

SELF ASSESSMENT PAPER 2

Class 10 - Mathematics

Time Allowed: 3 hours

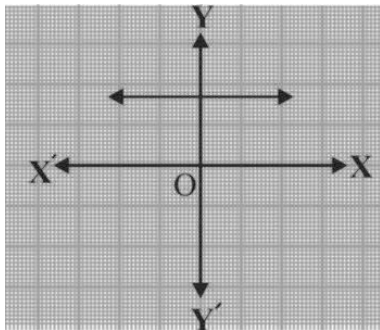
Maximum Marks: 80

General Instructions:

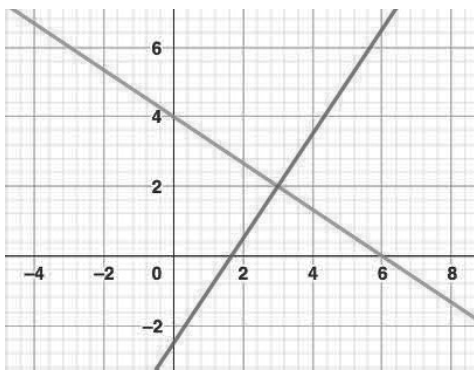
1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with sub- parts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks questions of Section E
8. Draw neat figures wherever required. Take $\pi = \frac{22}{7}$ wherever required if not stated.

Section A

1. If two numbers do not have common factor (other than 1), then they are called [1]
 - a) prime numbers
 - b) co-prime numbers
 - c) composite numbers
 - d) twin primes
2. The graph of $y = p(x)$ in a figure given below, for some polynomial $p(x)$. Find the number of zeroes of $p(x)$. [1]



- a) 4
 - b) 0
 - c) 1
 - d) 2
3. If $2x + 3y = 12$ and $3x - 2y = 5$ then [1]



a) $x = 3, y = 2$

b) $x = 2, y = -3$

c) $x = 2, y = 3$

d) $x = 3, y = -2$

4. Rohan's mother is 26 years older than him. The product of their ages 3 years from now will be 360, then Rohan's present age is [1]

a) 6 years

b) 7 years

c) 10 years

d) 8 years

5. The sum of first five multiples of 3 is [1]

a) 55

b) 65

c) 50

d) 45

6. If the point $(x, 4)$ lies on a circle whose centre is at the origin and radius is 5 then $x =$ [1]

a) 0

b) ± 3

c) ± 4

d) ± 5

7. If the centroid of the triangle formed by $(7, x)$, $(y, -6)$ and $(9, 10)$ is at $(6, 3)$, then $(x,y)=$ [1]

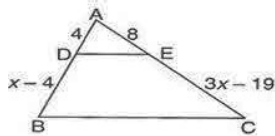
a) $(5, 4)$

b) $(5, 2)$

c) $(-5, -2)$

d) $(4, 5)$

8. In the given figure if $DE \parallel BC$, then x is equal to:- [1]



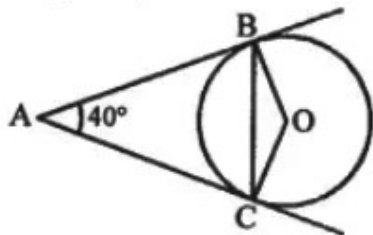
a) 17.

b) 15.

c) 11.

d) 19.

9. In the given figure, AB and AC are tangents to the circle with centre O such that $\angle BAC = 40^\circ$. Then $\angle BOC$ is equal to [1]



a) 140°

b) 120°

- c) 80° d) 100°
10. On the level ground, the angle of elevation of a tower is 30° . On moving 20 m nearer, the angle of elevation is 60° . The height of the tower is [1]
- a) 15 m b) 20 m
 c) 10 m d) $10\sqrt{3}$ m

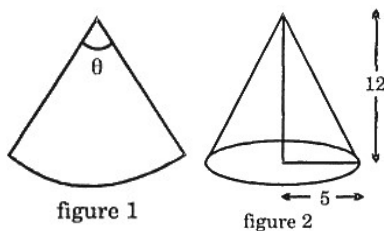
11. $\sin^2 A + \sin^2 A \tan^2 A =$ [1]
- a) $\tan^2 A$ b) $\cos^2 A$
 c) None of these d) $\sin^2 A$

12. If $\tan \theta = \frac{a}{b}$, then $\frac{a \sin \theta + b \cos \theta}{a \sin \theta - b \cos \theta}$ is [1]
- a) $\frac{a+b}{a-b}$ b) $\frac{a^2-b^2}{a^2+b^2}$
 c) $\frac{a-b}{a+b}$ d) $\frac{a^2+b^2}{a^2-b^2}$

13. If the height of a vertical pole is $\sqrt{3}$ times the length of its shadow on the ground, then the angle of elevation of the sun at that time is [1]
- a) 30° b) 75°
 c) 60° d) 45°

14. The length of an arc of a sector of angle θ° of a circle with radius R is [1]
- a) $\frac{\pi R^2 \theta}{180}$ b) $\frac{\pi R^2 \theta}{360}$
 c) $\frac{2\pi R \theta}{360}$ d) $\frac{2\pi R \theta}{180}$

15. A piece of paper in the shape of a sector of a circle (see figure 1) is rolled up to form a right-circular cone (see figure 2). The value of angle θ is: [1]



- a) $\frac{5\pi}{13}$ b) $\frac{6\pi}{13}$
 c) $\frac{10\pi}{13}$ d) $\frac{9\pi}{13}$

16. A girl has a cube one letter written on each face, as shown below: [1]
 M, N, P, M, N, M

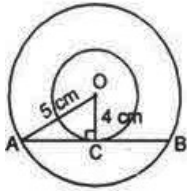
The cube is thrown once. The probability of getting M is

- a) $\frac{1}{3}$ b) $\frac{1}{5}$
 c) $\frac{1}{2}$ d) $\frac{1}{4}$

17. A bag contains 50 balls of which $2x$ are red, $3x$ are white and $5x$ are blue. A ball is selected at random. The probability that it is not white is [1]

- a) $\frac{7}{10}$ b) $\frac{2}{5}$
 c) $\frac{7}{45}$ d) $\frac{3}{5}$

18. If radii of two concentric circles are 4 cm and 5 cm, then the length of the chord of one circle which is tangent to the other circle is: [1]



- a) 9 cm
b) 3 cm
c) 1 cm
d) 6 cm
19. The string of a kite is 100 m long and it makes an angle of 60° with the horizontal. If there is no slack in the string, the height of the kite from the ground is [1]

- a) $100\sqrt{3}$ m
b) $50\sqrt{2}$ m
c) 100 m
d) $50\sqrt{3}$ m

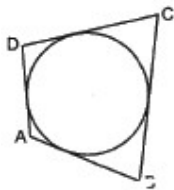
20. **Assertion (A):** Sum of first n terms in an A.P. is given by the formula: $S_n = 2n \times [2a + (n - 1)d]$ [1]

Reason (R): Sum of first 15 terms of 2, 5, 8 ... is 345.

- a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

Section B

21. Prove that $2 - 3\sqrt{5}$ is an irrational number. [2]
22. The diagonals of a quadrilateral ABCD intersect each other at the point O such that $\frac{AO}{BO} = \frac{CO}{DO}$. Show that ABCD is a trapezium. [2]
23. In figure, a circle touches all the four sides of a quadrilateral ABCD whose sides are $AB = 6$ cm, $BC = 9$ cm and $CD = 8$ cm. Find the length of side AD. [2]



24. If $m \cot A = n$, find the value of $\frac{m \sin A - n \cos A}{n \cos A + m \sin A}$. [2]

OR

If $x = a \sec \theta \cos \phi$, $y = b \sec \theta \sin \phi$ and $z = c \tan \theta$, show that $\frac{x^2}{a^2} + \frac{y^2}{b^2} - \frac{z^2}{c^2} = 1$

25. A tower stands near an airport. The angle of elevation θ of the tower from a point on the ground is such that its tangent is $\frac{5}{12}$. Find the height of the tower, if the distance of the observer from the tower is 120 m. [2]

OR

A tower stands vertically on the ground. From a point on the ground, which is 15 m away from the foot of the tower, the angle of elevation of the top of the tower is found to be 60° . Find the height of the tower.

Section C

26. 105 goats, 140 donkeys and 175 cows have to be taken across a river. There is only one boat which will have to make many trips in order to do so. The lazy boatman has his own conditions for transporting them. He insists [3]

that he will take the same number of animals in every trip and they have to be of the same kind. He will naturally like to take the largest possible number each time. Can you tell how many animals went in each trip?

27. Find the zeros of $p(x) = x^2 + 2\sqrt{2}x - 6$ and verify the relationship between the zeros and its coefficients. [3]
 28. The 12th term of an AP is -13 and the sum of its first four terms is 24. Find the sum of its first 10 terms. [3]

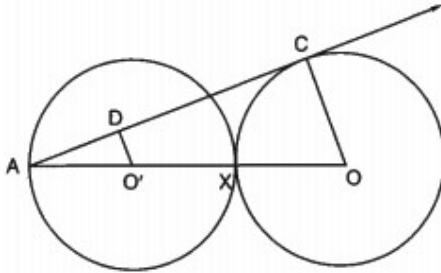
OR

Suba Rao started work in 1995 at an annual salary of ₹5000 and received a ₹200 raise each year. In what year did his annual salary will reach ₹7000?

29. If a hexagon ABCDEF circumscribe a circle, prove that $AB + CD + EF = BC + DE + FA$. [3]

OR

Equal circles with centres O and O' touch each other at X as shown in figure. OO' produced to meet a circle with centre O', at A. AC is a tangent to the circle whose centre is O. O'D is perpendicular to AC. Find the value of $\frac{DO'}{CO}$.



30. In $\triangle ABC$, right-angled at B, $AB = 5$ cm and $BC = 12$ cm. Find the values of $\sin A$, $\sec A$, $\sin C$ and $\sec C$. [3]
 31. A chord of a circle of radius 20 cm subtends an angle of 90° at the centre. Find the area of the corresponding major segment of the circle. (Use $\pi = 3.14$) [3]

Section D

32. Solve for y: [5]
 $\frac{y+3}{y-2} - \frac{1-y}{y} = \frac{17}{4}; y \neq 0 \cdot 2$

OR

If roots of the quadratic equation $x^2 + 2px + mn = 0$ are real and equal, show that the roots of the quadratic equation $x^2 - 2(m + n)x + (m^2 + n^2 + 2p^2) = 0$ are also equal.

33. Find the lengths of the medians of a $\triangle ABC$ whose vertices are $A(0, -1)$ $B(2, 1)$ and $C(0, 3)$. [5]
 34. An iron pillar has some part in the form of a right circular cylinder and remaining in the form of a right circular cone. The radius of base of each of cone and cylinder is 8 cm. The cylindrical part is 240 cm high and the conical part is 36 cm high. Find the weight of the pillar, if one cubic cm of iron weighs 10 g. [5]

OR

A solid consisting of a right cone standing on a hemisphere is placed upright in a right circular cylinder full of water and touches the bottom. Find the volume of water left in the cylinder, if the radius of the cylinder is 60 cm and its height is 180 cm, the radius of the hemisphere is 60 cm and height of the cone is 120 cm, assuming that the hemisphere and the cone have common base.

35. In a hospital, the ages of diabetic patients were recorded as follows. Find the median age. [5]

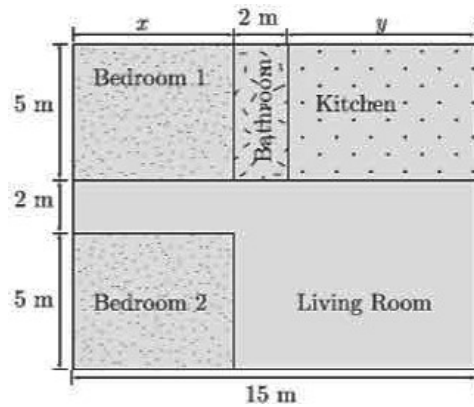
Age (in years)	0 - 15	15 - 30	30 - 45	45 - 60	60 - 75
Number of patients	5	20	40	50	25

Section E

36. Read the text carefully and answer the questions: [4]

Architect : 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.

Vishu 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?
- (ii) What is the length of the outer boundary of the layout?
- (iii) What is the area of the bedroom 1?

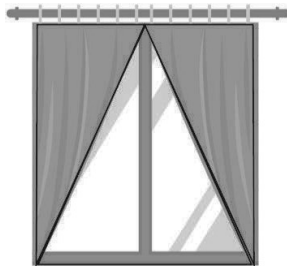
OR

What is the area of living room in the layout?

37. **Read the text carefully and answer the questions:**

[4]

Veena wants to make the curtains for her window as shown in the figure. The window is in the shape of a rectangle, whose width and height are in the ratio 2 : 3. The area of the window is 9600 square cm.



- (i) What is the shape of the window that is uncovered?
- (ii) What will be the ratio of two sides of each curtain (other than hypotenuse)?
- (iii) What are the dimensions of the window?

OR

What will be the perimeter of the window?

38. **Read the text carefully and answer the questions:**

[4]

TERM INSURANCE PLAN

A particular term insurance company has two options in the application form before issuing the policy - Smoker or Non-smoker. As a smoker has more chance of getting lung disease and death chance is comparatively higher. So premium payment is more for a smoking person. Company gives a rider plan (i.e. for some critical diseases) along with normal term plan by paying some extra premium money. In a certain time period, company issues 100 policies of which 30% are for smokers and rest for non-smoker customers. Also, half the smokers and $\frac{2}{5}$ th

of non-smoking customers have purchased a rider plan along with a normal plan.



- (i) Find the probability that company issues policy for a smoker with rider plan.
- (ii) Find the probability that company issues policy for a non-smoker without a rider plan.

OR

- Find the probability that company issues policy for a non-smoker with rider plan.
- (iii) Find the probability that company issues policy for a smoker without a rider plan.

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