

MP BOARD CLASS 10 MATHEMATICS MODEL PAPER SET 2 2020

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

- (i) If the shadow of a person standing in sun is $\sqrt{3}$ times its height then the angle of elevation of sun is :
(a) 30° (b) 45° (c) 60° (d) 75° .
- (ii) If radius of two concentric circles are 4 cm and 5 cm then the length of each chord of one circle which is tangent to the other circle is:
(a) 3 cm (b) 6 cm (c) 9 cm (d) 1 cm.
- (iii) The relation between an arc of a circle, radius of the circle and the angle subtended by the arc at the centre of the circle is:
(a) Angle = arc \times radius (b) Arc = angle \times radius
(c) Radius = arc \times angle (d) None of the above.
- (iv) If two solid hemisphere of same base radius r are joined together along their bases, then the curved surface area of this new solid is :
(a) $4\pi r^2$ (b) $6\pi r^2$ (c) $3\pi r^2$ (d) $8\pi r^2$
- (v) If an event cannot occur, then its probability is :
(a) 1 (b) $3/4$ (c) $1/2$ (d) 0.
- Ans. (1) (a) (ii) (b) (iii) (b) (iv) (a) (v) (d).

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

- (1) \sqrt{p} is called a, where p is a prime number.
- (ii) All circles are
- (iii) The distance of a point from y-axis is called
- (iv) The radius passing through the point of contact is to the tangent.
- (v) The distance travelled along a circle once is called of the circle.
- Ans. (i) irrational, (ii) similar, (iii) x-coordinate or abscissa, (iv) perpendicular, (v) circumference.

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

- (i) A quadratic polynomial is in the form of ax^2+bx+c , where a, b, c are real numbers and $a \neq 0$.
- (ii) In an equation $x + 2y = 5$ if $x = 1$, then $y = 2$.
- (iii) Quadratic equation can has many solutions.
- (iv) The terms of an AP are always in ascending order <http://www.mpboardonline.com>
- (v) The value of medians calculated from the grouped and ungrouped data of same observations are always same.
- Ans. (i) True, (ii) True, (iii) False, (iv) False, (v) False.

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

- (i) If α and β are the zeros of $ax^2 + bx + c$ then what will be the value of $\alpha \cdot \beta$?
- (ii) What type of the graph will be of the system of equations which have infinitely many solutions?
- (iii) If the discriminant of a quadratic equation is equal to zero then what type its roots will be ?
- (iv) Is $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \dots$ an AP or not?
- (v) What the score dividing, the entire frequency distribution in two equal parts is called ?
- Ans. (1) c/a , (ii) Coincident lines, (iii) Equal and real, (iv) No, (v) Median class.

5. Match the following columns : 1 x 5 = 5

Column 'A'

Column 'B'

(i) $\sec^2 3\theta - \tan^2 3\theta$

(a) $\cot^2 \theta$

(ii) $2 \tan \theta \cdot \cot \theta$

(b) $\sec \theta$

(iii) $1 + \tan^2 \theta$

(c) 1

(iv) $\operatorname{cosec}^2 \theta - 1$

(d) 2

(v) $\operatorname{cosec} (90^\circ - \theta)$

(e) $\sec^2 \theta$

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

6. Show that any positive odd integer is of the forms, $6q + 1$ or $6q + 3$ or $6q + 5$, where q is some integer. 2

Or

Given that $\text{HCF}(306, 657) = 9$, find $\text{LCM}(306, 657)$.

7. Find the zeros of quadratic polynomial $x^2 + 7x + 10$. 2

Or

Find the zeros of quadratic polynomial $x^2 - 3$.

8. Find the ratio in which the line segment joining A (1, -5) and B (-4, 5) is divided by the x -axis. Also find the co-ordinates of the point of division. 2

Or

Find the co-ordinates of a point A, where AB is the diameter of a circle whose centre is (2, -3) and B is (1,4).

9. A lot consist of 144 ball pens of which 20 are defective and the others are good. Nuri will buy a pen if it is good, but will not buy if it is defective. The shopkeeper draws one pen at random and gives it to her. What is the probability that: (i) she will buy it, (ii) she will not buy it? 2

Or

A die is thrown twice. What is probability that:

(i) 5 will not either time ? (ii) 5 will come at least once ?

10. There are 1,000 sealed envelopes in a box, 10 of them contains in cash prize of 100 each, 100 of them contains a cash prize of 50 each and 200 of them contains a cash prize of 10 each and rest do not contains any cash prize. If they are well-shuffled and an envelope is picked up out, what is the probability that it contains no cash prize. <http://www.mpboardonline.com>

Or

Box A contains 25 slips of which 19 are marked Rs.1 each and other are marked Rs. 5 each. Box B contain 50 slips of which 45 are marked Rs.1 each and others are marked Rs. 13 each. Slips of both boxes are poured into a third box and reshuffled. A slip is drawn at random what is the probability that it is marked other than Rs. 1?

11. Find the area of rhombus if its vertices are (3, 0), (4, 5), (-1, 4) and (-2, -1) taken in order. 3

Or

Find the area of the quadrilateral whose vertices taken in order are (-4,-2), (-3,-5), (3,-2) and (2, 3).

12. Evaluate : $\frac{\cos 45^\circ}{\sec 30^\circ + \operatorname{cosec} 30^\circ}$

Or

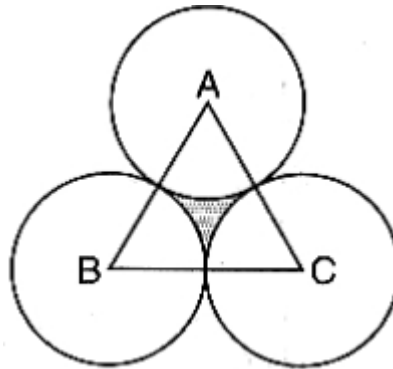
Evaluate : $\frac{\sin 30^\circ + \tan 45^\circ - \operatorname{cosec} 60^\circ}{\sec 30^\circ + \cos 60^\circ + \cot 45^\circ}$.

13. Prove that the parallelogram circumscribing a circle is a rhombus. 3

Or

Prove that the length of the two tangents, drawn from an external point to a circle are equal.

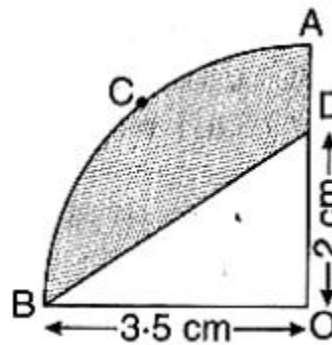
14. The area of an equilateral triangle ABC is 17320.5 cm^2 .



With each vertex of the triangle as centre of a circle is drawn with radius equal to half the length of the side of the triangle (see the given figure). Find the area of the shaded region. (Use $\pi = 3.14$, and $\sqrt{3} = 1.73205$)

3 <http://www.mpboardonline.com>

Or



In the given figure, OACB is a quadrant of a circle with centre (and radius 3.5 cm . If $OD = 2 \text{ cm}$, find the area of the (i) quadrant OACB (ii) shaded region. (Use $\pi = 22/7$)

15. Prove that $6 + \sqrt{2}$ is irrational. 4

An army contingent of 616 members is to march behind an army band of 32 members in a parade. The two groups are to march in the same number of columns. What is the maximum number of columns in which they can march?

16. Find the zeros of the quadratic polynomial $3x^2 - X - 4$ and verify, the relationship between the zeros and the coefficients. 4

Or

On dividing $x^3 - 3x^2 + x + 2$ by a polynomial $g(x)$, the quotient and remainder were $(x - 2)$ and $(-2x + 4)$ respectively. Find $g(x)$.

17. Solve the following pair of equations by reducing them to a pair of linear equations : 4

$$\frac{2}{\sqrt{x}} + \frac{3}{\sqrt{y}} = 2; \frac{4}{\sqrt{x}} - \frac{9}{\sqrt{y}} = -1.$$

Or

Solve the following pair of equations by reducing them to a pair of linear equations :

$$\frac{10}{x+y} + \frac{2}{x-y} = 4; \frac{15}{x+y} - \frac{5}{x-y} = -2.$$

18. Find the sum of first 51 terms of an AP, where second and third terms are 14 and 18 respectively. 4

Or

If the sum of first 7 terms of an AP is 49 and that of 17 terms is 289, find the sum of first n terms.

19. D and E are the points on the sides CA and CB respectively of a triangle ABC right angled at C. Prove that : $AE^2 + BD^2 = AB^2 + DE^2$. 4

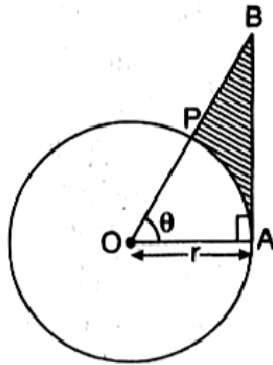
In an equilateral triangle, prove that three times the square of one side is equal to four times the square of one of its altitude. <http://www.mpboardonline.com>

20. From the top of a 7 m high building. The angle of elevation of the top of a cable tower is 60° and the angle of depression of its foot is 45° . Find the height of a cable tower. 4

Or

As observed from the top of a 75 m high light house from the sea-level. The angle of depression of two ships are 30° and 45° . If one ship is exactly behind the other on the same side of the light house, find the distance between the two ships.

21. A chord of a circle of radius 12 cm subtends an angle of 120° at the centre. Find the area of the corresponding segment of the circle. (Use $\pi = 3.14$ and $\sqrt{3} = 1.73$) 4



Or

In the given figure is shown a sector OAP of a circle with centre O, containing $\angle \theta$. AB is perpendicular to the radius OA and meet OP produced at B. Prove that the perimeter of the shaded region is :

$$r \left[\tan \theta + \sec \theta + \frac{\pi \theta}{180^\circ} - 1 \right]$$

22. An express train takes 1 hour less than a passenger train to take 132 km between Mysore and Bangalore (without taking into consideration the time they stop at intermediate stations). If the average speed of the express train is 11 km/hr more than that of the passenger train, find the average speed of the two trains. 5

Or

The sum of the areas of two squares is 468 m^2 . If the difference of their perimeters is 24 m, find the sides of the two squares.

23. Prove that: $(\operatorname{cosec} A - \sin A)(\sec A - \cos A) = \frac{1}{\tan A + \cot A}$. 5

Or

Prove that : $\left(\frac{1 + \tan^2 A}{1 + \cot^2 A} \right) = \left(\frac{1 - \tan A}{1 - \cot A} \right)^2 = \tan^2 A$.

24. Construct a triangle of sides 4 cm, 5 cm and 6 cm and then a triangle similar to it, whose sides are $\frac{2}{3}$ of the corresponding sides of the first triangle. Give the justification of the construction. 5

Or

Construct a triangle with sides 5 cm, 6 cm and 7 cm, and then another triangle whose sides are $\frac{7}{5}$ of the corresponding sides of the triangle. Give justification of the construction.

25. A solid toy is in the form of a hemisphere surmounted by a right circular cone. The height of the cone is 2 cm and the diameter of the base is 4 cm. Determine the volume of the toy. If a right circular cylinder circumscribe the toy, find the difference of the volume of the cylinder and the toy. 5

Or

A metallic right circular cone 20 cm high and whose vertical angle is 60° is cut into two parts at the middle of its height by a plane parallel to its base. If the frustum so obtained be drawn into a wire of diameter $\frac{1}{16}$ cm. Find the length of the wire.

26. The following table gives production yield per hectare of wheat of 100 farms of a village :

Productive yield (in kg/ha)	50-55	55-60	60-65	65-70	70-75	75-80
Numbers of farms	2	8	12	24	38	16

Change the distribution to a more than type distribution and draw its ogive.

5

Or

During the medical check-up of 35 students of a class, their weights were recorded as follows:

Weights (in kg)	Numbers of students
Less than 38	0
Less than 40	3
Less than 42	5
Less than 44	9
Less than 46	14
Less than 48	28
Less than 50	32
Less than 52	35

Draw a less than type ogive for the given data. Hence obtain the median weight from the graph.