MP BOARD CLASS 10 MATHEMATICS MODEL PAPER SET 3 2020

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

(i) A man sitting on the bridge observes a boat in the river whose angle of depression is 45°. If the height of the bridge is 15 m, then the distance of boat from the bridge is :

(a) 10 m   (b) 15 m   (c) 25 m   (d) 5 m.

(ii) If TP and TQ are two tangents to a circle with centre 0 so that $\angle POQ = 110°$, the $\angle PTQ$ is :

(a) 60°   (b) 70   (c) 80°   (d) 90°.

(iii) If the perimeters and the area of a circle are numerically equal, then the radius of the circle is:

(a) 2 units   (b) a units   (c) 4 units   (d) 7 units.

(iv) In a right circular cone, the cross-section made by a plane parallel to the base is a:

(a) circle   (b) frustum of the cone   (c) sphere   (d) hemisphere

(v) If the probability of an event is p, the probability of the complementary event will be :

(a) p -1   (b) p   (c) 1 - p   (d) $1 - \dfrac{1}{p}$.

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

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

(i) Any number p/q, where p and q are co-prime integers and q≠0 is called ....

(ii) Two polygons of same number of sides are similar if

(a) their corresponding angles are .... and

(b) their corresponding sides are .... (equal, proportional).

(iii) Co-ordinates of the mid-point of (2a, 0) and (0,2b) are ....

(iv) A circle can have .... parallel tangents at the most.

(v) The measure of an arc of corresponding sector of circle is called .... of the arc.

Ans. (i) rational number, (ii) (a) equal, (b) proportional, (iii) (a, b), (iv) two and only two, (v) length.

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

(i) There will be only one zero in a quadratic equation.

(ii) The pair of linear equations x = a and y= b represent two parallel lines.

(iii) The value of x in x (x - 1) are 0 and 1.

(iv) The next term of AP 10, 5, ... is 0.

(v) The cumulative frequency distribution is required for calculating medians.

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

4. Answer is one word/sentence : 1 x 5=5

(i) What is the degree of linear polynomial ?

(ii) What the system of equation is called which have no solution ?

(iii) What is the name of the equations in which the variable has maximum two powers ?

(iv) What is the next term $2\sqrt{2}, \sqrt{2}, 0$ ... ?

(v) If the values of any two of mean, median and mode are given, then how can the third be calculated?

Ans. (i) One, (ii) Inconsistent, (iii) Quadratic equation, (iv) $-\sqrt{2}$,

(v) By the use of the formula, Mode = 3 × median - 2 × mean.

5. Match the columns : 1 × 5= 5

Column 'A'	Column 'B'
(i) $1 - \sin^2\theta$	(a) $\tan^2\theta$
(ii) $\sin 60°$	(b) $\cot 41°$
(iii) $\sin^2 25° + \cos^2 25°$	(c) $\cos^2\theta$
(iv) $\sec^2\theta - 1$	(d) $\dfrac{\sqrt{3}}{2}$
(v) $\tan 49°$	(e) 1

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

6. Use Euclids division algorithm to find H.C.F of 196 and 38220.   2

Or

Find the H.C.F. and L.C.M. of 17, 23 and 29 by applying the prime factorisation method.

7. Find the quadratic polynomial with the given numbers as the sum and product of its zeros are respectively 0 and $\sqrt{5}$.   2

Or

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

8. Find the distance between the points (a, b) and (-a, -b).   2

Or

Find the distance between the points (0, 0) and (36, 15).

9. A piggy bank contain Hundred 50 p coins, fifty Rs. 1 coins, twenty Rs. 2 coins and ten Rs. 5 coins. If it is equally likely that one of the coins will fall out when the bank is turned upside down. What is the probability that the coin (i) will be a 50 p coin, (ii) will not be a Rs. 5 coin.   2

Or

Five cards; the ten, jack, queen, king and ace of diamonds are well-shuffled with their face downwards. One card is then picked up at random.

(i) What is the probability that the card is a queen.

(ii) If the queen is drawn and put aside what is the probability that the second card picked up is (a) an ace, (b) a queen.

10. The probability of selecting a rotten apple randomly from a heap of 900 apples is 0:18. What is the number of rotten apple in the heap ?   2

Or

A coin is tossed two times. Find the probability of getting at most one head.

11. If Q (0, 1) is equidistant from P(5, − 3) and R(x, 6) find the value of x. Also find the distance QR and PR.   3

Or

Find a relation between x and y such that the point (x, y) is equidistant from the points (3,6) and (-3, 4).

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

$$(\operatorname{cosec} \theta - \cot \theta)^2 = \frac{1 - \cos \theta}{1 + \cos \theta}.$$

Or Prove the following identity where the angle involved are acute angle for which its expressions are defined : $\dfrac{1 + \sec A}{\sec A} = \dfrac{\sin^2 A}{1 - \cos A}.$
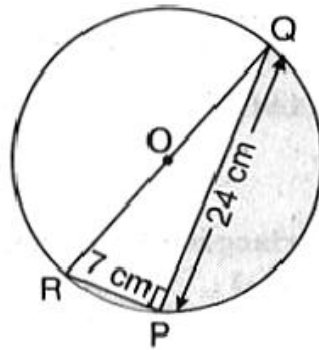
13. Two concentric circles are of radii 5 cm and 3 cm. Find the length of the chord of larger circle which touches the smaller circle.   3

Or

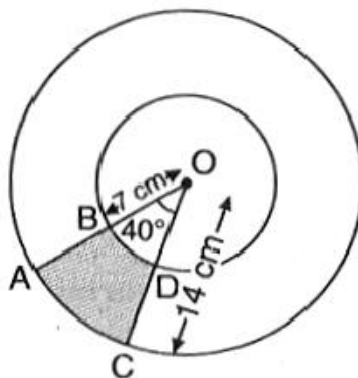A quadrilateral ABCD is drawn to circumscribe a circle. Prove that:

AB+CD= AD + BC.

14. Find the area of shaded region in the given figure, if PQ = 24 cm, PR = 7 cm and 3 O is the centre of the circle (Use $\pi = 22/7$).   3

Or

Find the area of the shaded region in the given figure, if radii of the two concentric circles with centre O are 7 cm and 14 cm respectively and $\angle AOC = 40°$ (use $\pi = 22/7$).

15. Prove that $\sqrt{5}$ is irrational.   4

Or

Prove that $3 + 2\sqrt{5}$ is irrational.

16. Find the zeros of the quadratic polynomial $4s^2 - 4s +1$ and verify the relationship between the zeros and the coefficient.   4

Or

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

$p(x) = x^4 - 3x^2 + 4x + 5, 8(x) = x^2 + 1 - x.$

17. Solve $2x + 3y = 11$ and $2x - 4y = -24$ and hence find the value of 'm' for which $y = mx + c$.   4

Or

For which values of a and b does the following pair of linear equations have no solution?

$2x + 3y = 7; (a - b)x + (a+b)y = 3a + b - 2.$

18. Find the sum of following AP: 4

$7 + 10\dfrac{1}{2} + 14 + \ldots\ldots + 84.$

Or

Find the sum of following AP:

$34 + 32 + 30 + \ldots\ldots + 10$

19. The diagonals of quadrilateral ABCD intersect each other at the point O such that $\dfrac{AO}{BO} = \dfrac{CO}{DO}$.

Show that. is a trapezium.   4

Or

D is a point on the side BC of triangle ABC such that $\angle ADC = \angle BAC$. Show that:

$CA^2 = CB.CD.$

20. A statue, 1.6 m tall, stands on the top of a pedestal. From a point on the ground, the angle of elevation of the top of the statue is 60° and from the same point the angle of elevation of the top of the pedestal is 45°. Find the height of the pedestal.

Or

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, find the height of the building.

21. In a circle of radius 21 cm, an arc subtends an angle 60° at the centre. Find :

(i) area of the sector formed by the are.

(ii) area of segment formed by the corresponding chord (Use $\pi = 22/7$).
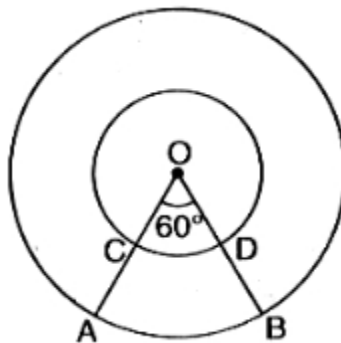
Or

In the given figure, two concentric circles with centre O have radii 21 cm and 42 cm. If $\angle AOB = 60°$, find the area of shaded region (Use $\pi = 22/7$).

22. The diagonal of rectangular field is 60 metre more than the shorter side. If the longer side is 30 metre more than the shorter side, find the sides of the field. 5

Or

The difference of squares of two numbers is 180. The square of small number is 8 times the larger number. Find the two numbers.

23. In ΔPQR right angled at Q, PR + QR = 25 cm and PQ = 5 cm. Determine the values of sin P, cos P and tan P. 5

Or

Write all other trigonometric ratios of ∠A in terms of sec A.

24. Draw a triangle ABC with side BC = 7 cm, ∠B = 45°, ∠A = 105°. Then construct a triangle whose sides are $\frac{4}{3}$ times the corresponding sides of ΔABC. Give the justification of the construction also. 5

Or

Draw a right triangle in which the sides (other than hypotenuse) are of length 4 cm and 3 cm. Then construct another triangle whose sides are 5/3 times the corresponding sides of the given triangle. Give the justification of the construction.

25. Rachel an engineering student was asked to make a model shaped like a cylinder with two cones attached at its two ends by using a thin aluminium sheet. The diameter of the model is 3 cm and its length is 12 cm. If each cone has a height of 2 cm. Find the volume of air contained in the model that Rachel made. (Assume the outer and inner dimensions of the model to be nearly the same.) 5

Or

A gulab jamun contains sugar syrup upto about 30% of its volume. Find approximately how much syrup would be found in 45 gulab jamuns each shaped like a cylinder two hemispherical ends with length 5 cm and diameter 2.8 cm ? http://www.mpboardonline.com

26. The following distribution gives the state wise teacher-student ratio in higher secondary schools of India. Find the mode and mean of this data : 5

Number of students per teacher	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55
Number of State/UT	3	8	9	10	3	0	0	2

Or

The following frequency distribution gives the monthly consumption of electricity of 68 consumers of a locality. Find the median, mean and mode of the data and compare them :

Monthly Consumption (in units)	65-85	85-105	105-125	125-145	145-165	165-185	185-205
No. of consumers	4	5	13	20	14	8	4