

MP BOARD CLASS 10 MATHEMATICS MODEL PAPER SET 1 2020

Time: 3 Hours)

Max. Marks : 100

Directions:

- (1) All the questions are compulsory.
- (2) Q. No. 1 to 5 are objective type questions. Solve as directed.
- (3) Q. No.6 to 26 have options.
- (4) Marks allotted to each question are marked against them.
- (5) Draw neat and clear diagrams wherever is necessary.

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

(i) A tangent PQ at a point P of a circle of radius 5 cm meets a line through the centre O at a point so that OQ = 12 cm then the length PQ is :

- (a) 12 cm (b) 13 cm (c) 8.5 cm (d) $\sqrt{119}$ cm.

(ii) The shadow of a tree is $20\sqrt{3}$. If the height of the tree is 20 m then the angle of elevation of sun will be :

- (a) 30° (b) 45° (c) 60° (d) 75° .

(iii) A right circular cylinder of radius r and height h cm ($h > 2r$) just enclosed a sphere of diameter :

- (a) r cm (b) 2r cm (c) h cm (d) 2h cm.

(iv) Which of the following cannot be the probability of an event ?

- (a) $\frac{1}{3}$ (b) 0.1 (c) 3% (d) $\frac{17}{16}$.

(v) If the area of a circle is 154 cm^2 , then its perimeter is :

- (a) 11 cm (b) 22 cm (c) 44 cm (d) 55 cm.

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

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

(i) Product of the smallest power of each common prime factor in the numbers is called

(ii) All squares are (similar, congruent)

(iii) The distance of a point from x-axis is called

(iv) Tangent to a circle intersect it in points.

(v) The measure of the surface covered by the circle is called

Ans. (i) H.C.F., (ii) similar, (iii) y-coordinate (ordinate), (iv) only one, (v) area.

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

(i) $\sqrt{x+2}$ is a polynomial.

(ii) The graph of a quadratic equation is a straight line.

(iii) The formula to find out the roots of a quadratic equations was given by Shridharacharya.

(iv) The arithmetic mean of 5 and 7 is 6.

(v) In the calculation of the values of central tendencies the class intervals must be continuous.

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

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

(i) What is called $p(x) = g(x)g(x) + r(x)$?

(ii) What is the system of equation is called which have solution ?

(iii) In a quadratic equation $ax^2 + bx + c = 0$ what the term $(b^2 - 4ac)$ is called ?

(iv) What is the next term 5, 10, 15,?

(v) Write the formula of a median.

Ans. (i) Division algorithm, (ii) Consistent, (iii) Discriminant, (iv) 20, (v) Median $= l + \left(\frac{n/2 - cf}{f} \right) \times h$.

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

Column 'A'	Column 'B'
(i) cosec 60°	(a) 1
(ii) $\tan(90^\circ - \theta)$	(b) ∞
(iii) $\sin 48^\circ \sec 42^\circ + \cos 48^\circ \operatorname{cosec} 42^\circ$	(c) $2/\sqrt{3}$
(iv) $\sin^2 \theta + \cos^2 \theta$	(d) $\cot \theta$
(v) $\tan 90^\circ$	(e) 2

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

6. Use Euclid's division algorithms to find HCF of 867 and 255. 2

Or Find L.C.M. and H.C.F. of 8, 9, 25 by applying the prime factorisation method.

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

Or Find the quadratic polynomial with the given numbers as the sum and product of its zeros are 4 and 1 respectively.

8. Determine if the points (1,5), (2, 3) and (-2, - 11) are collinear. 2

Or Check whether (5,-2), (6,4) and (7, - 2) are the vertices of an isosceles triangle.

9. (i) A lot of 20 bulbs contain 4 defective ones. One bulb is drawn at random from the lot. What is the probability that this bulb is defective ?

(ii) Suppose the bulb drawn in (i) is not defective and is not replaced. Now one bulb is drawn at random from the rest. What is the probability that this bulb is not defective ?

Or A child has a die whose six faces, show the letters as given below:

A **B** **C** **D** **E** **A**

The die is thrown once, what is the probability of getting (i) A? (ii) D?

10. Two dice are thrown at the same time. Determine the probability that the difference of the numbers on the two dice is 2. 2

Or A letter of English alphabets is chosen at random, determine the probability that the letter is a consonant.

11. Find the co-ordinates of the point which divides the join of (-1, 7) and (4, -3) in the ratio 2 : 3. 3

Or If A and B are (-2,-2) and (2, -4) respectively, find the co-ordinates of P such that $AP = \frac{3}{7} AB$ and P lies on the line segment AB.

12. Prove the following identity, where the angles involved are acute angles for which the expression are defined : 3

$$\sqrt{\frac{1+\sin A}{1-\sin A}} = \sec A + \tan A.$$

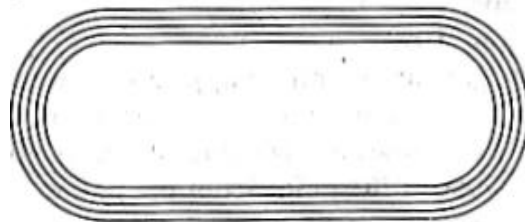
Or Prove that following identity, where the angles involved are acute angle for which the expression are defined :

$$\frac{\sin \theta - 2\sin^3 \theta}{2\cos^3 \theta - \cos \theta} = \tan \theta$$

13. XY and X'Y' are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersecting XY at A and X'Y' at B. Prove that: $\angle AOB = 90^\circ$.

Or Prove that angle between the two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line segment joining the points of contact at the centre.

14. The given figure depicts a racing track whose left and right ends are semi-circles.

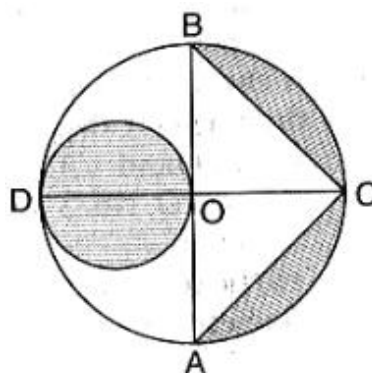


The distance between the two parallel line segments is 60 m and they are each 106 m long. If the track is 106 m wide, find :

(i) the distance around the track along its inner side.

(ii) the area of the track. (Use $\pi = 22/7$). 3

Or In the given figure AB and CD are two diameters of the circle (with centre O) perpendicular to each other and OD is a diameter of the smaller circle. If $OA = 7$ cm find the area of shaded region. ($\pi = 22/7$.)



15. Prove that $\frac{1}{\sqrt{2}}$ irrational.

Or Prove that $7\sqrt{5}$ is irrational.

16. Find the zeros of the quadratic polynomial $6x^2 - 3 - 7x$ and verify the relationship between the zeros and the coefficients. 4
- Or Divide the polynomial $p(x)$ by the polynomial $g(x)$ and find the quotient and the remainder :
 $p(x) = x^4 - 5x + 6$; $g(x) = 2 - x^2$.
17. Solve the following pair of equations by cross-multiplication method : 4
 $8x + 5y = 9$; $3x + 2y = 4$.
- Or Solve the following pair of equations by reducing them to a pair of linear equations :
 $\frac{1}{2x} + \frac{1}{3y} = 2$; $\frac{1}{3x} + \frac{1}{2y} = \frac{13}{6}$.
18. How many terms of AP: 9, 17, 25..... must be taken to give a sum of 636. 4
- Or The first term of an AP is 5, the last term is 45 and the sum is 400. Find the number of terms and the common difference.
19. If the area of two similar triangles are equal, prove that they are congruent. 4
- Or Prove that the sum of the squares of sides of rhombus is equal to the sum of the squares of its diagonals. <http://www.mpboardonline.com>
20. Two poles of equal heights are standing opposite each other on either side of the road which is 80 m wide. From a point between them on the road the angle of elevation of the top of the poles are 60° and 30° respectively. Find the height of the poles and the distance of the point from the poles. 4
- Or A T.V. tower stands vertically of a bank of canal. From a point on the other bank directly opposite the tower, the angle of elevation of the top of the tower is 60° . From another point 20 m away from this point on the line joining this point to the foot of the tower, the angle of elevation of the top of the tower is 30° . Find the height of the tower and width of the canal.
21. A chord of a circle of radius 15 cm subtend an angle of 60° at the centre. Find the areas of the corresponding minor and major segments of the circles. (Use $\pi = \sqrt{3}.14$ and $3 = 1.73$) 4
- Or Three semicircles each of diameter 3 cm, a circle of diameter 4.5 cm and a semicircle of radius 4.5 cm are drawn in the given figure. Find the area of the shaded region.
22. A train travels 360 km at a uniform speed. If the speed had been 5 km/hr more it would have taken 1 hour less for the same journey. Find the speed of the train. 5
- Or Two water taps together can fill a tank in $9\frac{3}{8}$ hours. The tap of larger diameter takes 10 hours less then the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank.
23. Prove that: $\frac{\cos A}{1 + \sin A} + \frac{1 + \sin A}{\cos A} = 2 \sec A$. 5
- Or Prove that : $\frac{\tan \theta}{1 - \cot \theta} + \frac{\cot \theta}{1 - \tan \theta} = 1 + \sec \theta \cdot \csc \theta$.
24. Draw a circle of radius 6 cm from a point 10 cm away from its centre, construct the pair of tangents to the circle and measure their lengths. Give the justification of the construction. 5

Or Construct a tangent to a circle of radius 4 cm from a point on the concentric circle of radius 6 cm and measure its length. Also verify the measurements by actual calculation. Given the justification of the construction.

25. A solid iron pole consist of a cylinder of height 220 cm and base diameter 25 cm which is surmounted by another cylinder of height 60 cm and radius 8 cm. Find the mass of the pole, given that 1 cm^3 of iron has approximately 8 g mass. (Use $\pi=3.14$)

Or A solid consisting of a right circular cone of height 120 cm and radius 60 cm standing on a hemisphere of radius 60 cm is placed upright in a right circular cylinder full of water such that it touches the bottom. Find the volume of water left in the cylinder if the radius of the cylinder is 60 cm and its height is 180 cm.

26. 100 surnames were randomly picked up from a local telephone directory and the frequency distribution of the number of letters in the English alphabets in the surnames was obtained as follows:

Number of letters	1-4	4-7	7-10	10-13	13-16	16-19
Number of Surnames	6	30	40	16	4	4

Determine the median number of letters in the surnames. Find the mean number of letters in the surnames. Find the modal size of the surnames. <http://www.mpboardonline.com>

Or The following distribution gives the daily income of 50 workers of a factory :

Daily Income (in)	100-120	120-140	140-160	160-180	180-200
Number of Workers	12	14	8	6	10

Convert the above distribution table to a less than type cumulative frequency distribution and draw its ogive.