

CLASS X (2020-21)
MATHEMATICS STANDARD (041)
SAMPLE PAPER-06

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. If HCF $(a, b) = 12$ and $a \times b = 1,800$, then find LCM (a, b) .
- Q2. If one of the zeroes of the quadratic polynomial $(k-1)x^2 + kx + 1$ is -3 , then what is the value of k ?
- Q3. Calculate the zeroes of the polynomial $p(x) = 4x^2 - 12x + 9$.
- Q4. Find the positive root of $\sqrt{3x^2 + 6} = 9$.

OR

If $x = -\frac{1}{2}$, is a solution of the quadratic equation $3x^2 + 2kx - 3 = 0$, find the value of k .

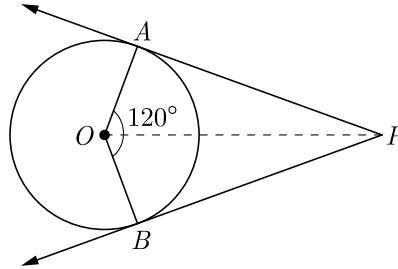
- Q5. Find the tenth term of the sequence $\sqrt{2}, \sqrt{8}, \sqrt{18}, \dots$

OR

Find the next term of the series $\sqrt{2}, \sqrt{8}, \sqrt{18}, \sqrt{32}, \dots$

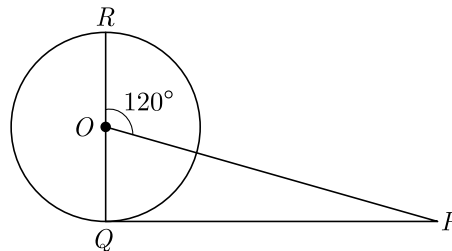
- Q6. Are two triangles with equal corresponding sides always similar?
- Q7. Find the distance of a point $P(x, y)$ from the origin.
- Q8. Find the value of a , for which point $P(\frac{a}{3}, 2)$ is the midpoint of the line segment joining the Points $Q(-5, 4)$ and $R(-1, 0)$.

- Q9. In a triangle ABC , write $\cos\left(\frac{B+C}{2}\right)$ in terms of angle A .
- Q10. What happens to value of $\cos\theta$ when θ increases from 0° to 90° .
- Q11. Find the value of $\sin^2 41^\circ + \sin^2 49^\circ$
- Q12. In the figure, PA and PB are tangents to a circle with centre O . If $\angle AOB = 120^\circ$, then find $\angle OPA$.



OR

PQ is a tangent drawn from an external point P to a circle with centre O , QOR is the diameter of the circle. If $\angle POR = 120^\circ$, What is the measure of $\angle OPQ$?



- Q13. The radius of a circle is 17.5 cm. find the area of the sector of the circle enclosed by two radii and an arc 44 cm in length.

OR

Find the area of the sector of a circle of radius 6 cm whose central angle is 30° . (Take $\pi = 3.14$)

- Q14. If the radius of the base of a right circular cylinder is halved, keeping the height same, find the ratio of the volume of the reduced cylinder to that of original cylinder.
- Q15. What is abscissa of the point of intersection of the “Less than type” and of the “More than type” cumulative frequency curve of a grouped data ?
- Q16. A card is drawn at random from a well shuffled pack of 52 cards. Find the probability of getting neither a red card nor a queen.

OR

A letter of English alphabet is chosen at random. Determine the probability that the chosen letter is a consonant.

SECTION II

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

- Q17. Amar, Akbar and Anthony are playing a game. Amar climbs 5 stairs and gets down 2 stairs in one turn. Akbar goes up by 7 stairs and comes down by 2 stairs every time. Anthony goes 10 stairs up and 3 stairs down each time.



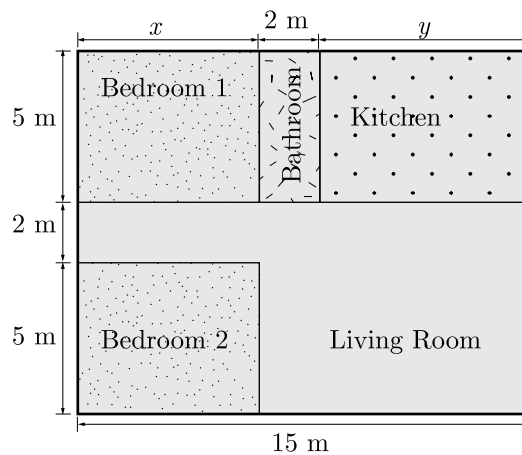
Doing this they have to reach to the nearest point of 100th stairs and they will stop once they find it impossible to go forward. They can not cross 100th stair in anyway.

- (i) Who reaches the nearest point?
 (a) Amar (b) Akbar
 (c) Anthony (d) All together reach to the nearest point.
- (ii) How many times can they meet in between on same stair ?
 (a) 3
 (b) 4
 (c) 5
 (d) No, they cannot meet in between on same stair.
- (iii) Who takes least number of steps to reach near hundred?
 (a) Amar (b) Akbar
 (c) Anthony (d) All of them take equal number of steps.
- (iv) What is the first stair where any two out of three will meet together?
 (a) Amar and Akbar will meet for the first time on 15th stair.
 (b) Akbar and Anthony will meet for the first time on 35th stair.
 (c) Amar and Anthony will meet for the first time on 21th stair.
 (d) Amar and Akbar will meet for the first time on 21th stair.
- (v) What is the second stair where any two out of three will meet together?
 (a) Amar and Akbar will meet on 21th stair.
 (b) Akbar and Anthony will meet on 35th stair.
 (c) Amar and Anthony will meet on 21th stair.
 (d) Amar and Anthony will meet on 35th stair.

Q18. An architect is a skilled professional who plans and designs buildings and generally plays a key role in their construction. Architects are highly trained in the art and science of building design. Since they bear responsibility for the safety of their buildings' occupants, architects must be professionally licensed.



Varsha is a licensed architect and design very innovative house. She has made a house layout for her client which is given below. In the layout, the design and measurements has been made such that area of two bedrooms and kitchen together is 95 sq. m.



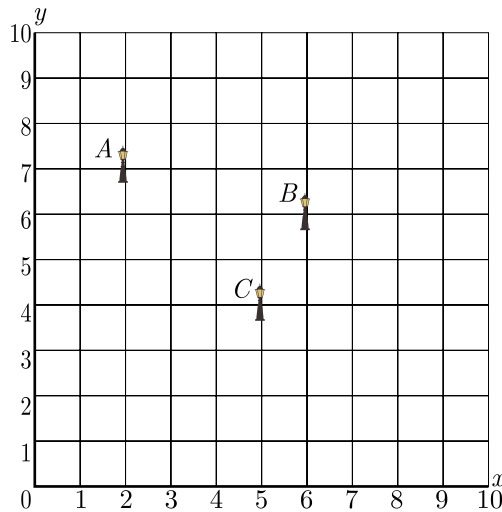
- (i) Which pair of linear equations does describe this situation ?
 - (a) $2x + y = 19$ and $x + y = 13$
 - (b) $x + 2y = 19$ and $2x + y = 13$
 - (c) $2x + y = 38$ and $x + y = 13$
 - (d) $2x + y = 38$ and $2x + y = 13$
- (ii) What is the length of the outer boundary of the layout.
 - (a) 24 m
 - (b) 48 m
 - (c) 27 m
 - (d) 54 m
- (iii) What is the area of bedroom 1 ?
 - (a) 24 m^2
 - (b) 30 m^2
 - (c) 28 m^2
 - (d) 24 m^2
- (iv) What is the area of living room in the layout ?
 - (a) 54 m^2
 - (b) 48 m^2
 - (c) 75 m^2
 - (d) 24 m^2
- (v) What is the cost of laying tiles in Kitchen at the rate of Rs. 50 per sq. m ?
 - (a) Rs. 1500
 - (b) Rs. 2000
 - (c) Rs. 1750
 - (d) Rs. 3000

Q19. Resident Welfare Association (RWA) of a Gulmohar Society in Delhi have installed three electric poles A , B and C in a society's common park. Despite these three poles, some parts of the park are still in dark.

So, RWA decides to have one more electric pole D in the park.



The park can be modelled as a coordinate systems given below.



On the basis of the above information, answer any four of the following questions:

- (i) What is the position of the pole C ?
 - (a) $(4, 5)$
 - (b) $(5, 4)$
 - (c) $(6, 5)$
 - (d) $(5, 6)$
- (ii) What is the distance of the pole B from the corner O of the park?
 - (a) $6\sqrt{2}$ units
 - (b) $3\sqrt{2}$ units
 - (c) $6\sqrt{3}$ units
 - (d) $3\sqrt{3}$ units
- (iii) Find the position of the fourth pole D so that four points A, B, C and D form a parallelogram
 - (a) $(5, 2)$
 - (b) $(1, 5)$
 - (c) $(1, 4)$
 - (d) $(2, 5)$
- (iv) What is the distance between poles A and C ?
 - (a) $6\sqrt{2}$ units
 - (b) $3\sqrt{2}$ units
 - (c) $6\sqrt{3}$ units
 - (d) $3\sqrt{3}$ units
- (v) What is the distance between poles B and D ?
 - (a) $2\sqrt{3}$ units
 - (b) $\sqrt{28}$ units
 - (c) $6\sqrt{3}$ units
 - (d) $\sqrt{26}$ units

Q20. When an eagle looks at a rat on the ground, eagle does not attack the rat at its initial position. It takes into account the speed of the rat and the direction in which rat is moving. After analysing the situation (how? it may be God's gift) eagle attacks the rat in such a way that it may successful in catching the rat.



Suppose an eagle sitting on the tree of height 90 m, observe a rat with angle of depression 45° , and moving away from the tree with some speed. Eagle start flying with 30° downward and catch rat in 10 second.

- (i) What is the horizontal distance between tree and initial position of rat ?
 (a) 60 m (b) 45 m
 (c) 90 m (d) 120 m
- (ii) What is the distance travelled by rat in 10 seconds?
 (a) $60(\sqrt{3} - 1)$ m (b) $60(\sqrt{2} - 1)$ m
 (c) $90(\sqrt{3} - 1)$ m (d) $90(\sqrt{2} - 1)$ m
- (iii) What is the distance travelled by eagle to catch rat?
 (a) 90 m (b) 180 m
 (c) 270 m (d) 240 m
- (iv) What is the speed of rat ?
 (a) 18 m/s (b) $9(\sqrt{3} + 1)$ m/s
 (c) 64.8 m/s (d) $9(\sqrt{3} - 1)$ m/s
- (v) What is the speed of eagle ?
 (a) 18 km/h (b) $9(\sqrt{3} + 1)$ km/h
 (c) $9(\sqrt{3} + 1)$ km/h (d) 64.8 km/h

PART - B

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

Q21. Find the quadratic polynomial whose sum and product of the zeroes are $\frac{21}{8}$ and $\frac{5}{16}$ respectively.

Q22. Solve the following pair of linear equations by substitution method:

$$3x + 2y - 7 = 0$$

$$4x + y - 6 = 0$$

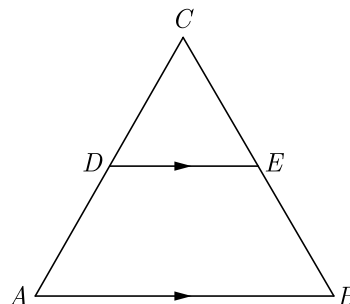
Q23. Solve the following quadratic equation for x :

$$4\sqrt{3}x^2 + 5x - 2\sqrt{3} = 0$$

OR

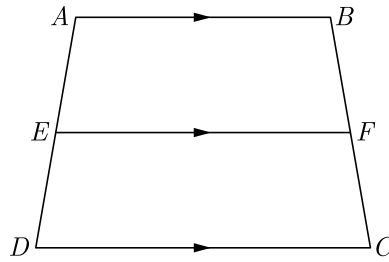
Solve for x : $x^2 - (\sqrt{3} + 1)x + \sqrt{3} = 0$

Q24. In the given figure, $\angle A = \angle B$ and $AD = BE$. Show that $DE \parallel AB$.



OR

In the given figure, if $ABCD$ is a trapezium in which $AB \parallel CD \parallel EF$, then prove that $\frac{AE}{ED} = \frac{BF}{FC}$



Q25. If $\sin A = \frac{\sqrt{3}}{2}$, find the value of $2 \cot^2 A - 1$.

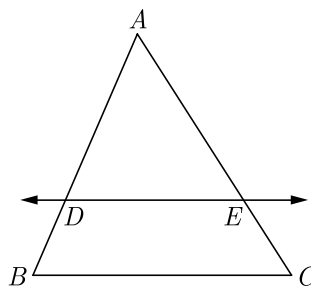
Q26. Given below is the distribution of weekly pocket money received by students of a class. Calculate the pocket money that is received by most of the students.

Pocket Money (in Rs.)	0-20	20-40	40-60	60-80	80-100	100-120	120-140
Number of students.	2	2	3	12	18	5	2

Q27. Find the values of k for which the quadratic equation $x^2 + 2\sqrt{2k}x + 18 = 0$ has equal roots.

Q28. The sum of the first 7 terms of an AP is 63 and that of its next 7 terms is 161. Find the AP.

Q29. In Figure, in ΔABC , $DE \parallel BC$ such that $AD = 2.4$ cm, $AB = 3.2$ cm and $AC = 8$ cm, then what is the length of AE ?



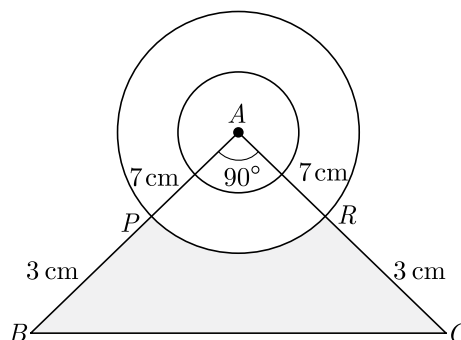
Q30. If $\sin \theta + \cos \theta = \sqrt{2}$ prove that $\tan \theta + \cot \theta = 2$

Q31. Draw two concentric circle of radii 3 cm and 5 cm. Taking a point on the outer circle, construct the pair of tangents to the inner circle.

Q32. Find the area of minor segment of a circle of radius 14 cm, when its centre angle is 60° . Also find the area of corresponding major segment. Use $\pi = \frac{22}{7}$.

OR

A momento is made as shown in the figure. Its base $PBCR$ is silver plate from the front side. Find the area which is silver plated. Use $\pi = \frac{22}{7}$.



- Q33. The following table shows the weights (in gms) of a sample of 100 apples, taken from a large consignment :

Weight (in gms)	50-60	60-70	70-80	80-90	90-100	100-110	110-120	120-130
No. of Apples	8	10	12	16	18	14	12	10

Find the median weight of apples.

OR

Weekly income of 600 families is given below :

Income (in Rs.)	0- 1000	1000-2000	2000-3000	3000-4000	4000-5000	5000-6000
No. of Families	250	190	100	40	15	5

Find the median.

- Q34. a, b and c are the sides of a right triangle, where c is the hypotenuse. A circle, of radius r , touches the sides of the triangle. Prove that $r = \frac{a+b-c}{2}$.
- Q35. Water is flowing at the rate of 5 km/hour through a pipe of diameter 14 cm into a rectangular tank of dimensions 50 m \times 44 m. Find the time in which the level of water in the tank will rise by 7 cm.

OR

A right triangle whose sides are 15 cm is made to revolve about its hypotenuse. Find the volume and the surface area of the double cone so formed. (Use $\pi = 3.14$)

- Q36. The king, queen and jack of clubs are removed from a deck of 52 cards. The remaining cards are mixed together and then a card is drawn at random from it. Find the probability of getting
- a face card,
 - a card of heart,
 - a card of clubs
 - a queen of diamond

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