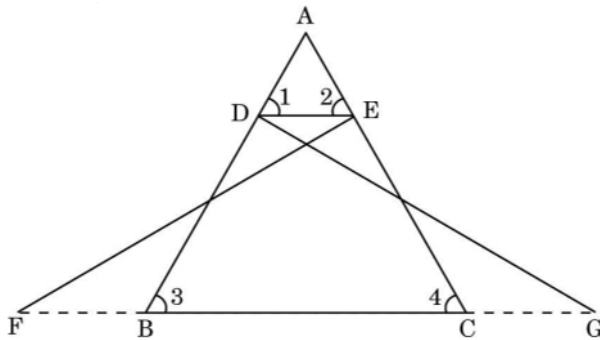
Section D

32. Find the values of k for which the equation $(3k + 1)x^2 + 2(k + 1)x + 1$, has equal roots. Also find the roots. [5]

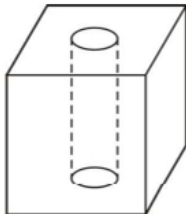
OR

A cottage industry produces a certain number of pottery articles in a day. It was observed on a particular day that cost of production of each article (in rupees) was 3 more than twice the number of articles produced on that day. If, the total cost of production on that day was ₹ 90, find the number of articles produced and the cost of each article.

33. In the given figure, $\triangle FEC \cong \triangle GDB$ and $\angle 1 = \angle 2$. Prove that $\triangle ADE \sim \triangle ABC$. [5]



34. In Figure, from a solid cube of side 7 cm, a cylinder of radius 2.1 cm and height 7 cm is scooped out. Find the total surface area of the remaining solid. [5]



OR

The interior of a building is in the form of cylinder of diameter 4.3 m and height 3.8 m, surmounted by a cone whose vertical angle is a right angle. Find the area of the surface and the volume of the building. (Use $\pi = 3.14$).

35. The table below gives the percentage distribution of female teachers in the primary schools of rural areas of various states and union territories (U.T.) of India. Find the mean percentage of female teachers by all the three methods discussed in this section. [5]

Percentage of female teachers	15 - 25	25 - 35	35 - 45	45 - 55	55 - 65	65 - 75	75 - 85

Number of states/U.T.	6	11	7	4	4	2	1
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Section E

36. **Read the following text carefully and answer the questions that follow:** [4]

Suman is celebrating his birthday. He invited his friends. He bought a packet of toffees/candies which contains 360 candies. He arranges the candies such that in the first row there are 3 candies, in second there are 5 candies, in third there are 7 candies and so on.

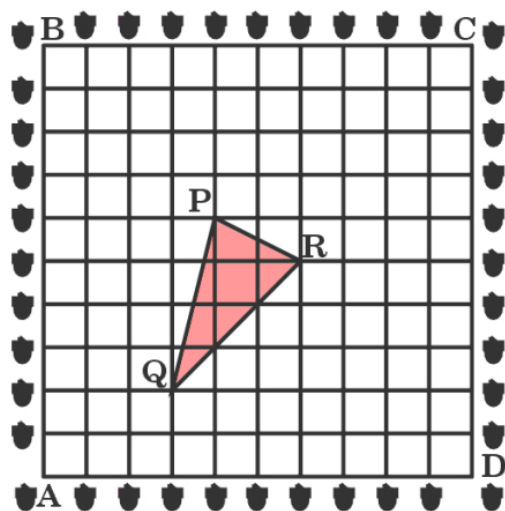
- i. Find the total number of rows of candies. (1)
- ii. How many candies are placed in last row? (1)
- iii. If Aditya decides to make 15 rows, then how many total candies will be placed by him with the same arrangement? (2)

OR

Find the number of candies in 12th row. (2)

37. **Read the following text carefully and answer the questions that follow:** [4]

A garden is in the shape of a square. The gardener grew saplings of Ashoka tree on the boundary of the garden at the distance of 1 m from each other. He wants to decorate the garden with rose plants. He chose a triangular region inside the garden to grow rose plants. In the above situation, the gardener took help from the students of class 10. They made a chart for it which looks like the given figure.



Based on the above, answer the following questions:

- i. If A is taken as origin, what are the coordinates of the vertices of $\triangle PQR$? (1)
- ii. a. Find distances PQ and QR. (2)

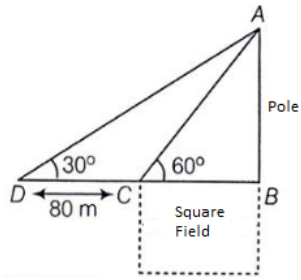
OR

- b. Find the coordinates of the point which divides the line segment joining points P and R in the ratio 2 : 1 internally. (2)
- iii. Find out if $\triangle PQR$ is an isosceles triangle. (1)

38. **Read the following text carefully and answer the questions that follow:** [4]

Basant Kumar is a farmer in a remote village of Rajasthan. He has a small square farm land. He wants to do fencing of the land so that stray animals may not enter his farmland. For this, he wants to get the perimeter of the land. There is a pole at one corner of this field. He wants to hang an effigy on the top of it to keep birds away. He standing in one corner of his square field and observes that the angle subtended by the pole in the corner just diagonally opposite to this corner is 60° . When he retires 80 m from the corner, along the same straight line, he

finds the angle to be 30° .



- Find the height of the pole too so that he can arrange a ladder accordingly to put an effigy on the pole. (1)
- Find the length of his square field so that he can buy material to do the fencing work accordingly. (1)
- Find the Distance from Farmer at position C and top of the pole? (2)

OR

Find the Distance from Farmer at position D and top of the pole? (2)

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