

MATHEMATICS STANDARD

(Questions)

2022 SET A-1

SECTION – A

1. (a) Find the sum of first 30 terms of AP: $-30, -24, -18, \dots$

OR

(b) In an AP if $S_n = n(4n + 1)$, then find the AP.

2. A solid metallic sphere of radius 10.5 cm is melted and recast into a number of smaller cones, each of radius 3.5 cm and height 3 cm . Find the number of cones so formed.

3. (i) Find the value of m for which the quadratic equation $(m - 1)x^2 + 2(m - 1)x + 1 = 0$ has two real and equal roots

OR

(ii) Solve the following quadratic equation for x :

4. Find the mode of the following frequency distribution:

| Class | 10 – 20 | 20 – 30 | 30 – 40 | 40 – 50 | 50 – 60 |
|-----------|---------|---------|---------|---------|---------|
| Frequency | 15 | 10 | 12 | 17 | 4 |

5. The product of Rehan's age (in years) 5 years ago and his age 7 years from now, is one more than twice his present age. Find his present age

6. Two concentric circles are of radii 4 cm and 3 cm . Find the length of the chord of the larger circle which touches the smaller circle.

SECTION – B

7. For what value of x , is the median of the following frequency distribution $34 - 5$?

| Class | Frequency |
|-------|-----------|
| 0-10 | 3 |
| 10-20 | 5 |
| 20-30 | 11 |
| 30-40 | 10 |
| 40-50 | x |
| 50-60 | 3 |
| 60-70 | 2 |

8. Draw a circle of radius 3 cm . Take two points P and Q on one of its extended diameters each at a distance of 7 cm from its center. Construct tangents to the circle from these two points P and Q .

9. (a) The angle of elevation of the top of a building from the foot of the tower is 30° and the angle of elevation of the top of the tower from the foot of the building is 60° . If the tower is 50 m high, then find the height of the building.

OR

(b) From a point on a bridge across a river, the angles of depression of the banks on opposite sides of the river are 30° and 45° respectively. If the bridge is at a height of 3 m from the banks, then find the width of the river.

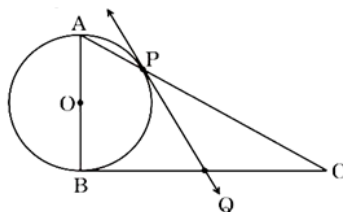
10. Following is the daily expenditure on lunch by 30 employees of a company:

| Daily expenditure (in rupees) | Numbers of employees |
|-------------------------------|----------------------|
| 100-120 | 8 |
| 120-140 | 3 |
| 140-160 | 8 |
| 160-180 | 6 |
| 180-200 | 5 |

Find the mean daily expenditure of the employees.

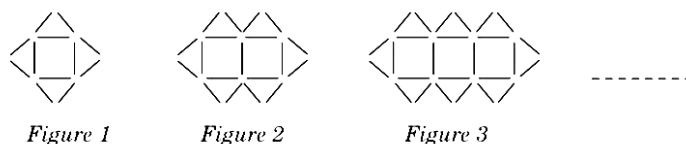
SECTION – C

11. (a) 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.
 (b) Water in a canal, 8 m wide and 6 m deep, is flowing with a speed of 12 km/hour. How much area will it irrigate in one hour, if 0.05 of standing water is required?
12. In figure 1, a triangle ABC with $\angle B = 90^\circ$ is shown. Taking AB as diameter, a circle has been drawn intersecting AC at point P. prove the tangent drawn at point P bisects BC.



CASE STUDY – 1

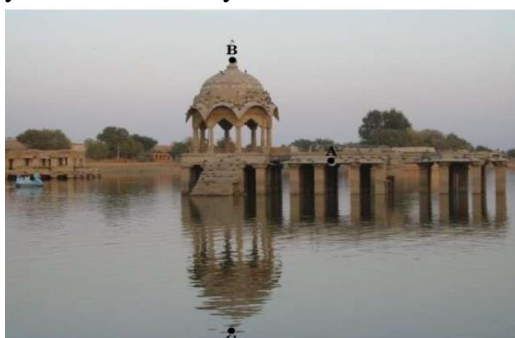
13. In mathematics relations can be expressed in various ways. The matchstick patterns are based on linear relations. Different strategies can be used to calculate the number of matchstick used in different figures. One such patterns is shown below. Observe the pattern and answer the following questions using arithmetics progression:



- (a) Write the AP for the number of triangle used in the figures. Also write the n^{th} term of this AP.
 (b) Which figure has 61 matchstick.

CASE STUDY – 2

14. Gadisar Lake is located in the Jaisalmar district of Rajasthan. It was build by the king of Jaisalmar and rebuild by Gadsingh in 14th century.the lake has many chhatris. One of them isn shown below:



Observe the picture. From a point A h m above water level, the angle of elevation of top of chhatris (point B) is 45° and angle of depression of its reflection in water (point C) is 60° . If the height of chhatris above water level is (approximately) 10 m, then

(a) Draw a well-labelled figure based on the above information

(b) Find the height (h) of the point A above water level.

(Use $\sqrt{3} = 1.73$)

