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SAMPLE TEST PAPER 09 FOR CLASS X BOARD EXAM 2021

CLASS: X
SUBJECT: MATHEMATICS

MAX. MARKS: 80
DURATION: 3 hrs

General Instruction:

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 three sections- I and II.
2. Section I has 16 questions of 1 mark each. Internal choice is provided in 5 questions.
3. Section II has 4 questions on case study. 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

Questions 1 to 16 carry 1 mark each.

1. Write the sum of exponents of prime factors in the prime factorisation of 250.

OR

If $xy = p^3q^4$ and $HCF(x,y) = pq^2$, then find the $LCM(x,y)$.

2. Find a quadratic polynomial, the sum and product of whose zeroes are -3 and 2 , respectively.
3. Find the number of solutions of the pair of equations $x + 2y - 4 = 0$ and $2x + 4y - 12 = 0$.
4. Check whether 301 is a term of the list of numbers 5, 11, 17, 23, . . .

OR

How many two-digit numbers are divisible by 3?

5. For what values of k , the equation $9x^2 - 6kx + 4 = 0$ has equal roots?

OR

Find the roots of the equation $x^2 - 7x + 10 = 0$

6. Evaluate: $2 \tan^2 45^\circ + \cos^2 30^\circ - \sin^2 60^\circ$
7. A line segment AB is to be divided in the ratio $7 : 6$. Ray AX is drawn such that $\angle BAX$ is acute. Also ray BY is drawn parallel to AX and the points A_1, A_2, A_3, \dots and B_1, B_2, B_3, \dots are located at equal distances on rays AX and BY respectively. Which two points now will be joined?
8. If TP and TQ are the two tangents to a circle with centre O so that $\angle POQ = 110^\circ$, then find $\angle PTQ$.

OR

If tangents PA and PB from a point P to a circle with centre O are inclined to each other at angle of 80° , then find $\angle POA$.

9. If one root of quadratic polynomial $2x^2 - 3x + k$ is reciprocal to the other, then find the value of k .
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10. If $\cot A = \frac{5}{12}$, then find the value of $\operatorname{cosec} A$.
11. If the pair of linear equations $13x + ky = k$ and $39x + 6y = k + 4$ has infinitely many solutions, then find the value of k .
12. The length of a tangent from a point A at distance 5 cm from the centre of the circle is 4 cm. Find the radius of the circle.
13. A ladder is placed against a wall such that its foot is at a distance of 2.5 m from the wall and its top reaches a window 6 m above the ground. Find the length of the ladder.
14. Find the area of a quadrant of a circle whose circumference is 22 cm.
15. A cone of height 24 cm and radius of base 6 cm is made up of modelling clay. A child reshapes it in the form of a sphere. Find the radius of the sphere.
16. A lot of 20 bulbs contain 6 defective ones. One bulb is drawn at random from the lot. What is the probability that this bulb is good?

OR

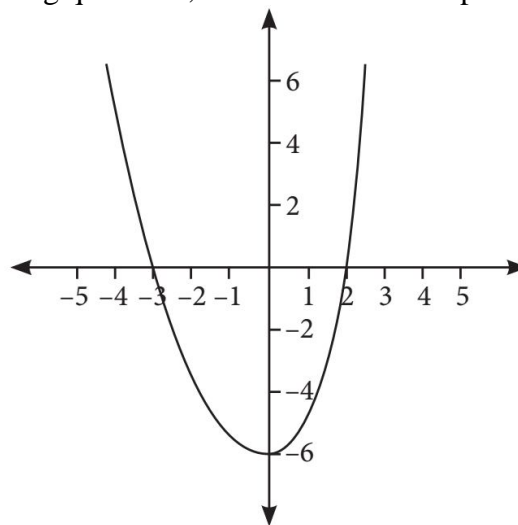
If two dice are thrown at the same time, then what will be the probability of getting doublet?

SECTION-II

Case study based questions are compulsory. Attempt any four sub parts of each question. Each subpart carries 1 mark

17. Case Study based-1: Heavy Storm

Aditya saw a creeper on the wall of his grandmother's house which was in the shape as shown in the figure. Answer the following questions, considered that creeper has a mathematical shape.

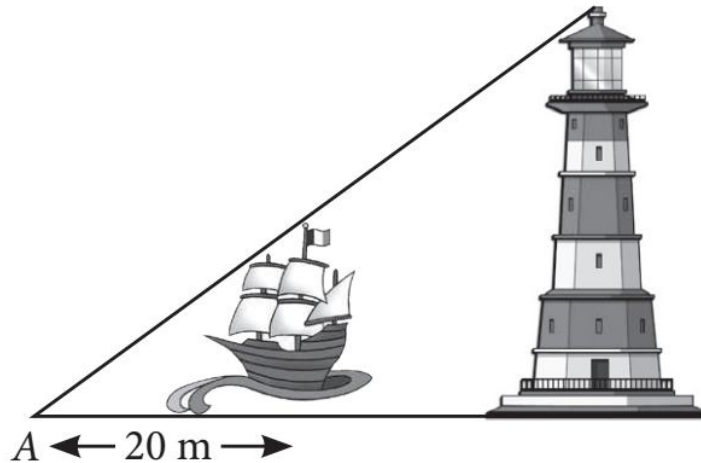


- (i) How many zeroes does the polynomial (shape of the creeper) have?
 (a) 0 (b) 1 (c) 2 (d) 3
- (ii) The zeroes of the polynomial are
 (a) 2, -3 (b) -2, 3 (c) 2, 1 (d) -3, 1
- (iii) Name the shape represents a polynomial.
 (a) Linear (b) Cubic (c) Quadratic (d) None of these
- (iv) The expression of the polynomial is
 (a) $x^2 - x - 6$ (b) $x^2 + x - 6$ (c) $x^3 - x + 6$ (d) $x^3 - x^2 + x + 6$

- (v) For what value of x , the value of polynomial is 6?
 (a) $x = 3$ (b) $x = -4$ (c) Both (a) and (b) (d) Can't be determined

18. Case Study based-2:

Shweta went to a beach with her uncle. From a point A where Shweta was standing, a ship and light house come in a straight line as shown in the figure.



- (i) Which similarity criteria can be seen in this case, if ship and lighthouse are considered as straight lines?
 (a) AA (b) SAS (c) SSS (d) ASA
- (ii) The distance between Shweta and the ship is twice as much as the height of the ship. What is the height of the ship?
 (a) 40 m (b) 10 m (c) 15 m (d) 25 m
- (iii) If the distance of Shweta from the lighthouse is twelve times the height of the ship, then the ratio of the heights of ship and lighthouse is
 (a) 3 : 1 (b) 1 : 4 (c) 1 : 6 (d) 2 : 3
- (iv) What is the ratio of the distance between Shweta and top of ship to the distance between the tops of ship and lighthouse?
 (a) 1 : 5 (b) 1 : 6 (c) 2 : 5 (d) Can't be determined
- (v) What is the height of the lighthouse?
 (a) 50 m (b) 60 m (c) 120 m (d) 30 m

19. Case Study based-3: 100m RACE

A stopwatch was used to find the time that it took a group of students to run 100 m.

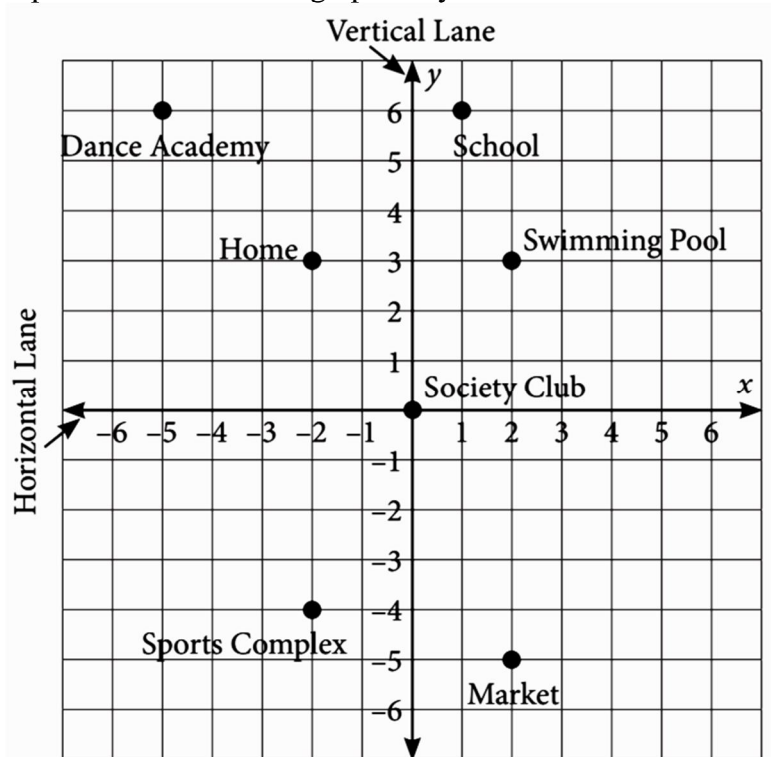
<i>Time (in sec)</i>	0-20	20-40	40-60	60-80	80-100
<i>No. of students</i>	8	10	13	6	3



- (i) Estimate the mean time taken by a student to finish the race.
 (a)54 (b)63 (c)43 (d)50
- (ii) What will be the upper limit of the modal class ?
 (a)20 (b)40 (c)60 (d)80
- (iii) The construction of cumulative frequency table is useful in determining the
 (a)Mean (b)Median (c)Mode (d)All of the above
- (iv) The sum of lower limits of median class and modal class is
 (a)60 (b)100 (c)80 (d)140
- (v) How many students finished the race within 1 minute?
 (a)18 (b)37 (c)31 (d)8

20. Case Study based-4:

Isha was making a survey on the facilities provided in her society. For that she represented the positions of various places near her home graphically as shown below.



- (i) The distance of Market from Horizontal Lane is
 (a) 2 units (b) 5 units (c) 3 units (d) 7 units
- (ii) What is the distance of Isha's home from society club?
 (a) $\sqrt{14}$ units (b) $\sqrt{5}$ units (c) $\sqrt{30}$ units (d) $\sqrt{13}$ units
- (iii) The midpoint of line joining Sports complex and Dance Academy is
 (a) $(-7/2, 5)$ (b) $(3/2, 1)$ (c) $(-7/2, 1)$ (d) $(-3/2, -5)$
- (iv) The point dividing the line segment joining school and market in the ratio 2 : 1 is
 (a) $(5/3, -4/3)$ (b) $(1, 16/3)$ (c) $(4/3, 7/3)$ (d) None of these
- (v) Which of the following options are equidistant from vertical lane?
 (a) Sports complex and Dance Academy (b) Isha's home and School
 (c) Swimming pool and Isha's home (d) Swimming pool and market

PART – B

(Question No 21 to 26 are Very short answer Type questions of 2 mark each)

21. Find the largest number which divides 245 and 1037, leaving remainder 5 in each case.
22. If (1, 2), (4, y), (x, 6) and (3, 5) are the vertices of a parallelogram taken in order, find x and y.

OR

Find the ratio in which the x-axis divides the line segment joining the points A(3, 6) and B(12, -3).

23. If the sum of the first 14 terms of an AP is 1050 and its first term is 10, find the 20th term.
24. In ΔOPQ , right-angled at P, $OP = 7$ cm and $OQ - PQ = 1$ cm. Determine the values of $\sin Q$ and $\cos Q$.

OR

If $\sin(A - B) = 1/2$, $\cos(A + B) = 1/2$, $0^\circ < A + B \leq 90^\circ$, $A > B$, find A and B.

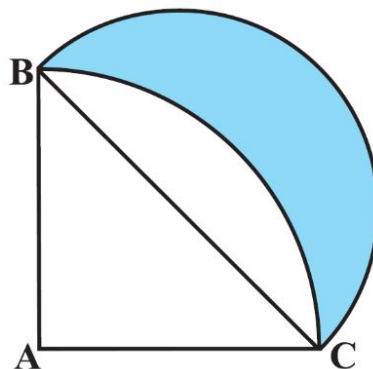
25. Draw a circle of radius 6 cm. From a point 10 cm away from its centre, construct the pair of tangents to the circle.
26. A quadrilateral ABCD is drawn to circumscribe a circle. Prove that $AB + CD = AD + BC$.

(Question no 27 to 33 are Short Answer Type questions of 3 marks each)

27. Prove that $\sqrt{7}$ is an irrational number.
28. Prove that: $(\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2 = 7 + \tan^2 A + \cot^2 A$
29. Find the median of the given distribution:

Class Interval	130 – 139	140 – 149	150 – 159	160 – 169	170 – 179	180 – 189	190 – 199
Frequency	4	9	18	28	24	10	7

30. In the below figure, ABC is a quadrant of a circle of radius 14 cm and a semicircle is drawn with BC as diameter. Find the area of the shaded region.



31. D and E are points on the sides CA and CB respectively of a triangle ABC right angled at C. Prove that $AE^2 + BD^2 = AB^2 + DE^2$.

32. A box contains 90 discs which are numbered from 1 to 90. If one disc is drawn at random from the box, find the probability that it bears
- a two-digit number
 - a perfect square number.
 - a number divisible by 5.

OR

One card is drawn from a well shuffled deck of 52 cards. Find the probability of getting

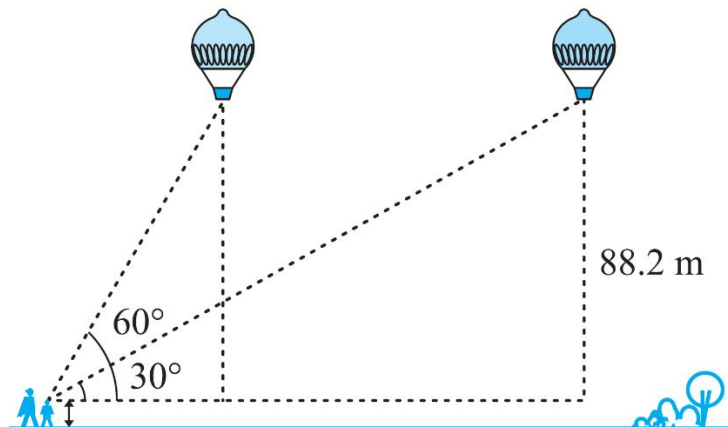
- a red face card.
 - neither spade card nor face card
 - an ace card.
33. A train travels 360 km at a uniform speed. If the speed had been 5 km/h more, it would have taken 1 hour less for the same journey. Find the speed of the train.

OR

Sum of the areas of two squares is 468 m^2 . If the difference of their perimeters is 24 m, find the sides of the two squares.

(Question no 34 to 36 are Long Answer Type questions of 5 marks each.)

34. Draw the graphs of the equations $x - y + 1 = 0$ and $3x + 2y - 12 = 0$. Find the solution and determine the coordinates of the vertices of the triangle formed by these lines and the x-axis.
35. A 1.2 m tall girl spots a balloon moving with the wind in a horizontal line at a height of 88.2 m from the ground. The angle of elevation of the balloon from the eyes of the girl at any instant is 60° . After some time, the angle of elevation reduces to 30° (see below figure). Find the distance travelled by the balloon during the interval.



OR

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 angles of elevation of the top of the poles are 60° and 30° , respectively. Find the height of the poles and the distances of the point from the poles.

36. A container shaped like a right circular cylinder having diameter 12 cm and height 15 cm is full of ice cream. The ice cream is to be filled into cones of height 12 cm and diameter 6 cm, having a hemispherical shape on the top. Find the number of such cones which can be filled with ice cream.

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