MP BOARD CLASS 10 MATHEMATICS MODEL PAPER SET 4 2020

1. Choose the correct option and write : $1 \times 5=5$

(i) A man observed from the top of an electric pole, the angle of depression of a point at the ground is 60°. If the distance of the point from the foot of the electric pole is 25 m. Then the height of the pole will be:

(a) 25 m   (b) $25\sqrt{2}$ m   (c) $25\sqrt{3}$ m   (d) 1 m.

(ii) From a point the length of the tangent to a circle is 24 cm and the distance of from the centre is 25 cm. The radius of the circle is :

(a) 7 cm   (b) 12 cm   (c) 15 cm   (d) 24.5 cm.

(iii) Ife is the angle in degree) of a sector of a circle of radius r, then area of the sector is :

(a) $\frac{\pi r^2 \theta}{360°}$ (b) $\frac{\pi r^2 \theta}{180°}$ (c) $\frac{2\pi r \theta}{360°}$ (d) $\frac{2\pi r \theta}{180°}$.

(iv) During conversion of a solid from one shape to another, the volume of the new shape will be:

(a) increases   (b) decreases   (c) remains unchanged   (d) be doubled.

(v) An event is very unlikely to happen. It's probability is closest to :

(a) 0.0001   (b) 0.001   (c) 0.01   (d) 0.1.

Ans. (i) (c), (ii) (a), (iii) (a), (iv) (c), (v) (a).

2. Fill in the blanks : $1 \times 5=5$

(i) Product of the greatest power of each prime factor involved in the numbers is called ....

(ii) All .... triangles are similar.

(iii) The distance between (0, y) and (x, 0) is ………

(iv) A line intersecting a circle in two points is called ……….

(v) A portion of a circular field covered by two radii and corresponding arc is called…………

Ans. (i) L.C.M., (ii) equilateral, (iii) $\sqrt{x^2 + y^2}$, (iv) Secant, (v) Sector.

3. Match the columns : $1 \times 5 = 5$

Column 'A'   Column 'B'

(i) $\sin\theta .\mathrm{cosec}\,\theta$ (a) $\mathrm{cosec}^2\theta$

(ii) $\sin (90°-\theta)$ (b) 2

(iii) $\cot (90° -\theta)$ (c) 1

(iv) $1 + \cot^2\theta$ (d) $\cos\theta$

(v) $\sec 60°$ (e) $\tan\theta$

Ans. (i) → (c), (ii) → (d), (iii) → (e), (iv) → (a), (v) → (b).

4. Write True/False : $1 \times 5 = 5$

(i) The highest power of x in polynomial p(x) is called the degree of the polynomial.

(ii) The pair of linear equations have either a unique solution, infinitely many solutions or no solutions.

(iii) The maximum power of a variable in a quadratic equation can be any.

(iv) The difference of any two terms of an AP is common difference.

(v) The value of modes calculated from the grouped data and ungrouped data of same observations are always same.

Ans. (i) True, (ii) True, (iii) False, (iv) False, (v) False.

5. Answer in one word/sentence : $1 \times 5 = 5$

(i) If α a and β are the zeros of $ax^2 + bx + c$ then what will be the value of $\alpha +$?

(ii) What the type of equation is called whose graph is a straight line ?

(iii) What the two values of the variable of a quadratic equation are called ?

(iv) $\dfrac{3}{\sqrt{5}}, \dfrac{4}{\sqrt{5}}, \sqrt{5}, \ldots\ldots$ is which type of progression ?

(v) What the class of maximum frequency is called ?

Ans. (i) $-\dfrac{b}{a}$, (ii) Linear equation, (iii) Roots, (iv) Arithmetical progression (AP), (v) Modal-class.

6. Use Euclid's division algorithms to find HCF of 135 and 225.   2

Or

Find the L.C.M. and H.C.F. of 12, 15 and 21 applying the prime factorisation method.

7. Find the quadratic polynomial with the given numbers as the sum and product of its zeros are respectively $\dfrac{1}{4}$ and - 1.   2

Or

Find the quadratic polynomial with the given numbers as the sum and product of its zeros are respectively $\sqrt{2}$ and $\dfrac{1}{3}$.

8. Find the distance between the points (2, 3) and (4,1).   2

Or

Find the distance between the points (-5, 7) and (-1, 3).

9. A bag contains lemon flavoured candies only. Malini takes out one candy without looking into the bag. What is the probability that she takes out (i) an organe flavoured and (ii) a lemon flavoured candy?   2

Or

A bag contain 3 red balls and 5 black balls. A ball is drawn at random from the bag. What is the probability that the ball drawn is (i) red ? (ii) not red ?

10. Two different dice are tossed together. Find the probability that the product of two numbers on the top of the dice is 6.   2

Or

A card is drawn at random from a well-shuffled pack of 52 playing cards. Find the probability of getting neither a red card nor a queen.

11. Find the point on x-axis which is equidistant from (2, - 5) and (-2,9).   3

Or

Find the values of y for which the distance between the points P (2, - 3) and Q (10, y) is 10 units.

12. If tan (A+B) = $\sqrt{3}$ and tan (A-B) = $\dfrac{1}{\sqrt{3}}$, $0^\circ < A + B < 90^\circ$ and A > B, find A and B.   3

Prove the following identity, where the angle involved are acute angle for which the expressions are defined :

$(\sin A + \mathrm{cosec}\ A)^2 + (\cos A + \sec A)^2 = 7 + \tan^2 A + \cot^2 A$.

13. Prove that the tangents drawn at the end points of diameter of a circle are parallel.   3

Or

Prove that the perpendicular at the point of contact to the tangent to a circle passes through the centre.

14. Find the area of the shaded region in the given figure,
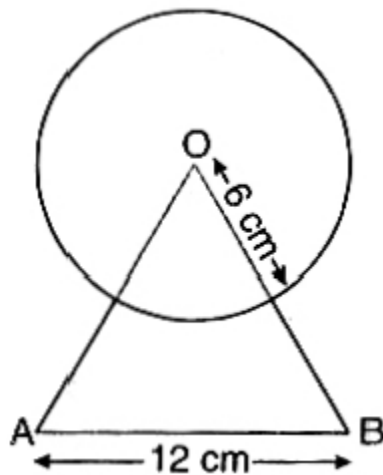
where a circular are of radius 6 cm have been drawn with vertex O of the equilateral triangle OAB of side 12 cm as centre. (use π = 22/7)

Or
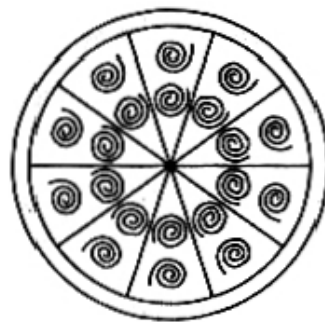
A brooch is made with silver wire in the form of a circle with diameter 35 mm. The wire is also used in making 5 diameters which divide the circle into 10 equal sectors as shown in the given figure. Find (i) the total length of the silver wire required (ii) The area of each sector of the brooch. (use π = 22/7).

15. Use Euclid's Division Lemma to show that the square of any positive integer is either of the form 3 m or 3m + 1 for some integer m.

Or

Use Euclid's Division Lemma to show that the cube of any positive integer is of the form 9m, 9m +1 or 9m +8.

16. Find the zeros of quadratic polynomial x^2 - 2x -8 and verify, the relationship between the zeros and the coefficients.   4

Or

Divide the polynomial p(x) by polynomial g(x) and find the quotient and remainder:

p(x) = ? $x^{3-}3x^2$ + 5x − 3; g (x) = x^2 - 2.

17. Solve the following pair of linear equations by substitution method :   4

0.2.x + 0-3y = 1:3; 0.4x + 0.5y = 2.3.

Or

Solve the following pair of linear equations by substitution method :

$$\frac{3x}{2} - \frac{5y}{3} = -2; \frac{x}{3} + \frac{y}{2} = \frac{13}{6}.$$

18. An AP consists 50 terms of which 3rd term is 12 and last term is 106. Find the 29th term.   4

Or

If the 3rd and 9th terms of an AP are 4 and - 8 respectively, which term of this AP is zero ?

19. Using Basic Proportionality Theorem prove that a line drawn through the mid point of one side of triangle parallel to another side bisect the third side.   4

Or

ABCD is a trapezium in which AB || DC and its diagonals intersect each other at point O. Show that:

$$\frac{AO}{BO} = \frac{CO}{DO}.$$

20. A 1.5 m tall boy is standing at some distance from a 30 m tall building. The angle of elevation from his eyes to the top of the building increases from 30° to 60°, as he walks towards the building. Find the distance he walked towards the building.

Or

From a point on the ground, the angle of elevation of the bottom and the top of transmission tower formed at the top of 20 m high building are 45° and 60° respectively. Find the height of the tower.

21. A chord of circle of radius 10 cm subtend a right angle at the centre. Find the area of the corresponding (i) minor segment, (ii) major sector (Use π = 3:14).   4

Or
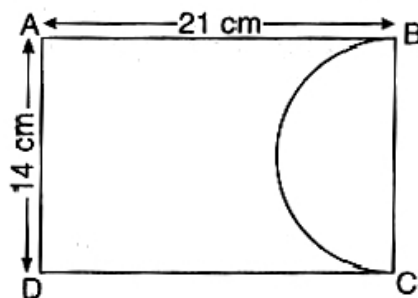
In the given figure, ABCD is a rectangle of dimension 21 cm x 14 cm. A semicircle is drawn with BC as diameter. Find the area and perimeter of the shaded region in the figure.

22. The sum of reciprocals of Rehman's ages (in years) 3 years ago and 5 years from now is $\frac{1}{3}$. Find his present age.   5

Or

In a class test the sum of Shefali's marks in Mathematics and English is 30. Had she got 2 marks more in Mathematics and 3 marks less in English the product of their marks would have been 210. Find her marks in the two subjects.

23. Given $\sec\theta = \dfrac{13}{12}$, calculate all other trigonometrical ratios.   5

Or

If 3 cot A = 4, check whether $\dfrac{1-\tan^2 A}{1+\tan^2 A} = \cos^2 A - \sin^2 A$ or not.

24. Construct an isosceles triangle whose base is 8 cm and altitude 4 cm and then another triangle, whose sides are $1\dfrac{1}{2}$ times the corresponding sides of the isosceles triangle. Give the justification of the construction.   5

Or

Draw a triangle ABC with BC = 6 cm, AB = 5 cm and $\angle$ ABC = 60°. Then construct a triangle whose sides are 3/4 of the corresponding sides of $\triangle$ ABC. Give justification of the construction.

25. A toy is in the form of a cone of radius 3.5 cm mounted on a hemisphere of same radius. The total height of the toy is 15.5 cm. Find the total surface area of the toy.   5

Or

From a solid cylinder whose height is 2.4 cm and diameter 1.4 cm a conical cavity of same height and same diameter is hollowed out. Find the total surface area of the remaining solid to the nearest cm^2.

26. The following table shows the ages of the patients admitted in a hospital during a year :

Age (in years)	5-15	15–25	25–35	35–45	45–55	55-65
Number of Patients	6	11	21	23	14	5

Find the mode and mean of the data given above. Compare and interpret the two measures of central tendency.   http://www.mpboardonline.com   5

Or

The following data gives the distribution of total monthly household expenditure of 200 families of a village. Find the model monthly expenditure of the families. Also find the mean monthly expenditure :

Expenditure (in Rs.)	Number of Families
1,000–1,500	24
1,500–2,000	40
2,000–2,500	33
2,500–3,000	28
3,000-3,500	30
3,500-4,000	22
4,000–4,500	16
4,500-5,000	7