

BUDHA DAL PUBLIC SCHOOL PATIALA
SECOND TERM EXAMINATION (11 December 2023)
Class - X
Paper-Mathematics Standard (Set-A)

Time: 3hrs.

M.M. 80

General Instructions:

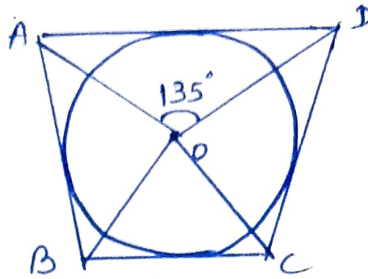
1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.

Section-A

1. If the value of $\cos A$ is $\frac{4}{5}$, then what will be the value of $\tan A$
a) $\frac{4}{3}$ b) $\frac{3}{4}$ c) $\frac{5}{4}$ d) none of these
2. $\frac{\sec 30^\circ}{\operatorname{cosec} 60^\circ} = ?$
a) $\frac{2}{\sqrt{3}}$ b) $\sqrt{3}$ c) $\frac{\sqrt{3}}{2}$ d) 1
3. The height of the tower is 12m. Calculate the length of its shadow, when sun's altitude is 45° .
a) $12\sqrt{3}$ b) $\frac{12}{\sqrt{3}}$ c) 12 d) none of these
4. The total surface area of a hemisphere of radius $r/2$ is
a) $\frac{1}{4} \pi r^2$ b) $2 \pi r^2$ c) $\frac{3}{4} \pi r^2$ d) $\frac{2}{3} \pi r^2$
5. The length of the tangent from a point A at a distance of 5cm from the centre of the circle is 4cm. What will be the diameter of the circle?
a) 6 cm b) 9 cm c) 5 cm d) 4 cm
6. A sector of 120° cut out from a circle has an area of $9\frac{3}{7}$ sq cm. Find the radius of the circle
a) 5 cm b) 1 cm c) 3 m d) 2 m
7. A toy is in the form of a cone mounted on a hemisphere of common base radius 7cm. If the total height of the toy is 31cm, then the height of the cone is
a) 31 cm b) 38 cm c) 7 cm d) 24 cm

8. In the given figure if $\angle AOD = 135^\circ$, then $\angle BOC$ is

- a) 52.5°
- b) 45°
- c) 62.5°
- d) 25°



9. The length of arc of a sector of angle θ of a circle with radius R is

- a) $\frac{2\pi R}{360^\circ}$
- b) $\frac{2\pi R\theta}{360^\circ}$
- c) $\frac{\pi R^2\theta}{180^\circ}$
- d) $\frac{\pi R^2\theta}{360^\circ}$

10. What is the probability that two friends have different birthdays?

- a) $\frac{1}{365}$
- b) $\frac{2}{365}$
- c) $\frac{364}{365}$
- d) $\frac{363}{365}$

11. How many multiples of 4 are there in between 10 and 250?

- a) 70
- b) 60
- c) 65
- d) 73

12. What is the mean of the following data?

Class Interval	50-60	60-70	70-80	80-90	90-100
Frequency	8	6	12	11	13

- a) 78
- b) 68
- c) 48
- d) 58

13. A card is drawn from a well shuffled deck of 52 cards. The probability that the card will not be an ace is

- a) $\frac{1}{13}$
- b) $\frac{1}{4}$
- c) $\frac{12}{13}$
- d) $\frac{3}{4}$

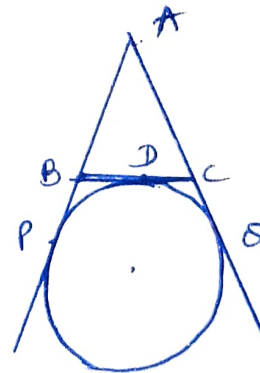
14. Write the maximum value of $\frac{1}{\operatorname{cosec} \theta}$

- a) $\frac{1}{2}$
- b) $\sqrt{2}$
- c) 1
- d) none of these

15. In the given figure, AP, AQ and BC are

tangents to the circle. If $AB = 5\text{cm}$, $AC = 6\text{cm}$ and $BC = 4\text{cm}$ then the length of AP is

- a) 7.5
- b) 15
- c) 10
- d) 9



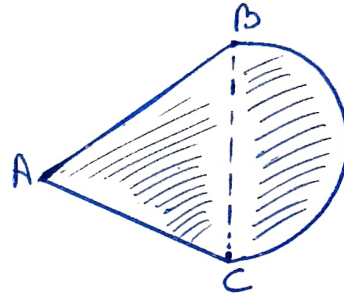
16. A pendulum swings through an angle of 30° and describes an arc 6.6cm in length then the length of pendulum is

- a) 12.6 cm
- b) 10.6 cm
- c) 5 cm
- d) 10 cm

17. A toy is in the form of a cone mounted on a hemisphere of common base radius 7cm. If the total height of the toy is 31 cm, then the height of the cone is

- a) 31 cm b) 38 cm c) 7 cm d) 24 cm

18. In the adjoining figure ABC is an isosceles triangle with $AB = AC = 5\text{cm}$ and base $BC = 5.6\text{ cm}$ and a semicircle with mid point of BC as its centre. The perimeter of the shaded figure is



- a) 15.6 cm b) 18.8 cm c) 20.4 cm d) 24.4 cm

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

- a) Both A and R are true and Reason (R) is correct explanation of A
 b) Both A and R are true but Reason (R) is not the correct explanation of A
 c) A is true but R is false
 d) A is false but R is true
19. Statement A (Assertion) : The area enclosed by a chord and the major arc is major segment.
 Statement R (Reason) : If a circle is divided into three equal arcs, then each is a major arc.
20. Statement A (Assertion) : In a cricket match a batsman hits a boundary 9 times out of 45 balls he plays. The probability that in a given throw he does not hit the boundary is $\frac{4}{5}$.
 Statement R (Reason): $P(E) + P(\text{not } E) = 1$

Section - B

21. If $\tan \theta = \frac{20}{21}$, then the value of $\frac{\sin \theta \cos \theta}{\cos^2 \theta - \sin^2 \theta}$
22. The circumference of a circle exceeds the diameter by 33.6 m. Find the area of the circle.
23. The largest sphere is carved out of a cube of sides 7cm. Find the volume of sphere and the volume of the wood left.

OR

The following table shows the marks obtained by 140 students in an examination

Marks	0-10	10-20	20-30	30-40	40-50
No. of students	20	36	40	28	16

Find mode of the given data

24. If two dices are thrown simultaneously. Find the probability that the product of two numbers appearing in the two dice is less than 18.

25. Prove that $(\sqrt{3} + 1)(3 - \cot 30^\circ) = \tan^3 60^\circ - 2 \sin 60^\circ$

OR

If $2 \cos(A + B) = 1$ and $2 \sin(A - B) = 1$ find A and B.

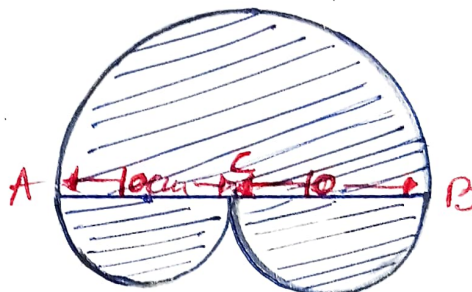
Section - C

26. Prove that $(1 + \cot \theta - \operatorname{cosec} \theta)(1 + \tan \theta + \sec \theta) = 2$

OR

Prove that $(\sec \theta - \operatorname{cosec} \theta)(1 + \tan \theta + \cot \theta) = \tan \theta \sec \theta - \cot \theta \operatorname{cosec} \theta$

27. In the figure, if $AB = 20$ cm, ^{find} the area of the shaded region.



28. Prove that the lengths of tangents drawn from an external point to a circle are equal.

29. A solid toy is in the form of a hemisphere surmounted by a right circular cone. If the height of the cone is 4cm and diameter of the base is 6cm, calculate surface area of the toy ($\pi = 3.14$)

30. The following table gives the daily income of 50 workers of a factory. Find the mean of the given data:

Daily income (Rs.)	100-120	120-140	140-160	160-180	180-200
No. of workers	12	14	8	6	10

Section - D

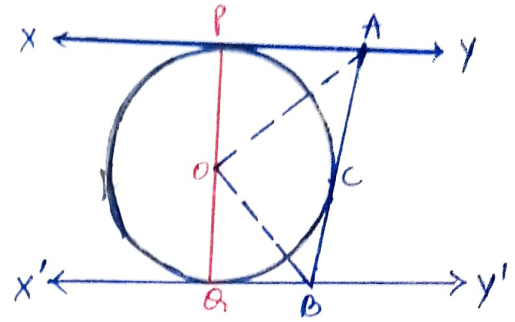
31. A coin is tossed 3 times, list the possible outcomes. Find the probability of getting

i) Atleast 2 heads ii) atmost 2 tails

32. If the median of the following distribution is 46, find the missing frequencies.

Class Int.	10-20	20-30	30-40	40-50	50-60	60-70	70-80	Total
Freq.	12	30	f_1	65	f_2	25	18	229

33. XY and X'Y' are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersecting XY and X'Y' at B.



Prove that $\angle AOB = 90^\circ$

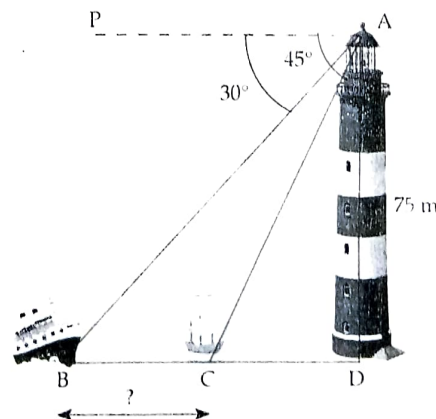
34. A chord AB of a circle of radius 12cm makes an angle 60° at the centre of the circle. Find the area of the major and minor segments. (use $\pi = 3.14$ and $\sqrt{3} = 1.73$)
35. A card is drawn at random from a pack of 52 cards. Find the probability that the card is
- a black and queen
 - neither a red card nor a queen
 - a club or an ace
 - non face card of red colour
 - the jack of hearts

SECTION E

(Case study based questions are compulsory.)

36. Case-study 1

A lighthouse is a tower topped with a very bright light called a beacon. The beacon is used by sailors to help guide their ship at night. No matter their size or shape, lighthouses have served an important role in keeping ships and sailors safe from harm. Their shining lights have served as important navigational aids for thousands of years and have prevented countless shipwrecks by warning unsuspecting vessels away from unseen dangers. Although they are now considered old fashioned and obsolete, lighthouses continue to serve as symbols of hope to this day.



From the top of a 75 m high lighthouse, a person observes two ships due East. Based on the above information, answer the following:

- Find the angle of depression of the ship, which is closer to the lighthouse.
- What is the distance of the ship C from the lighthouse?

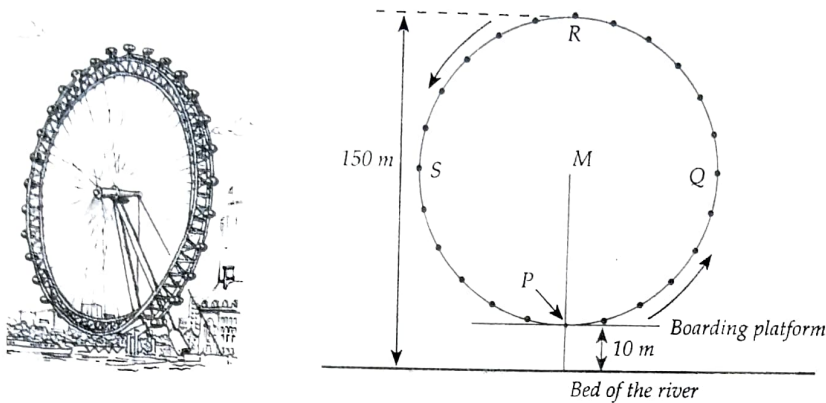
(iii) What is the distance of the ship B from the lighthouse?

OR

(iii) What is the distance between the ships?

37. Case-study 2

In a fair, a giant wheel was fixed. The giant wheel is in the shape of a circle divided into 12 equal sectors as shown in the diagram below.



Based on this, answer the following questions.

(i) Find the radius of the circular wheel.

(ii) Find the distance between the centre of the circle and the ground level.

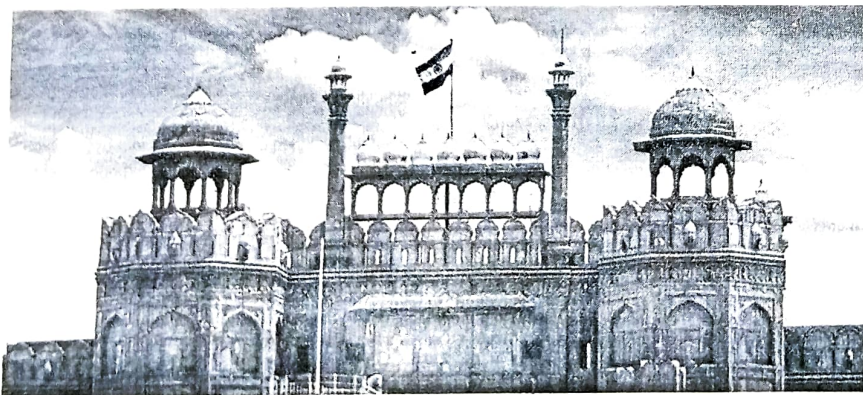
(iii) Find the angle formed by each sector at the centre.

OR

(iii) Find the area of each sector of the circle.

38. Case-study 3

Mathematics teacher of a school took her 10th standard students to show Red Fort. It was a part of their Educational trip. The teacher had interest in history as well. She narrated the facts of Red Fort to students. Then the teacher said in this monument one can find combination of solid figures. There are 2 pillars which are cylindrical in shape. Also 2 domes at the corners which are hemispherical and 7 smaller domes at the centre. Flag hoisting ceremony on Independence Day takes place near these domes.



Based on this, answer the following questions.

(i) How much cloth material will be required to cover 2 big domes each of radius 2.5 m? Take $\pi = 22/7$

(ii) Write the formula to find the volume of a cylindrical pillar.

(iii) Find the lateral surface area of two pillars if height of the pillar is 7 m and radius of the base is 1.4 m.

OR

(iii) How much is the volume of a hemisphere if the radius of the base is 3.5 m?