Sample Paper 01

Class - 10th Exam - 2024 - 25

Mathematics - Standard

Time : 3 Hours   **Max. Marks : 80**

General Instructions :

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 Question 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 $\pi = \frac{22}{7}$ wherever required if not stated.
11. Use of calculators is not allowed.

Section - A

Section A consists of 20 questions of 1 mark each.

1. If $x^2 + y^2 = 25$, $xy = 12$, then x is

    (a) $(3, \ 4)$ (b) $(3, -3)$

    (c) $(3, 4, -3, -4)$ (d) $(3, -3)$

2. If the square of difference of the zeroes of the quadratic polynomial $x^2 + px + 45$ is equal to 144, then the value of p is

    (a) ± 9 (b) ± 12

    (c) ± 15 (d) ± 18

3. ΔABC and ΔBDE are two equilateral triangle such that D is the mid-point of BC. Ratio of the areas of triangles ABC and BDE is ....

    (a) $1 : 4$ (b) $4 : 1$

    (c) $1 : 3$ (d) $3 : 1$

4. In the adjoining figure, TP and TQ are the two tangents to a circle with centre O. If $\angle POQ = 110°$, then $\angle PTQ$ is
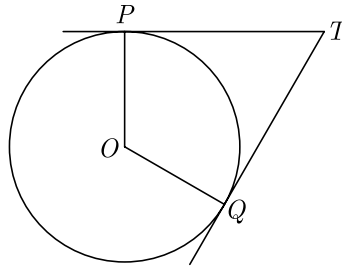
(a)   60°   (b) 70°

(c)   80°   (d) 90°

5.   A set of numbers consists of three 4's, five 5's, six 6's, eight 8's and seven 10's. The mode of this set of numbers is

(a)   6   (b) 7

(c)   8   (d) 10

6. $\triangle ABC$ is an equilateral triangle with each side of length $2p$. If $AD \perp BC$ then the value of AD is

(a) $\sqrt{3}$ (b) $\sqrt{3}\,p$

(c) $2p$ (d) $4p$

7.   The quadratic equation $x^2 - 4x - 3\sqrt{2} = 0$ has

(a)   two distinct real roots   (b)   two equal real roots

(c)   no real roots   (d)   more than 2 real roots

8.   From an external point P, tangents PA and PB are drawn to a circle with centre O. If CD is the tangent to the circle at a point E and $PA = 14\,\text{cm}$. The perimeter of $\triangle PCD$ is

(a)   14 cm   (b) 21 cm

(c)   28 cm   (d) 35 cm

9. $(\cos^4 A - \sin^4 A)$ is equal to

(a) $1 - 2\cos^2 A$ (b) $2\sin^2 A - 1$

(c) $\sin^2 A - \cos^2 A$ (d) $2\cos^2 A - 1$

10.   An observer, 1.5 m tall is 20.5 away from a tower 22 m high, then the angle of elevation of the top of the tower from the eye of observer is

(a)   30°   (b) 45°

(c)   60°   (d) 90°

11.   Which of the following relationship is the correct?

(a) $P(E) + P(\overline{E}) = 1$ (b) $P(\overline{E}) - P(E) = 1$

(c) $P(E) = 1 + P(\overline{E})$ (d) None of these

12. The pair of equations $x = a$ and $y = b$ graphically represents lines which are
(a) parallel   (b) intersecting at (b, a)
(c) coincident   (d) intersecting at (a, b)

13. A tree casts a shadow 15 m long on the level of ground, when the angle of elevation of the sun is $45°$. The height of a tree is
(a) 10 m   (b) 14 m
(c) 8 m   (d) 15 m

14. From a solid circular cylinder with height 10 cm and radius of the base 6 cm, a right circular cone of the same height and same base is removed, then the volume of remaining solid is
(a) $280 \,\pi \text{cm}^3$ (b) $330 \,\pi \text{cm}^3$
(c) $240 \,\pi \text{cm}^3$ (d) $440 \,\pi \,\text{cm}^3$

15. If median is 137 and mean is 137.05, then the value of mode is
(a) 156.90   (b) 136.90
(c) 186.90   (d) 206.90

16. If the circumference of a circle increases from $4\,\pi$ to $8\,\pi$, then its area is
(a) halved   (b) doubled
(c) tripled   (d) quadrupled

17. A chord of a circle of radius 10 cm, subtends a right angle at its centre. The length of the chord (in cm) is
(a) $\dfrac{5}{\sqrt{2}}$ (b) $5\sqrt{2}$
(c) $10\sqrt{2}$ (d) $10\sqrt{3}$

18. If a number x is chosen at random from the numbers $-2, -1,\ 0,\ 1,\ 2$. Then, the probability that $x^2 < 2$ is
(a) $\dfrac{2}{5}$ (b) $\dfrac{4}{5}$
(c) $\dfrac{1}{5}$ (d) $\dfrac{3}{5}$

19. **Assertion :** The value of $\sin\theta = \frac{4}{3}$ is not possible.
Reason : Hypotenuse is the largest side in any right angled triangle.
(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 :** $a_n - a_{n-1}$ is not independent of n then the given sequence is an AP.

Reason : Common difference $d = a_n - a_{n-1}$ is constant or independent of n.

(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. Find the ratio in which the point $(-3, k)$ divides the line segment joining the points $(-5, -4)$ and $(-2, 3)$. Also find the value of k.

22. From an external point P, tangents PA and PB are drawn to a circle with centre O. If $\angle PAB = 50^\circ$, then find $\angle AOB$.

23. Write a rational number between $\sqrt{2}$ and $\sqrt{3}$.

24. Find the 7th term from the end of AP $7, 10, 13, \dots 184$.

OR

The fourth term of an AP is 11. The sum of the fifth and seventh terms of the AP is 34. Find the common difference.

25. How many two digits numbers are divisible by 3?

Section - C

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

26. Two dice are tossed simultaneously. Find the probability of getting

(i) an even number on both dice.

(ii) the sum of two numbers more than 9.

27. An electric pole is 10 m high. A steel wire tied to top of the pole is affixed at a point on the ground to keep the pole up right. If the wire makes an angle of 45° with the horizontal through the foot of the pole, find the length of the wire. [Use $\sqrt{2} = 1.414$]

28. Solve for x : $\dfrac{1}{x+4} - \dfrac{1}{x+7} = \dfrac{11}{30}$ $x \ne -4, -7$.

29. Prove that the rectangle circumscribing a circle is a square.

OR

If O is centre of a circle, PQ is a chord and the tangent PR at P makes an angle of 50° with PQ, find $\angle POQ$.
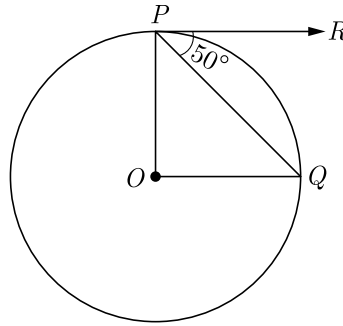
30. From a solid right circular cylinder of height 14 cm and base radius 6 cm, a right circular cone of same height and same base removed. Find the volume of the remaining solid.

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

A metallic cylinder has radius 3 cm and height 5 cm. To reduce its weights, a conical hole is drilled in the cylinder. The conical hole has a radius of $\frac{3}{2}$ cm and its depth $\frac{8}{9}$ cm. Calculate the ratio of the volume of metal left in the cylinder to the volume of metal taken out in conical shape.

31. A fraction becomes $\frac{1}{3}$ when 2 is subtracted from the numerator and it becomes $\frac{1}{2}$ when 1 is subtracted from the denominator- Find the fraction.

Section - D

Section D consists of 4 questions of 5 marks each.

32. In Figure, a square $OABC$ is inscribed in a quadrant $OPBQ$. If $OA = 15\,\text{cm}$, find the area of the shaded region. (Use $\pi = 3.14$).
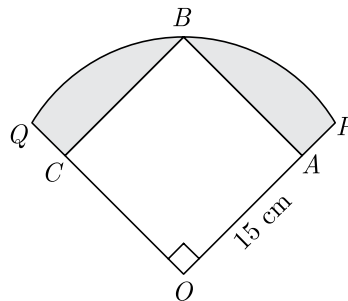
33. Find the zeroes of the quadratic polynomial $7y^2 - \frac{11}{3}y - \frac{2}{3}$ and verify the relationship between the zeroes and the coefficients.
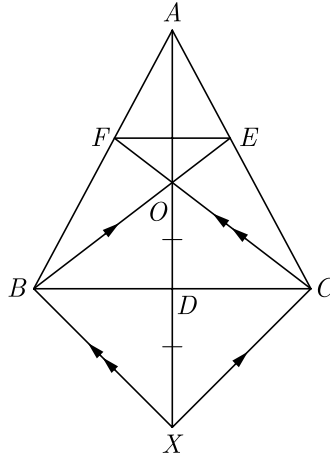
<div align="center">**OR**</div>

If α and β are the zeroes the polynomial $2x^2 - 4x + 5$, find the values of

(i) $\alpha^2 + \beta^2$ (ii) $\dfrac{1}{\alpha} + \dfrac{1}{\beta}$

(iii) $(\alpha - \beta)^2$ (iv) $\dfrac{1}{\alpha^2} + \dfrac{1}{\beta^2}$

(v) $\alpha^2 + \beta^2$

34. In $\triangle ABC$, AD is a median and O is any point on AD. BO and CO on producing meet AC and AB at E and F respectively. Now AD is produced to X such that $OD = DX$ as shown in figure.
Prove that :
(1) $EF \parallel BC$
(2) $AO : AX = AF : AB$

35. If $\sin A = \dfrac{3}{4}$ calculate $\sec A$.

OR

Evaluate : $4(\sin^4 30^\circ + \cos^4 60^\circ) - 3(\cos^2 45 - \sin^2 90^\circ)$

Section - E

Section E consists of 3 case study based questions of 4 marks each.

36. Heart Rate : The heart rate is one of the 'vital signs,' or the important indicators of health in the human body. It measures the number of times per minute that the heart contracts or beats. The speed of the heartbeat varies as a result of physical activity, threats to safety, and emotional responses. The resting heart rate refers to the heart rate when a person is relaxed. While a normal heart rate does not guarantee that a person is free of health problems, it is a useful benchmark for identifying a range of health issues. After the age of 10 years, the heart rate of a person should be between 60 and 100 beats per minute while they are resting.

Thirty women were examined by doctors of AIIMS and the number of heart beats per minute were recorded and summarised as follows.

Number of heart beats per minute	Number of women (f_i)
65-68	2
68-71	4
71-74	3
74-77	8
77-80	7
80-83	4
83-86	2

Based on the above information, answer the following questions.
(i)   What is the mean heart beats per minute for these women ?

(ii)   What is the upper limit of median value of heart beats per minute for these women ?

(iii) What is the lower limit of mode value of heart beats per minute for these women ?

OR

How many women are having heart beat in range 68-77?

37.   Volume of a Bird Cage. A company makes rectangular shaped bird cages with height b inches and square bottoms. The volume of these cages is given by the function $V = b^3 - 6b^2 + 9b$.
(i)   Find an expression for the length of each side of the square bottom.
(ii)   Use the function to find the volume of a cage with a height of 18 inches.
(iii) Use the remainder theorem to find the volume of a cage with a height of 15 inches.

CLICK HERE TO SEE ANSWERS

38. Morning assembly is an integral part of the school's schedule. Almost all the schools conduct morning assemblies which include prayers, information of latest happenings, inspiring thoughts, speech, national anthem, etc. A good school is always particular about their morning assembly schedule. Morning assembly is important for a child's development. It is essential to understand that morning assembly is not just about standing in long queues and singing prayers or national anthem, but it's something beyond just prayers. All the activities carried out in morning assembly by the school staff and students have a great influence in every point of life. The positive effects of attending school assemblies can be felt throughout life.

Have you noticed that in school assembly you always stand in row and column and this make a coordinate system. Suppose a school have 100 students and they all assemble in prayer in 10 rows as given below.
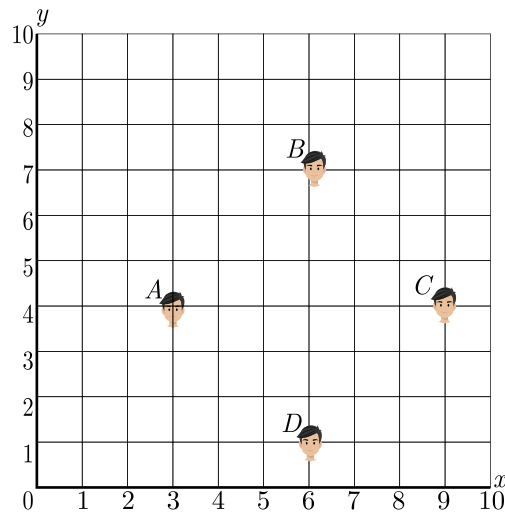
Here A, B, C and D are four friend Amar, Bharat, Colin and Dravid.
(i) What is the distance between A and B ?
(ii) What is the distance between C and D ?
(iii) What is the distance between A and C ?

OR

What is the distance between D and B ?

□□□□□□