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 **24 questions.** All questions are **compulsory.**

ii. This question paper is divided into **3 sections.**

iii. **Section A** – questions number **1 to 8** are very short answer Each question carries **2 marks.**

iv. **Section B** – questions number **9 to 13** are short answer Each question carries **3 marks.**

v. **Section C** – questions number **14 to 21** are case based questions

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

vii. Use of calculator is NOT allowed.

Section A

Question 1. Solve the quadratic equation for x : $x^2 - 2ax + (4b^2 - a^2) = 0$.

[2 Marks]

Question 2. If the quadratic equation $(1 + a^2)\,x^2 + 2abx + (b^2 - c^2) = 0$ has equal and real roots, then prove that $b^2 = c^2(1 + a^2)$.

[2 Marks]

Question 3.

Find the sum of first 20 terms of an AP in which d = 5 and a_{20} = 135.

[2 Marks]

Question 4.

Find the mode of the given frequency distribution:

[2 Marks]

Question 5.

150 spherical marbles, each of diameter 1.4 cm, are dropped in a cylindrical vessel of diameter 7 cm containing some water, and are completely immersed in water. Find the rise in the level of water in the cylindrical vessel.

[2 Marks]

Question 6. Three cubes of side 6 cm each are joined as shown in Figure 1. Find the total surface area of the resulting cuboid.

[2 Marks]

Question 7.

For what value of 'n', are the n^{th} terms of the APs 9, 7, 5, ... and 15, 12, 9, ... the same?

[2 Marks]

Question 8. In Figure 2, PQ and PR are tangents to the circle centred at O. If ∠OPR = 45°, prove that ORPQ is a square.

[2 Marks]

Section B

Question 9. Draw a line segment AB of length 8 cm and locate a point P on AB such that AP : PB = 1 : 5.

[3 Marks]

Question 10. Draw a circle of radius 3 cm. From a point P lying outside the circle at a distance of 6 cm from its centre, construct two tangents PA and PB to the circle.

[3 Marks]

Question 11. The tops of two poles of heights 20 m and 28 m are connected with a wire. The wire is inclined to the horizontal at an angle of 30°. Find the length of the wire and the distance between the two poles.

[3 Marks]

Question 12.

The weights (in kg) of 50 wild animals of a National Park were recorded and the following data was obtained:

Find the mean weight (in kg) using assumed mean method.

[3 Marks]

Question 13.

For the following frequency distribution, find the median:

[3 Marks]

Section C

Question 14. In the picture given below, one can see a rectangular in-ground swimming pool installed by a family in their backyard. There is a concrete sidewalk around the pool of width x m. The outside edges of the sidewalk measure 7 m and 12 m. The area of the pool is 36 sq. m.

(1) Based on the information given above, form a quadratic equation in terms of x.

[2 Marks]

(2)

Find the width of the sidewalk around the pool.

[2 Marks]

Question 15. John planned a birthday party for his younger sister with his friends. They decided to make some birthday caps by themselves and to buy a cake from a bakery shop. For these two items, they decided the following dimensions : Cake : Cylindrical shape

with diameter 24 cm and height 14 cm. Cap: Conical shape with base circumference 44 cm and height 24 cm. Based on the above information, answer the following questions :

Question 16. John planned a birthday party for his younger sister with his friends. They decided to make some birthday caps by themselves and to buy a cake from a bakery shop. For these two items, they decided the following dimensions : Cake : Cylindrical shape with diameter 24 cm and height 14 cm. Cap: Conical shape with base circumference 44 cm and height 24 cm. Based on the above information, answer the following questions :

Question 17. John planned a birthday party for his younger sister with his friends. They decided to make some birthday caps by themselves and to buy a cake from a bakery shop. For these two items, they decided the following dimensions : Cake : Cylindrical shape with diameter 24 cm and height 14 cm. Cap: Conical shape with base circumference 44 cm and height 24 cm. Based on the above information, answer the following questions :

Question 18. John planned a birthday party for his younger sister with his friends. They decided to make some birthday caps by themselves and to buy a cake from a bakery shop. For these two items, they decided the following dimensions : Cake : Cylindrical shape with diameter 24 cm and height 14 cm. Cap: Conical shape with base circumference 44 cm and height 24 cm. Based on the above information, answer the following questions :

Question 19. John planned a birthday party for his younger sister with his friends. They decided to make some birthday caps by themselves and to buy a cake from a bakery shop. For these two items, they decided the following dimensions : Cake : Cylindrical shape with diameter 24 cm and height 14 cm. Cap: Conical shape with base circumference 44 cm and height 24 cm. Based on the above information, answer the following questions :

Question 20. John planned a birthday party for his younger sister with his friends. They decided to make some birthday caps by themselves and to buy a cake from a bakery shop. For these two items, they decided the following dimensions : Cake : Cylindrical shape with diameter 24 cm and height 14 cm. Cap: Conical shape with base circumference 44 cm and height 24 cm. Based on the above information, answer the following questions :

Question 21.

John planned a birthday party for his younger sister with his friends. They decided to make some birthday caps by themselves and to buy a cake from a bakery shop. For these two items, they decided the following dimensions :

Cake : Cylindrical shape with diameter 24 cm and height 14 cm.

Cap : Conical shape with base circumference 44 cm and height 24cm.

Based on the above information, answer the following questions :

(1) How many square cm paper would be used to make 4 such caps ?

[2 Marks]

(2)

The bakery shop sells cakes by weight (0·5 kg, 1 kg, 1·5 kg, etc.). To have the required dimensions, how much cake should they order, if 650 cm3 equals 100 g of cake ?

[2 Marks]