BUDHA DAL PUBLIC SCHOOL PATIALA
SECOND TERM EXAMINATION (11 December 2023)
Class – X
Paper-Mathematics Basic

Time: 3hrs.   M.M. 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.

Section-A

1. Value of $\left(\frac{1}{1+cot^2 Q} + \frac{1}{1+tan^2 Q}\right)$ is

   a) 1   b) −1   c) 0   d) none of these

2. Write the acute angle θ satisfying $\sqrt{3}\sin\theta = \cos\theta$

   a) 30^0 b) 45^0 c) 0   d) 68

3. A line intersecting a circle in two points is called

   a) tangent   b) secant   c) cosecant   d) none of these

4. Area of the sector of angle θ

   a) $\frac{Q}{360} \times \pi r$ b) $\frac{Q}{360} \times \pi r^2$ c) $\frac{Q}{360} \times 2\pi r^2$ d) $\frac{Q}{360} \times 2\pi r$

5. Curved surface area of cone is

   a) πr^2 b) $2\pi rh$ c) $\pi r l$ d) $\pi r^2 h$

6. Total surface area of hemisphere is

   a) πr^2 b) $2\pi r^2$ c) $3\pi r^2$ d) $4\pi r^2$

7. 2 cubes each of volume 64 cm³ and joined end to end. The surface area of the resulting cuboid is

   a) 106 cm³   b) 160 cm³   c) 126 cm²   d) 160 cm²

8. Median can be calculated by using

   a) $l + \left(\frac{\frac{N}{2}-Cf}{f}\right) \times h$ b) $l + \left(\frac{Cf-\frac{N}{2}}{f}\right) \times h$ c) $l + \left(\frac{\frac{N}{2}+Cf}{f}\right) \times h$ d) $l + \left(\frac{\frac{N}{2}-Cf}{f}\right) \times h$

9. If O is centre of a circle and chord PQ makes an angle 50^0 with tangent PR at a point of contact P then the angle subtended by the chord at the centre is

a) 130^0 b) 100^0 c) 50^0 d) 30^0
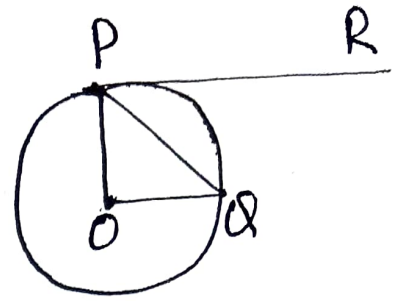
10. Given that $\sin \theta = \frac{a}{b}$, then $\cos \theta$ is

a) $\frac{b}{\sqrt{b^2-a^2}}$ b) $\frac{a}{b}$ c) $\frac{\sqrt{b^2-a^2}}{b}$ d) $\frac{a}{\sqrt{b^2-a^2}}$

11. If a pole 6 m high casts a shadow $2\sqrt{3}m$ long on the ground, then the sun's elevation is

a) 60^0 b) 45^0 c) 30^0 d) 90^0

12. $(\sec A + \tan A)(1 - \sin A)$ equals

a) sec A   b) sin A   c) cosec A   d) cos A

13. If the perimeter and the area of a circle are numerically equal, then radius of the circle is

a) 2 units   b) π units   c) 4 units   d) 7 units

14. 2 cards of hearts and 4 cards of spades are missing from a pack of 52 cards. A card is drawn at random from remaining pack, what is the probability of getting a black card?

a) $\frac{22}{52}$ b) $\frac{22}{46}$ c) $\frac{24}{52}$ d) $\frac{24}{46}$

15. The upper limit of the modal class of the given distribution is

Height	Below 140	Below 145	Below 150	Below 155	Below 160	Below 165
No. of girls	4	11	29	40	46	51

a) 165   b) 160   c) 155   d) 150

16. The area of the circle that can be inscribed in a square of side 6cm is

a) $36 \pi \ cm^2$ b) $18 \pi \ cm^2$ c) $12 \pi \ cm^2$ d) $9 \pi \ cm^2$

17. Two dice are rolled simultaneously what is the probability that 6 will come up atleast once?

a) $\frac{1}{6}$ b) $\frac{7}{36}$ c) $\frac{11}{36}$ d) $\frac{13}{36}$

18. If $5 \tan A = 4$ then $\frac{5 \sin A - 2 \cos A}{5 \sin A + 2 \cos}$

a) $\frac{1}{3}$ b) $\frac{2}{5}$ c) $\frac{3}{5}$ d) 6

Assertion-Reason Based Questions

DIRECTION: In the question number 19 a statement of assertion (A) is followed by a statement of Reason (R), Choose the correct answer out of the following choices:

(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. **Statement A (Assertion):** Total surface area of the top is the sum of the curved surface area of the hemisphere and the curved surface area of the cone.

Statement R (Reason): Top is obtained by joining the plane surfaces of the hemisphere and cone together.

20 Two coins are tossed simultaneously. What is the probability of getting almost one tail.

a) $\frac{3}{4}$ b) $\frac{1}{4}$ c) $\frac{2}{4}$ d) none of these

Section – B

21. In a triangle ABC right angled at B if $\tan A = \frac{1}{\sqrt{3}}$, find the value of $\sin A \cos C + \cos A \sin C$

22. A tower stands vertically on the ground, From a point on the ground which is 15m away from the foot of the tower, the angle of elevation of the top of the tower is found to be 60^0. Find the height of the tower.

23. Fill these

a) A tangent to a circle intersects it in _____ point

b) A line intersecting a circle in two points is called a _____

24. Find the area of a sector of a circle with radius 6 cm if angle of the sector is 60^0.

25. Two players Ram and Sham play a tennis match. The probability of Ram winning the match is 0.62, what is the probability of Sham winning the match?

Section – C

26. A vessel is in the form of a hollow hemisphere mounted by a hollow cylinder. The diameter of the hemisphere is 14cm and the total height of the vessel is 13cm. Find the inner surface area of the vessel.

27. A box contains 5 red marbles, 8 white marbles and 4 green marbles. One marble is taken out of the box at random. What is the probability that the marble taken out will be

(a) red   (b) white   (c) not green

28. An umbrella has 8 ribs which are equally spaced. Assuming umbrella to be a flat circle or radius 45 cm. Find the area between the two consecutive ribs of the umbrella.

29. Prove that the parallelogram circumscribing a circle is a rhombus.

30. Prove that $Sec\ A\ (1 - \sin A)\ (\sec A + \tan A) = 1$

31. A survey conducted on 20 households in a locality by a group of students resulted in the following frequency table for the number of family members and household:

| Family size	1-3	3-5	5-7	7-9	9-11
No. of families	7	8	2	2	1

Find mode of this data

Section – D

32. Prove $\sqrt{\dfrac{1+\sin A}{1-\sin A}} = \sec A + \tan A$

33. The angle of elevation of the top of a building from the foot of the tower is 30^0 an the angle of elevation of the top of the tower from the foot of the building is 60^0. If the tower is 50 m high, find the height of the building.

34. A triangle ABC is drawn to circumscribe a circle of radius 4cm such that the segment BD and DC into which BC is divided by the point of constant D are of lengths 8 cm and 6 cm respectively. Find the sides AB and AC.
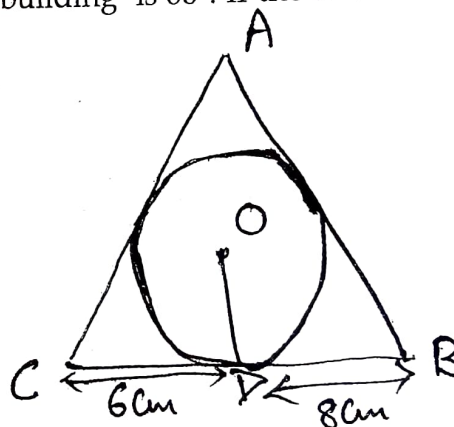
35. The distribution below gives the weights of 30 students of a class. Find the median weight of the students.

Weight	40-45	45-50	50-55	55-60	60-65	65-70	70-75
No. of students	2	3	8	6	6	3	2

Case Study

36 Akriti and Sukriti have to start the game of ludo. They are fighting for who will start the game. They found two coins and decided to toss them simultaneously to know who will start the game.

Based on above information answer the following questions.

(i) How many possible outcomes are there?

(ii) Akriti says if I get atleast one head, I will win and start the game. What is the probability that Akriti will start the game?

OR

Sukriti says if I get at most one tail, I will start the game. What is the probability that Sukriti will start the game?

(iii) If the probability of success is 73%. Then what is the probability of failure?

Case-study

37. **Humayun's Tomb :** Humayun's Tomb is an early example of Mughal architecture built in Delhi. To clean the Minaret top which is at a height of 47 m from the ground, two ladders were made and placed at an angle of 60° and 30° to the horizontal as shown in the figure.
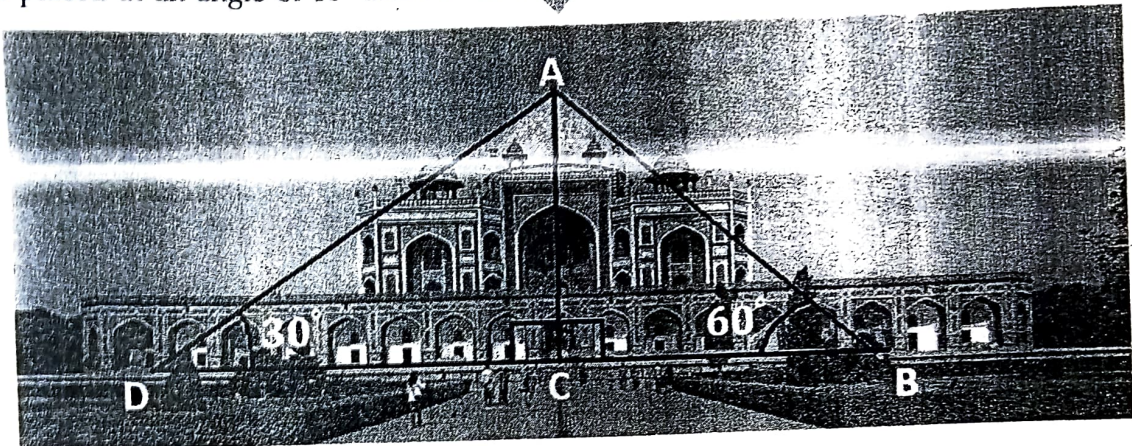
Based on the above information, answer the following questions:

(i) Which of the trigonometric ratio of the ∠B will represent $\frac{AC}{AB}$?

(ii) Find the length of the ladder AB in m.

(iii) Find the length of the ladder AD.

OR

(iii) Which is greater DC or BC?

Case Study

38. Aisha took a pack of 52 cards. She kept aside all the face cards and shuffled the remaining cards well.

Based on the above information answer the following questions.

(i) Write the number of total possible outcomes.

(ii) She draw a card from the well-shuffled pack of remaining cards. What is the probability that the card is a red card?

(iii) Write the probability of drawing a black card.

OR

What is the probability of getting neither a black card nor a red card?