## SAMPLE PAPER

### CLASS : X

| Time : 03 Hours | MATHEMATICS - 041 | M. M. : 80 |

**General Instructions :**

Read the following instructions very carefully and strictly follow them :

(i) This question paper contains 38 questions. All questions are compulsory.

(ii) This question paper is divided into five Sections – A, B, C, D and E.

(iii) In Section A, Questions no. 1 to 18 are Multiple Choice Questions (MCQs) and questions number 19 and 20 are Assertion-Reason based questions of 1 mark each.

(iv) In Section B, Questions no. 21 to 25 are Very Short Answer (VSA) type questions, carrying 2 marks each.

(v) In Section C, Questions no. 26 to 31 are Short Answer (SA) type questions, carrying 3 marks each.

(vi) In Section D, Questions no. 32 to 35 are Long Answer (LA) type questions carrying 5 marks each.

(vii) In Section E, Questions no. 36 to 38 are case study based questions carrying 4 marks each. Internal choice is provided in 2 marks questions in each case study.

(viii) There is no overall choice. However, an internal choice has been provided in 2 questions in Section B, 2 questions in Section C, 2 questions in Section D and 3 questions in Section E.

(ix) Draw neat diagrams wherever required. Take $\pi = \dfrac{22}{7}$ wherever required, if not stated.

(x) Use of calculator is not allowed.

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## <u>SECTION - A</u>

*This section comprises multiple choice questions (MCQs) of 1 mark each.*

01. If the pair of equations $3x - y + 8 = 0$ and $6x - ry + 16 = 0$ represent coincident lines, then the value of 'r' is:     1

(a) $-\dfrac{1}{2}$       (b) $\dfrac{1}{2}$

(c) 2          (d) -2

02. If $\triangle ABC \sim \triangle PQR$ with $\angle A = 32°$ and $\angle R = 65°$, then the measure of $\angle B$ is:     1

(a) 32°        (b) 65°

(c) 83°        (d) 97°

03. In the given figure, $AB \parallel PQ$. If AB = 6 cm, PQ = 2 cm and OB = 3 cm, then the length of OP is :  1
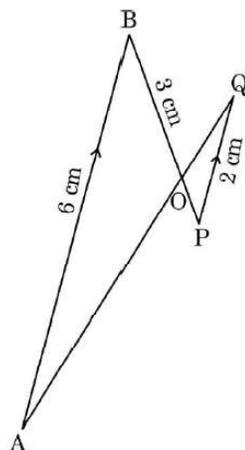


    (a) 9cm         (b) 3cm         (c) 4cm         (d) 1cm

04. If one zero of the polynomial $x^2 - 3kx + 4k$ be twice the other, then the value of k is :  1

    (a) -2         (b) 2         (c) $\dfrac{1}{2}$         (d) $-\dfrac{1}{2}$

05. What is the length of the arc of the sector of a circle with radius 14 cm and of central angle 90°?  1

    (a) 22 cm         (b) 44 cm         (c) 88 cm         (d) 11 cm

06. The first four terms of an AP whose first term is -2 and the common difference is -2 are  1

    (a) -2,0,2,4         (b) -2,4, - 8,16         (c) -2, - 4, - 6, - 8     (d) -2, - 4, - 8, - 16

07. A single letter is selected at random from the word PROBABILITY. The probability that the selected letter is a vowel is  1

    (a) $\dfrac{2}{11}$         (b) $\dfrac{3}{11}$         (c) $\dfrac{4}{11}$         (d) 0

08. If $\triangle ABC$ is right angled at C , then the value of $\cos(A+B)$ is  1

    (a) 0         (b) 1         (c) $\dfrac{1}{2}$         (d) $\dfrac{\sqrt{3}}{2}$

09. A pole casts a shadow of length $2\sqrt{3}m$ on the ground, when the Sun's elevation is 60°. Find the height of the pole.  1

    (a) 4 m         (b) 6 m         (c) 2 m         (d) 3 m

10. The radius of a circle whose circumference is equal to the sum of the circumferences of the two circles of diameters 36 cm and 20 cm is  1

    (a) 56 cm         (b) 42 cm         (c) 28 cm         (d) 16 cm

11. In the adjoining figure, TP and TQ are the two tangents of a circle with centre O. If $\angle POQ = 110°$, then $\angle PTQ$ is 1
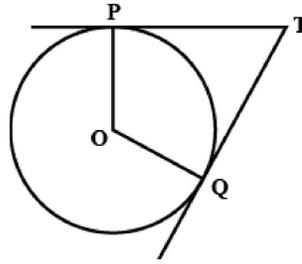


(a) 60°  (b) 70°  (c) 80°  (d) 90°

12. $2\sqrt{3}$ is 1

(a) an integer  (b) a rational number

(c) an irrational number  (d) a whole number

13. A bag contains 3 red balls, 5 white balls and 7 black balls. The probability that a ball drawn from the bag at random will be neither red nor black is 1

(a) $\dfrac{1}{3}$  (b) $\dfrac{1}{5}$  (c) $\dfrac{7}{15}$  (d) $\dfrac{8}{15}$

14. Perimeter of a sector of a circle whose central angle is 90° and radius 7 cm is 1

(a) 35 cm  (b) 11 cm  (c) 22 cm  (d) 25 cm

15. A pair of irrational number whose product is a rational number is 1

(a) $\left(\sqrt{16}, \sqrt{4}\right)$  (b) $\left(\sqrt{5}, \sqrt{2}\right)$  (c) $\left(\sqrt{3}, \sqrt{27}\right)$  (d) $\left(\sqrt{36}, \sqrt{2}\right)$

16. Given HCF $(2520, 6600) = 40$, LCM $(2520, 6600) = 252 \times k$, then the value of k is 1

(a) 1650  (b) 1600  (c) 165  (d) 1625

17. Two dice are thrown together. The probability that they show different number is 1

(a) $\dfrac{1}{6}$  (b) $\dfrac{5}{6}$  (c) $\dfrac{1}{3}$  (d) $\dfrac{2}{3}$

18. In the given figure, if PT is a tangent to a circle with centre O and $\angle TPO = 25°$, then the measure of $\angle x$ is 1
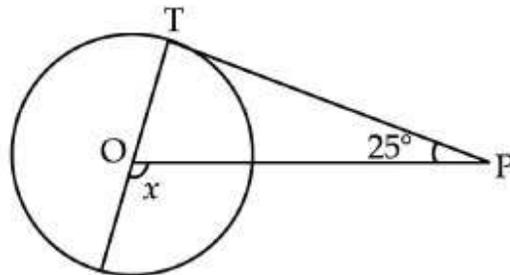


(a) 110°  (b) 115°  (c) 120°  (d) 125°

**For Questions number 19 to 20, two statements are given one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to these questions from the options (a), (b), (c) and (d) as given below.**

(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).

(b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).

(c) Assertion (A) is true, but Reason (R) is false.

(d) Assertion (A) is false, but Reason (R) is true.

19. **Assertion (A) :** The point which divides the line segment joining the points $A(1,2)$ and $B(-1,1)$ internally in the ratio $1:2$ is $\left(-\dfrac{1}{3},\dfrac{5}{3}\right)$. 	1

   **Reason (R) :** The coordinates of the point which divides the line segment joining the points $A(x_1,y_1)$ and $B(x_2,y_2)$ in the ratio $m_1:m_2$ are $\left(\dfrac{m_1 x_2 + m_2 x_1}{m_1+m_2},\dfrac{m_1 y_2 + m_2 y_1}{m_1+m_2}\right)$.

20. **Assertion (A) :** In a cricket match, a batsman hits a boundary 9 times out of 45 balls he plays. The probability that in a given ball, he does not hit the boundary is $\dfrac{4}{5}$. 	1

   **Reason (R) :** $P(E)+P(not\ E)=1$

## SECTION-B

*This section comprises very short answer type questions (VSA) of 2 mark each.*

21. Solve the following system of linear equations 	2

   $7x-2y=5$ and $8x+7y=15$.
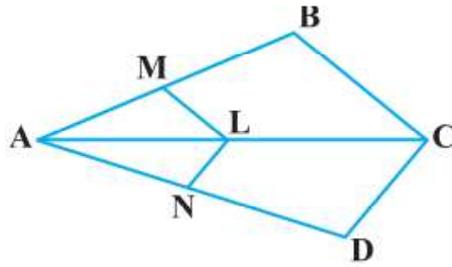
22. Find the mode of the following distribution : 	2

| Marks : | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 |
|---|---|---|---|---|---|---|
| Number of students: | 4 | 6 | 7 | 12 | 5 | 6 |

23. (a) If $4\cot^2 45^\circ - \sec^2 60^\circ + \sin^2 60^\circ + p = \dfrac{3}{4}$, then find the value of p. 	2

**OR**
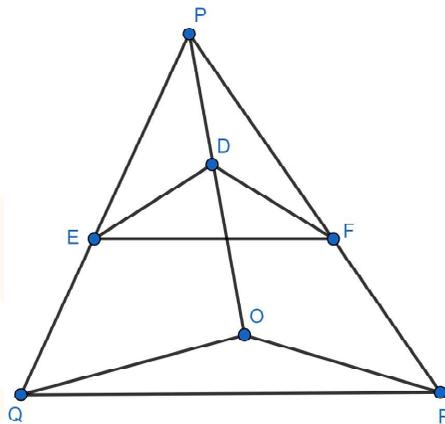
   (b) If $\cos A + \cos^2 A = 1$, then find the value of $\sin^2 A + \sin^4 A$. 	2

24. Show that the points $(-2,3),(8,3)$ and $(6,7)$ are the vertices of a right-angled triangle. 2

25. (a) In figure, if $LM \parallel CB$ and $LN \parallel CD$, Prove that $\dfrac{AM}{AB} = \dfrac{AN}{AD}$.  2



**OR**

(b) In figure, $DE \parallel OQ$ and $DF \parallel OR$, Show that $EF \parallel QR$.  2



## SECTION-C
*This section comprises short answer type questions (SA) of 3 mark each.*

26. If $\alpha$ and $\beta$ are the zeroes of the polynomial $f(x) = x^2 - 4x - 5$ then the value of $\alpha^2 + \beta^2$.  3

27. (a) If the system of linear equations  3

$2x + 3y = 7$ and $2ax + (a+b)y = 28$

have infinite number of solutions, then find the values of 'a' and 'b'

**OR**

(b) If $217x + 131y = 913$ and  3

$131x + 217y = 827$,

then solve the equations for the values of $x$ and $y$.

28. Prove that the length of tangents drawn from an external point are equal.  3

29. (a) Prove that : $\dfrac{\sin\theta}{1+\cos\theta} + \dfrac{1+\cos\theta}{\sin\theta} = 2\cos ec\theta$  3

**OR**

(b) Prove that $\sec A(1 - \sin A)(\sec A + \tan A) = 1$.  3

30. If $Q(0,1)$ is equidistant from $P(5,-3)$ and $R(x,6)$, find the values of $x$.  3

31. How many two-digit numbers are divisible by 3?  3

## SECTION-D

*This section comprises long answer type questions (LA) of 5 marks each.*

32. (a) In a flight of 2800 km, an aircraft was slowed down due to bad weather. Its average speed is reduced by 100km/h and by doing so, the time of flight is increased by 30 minutes. Find the original duration of the flight.                   5

**OR**

(b) The denominator of a fraction is one more than twice the numerator. If the sum of the fraction and its reciprocal is $2\dfrac{16}{21}$, find the fraction.                   5

33. (a) Sides AB, BC and median AD of a triangle ABC are respectively proportional to sides PQ, QR and median PM of $\triangle PQR$. Show that $\triangle ABC \sim \triangle PQR$.                   5

**OR**

(b) Through the mid-point M of the side CD of a parallelogram ABCD, the line BM is drawn intersecting AC in L and AD (produced) in E. Prove that $EL = 2BL$.                   5

34. A tent is in the shape of a cylinder surmounted by a conical top. If the height and radius of the cylindrical part are 3 m and 14 m respectively, and the total height of the tent is 13.5 m, find the area of the canvas required for making the tent, find the cost of canvas purchased at the rate of Rs. 500 per m². 5
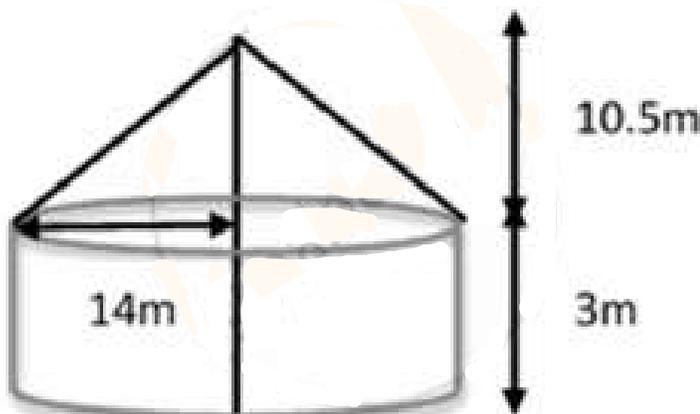


35. The angles of elevation and depression of the top and bottom of a light-house from the top of a 60 m high building are 30° and 60° respectively. Find

(i) the difference between the heights of the light-house and the building.                   2

(ii) the distance between the light-house and the building.                   2

(iii) the height of the light house.                   1

*This section comprises case based questions (CSA) of 4 marks each.*

36. India meteorological department observes seasonal and annual rainfall every year in different sub-divisions of our country.

    It helps them to compare and analyse the results. The table given below shows sub-division wise seasonal (monsoon) rainfall (mm) in 2018:

| Rainfall (mm) | 200-400 | 400-600 | 600-800 | 800-1000 | 1000-1200 | 1200-1400 | 1400-1600 | 1600-1800 |
|---|---|---|---|---|---|---|---|---|
| Number of sub-divisions | 2 | 4 | 7 | 4 | 2 | 3 | 1 | 1 |

    **Based on the above information, answer the following questions:**

    (i) Write the modal class. 1

    (ii) (a) Find the median of the given data. 2

    **OR**

    (b) Find the mean rainfall in this season 2

    (iii) If sub-division having at least 1000 mm rainfall during monsoon seasoon season, is considered good rainfall sub-division, then how many sub-divisions had good rainfall?
    1

37. Governing council of a local public development authority of Dehradun decided to build an adventure playground on the top of a hill, which will have adequate space for parking.

    After survey, it was decided to build rectangular playground, with a semicircular are allotted for parking at one end of the playground. The length and breadth of the rectangular playground are 14 units and 7 units respectively. There are two quadrants of radius 2 units on one side of playground for special seats.

    **Based on the above information, answer the following questions:**

    (i) What is the total perimeter of the parking area? 1

    (ii) (a) What is the total area of parking and the two quadrants? 2

    **OR**

    (b) What is the ratio of area of playground to the area of parking area? 2

    (iii) Find the cost of fencing the playground and parking area at the rate of Rs. 2 per unit. 1
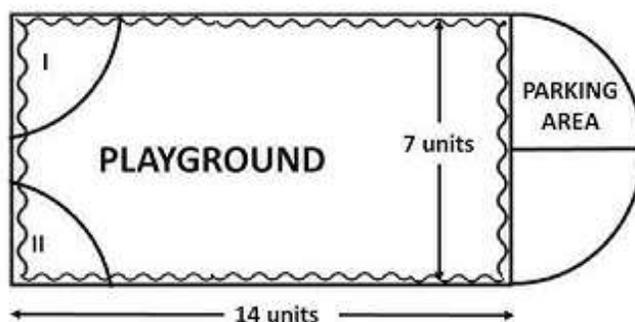
38. Teaching Mathematics through activities is a powerful approach that enhances students' understanding and engagement. Keeping this in mind, Ms. Mukta planned a prime number game for class 5 students. She announces the number 2 in her class and asked the first student to multiply it by a prime number and then pass it to second student. Second student also multiplied it by a prime number and passed it to third student. In thisway by multiplying to a prime number, the last student got 173250.  Now, Mukta asked some questions as given below to the students:

*Based on the above information, answer the following questions:*

(i) What is the least prime number used by students?                              1

(ii) (a) How many students are in the class?                                     2

**OR**

(b) What is the highest prime number used by students?                        2

(iii) Which prime number has been used maximum times?                         1


**\* \* \* \* \***