

CLASS X (2020-21)
MATHEMATICS STANDARD (041)
SAMPLE PAPER-04

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.
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PART - A

SECTION - I

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

- Q1. a and b are two positive integers such that the least prime factor of a is 3 and the least prime factor of b is 5. Then calculate the least prime factor of $(a + b)$.

OR

What is the HCF of the smallest composite number and the smallest prime number?

- Q2. The 2 digit number which becomes $\frac{5}{6}$ th of itself when its digits are reversed. If the difference in the digits of the number being 1, what is the two digits number?

- Q3. What are the values of k for which the quadratic equation $2x^2 - kx + k = 0$ has equal roots?

OR

If one root of the quadratic equation $ax^2 + bx + c = 0$ is the reciprocal of the other, then show that $a = c$.

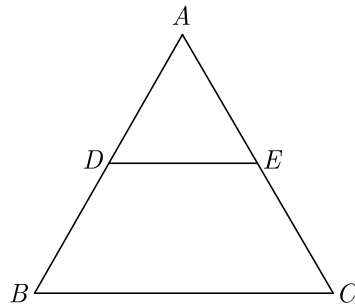
- Q4. Show that $(a - b)^2$, $(a^2 + b^2)$ and $(a + b)^2$ are in AP.

OR

Find the sum of all 11 terms of an AP whose middle term is 30.

Q5. In $\triangle ABC$, $AB = 6\sqrt{3}$ cm, $AC = 12$ cm and $BC = 6$ cm, then $\angle B = \dots\dots\dots$.

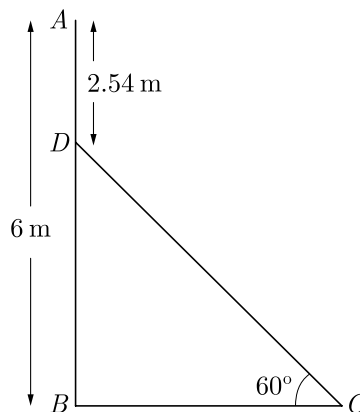
Q6. In given figure $DE \parallel BC$. If $AD = 3c$, $DB = 4c$ cm and $AE = 6$ cm then find EC .



Q7. The value of the $(\tan^2 60^\circ + \sin^2 45^\circ)$ is $\dots\dots\dots$.

Q8. Evaluate $\sin^2 60^\circ - 2 \tan 45^\circ - \cos^2 30^\circ$

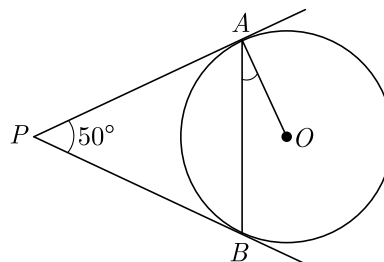
Q9. In the given figure, AB is a 6 m high pole and DC is a ladder inclined at an angle of 60° to the horizontal and reaches up to point D of pole. If $AD = 2.54$ m, find the length of ladder. (use $\sqrt{3} = 1.73$)



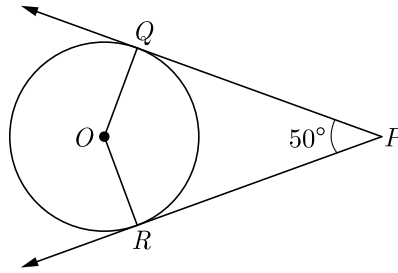
OR

A ladder, leaning against a wall, makes an angle of 60° with the horizontal. If the foot of the ladder is 2.5 m away from the wall, find the length of the ladder.

Q10. In figure, PA and PB are tangents to the circle with centre O such that $\angle APB = 50^\circ$. Write the measure of $\angle OAB$.



- Q11. In the given figure, PQ and PR are tangents to the circle with centre O such that $\angle QPR = 50^\circ$, Then find $\angle OQR$.



- Q12. If the circumference of a circle increases from 4π to 8π , then what about its area ?

OR

If the radius of the circle is 6 cm and the length of an arc 12 cm. Find the area of the sector.

- Q13. A rectangular sheet paper $40\text{ cm} \times 22\text{ cm}$ is rolled to form a hollow cylinder of height 40 cm. Find the radius of the cylinder.
- Q14. The radius of sphere is r cm. It is divided into two equal parts. Find the whole surface of two parts.
- Q15. Consider the following distribution :

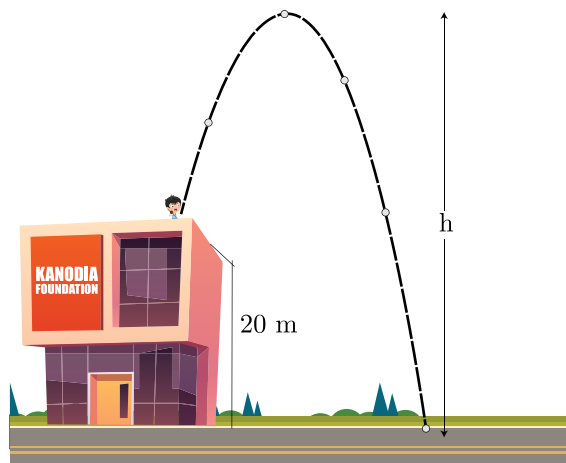
Marks Obtained	0 or more	10 or more	20 or more	30 or more	40 or more	50 or more
Number of students	63	58	55	51	48	42

- (i) Calculate the frequency of the class 30 - 40.
 (ii) Calculate the class mark of the class 10 - 25.
- Q16. For finding the popular size of readymade garments, which central tendency is used?

SECTION II

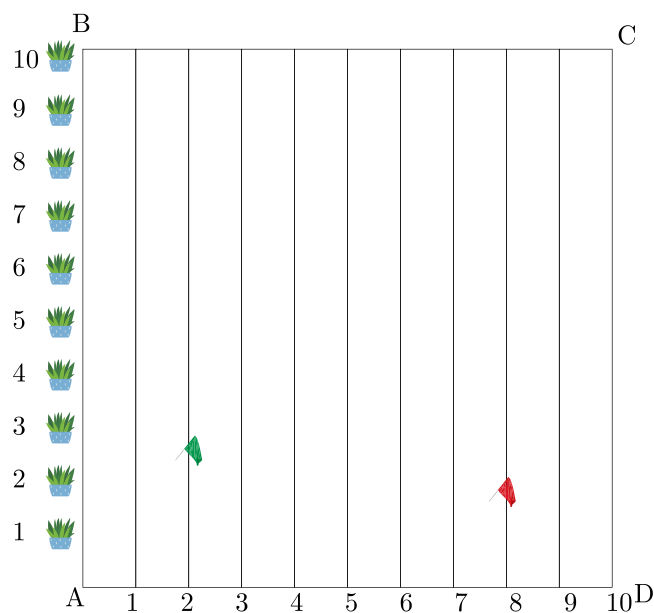
Case study-based questions are compulsory. Attempt any 4 sub parts from each question. Each question carries 1 mark.

- Q17. Lavanya throws a ball upwards, from a rooftop, which is 20 m above from ground. It will reach a maximum height and then fall back to the ground. The height of the ball from the ground at time t is h , which is given by $h = -4t^2 + 16t + 20$.



- (i) What is the height reached by the ball after 1 second?
 (a) 64 m (b) 128 m
 (c) 32 m (d) 20 m
- (ii) What is the maximum height reached by the ball?
 (a) 54 m (b) 44 m
 (c) 36 m (d) 18 m
- (iii) How long will the ball take to hit the ground?
 (a) 4 seconds (b) 3 seconds
 (c) 5 seconds (d) 6 seconds
- (iv) What are the two possible times to reach the ball at the same height of 32 m?
 (a) 1 and 3 seconds (b) 1 and 4 seconds
 (c) 1 and 2 seconds (d) 1 and 5 seconds
- (v) Where is the ball after 5 seconds ?
 (a) at the ground (b) rebounds
 (c) at highest point (d) fall back

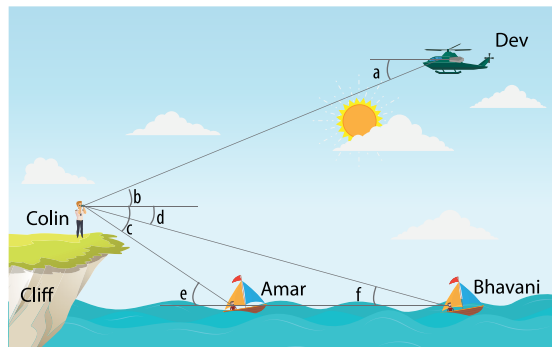
Q18. To conduct sports day activities, in a rectangular shaped school ground $ABCD$, lines have been drawn with chalk powder at a distance of 1 m each. 100 flower pots have been placed at a distance of 1 m from each other along AB , as shown in figure. Nishtha runs $\frac{1}{4}$ th the distance AB on the 2nd line and posts a green flag. Suman runs $\frac{1}{5}$ th the distance AB on the 8th line and posts a red flag.



- (i) What is the position of green flag ?
 (a) (2, 25) (b) (25, 4)
 (c) (25, 2) (d) (4, 25)
- (ii) What is the position of red flag ?
 (a) (20, 4) (b) (8, 20)
 (c) (20, 8) (d) (4, 20)
- (iii) What is the distance between both the flags?
 (a) $\sqrt{51}$ (b) $3\sqrt{3}$
 (c) $\sqrt{61}$ (d) $2\sqrt{3}$

- (iv) What is the distance of red flag from point A ?
 (a) $4\sqrt{29}$ (b) $2\sqrt{29}$
 (c) $8\sqrt{15}$ (d) $16\sqrt{3}$
- (v) If Rakhi has to post a blue flag exactly halfway between the line segment joining the two flags, where should she post her flag?
 (a) (20, 4) (b) (22.5, 5)
 (c) (4, 20) (d) (5, 22.5)

Q19. Navy officer Mr. Colin is tasked with planning a coup on the enemy at a certain date. Currently he is inspecting the area standing on top of the cliff. Agent Dev is on a chopper in the sky. When Mr. Colin looks down below the cliff towards the sea, he has Bhawani and Amar in boats positioned to get a good vantage point. Bhawani boat is behind the Amar boat.



Following angle have been measured :

From Colin to Bhawani : 30°

From Dev to Colin : 60°

From Amar to Colin : 60°

- (i) Which of the following is a pair of angle of elevation?
 (a) $(\angle a, \angle e)$ (b) $(\angle b, \angle e)$
 (c) $(\angle c, \angle d)$ (d) $(\angle a, \angle f)$
- (ii) Which of the following is a pair of angle of depression?
 (a) $(\angle a, \angle e)$ (b) $(\angle b, \angle e)$
 (c) $(\angle c, \angle d)$ (d) $(\angle a, \angle f)$
- (iii) If angle of elevation of Amar to Colin is 60° , what is the distance of Amar boat from the base of hill ?
 (a) $\frac{\sqrt{3}h}{2}$ (b) $\frac{h}{\sqrt{3}}$
 (c) $\frac{2h}{\sqrt{3}}$ (d) $\sqrt{3}h$
- (iv) If angle of depression of Colin to Bhawani is 30° , what is the distance of Amar boat from the Bhawani boat?
 (a) $\frac{\sqrt{3}h}{2}$ (b) $\frac{h}{\sqrt{3}}$
 (c) $\frac{2h}{\sqrt{3}}$ (d) $\sqrt{3}h$
- (v) If angle of depression of Dev to Colin is 60° , what is the height of Dev from base of hill ?
 (a) h (b) $2h$
 (c) $3h$ (d) $4h$

Q20. A game at a stall in new year carnival involves spinning a wheel first as a first step to complete the game with certain rules. If the wheel stops at a particular number, then the player is allowed to roll a 6 faced unbiased dice.

Rules of Game:

1. If the wheel stops at a particular number, then the player is allowed to roll a unbiased dice.
2. If the wheel stops at any other number, player get to try again and only one extra try allowed. If player reach the next stage and roll a dice, he may get a prize depending on the number on dice.



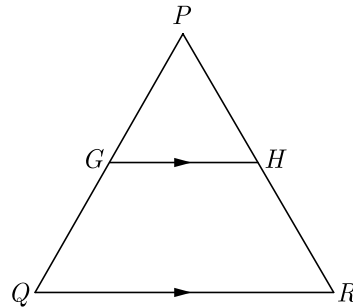
- (i) What is the probability of getting an even number on the wheel?
- (a) $\frac{1}{4}$ (b) $\frac{1}{2}$
(c) $\frac{1}{8}$ (d) $\frac{1}{16}$
- (ii) If getting an odd number on the wheel allows a player to roll the die, then what is the probability of his rolling the die ?
- (a) $\frac{1}{4}$ (b) $\frac{1}{2}$
(c) $\frac{1}{8}$ (d) $\frac{1}{16}$
- (iii) If the player is allowed to roll the dice and getting a number greater than 4 entitles him to get prize, what is the probability of his winning the prize?
- (a) $\frac{3}{4}$ (b) $\frac{1}{6}$
(c) $\frac{1}{3}$ (d) $\frac{2}{3}$
- (iv) If getting a square number on the wheel allows a player to roll the dice, then what is the probability of his rolling the dice ?
- (a) $\frac{1}{4}$ (b) $\frac{1}{2}$
(c) $\frac{1}{3}$ (d) $\frac{2}{3}$
- (v) If the player is allowed to roll the die and getting a prime number on die entitles him to get prize, then what is the probability of his winning the prize?
- (a) $\frac{1}{4}$ (b) $\frac{1}{2}$
(c) $\frac{1}{3}$ (d) $\frac{1}{6}$

PART - B

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

Q21. Explain whether $3 \times 12 \times 101 + 4$ is a prime number or a composite number.

- Q22. In the given figure, G is the mid-point of the side PQ of $\triangle PQR$ and $GH \parallel QR$. Prove that H is the mid-point of the side PR or the triangle PQR .



- Q23. If $A(4,3)$, $B(-1,y)$, and $C(3,4)$ are the vertices of a right triangle ABC , right angled at A , then find the value of y .
- Q24. If $\sin \theta - \cos \theta = \frac{1}{2}$, then find the value of $\sin \theta + \cos \theta$.
- Q25. A sphere of maximum volume is cut out from a solid hemisphere of radius 6 cm. Find the volume of the cut out sphere.

OR

If the total surface area of a solid hemisphere is 462 cm^2 , find its volume. Use $\pi = \frac{22}{7}$

- Q26. The data regarding marks obtained by 48 students of a class in a class test is given below. Calculate the modal marks of students.

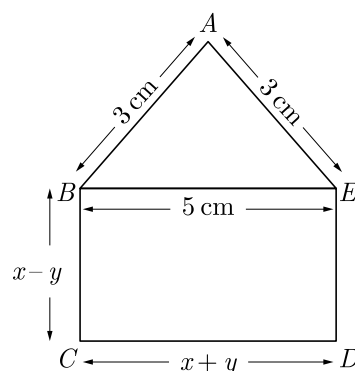
Marks obtained	0-5	5- 10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50
Number of students	1	0	2	0	0	10	25	7	2	1

OR

Find the value of λ , if the mode of the following data is 20 :

15, 20, 25, 18, 13, 15, 25, 15, 18, 17, 20, 25, 20, λ , 18.

- Q27. The HCF of 65 and 117 is expressible in the form $65m-117$. Find the value of m . Also find the LCM of 65 and 117 using prime factorization method.
- Q28. In the figure below $ABCDE$ is a pentagon with $BE \parallel CD$ and $BC \parallel DE$. BC is perpendicular to DC . If the perimeter of $ABCDE$ is 21 cm, find the values of x and y .



OR

Solve for x and y :

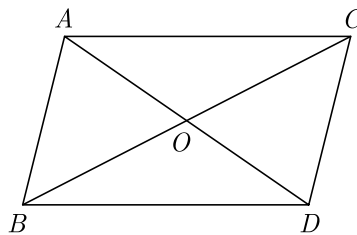
$$\frac{x+1}{2} + \frac{y-1}{3} = 9 ; \quad \frac{x-1}{3} + \frac{y+1}{2} = 8.$$

- Q29. If the sum of the first n terms of an AP is $\frac{1}{2}[3n^2 + 7n]$, then find its n^{th} term. Hence write its 20^{th} term.

OR

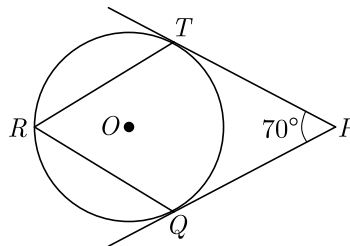
In an AP, if the 12^{th} term is -13 and the sum of its first four terms is 24 , find the sum of its first ten terms.

- Q30. In the given figure, $\triangle ABC$ and $\triangle DBC$ are on the same base BC . AD and BC intersect at O . Prove that $\frac{\text{ar}(\triangle ABC)}{\text{ar}(\triangle DBC)} = \frac{AO}{DO}$.



- Q31. Prove that : $\frac{\text{cosec}^2\theta}{\text{cosec}\theta - 1} - \frac{\text{cosec}^2\theta}{\text{cosec}\theta + 1} = 2\sec^2\theta$

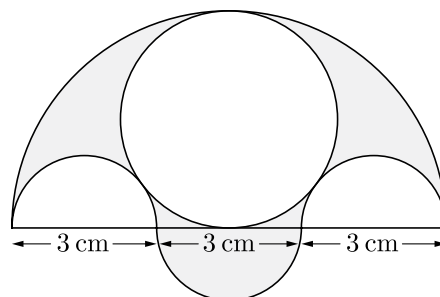
- Q32. In figure, O is the centre of a circle. PT are tangents to the circle from an external point P . If $\angle TPQ = 70^\circ$, find $\angle TRQ$.



- Q33. 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.

- Q34. Find the values of k for which the equation $(3k+1)^2 + 2(k+1)x + 1$ has equal roots. Also find the roots.

- Q35. 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.



Q36. If the mean of the following frequency distribution is 91, and sum of frequency is 150, find the missing frequency x and y :

Class	0- 30	30- 60	60- 90	90-120	120-150	150-180
Frequency	12	21	x	52	y	11

OR

Find the median of the following data :

Profit (in lakh of rupee)	Number of shops
More than of equal to 5	30
More than of equal to 10	28
More than of equal to 15	16
More than of equal to 20	14
More than of equal to 25	10
More than of equal to 30	7
More than of equal to 35	3

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