SAMPLE PAPER 3 (CBSE)

Class 10 - Mathematics

Time Allowed: 3 hours **Maximum Marks: 80**

General Instructions:

1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 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 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks questions of Section E
8. Draw neat figures wherever required. Take $\pi = \frac{22}{7}$ wherever required if not stated.

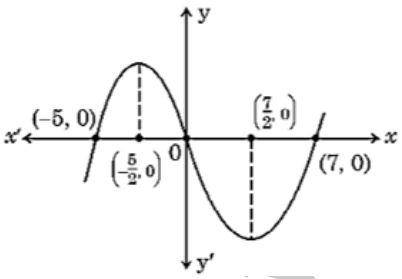
Section A

1. The prime factorisation of 1728 is **[1]**

   a) $2^6 \times 3^3$ b) $2^6 \times 3^2$

   c) $2^5 \times 3^3$ d) $2^5 \times 3^4$

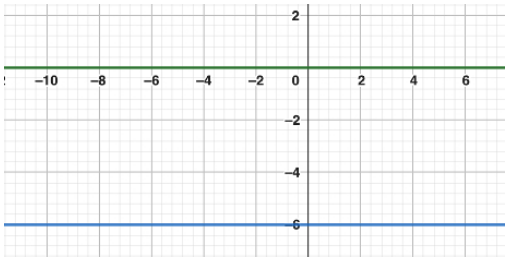
2. The graph of y = p(x) is given in the adjoining figure. Zeroes of the polynomial p(x) are **[1]**



   a) $-5, \frac{-5}{2}, \frac{7}{2}, 7$ b) -5, 7

   c) -5, 0, 7 d) $\frac{-5}{2}, \frac{-7}{2}$

3. The pair of linear equations y = 0 and y = - 6 has: **[1]**



   a) no solution b) only solution (0, 0)

c) infinitely many solutions

d) a unique solution

4. If **p** is a root of the quadratic equation x^2 - (p + q) x + k = 0, then the value of **k** is **[1]**

a) p + q

b) p

c) pq

d) q

5. How many three-digit numbers are divisible by 9? **[1]**

a) 100

b) 90

c) 96

d) 86

6. The distance between the points (6, 2) and (-6, 2) is: **[1]**

a) 12 units

b) $6\sqrt{2}$ units

c) $2\sqrt{6}$ units

d) 6 units

7. The distance between the points (-1, -3) and (5, -2) is: **[1]**

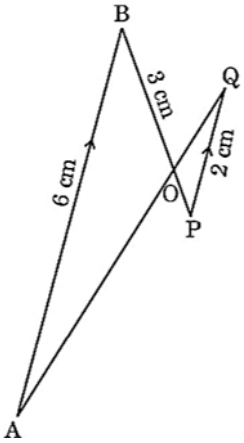
a) $\sqrt{17}$ units

b) $\sqrt{37}$ units

c) $\sqrt{61}$ units

d) 5 units

8. In the given figure, AB || PQ. If AB = 6 cm, PQ = 2 cm and OB = 3 cm, then the length of OP is: **[1]**



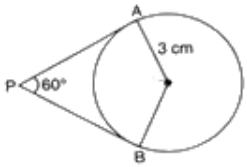
a) 1 cm

b) 4 cm

c) 9 cm

d) 3 cm

9. If two tangents inclined at 60° are drawn to circle of radius 3 cm, then length of each tangent is equal to **[1]**



a) $3\sqrt{3}$

b) 3 cm

c) $2\sqrt{3}$ cm

d) $3\sqrt{2}$ cm

10. How many tangents can be drawn to a circle from a point on it? **[1]**

a) Two

b) Zero

c) Infinite

d) One

11. If $\tan\theta = \frac{x}{y}$, then $\cos\theta$ is equal to **[1]**

a) $\frac{y}{\sqrt{x^2-y^2}}$

b) $\frac{x}{\sqrt{x^2-y^2}}$

c) $\frac{x}{\sqrt{x^2+y^2}}$ d) $\frac{y}{\sqrt{x^2+y^2}}$

12. $[\frac{5}{8}\ \sec^2 60^o - \tan^2 60^o + \cos^2 45^o]$ is equal to **[1]**

a) $\frac{-5}{3}$ b) 0

c) $\frac{-1}{4}$ d) $\frac{-1}{2}$

13. A vertical tower stands on a horizontal plane and is surmounted by a vertical flag staff of height 5 m. From a point on the plane the angles of elevation of the bottom and top of the flagstaff are respectively 30° and 60°. The height of the tower is **[1]**

a) 10 m b) 5 m

c) 2.5 m d) 2 m

14. The area of a sector of angle α (in degrees) of a circle with radius R is: **[1]**

a) $\frac{\alpha}{180} \times 2\pi \mathrm{R}$ b) $\frac{\alpha}{180} \times \pi \mathrm{R}^2$

c) $\frac{\alpha}{360} \times 2\pi \mathrm{R}$ d) $\frac{\alpha}{360} \times \pi \mathrm{R}^2$

15. The area of a sector of a circle with radius r, making an angle of x° at the centre is **[1]**

a) $\frac{x}{360} \times \pi r^2$ b) $\frac{x}{100}\ xw^2$

c) $\frac{x}{180} \times 2\pi$ d) $\frac{x}{360} \times 2xr$

16. The probability of an impossible event is **[1]**

a) $\frac{1}{2}$ b) not defined

c) 0 d) 1

17. Two coins are tossed together. The probability of getting atmost two heads, is: **[1]**

a) 1 b) $\frac{3}{4}$

c) $\frac{1}{4}$ d) $\frac{1}{2}$

18. Mean and median of some data are 32 and 30 respectively. Using empirical relation, mode of the data is: **[1]**

a) 36 b) 30

c) 20 d) 26

19. **Assertion (A):** A sphere of radius 7 cm is mounted on the solid cone of radius 6 cm and height 8 cm. The volume of the combined solid is 1737.97 cm^3. **[1]**

Reason (R): Volume of sphere is $\frac{4}{3}\pi r^3$.

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):** Sum of natural number from 1 to 100 is 5050. **[1]**

Reason (R): Sum of n natural number is $\frac{n(n+1)}{2}$.

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.

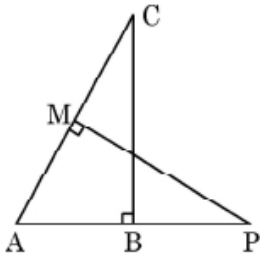
c) A is true but R is false.

d) A is false but R is true.

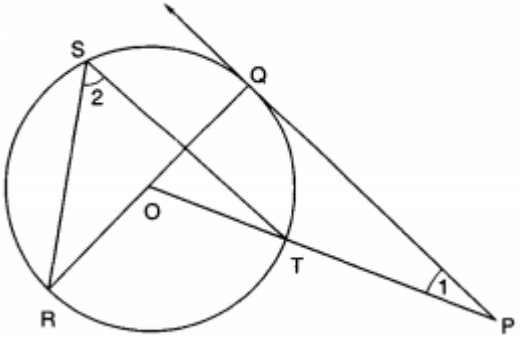
Section B

21. Find the least number which when divided by 12, 16 and 24 leaves remainder 7 in each case. **[2]**

22. In the given figure, ABC and AMP are two right triangles, right angled at B and M, respectively. Prove that **[2]**
$\triangle ABC \sim \triangle AMP$.



23. In figure, PQ is a tangent from an external point P to a circle with centre O and OP cuts the circle at T and QOR is a diameter. If $\angle POR = 130°$ and S is a point on the circle, find $\angle 1 + \angle 2$. **[2]**



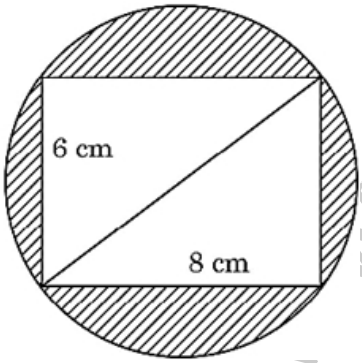
24. If $a\cos\theta - b\sin\theta = c$, prove that $a\sin\theta + b\cos\theta = \pm\sqrt{a^2 + b^2 - c^2}$ **[2]**

OR

Prove the identity:

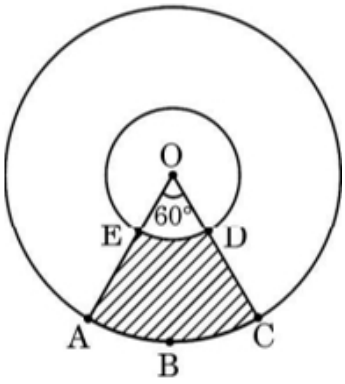
$\sin^6\theta + \cos^6\theta + 3\sin^2\theta\cos^2\theta = 1$

25. Reeti prepares a Rakhi for her brother Ronit. The Rakhi consists of a rectangle of length 8 cm and breadth 6 cm inscribed in a circle as shown in the figure. Find the area of the shaded region. (Use $\pi = 3{\cdot}14$) **[2]**



OR

In the given figure, two concentric circles with centre O are shown. Radii of the circles are 2 cm and 5 cm respectively. Find the area of the shaded region.



Section C

26. Prove that $(3+\sqrt{2})$ is irrational. **[3]**

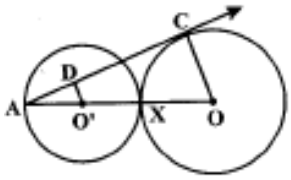
27. Find a quadratic polynomial whose sum and product of the zeroes are $-\frac{21}{8}$ and $\frac{5}{16}$ respectively. Also find the zeroes of the polynomial by factorisation. **[3]**

28. The sum of digits of a two digit number is 15. The number obtained by reversing the order of digits of the given number exceeds the given number by 9. Find the given number. **[3]**

OR

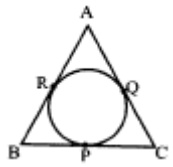
If x + 1 is a factor of $2x^3 + ax^2 + 2bx + 1$, then find the values of a and b given that 2a -3b = 4.

29. Equal circles with centres O and O' touch each other at X. OO' produced to meet a circle with centre O', at A. AC is a tangent to the circle whose centre is O. O' D is perpendicular to AC. Find the value of $\frac{DO'}{CO}$. **[3]**



OR

ABC is an isosceles triangle in which AB = AC, circumscribed about a circle, as shown in the adjoining figure. Prove that the base is bisected at the point of contact.



30. Prove that: $\frac{\sin\theta-\cos\theta+1}{\cos\theta+\sin\theta-1} = \frac{1}{\sec\theta-\tan\theta}$ **[3]**

31. A class teacher has the following absentee record of 40 students of a class for the whole term. Find the mean number of days a student was absent **[3]**

Number of Days	0-6	6-12	12-18	18-24	24-30	30-36	36-42
Number of students	10	11	7	4	4	3	1

Section D

32. The area of right angled triangle is 480 cm^2 . If the base of triangle is 8 cm more than twice the height (altitude) of the triangle, then find the sides of the triangle. **[5]**

OR

Sum of the areas of two squares is 544 m^2. If the difference of their perimeters is 32 m, find the sides of the two squares.

33. If a line is drawn parallel to one side of a triangle to intersect the other two sides at distinct points, prove that the other two sides are divided in the same ratio. **[5]**

34. A solid is in the shape of a cone standing on a hemisphere with both their diameters being equal to 1 cm and the height of the cone is equal to its radius. Find the volume of the solid. [Use π = 3.14] **[5]**

OR

From a solid cylinder of height 30 cm and radius 7 cm, a conical cavity of height 24 cm and same radius is hollowed out. Find the total surface area of the remaining solid.

35. The following table shows the marks scored by 140 students in an examination of a certain paper: **[5]**

Marks	0-10	10-20	20-30	30-40	40-50

Number of students	20	24	40	36	20

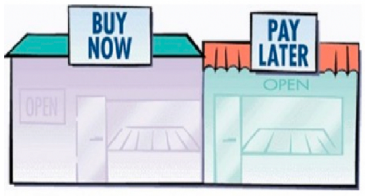
Calculate the average marks by using all the three methods: direct method, assumed mean deviation and shortcut method.

Section E

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

Deepa has to buy a scooty. She can buy scooty either making cashdown payment of ₹ 25,000 or by making 15 monthly instalments as below.

Ist month - ₹ 3425, IInd month - ₹ 3225, IIIrd month - ₹ 3025, IVth month - ₹ 2825 and so on



(a) Find the amount of 6th instalment.

(b) Total amount paid in 15 instalments.

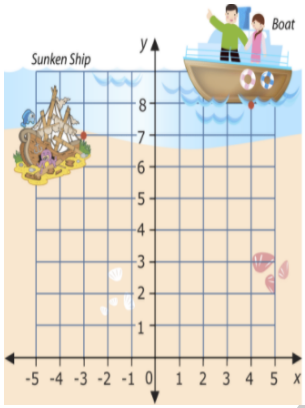
OR

If Deepa pays ₹2625 then find the number of instalment.

(c) Deepa paid 10th and 11th instalment together find the amount paid that month.

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

Mary and John are very excited because they are going to go on a dive to see a sunken ship. The dive is quite shallow which is unusual because most sunken ship dives are found at depths that are too deep for two junior divers. However, this one is at 40 feet, so the two divers can go to see it.



They have the following map to chart their course. John wants to figure out exactly how far the boat will be from the sunken ship. Use the information in this lesson to help John figure out the following.

(a) What are the coordinates of the boat and the sunken ship respectively?

(b) How much distance will Mary and John swim through the water from the boat to the sunken ship?

OR

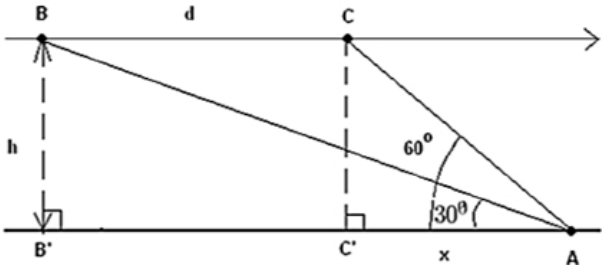
If the distance between the points (x, -1) and (3, 2) is 5, then what is the value of x?

(c) If each square represents 160 cubic feet of water, how many cubic feet of water will Mary and John swim through from the boat to the sunken ship?

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

Mr. Vinod is a pilot in Air India. During the Covid-19 pandemic, many Indian passengers were stuck at Dubai Airport. The government of India sent special aircraft to take them. Mr. Vinod was leading this operation. He is flying from Dubai to New Delhi with these passengers. His airplane is approaching point A along a straight line

and at a constant altitude h. At 10:00 am, the angle of elevation of the airplane is 30^o and at 10:01 am, it is 60^o.



(a) What is the distance **d** is covered by the airplane from 10:00 am to 10:01 am if the speed of the airplane is constant and equal to 600 miles/hour?

(b) What is the altitude **h** of the airplane? (round answer to 2 decimal places)

OR

Find the distance between passenger and airplane when the angle of elevation is 60^o.

(c) Find the distance between passenger and airplane when the angle of elevation is 30^o.