

CLASS X (2020-21)
MATHEMATICS STANDARD (041)
SAMPLE PAPER-05

Time : 3 Hours

Maximum Marks : 80

General Instructions :

1. This question paper contains two parts A and B.
2. Both Part A and Part B have internal choices.

Part–A :

1. It consists of two sections- I and II.
2. Section I has 16 questions. Internal choice is provided in 5 questions.
3. Section II has four case study-based questions. Each case study has 5 case-based sub-parts. An examinee is to attempt any 4 out of 5 sub-parts.

Part–B :

1. Question no. 21 to 26 are very short answer type questions of 2 mark each.
2. Question no. 27 to 33 are short answer type questions of 3 marks each.
3. Question no. 34 to 36 are long answer type questions of 5 marks each.
4. Internal choice is provided in 2 questions of 2 marks, 2 questions of 3 marks and 1 question of 5 marks.

PART - A

SECTION - I

Section I has 16 questions of 1 mark each. Internal choice is provided in 5 questions.

- Q1. Calculate the HCF of $3^3 \times 5$ and $3^2 \times 5^2$.
- Q2. If the square of difference of the zeroes of the quadratic polynomial $x^2 + px + 45$ is equal to 144, then what is the value of p ?
- Q3. If α and β are the roots of $ax^2 - bx + c = 0 (a \neq 0)$, then calculate $\alpha + \beta$.
- Q4. Value of the roots of the quadratic equation, $x^2 - x - 6 = 0$ are

OR

If quadratic equation $3x^2 - 4x + k = 0$ has equal roots, then the value of k is

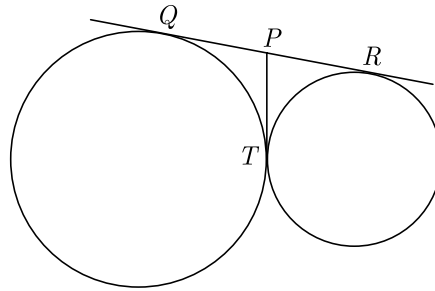
- Q5. Which of the term of AP 5, 2, -1,..... is -49?

OR

Find the first four terms of an AP Whose first term is -2 and common difference is -2.

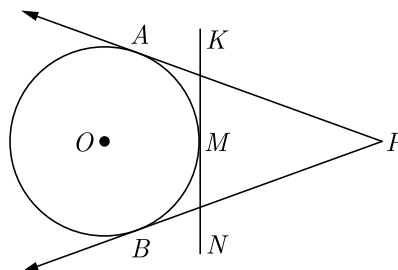
- Q6. If triangle ABC is similar to triangle DEF such that $2AB = DE$ and $BC = 8$ cm then find EF .
- Q7. The co-ordinate of the point dividing the line segment joining the points $A(1, 3)$ and $B(4, 6)$ in the ratio 2 : 1 is

- Q8. Find the coordinates of a point A , where AB is diameter of a circle whose centre is $(2, -3)$ and B is the point $(1, 4)$.
- Q9. If $\sin\theta + \sin^2\theta = 1$ then prove that $\cos^2\theta + \cos^4\theta = 1$.
- Q10. If $\tan(3x + 30^\circ) = 1$ then find the value of x .
- Q11. If $k + 1 = \sec^2\theta(1 + \sin\theta)(1 - \sin\theta)$, then find the value of k .
- Q12. In the figure, QR is a common tangent to given circle which meet at T . Tangent at T meets QR at P . If $QP = 3.8$ cm, then find length of QR .



OR

PA and PB are tangents from point P to the circle with centre O as shown in figure. At point M , a tangent is drawn cutting PA at K and PB at N . Prove that $KN = AK + BN$



- Q13. A chord of a circle of radius 10 cm subtends a right angle at the centre. Find area of minor segment. ($\pi = 3.14$)

OR

If the perimeter of a semi-circular protractor is 36 cm, find its diameter. (Use $\pi = \frac{22}{7}$).

- Q14. What is the volume of a right circular cylinder of base radius 7 cm and height 10 cm ? Use $\pi = \frac{22}{7}$
- Q15. Which central tendency is obtained by the abscissa of point of intersection of less than type and more than type ogives ?
- Q16. If a number x is chosen a random from the number $-3, -2, -1, 0, 1, 2, 3$. What is probability that $x^2 \leq 4$?

OR

Out of 200 bulbs in a box, 12 bulbs are defective. One bulb is taken out at random from the box. What is the probability that the drawn bulb is not defective?

SECTION II

Case study-based questions are compulsory. Attempt any 4 sub parts from each question. Each question carries 1 mark.

- Q17. Shalvi is a tuition teacher and teaches mathematics to some kids at her home. She is very innovative and always plan new games to make her students learn concepts. Today, she has planned a prime number game. She announce the number 2 in her class and asked the first student to multiply it by a prime number and then pass it to second student. Second student also multiplied it by a prime number and passed it to third student. In this way by multiplying to a prime number the last student got 173250. He told this number to Shalvi in class. Now she asked some questions to the students as given below.



- (i) How many students are in the class?
(a) 3 (b) 9
(c) 4 (d) 7
- (ii) What is the highest prime number used by student?
(a) 11 (b) 7
(c) 5 (d) 3
- (iii) What is the least prime number used by students ?
(a) 2 (b) 7
(c) 5 (d) 3
- (iv) Which prime number has been used maximum times ?
(a) 2 (b) 7
(c) 5 (d) 3
- (v) Which prime number has been used minimum times ?
(a) 2 (b) 7
(c) 5 (d) 3

- Q18. Due to ongoing Corona virus outbreak, Wellness Medical store has started selling masks of decent quality. The store is selling two types of masks currently type A and type B .

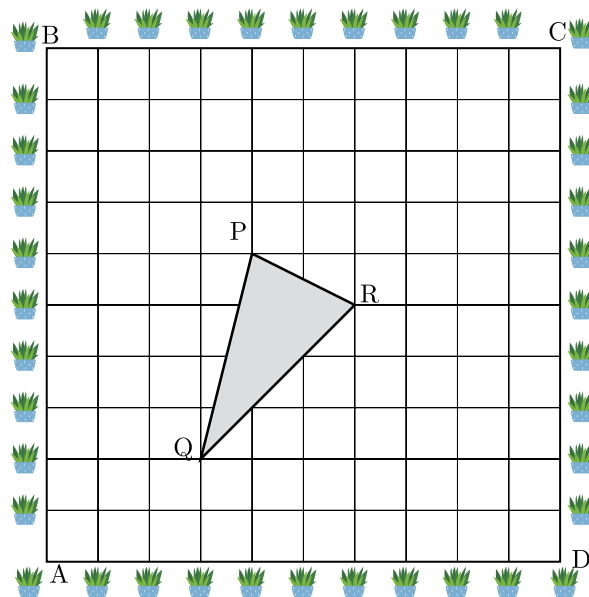


The cost of type A mask is Rs. 15 and of type B mask is Rs. 20. In the month of April, 2020, the store sold 100 masks for total sales of Rs. 1650.



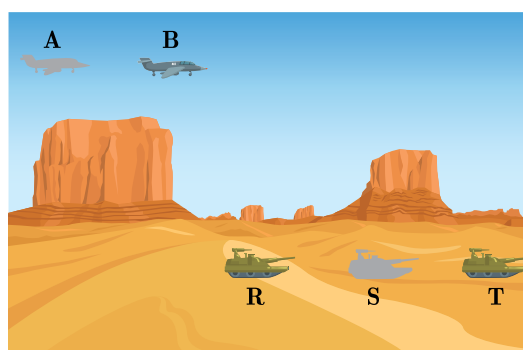
- (i) How many masks of each type were sold in the month of April?
- 40 masks of type A , and 60 masks of type B
 - 60 masks of type A , and 40 masks of type B
 - 70 masks of type A , and 30 masks of type B
 - 30 masks of type A , and 70 masks of type B
- (ii) If the store had sold 50 masks of each type, what would be its sales in the month of April?
- Rs 550
 - Rs 560
 - Rs 1050
 - Rs 1750
- (iii) Due to great demand and short supply, the store has increased the price of each type by Rs. 5 from May 1, 2020. In the month of May, 2020, the store sold 310 masks for total sales of Rs. 6875. How many masks of each type were sold in the month of May?
- 175 masks of type A , and 135 masks of type B
 - 200 masks of type A , and 110 masks of type B
 - 110 masks of type A , and 200 masks of type B
 - 135 masks of type A , and 175 masks of type B
- (iv) What percent of masks of each type sale was increased in the month of May, compared with the sale of month April?
- 110 % in type A and 180 % in type B
 - 180 % in type A and 110 % in type B
 - 350 % in type A and 150 % in type B
 - 150 % in type A and 350 % in type B
- (v) What extra profit did store earn by increasing price in May month.
- Rs 1550
 - Rs 3100
 - Rs 1650
 - Rs 1825

Q19. A garden is in the shape of rectangle. Gardener grew sapling of Ashoka tree on the boundary of garden at the distance of 1 meter from each other. He want to decorate the garden with rose plants. He choose triangular region inside the park to grow rose plants. On the above situation, gardener took help from the students of class 10th. They made a chart for it which looks as the above figure.



- (i) If A is taken as origin, What are the coordinates of triangle PQR
 - (a) $P(4, 6), Q(3, 2), R(6, 5)$
 - (b) $P(6, 4), Q(2, 3), R(5, 6)$
 - (c) $P(5, 7), Q(3, 3), R(5, 5)$
 - (d) $P(6, 6), Q(2, 3), R(6, 6)$
- (ii) If C is taken as origin, what is the co-ordinate of point P
 - (a) $(-12, 2)$
 - (b) $(12, 2)$
 - (c) $(12, -2)$
 - (d) $(-12, -2)$
- (iii) If B is taken as origin, what are the co-ordinate of P
 - (a) $(4, 3)$
 - (b) $(-4, 3)$
 - (c) $(4, -3)$
 - (d) $(-4, -3)$
- (iv) What is distance between P and Q if origin is taken A?
 - (a) $\sqrt{71}$
 - (b) $\sqrt{17}$
 - (c) $\sqrt{65}$
 - (d) $\sqrt{50}$
- (v) What is distance between P and Q if origin is taken B?
 - (a) $\sqrt{50}$
 - (b) $\sqrt{71}$
 - (c) $\sqrt{17}$
 - (d) $\sqrt{61}$

Q20. An air-to-surface missile (ASM) or air-to-ground missile (AGM or ATGM) is a missile designed to be launched from military aircraft and strike ground targets on land, at sea, or both. They are similar to guided glide bombs but to be deemed a missile,



A military fighter plane is flying at an altitude of 600 metres with the speed of 200 km/h. The pilot spots enemy tanks at point R on ground. After getting the permission from command centre to hit the target at R , pilot fires a missile. Fighter plane was at point A at the time of fire of missile. Missile moves to target at enemy tanks stationed at R at an angle of 45° at a speed of 300 km/h.

- (i) What is the horizontal distance between fighter plane at A and tank at R ?
 (a) 300 metre (b) $300\sqrt{3}$ metre
 (c) 600 metre (d) $600\sqrt{3}$ metre
- (ii) How much time will missile take to hit the target R ?
 (a) $\frac{36\sqrt{2}}{5}$ sec (b) $\frac{5\sqrt{2}}{36}$ sec
 (c) $\frac{36\sqrt{3}}{5}$ sec (d) $\frac{34\sqrt{3}}{5}$ sec
- (iii) Another enemy tank at point S on ground moving with a speed of 90 km/h in straight line away from plane. Pilot fires another missile at an angle of 60° from its flight path position B at the instant when enemy's tank was at S and it hits this enemy tank at point T . How much time is taken by second missile to hit the enemy tank at point T ?
 (a) $\frac{24\sqrt{3}}{5}$ sec (b) $\frac{5\sqrt{2}}{24}$ sec
 (c) $\frac{24\sqrt{2}}{5}$ sec (d) $\frac{5\sqrt{3}}{24}$ sec
- (iv) What is the horizontal distance between fighter plane at B and tank at T ?
 (a) 200 metre (b) $100\sqrt{3}$ metre
 (c) 100 metre (d) $200\sqrt{3}$ metre
- (v) What is the distance of point T from S ?
 (a) $80\sqrt{3}$ metre (b) $120\sqrt{3}$ metre
 (c) $160\sqrt{3}$ 100 metre (d) $240\sqrt{3}$ metre

PART - B

All questions are compulsory. In case of internal choices, attempt anyone.

Q21. Find the zeroes of the quadratic polynomial $\sqrt{3}x^2 - 8x + 4\sqrt{3}$.

OR

Find a quadratic polynomial, the sum and product of whose zeroes are 6 and 9 respectively. Hence find the zeroes.

Q22. For what value of k , the system of equations $kx + 3y = 1$, $12x + ky = 2$ has no solution.

OR

Solve the following pair of linear equations by cross multiplication method:

$$x + 2y = 2$$

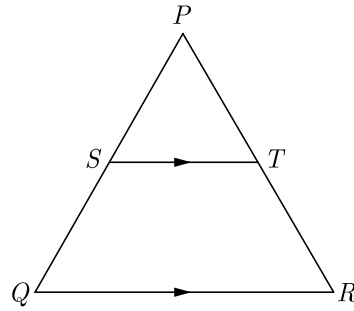
$$x - 3y = 7$$

Q23. Find the roots of the following quadratic equation :

$$15x^2 - 10\sqrt{6}x + 10 = 0$$

OR

Q24. In the given figure, in a triangle PQR , $ST \parallel QR$ and $\frac{PS}{SQ} = \frac{3}{5}$ and $PR = 28$ cm, find PT .



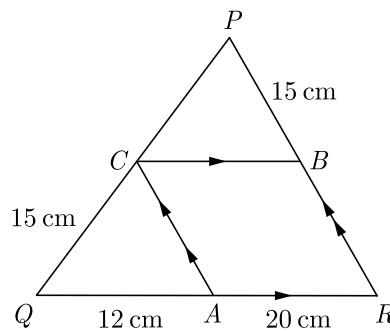
Q25. If θ be an acute angle and $5 \operatorname{cosec} \theta = 7$, then evaluate $\sin \theta + \cos^2 \theta - 1$.

Q26. The mean and median of 100 observation are 50 and 52 respectively. The value of the largest observation is 100. It was later found that it is 110. Find the true mean and median.

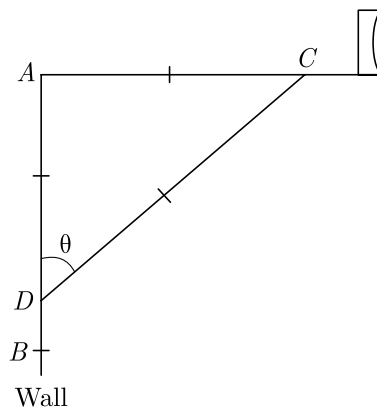
Q27. Solve the following equation: $\frac{1}{x} - \frac{1}{x-2} = 3, x \neq 0, 2$

Q28. The sum of four consecutive number in AP is 32 and the ratio of the product of the first and last term to the product of two middle terms is 7 : 15. Find the numbers.

Q29. In the given figure, $CB \parallel QR$ and $CA \parallel PR$. If $AQ = 12$ cm, $AR = 20$ cm, $PB = CQ = 15$ cm, calculate PC and BR .



Q30. The rod of TV disc antenna is fixed at right angles to wall AB and a rod CD is supporting the disc as shown in Figure. If $AC = 1.5$ m long and $CD = 3$ m, find (i) $\tan \theta$ (ii) $\sec \theta + \operatorname{cosec} \theta$.



OR

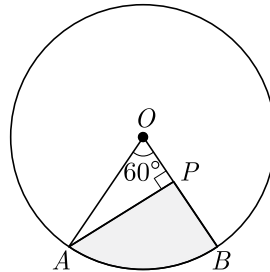
Prove that : $\frac{\cot \theta + \operatorname{cosec} \theta - 1}{\cot \theta - \operatorname{cosec} \theta + 1} = \frac{1 + \cot \theta}{\sin \theta}$

Q31. Draw a circle of radius 4 cm. Draw two tangents to the circle inclined at an angle of 60° to each other.

OR

Draw a circle of radius 3 cm. From a point P , 7 cm away from centre draw two tangents to the circle. Measure the length of each tangent.

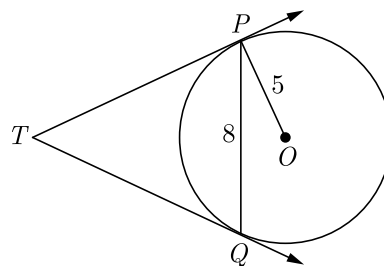
Q32. In the given figure, AOB is a sector of angle 60° of a circle with centre O and radius 17 cm. If $AP \perp OB$ and $AP = 15$ cm, find the area of the shaded region.



Q33. If the median of the following data is 240, then find the value of f :

Classes	0- 100	100-200	200-300	300-400	400-500	500-600	600-700
Frequency	15	17	f	12	9	5	2

Q34. In Figure, PQ is a chord of length 8 cm of a circle of radius 5 cm and centre O . The tangents at P and Q intersect at point T . Find the length of TP .



OR

If the angle between two tangents drawn from an external point P to a circle of radius a and centre O , is 60° , then find the length of OP .

Q35. Hence, radius of the ice-cream cone is 3 cm A well of diameter 4 m is dug 14 m deep. The earth taken out is spread evenly all around the well to form a 40 m high embankment. Find the width of the embankment.

Q36. A box contains 125 shirts of which 110 are good 12 have minor defects and 3 have major defects. Ram Lal will buy only those shirts which are good while Naveen will reject only those which have major defects. A shirt is taken out at random from the box. Find the probability that :

- Ram Lal will buy it
- Naveen will buy it

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