CBSE EXAMINATION PAPER-2022

MATHEMATICS

(Solved)

Time allowed : 3 hours | Maximum Marks : 43

General Instructions :

Read the following instructions carefully and follow them :

i. This question paper contains **21 questions.** All questions are **compulsory.**

ii. This question paper is divided into **4 sections.**

iii. **Section A** – questions number **1 to 5** are case based questions

iv. **Section B** – questions number **6 to 13** are very short answer

v. **Section C** – questions number **14 to 18** are short answer

vi. **Section D** – questions number **19 to 21** are long answer

vii. There is no overall choice given in the question paper. However, an internal choice has been provided in few questions.

viii. Use of calculator is NOT allowed.

Section A

Question 1.

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 matchsticks used in different figures.

One such pattern is shown below. Observe the pattern and answer the following questions using Arithmetic Progression.

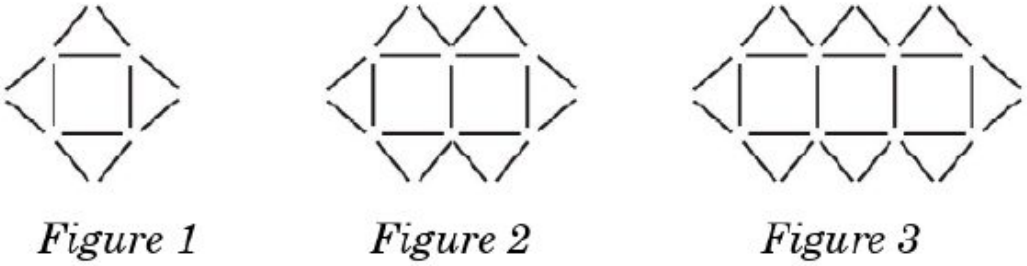


Figure 1 *Figure 2* *Figure 3*

(1)

Write the AP for the number of triangles used in the figures. Also, write the n^{th} term of this AP.

[2 Marks]

(2) Which figure has 61 matchsticks?

[2 Marks]

Question 2.

Gadisar Lake is located in the Jaisalmer district of Rajasthan. It was built by the King of Jaisalmer and rebuilt by Gadsi Singh in the 14^{th} century. The lake has many Chhatris. One of them is shown below. observe the picture From a point A h m above water level, the angle of elevation of top of Chhatri (point B) is 45° and angle of depression of its reflection in water (point C) is 60°. If the height of Chhatri above water level is approximately 10 m, then



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

[2 Marks]

(2)

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

(Use √3 = 1.73)

[2 Marks]

Question 3.

Question 4.

Question 5.

Section B

Question 6.

Find the sum of first 30 terms of AP: -30, -24, -18, ...

[2 Marks]

Question 7.

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

[2 Marks]

Question 8. 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.

[2 Marks]

Question 9. 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.

[2 Marks]

Question 10.

Solve the following quadratic equation for x : $\sqrt{3}x^2 + 10x + 7\sqrt{3} = 0$

[2 Marks]

Question 11.

Find the mode of the following frequency distribution:

[2 Marks]

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

Question 12.

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.

[2 Marks]

Question 13. 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.

[2 Marks]

Section C

Question 14.

For what value of x is the median of the following frequency distribution 34.5?

[3 Marks]

Class	*Frequency*
0 – 10	3
10 – 20	5
20 – 30	11
30 – 40	10
40 – 50	x
50 – 60	3
60 – 70	2

Question 15. Draw a circle of radius 3 cm. Take two points P and Q on one of its extended diameter each at a distance of 7 cm from its centre. Construct tangents to the circle from these two points P and Q.

[3 Marks]

Question 16. 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.

[3 Marks]

Question 17. 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.

[3 Marks]

Question 18.

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

Find the mean daily expenditure of the employees.

[3 Marks]

Daily Expenditure (in Rupees)	*Number of Employees*
100 – 120	8
120 – 140	3
140 – 160	8
160 – 180	6
180 – 200	5

Section D

Question 19. 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.

[4 Marks]

Question 20. In Figure 1, a triangle ABC with ∠B = 90° is shown. Taking AB as diameter, a circle has been drawn intersecting AC at point P. Prove that the tangent drawn at point P bisects BC.

[4 Marks]

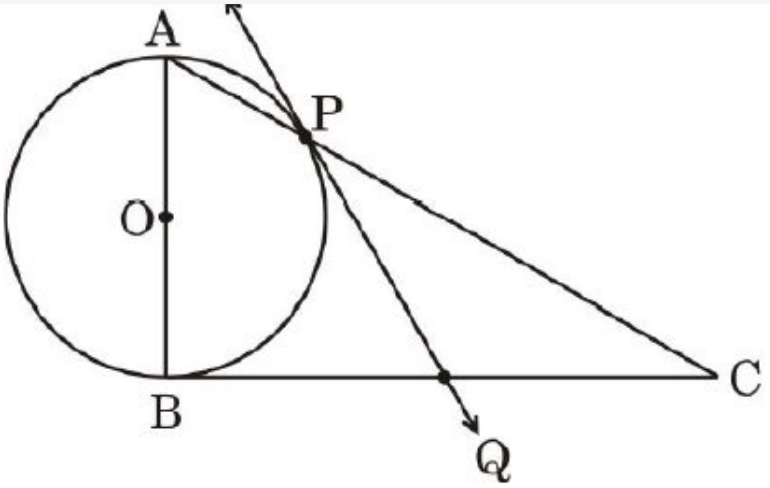


Figure 1

Question 21.

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 m of standing water is required ?

[4 Marks]