

Sample Question Paper

Session 2024–25
Standard (Code 041)

Time Allowed: 3 hours

Maximum Marks: 80

General Instructions:

Read the following instructions carefully and follow them.

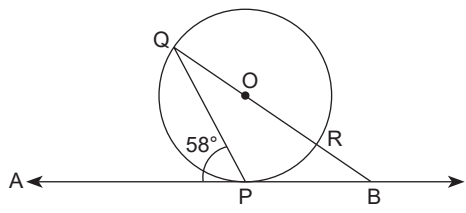
1. This question paper contains 38 questions.
2. This Question Paper is divided into 5 Sections A, B, C, D and E.
3. In Section A, Questions no. 1–18 are multiple choice questions (MCQs) and questions no. 19 and 20 are Assertion-Reason based questions of 1 mark each.
4. In Section B, Questions no. 21–25 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 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 α and β are zeroes of the polynomial $6y^2 - 2 + y$, then the value of $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$ is
(a) $-\frac{25}{36}$ (b) $-\frac{25}{12}$ (c) $\frac{25}{36}$ (d) $\frac{25}{12}$
2. The pair of linear equations $(3k + 1)x + 3y - 5 = 0$ and $2x - 3y + 5 = 0$ have infinite number of solutions. Then the value of k is
(a) 1 (b) 0 (c) 2 (d) -1
3. If two tangents inclined at 60° are drawn to a circle of radius 3 cm, then length of each tangent is equal to
(a) $3\sqrt{3}$ cm (b) 3 cm (c) $3\sqrt{2}$ cm (d) $2\sqrt{3}$ cm

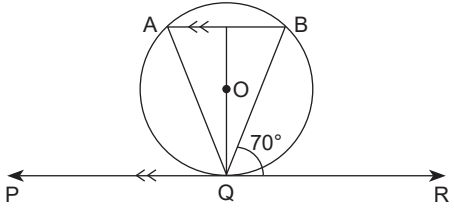
4. If the n th term of an AP is $(2n + 1)$, then the sum of first n terms of the AP is
 (a) $n(n - 1)$ (b) $n(n + 1)$ (c) $n(n - 2)$ (d) $n(n + 2)$
5. Volumes of two solid spheres are in the ratio $125 : 64$. Determine their radii if the sum of their radii is 45 cm.
 (a) 24 cm, 18 cm (b) 25 cm, 20 cm (c) 28 cm, 21 cm (d) 30 cm, 16 cm
6. If $\cos \theta = \frac{2}{3}$, then $2 \sec^2 \theta + 2 \tan^2 \theta - 7$ is equal to
 (a) 0 (b) 1 (c) 3 (d) 4
7. In the given figure, O is the centre of the circle. AB is a tangent to the circle at the point P. If $\angle APQ = 58^\circ$, then the measure of $\angle PQB$ is



- (a) 32° (b) 58° (c) 122° (d) 132°
8. If p and q are the zeroes of the polynomial $ax^2 - 5x + c$ and $p + q = pq = 10$, then
 (a) $a = 5, c = \frac{1}{2}$ (b) $a = 1, c = \frac{5}{2}$ (c) $a = \frac{5}{2}, c = 1$ (d) $a = \frac{1}{2}, c = 5$
9. The marks obtained by 60 students are tabulated below.

Marks	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	Total
Number of students	2	10	25	20	3	60

- The number of students who got less than 30 marks is equal to
 (a) 37 (b) 35 (c) 57 (d) 45
10. In the given figure, PQR is the tangent to a circle at Q whose centre is O, AB is a chord parallel to PR and $\angle BQR = 70^\circ$. $\angle AQB$ is equal to



- (a) 20° (b) 35° (c) 40° (d) 45°
11. If $(a^2 + b^2)x^2 + 2(ac + bd)x + (c^2 + d^2) = 0$ has no real roots, then
 (a) $ad = bc$ (b) $ab = cd$ (c) $ac = bd$ (d) $ad \neq bc$

12. If $\sin \theta = \frac{1}{5}$, then the value of $\frac{1}{5} \cot^2 \theta + \frac{1}{5}$ is
 (a) $\frac{1}{125}$ (b) $\frac{1}{5}$ (c) 5 (d) 25
13. If the volume of a hemisphere is 19404 cm^3 , then the total surface area of the hemisphere is
 (a) 4000 cm^2 (b) 4062 cm^2 (c) 4158 cm^2 (d) 4168 cm^2
14. A bag contains 5 red balls and n green balls. If the probability of drawing a green ball is three times that of a red ball, then the value of n is
 (a) 10 (b) 15 (c) 18 (d) 20
15. The perpendicular bisector of the line segment joining the points A(2, 3) and B(5, 6) cuts the y -axis at
 (a) (8, 0) (b) (0, 8) (c) (0, -8) (d) (0, 7)
16. For a symmetrical distribution, which of the following is true?
 (a) Mean > Mode > Median (b) Mean = Median = Mode
 (c) Mean < Mode < Median (d) Mode = $\frac{\text{Mean} + \text{Median}}{2}$
17. The point which divides the line segment joining the points A(5, 6) and B(2, -3) in the ratio 2 : 1 internally lies on the
 (a) positive direction of x -axis (b) negative direction of x -axis
 (c) positive direction of y -axis (d) negative direction of y -axis
18. A pack of cards is shuffled well after all the face cards have been removed. Then, the probability of drawing a non-red ace from the new pack is
 (a) $\frac{1}{36}$ (b) $\frac{1}{20}$ (c) $\frac{1}{13}$ (d) $\frac{2}{13}$

DIRECTION: In the question numbers 19 and 20, a statement of **Assertion (A)** is followed by a statement of **Reason (R)**.

Choose the correct option.

- (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.
19. **Assertion (A)** : The HCF and LCM of two numbers are q and 360 respectively. If one of the numbers is 72, then the other number is 45.
Reason (R) : For any two positive integers a and b
 $a \times b = \text{HCF}(a, b) \times \text{LCM}(a, b)$

20. **Assertion (A)** : If there are two concentric circles of radii 5 cm and 13 cm respectively, then the length of the chord of the outer circle which touches the inner circle is 24 cm.

Reason (R) : The tangent at any point of a circle is perpendicular to the radius through the point of contact and the perpendicular drawn from the centre of a circle to a chord bisects the chord.

Section B

Section B consists of 5 questions of 2 marks each.

21. The LCM of two number is 14 times their HCF. The sum of LCM and HCF is 600. If one number is 280, then find the other number.

or

If d is the HCF of 45 and 27, find x, y satisfying $d = 27x + 45y$.

22. Two dice are numbered 1, 2, 3, 4, 5, 6 and 1, 1, 2, 2, 3, 3 respectively. They are thrown and the sum of the numbers on them is noted. Find the probability of getting each sum from 2 to 9 separately.

or

A box of sweets contains toffees and eclairs. There are 6 eclair more than the number of toffees. If a sweet is to be chosen at random, the probability that it is a toffee is $\frac{3}{8}$. How many toffees and how many eclairs are there in the box?

23. Evaluate: $4(\sin^4 30^\circ + \cos^4 60^\circ) - \frac{2}{3}(\sin^2 60^\circ - \cos^2 45^\circ) + \frac{1}{2} \tan^2 60^\circ$

24. If P is a point on the y -axis such that 4 times its distance from A(5, 2) is equal to twice its distance from B(8, 8), then find its coordinates.

25. The points A(4, 7), B(p, 3) and C(7, 3) are the vertices of a right triangle, right-angled at B. Find the value of p .

Section C

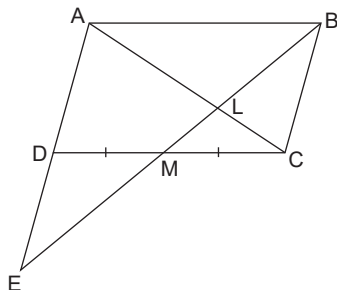
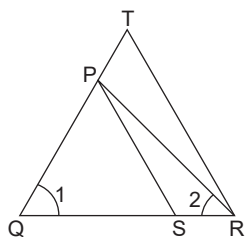
Section C consists of 6 questions of 3 marks each.

26. In the given figure, $\frac{QR}{QS} = \frac{QT}{PR}$ and $\angle 1 = \angle 2$.

Prove that $\Delta PQS \sim \Delta TQR$.

or

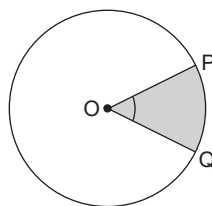
Through the mid-point M of the side CD of a parallelogram ABCD, the line BM is drawn intersecting AC at L and AD produced at E. Prove that $EL = 2BL$.



27. A two-digit number is four times the sum of the digits. It is also equal to three times the product of the digits. Find the number.
28. If α and β are the zeroes of the polynomial $x^2 + 4x + 3$, form the polynomial whose zeroes are $1 + \frac{\beta}{\alpha}$ and $1 + \frac{\alpha}{\beta}$.
29. If $x = a \sec \theta + b \tan \theta$ and $y = a \tan \theta + b \sec \theta$, prove that $x^2 - y^2 = a^2 - b^2$.
30. The minute hand of a clock is 12 cm long. Find the area on the face of the clock described by the minute hand between 8 am and 8:35 am.

or

In the given figure, area of the shaded sector POQ is $\frac{3}{20}$ of the area of the whole circle. Calculate $\angle POQ$.



31. Prove that $3 + 5\sqrt{2}$ is an irrational number.

Section D

Section D consists of 4 questions of 5 marks each.

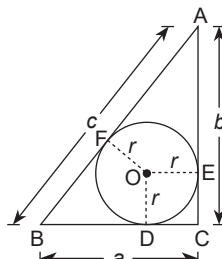
32. Solve graphically the following pair of linear equations. Also find the coordinates of the points where the lines intersect the x -axis and the y -axis.

$$x + y = 7; \quad 5x + 2y = 20$$

or

Two ships leave simultaneously in directions at right angles to each other. The speed of one of them exceeds the other by 1 km per hour. The distance between the ships after 1 hour is 29 km. Find their speeds.

33. If a, b, c are sides of a right triangle where c is the hypotenuse, r is the radius of the circle which touches the sides of the triangle, then prove that $2r + c = a + b$.



34. A bird is sitting on the top of a 80 m high tree. From a point on the ground, the angle of elevation of the bird is 45° . The bird flies away horizontally in such a way that it remained at a constant height from the ground. After 2 seconds, the angle of elevation of the bird from the same point is 30° . Find the speed of flying of the bird. [Use $\sqrt{3} = 1.732$]
35. Find the mean and median of the following frequency distribution:

Class	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70
Frequency	8	7	15	20	12	8	10

or

Find the missing frequencies in the following frequency distribution table if $N = 100$ and median is 32.

Marks	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	Total
Number of students	10	f_1	25	30	f_2	10	100

Section E

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

36. In an energy drink factory, manager observes that, in the 3rd year, the factory manufactured 3000 drinks and in the 6th year, the factory manufactured 6000 drinks (assuming that the production increases uniformly by a fixed number every year). Read the above information and answer the following questions:

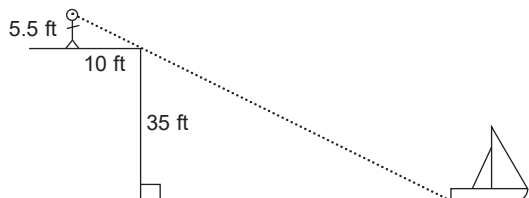


- What is the production of drinks in the 1st year?
- What is the production increase uniformly by a fixed number every year?
- (i) What is the production of drinks in the 4th year?

or

- What is total production of energy drinks in first 6 years?

37. A teacher of secondary school took 10 students of class 10 to Nongpoh, Meghalaya in summer vacation. One of the students, Amit was standing on a cliff. The cliff was 35 ft above the lake. Amit's height was 5.5 ft. Amit was standing 10 ft away from the edge of the cliff. Amit could visually align the top of the cliff with the water at the back of the boat. The situation was drawn and levelled. Based on this situation, answer the following questions.



- (a) Find the distance of the boat from the cliff.
- (b) If Amit stands 15 ft away from the cliff, what will be the distance of the boat from the cliff?
- (c) (i) A girl 160 cm tall, stands 360 cm from a lamp post at night. Her shadow from the light is 90 cm long. What is the height of the lamp post?

or

- (ii) A tower casts a shadow 7 m long. A vertical stick casts a shadow 0.6 m long. If the stick is 1.2 m high, what is the height of the tower?

38. Dice are one of the oldest gaming implements. In most games played with dice, the dice are thrown from the hand or by using a dice cup. The most common form of die is the cube. Each side is marked from one to six dots.

Rama makes a cube-shaped regular die of wood. The numbers on the side of the die are represented by the number of hemispherical indents on each side. The radius of each hemispherical indent is 4 cm and the edge of the die is 30 cm.

- (a) Find the number of hemispherical indents that has to be scooped.
- (b) What is the volume of wood that has to be scooped for each hemispherical indent?
- (c) (i) The inner surface of each hemispherical indent is to be painted black. What is the total surface area that has to be painted black?

or

- (ii) What is the volume of the remaining wood in the die?