S R Coaching Centre

SELF ASSESSSMENT PAPER 1

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. The HCF and the LCM of 12, 21, 15 respectively are: **[1]**

   a) 3, 140   b) 420, 3

   c) 12, 420   d) 3, 420

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]**
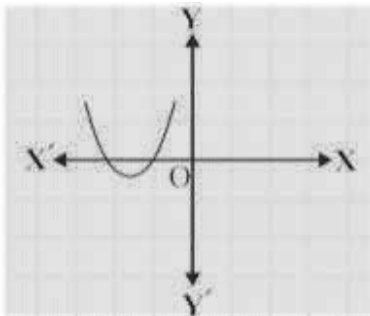
   a) 1   b) 4

   c) 3   d) 2

3. If 2x + 3y = 12 and 3x - 2y = 5 then   **[1]**
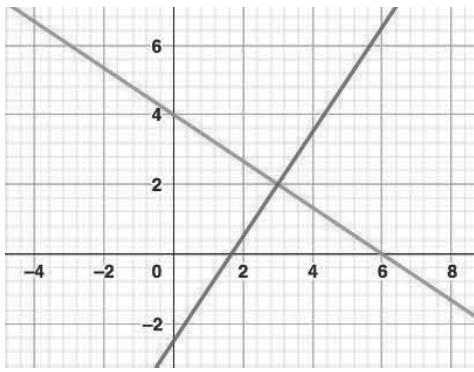
a) x = 3, y = 2   b) x = 2, y = -3

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

4.   Which of the following equations has the sum of its roots as 3?   **[1]**

     a) $-x^2 + 3x - 3 = 0$ b) $\sqrt{2}x^2 - \frac{3}{\sqrt{2}}x + 1 = 0$

     c) $2x^2 - 3x + 6 = 0$ d) $3x^2 - 3x + 3 = 0$

5.   If the sum of the n terms of an A.P is $2n^2+5n$, then its nth term is   **[1]**

     a) 4n + 3   b) 3n + 4

     c) n - 4   d) 4n - 3
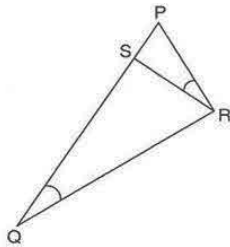
6.   The distance between the points **(-1, -3)** and **(5, -2)** is: **[1]**

     a) $\sqrt{17}$ units   b) $\sqrt{37}$ units

     c) $\sqrt{61}$ units   d) 5 units

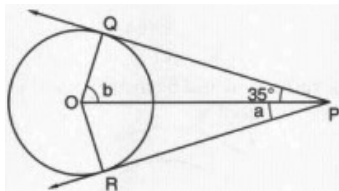7.   If P(-1, 1) is the midpoint of the line segment joining A(-3, b) and B(1, b + 4) then b = ?   **[1]**

     a) 0   b) 2

     c) 1   d) -1

8.   In the adjoining figure $\angle PQR = \angle PRS$. If PR = 8cm, PS = 4 cm, then PQ is equal to   **[1]**

     a) 16 cm.   b) 12 cm.

     c) 24 cm.   d) 32 cm.

9.   In Figure, PQ and PR are tangents drawn from P to a circle with centre O. If $\angle OPQ = 35°$, then   **[1]**

     a) a = 40⁰, b = 50⁰   b) a = 30⁰, b = 60⁰

     c)   d)

a = 45⁰, b = 45⁰   a = 35⁰, b = 55⁰

10. The tops of two towers of heights x and y, standing on a level ground subtend angles of 30° and 60° respectively **[1]** at the centre of the line joining their feet. Then, x : y is

   a) 1 : 3   b) 2 : 1

   c) 1 : 2   d) 3 :1

11. The value of $\sin^6 A + \cos^6 A + 3\cos^2 A \sin^2 A$ is   **[1]**

   a) 0   b) – 1

   c) 2   d) 1

12. If $(\tan\theta + \cot\theta) = 5$ then $(\tan^2\theta + \cot^2\theta) = ?$ **[1]**

   a) 23   b) 25

   c) 24   d) 27

13. A tree 12m high is broken by the wind in such a way that its top touches the ground and makes an angle $30°$ **[1]** with the ground. The height at which from the bottom the tree is broken by the wind is

   a) 8 m   b) 6 m

   c) 4 m   d) 9 m

14. Find the area of the sector if the radius is 5 cm and with an angle of 50⁰.   **[1]**

   a) 10.90 cm   b) 12.90 cm

   c) 13.90 cm   d) 11.90 cm

15. A piece of wire 20cm long is bent into the form of an arc of a circle subtending an angle of 60⁰ at its centre. The **[1]** radius of the circle is

   a) $\frac{20}{6+\pi}$ cm   b) $\frac{30}{6+\pi}$ cm

   c) $\frac{60}{\pi}$ cm   d) $\frac{15}{6+\pi}$ cm

16. In a lottery, there are 8 prizes and 16 blanks. What is the probability of getting a prize?   **[1]**

   a) $\frac{1}{2}$ b) None of these

   c) $\frac{1}{3}$ d) $\frac{2}{3}$

17. A bag contains 4 red and 6 black balls. A ball is taken out of the bag at random. What is the probability of **[1]** getting a black ball?

   a) $\frac{2}{5}$ b) $\frac{3}{5}$

   c) $\frac{1}{10}$ d) None of these

18. If the mean of data is 27 and its median is 33 then the mode is   **[1]**

   a) 43   b) 45

   c) 30   d) 47

19. The angle of elevation of the sun when the shadow of a pole 'h' metres high is $\frac{h}{\sqrt{3}}$ metres long is **[1]**

   a) $45°$ b) $30°$

   c) $60°$ d) none of these

20. **Assertion (A):** Sum of first hundred even natural numbers divisible by 5 is 500 **[1]**

   Reason (R): Sum of first n-terms of an A.P. is given by $S_n = \frac{n}{2}[a + l]$ where l = last term.

   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. Two tanks contain 504 and 735 liters of milk. Find the capacity of a container which can measure the milk of either tank in exact number of times **[2]**

22. In the given figure, $\triangle ABC \sim \triangle PQR$. Find the value of y + z. **[2]**
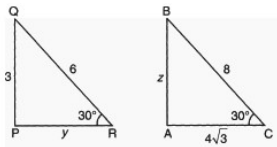
23. ABC is a right triangle, right-angled at B, such that BC = 6 cm and AB = 8 cm, find the radius of circle. **[2]**

24. If x = asecθcosϕ , y = bsecθsinϕ and z = c tanθ then prove that $\left(\frac{x^2}{a^2} + \frac{y^2}{b^2} \right) = \left(1 + \frac{z^2}{c^2} \right)$ **[2]**

OR

Prove the trigonometric identity : $\frac{\sin\theta}{1+\cos\theta} + \frac{1+\cos\theta}{\sin\theta} = 2 \cosec\theta$.

25. The angle of elevation of a ladder leaning against a wall is 60° and the foot of the ladder is 9.5 m away from the wall. Find the length of the ladder. **[2]**

OR

Find the angle of elevation of the sun when the shadow of a pole h m high is $\sqrt{3}\, h$ m long.

Section C

26. Amita, Suneha and Raghav start preparing cards for greeting each person of an old age home on new year. In order to complete one card, they take 10, 16 and 20 minutes respectively. If all of them started together, after what time will they start preparing a new card together ? Why do you think there is a need to show elders that the young generation cares for them and remembers the contribution made by them in the prime of their life? **[3]**

27. Find the zeroes of the quadratic polynomial $4y^2 - 15$ and verify the relationship between the zeroes and coefficient of polynomial. **[3]**

28. Find the sum of first 22 terms of an AP in which d = 7 and 22nd term is 149. **[3]**
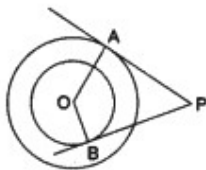
OR

Which term of the AP : 3, 15, 27, 39, ... will be 132 more than its 54th term?

29. AB and CD are equal chords of a circle whose centre is O. When produced, these chords meet at E. Prove that EB = ED **[3]**
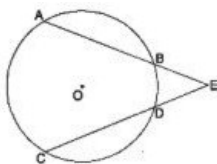
OR

Tangents PA and PB are drawn from an external point P to two concentric circles with centre O and radii 8 cm and 5 cm respectively, as shown in the figure. If AP = 15 cm then find the length of BP.

30. If $\tan\theta = \frac{12}{13}$, find the value of $\frac{2\sin\theta\cos\theta}{\cos^2\theta - \sin^2\theta}$. [3]

31. The arithmetic mean of the following frequency distribution is 25. [3]

Class	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50
Frequency	16	p	30	32	14

Find the value of p.

Section D

32. The difference of two numbers is 5 and the difference of their reciprocals is $\frac{1}{10}$. Find the numbers. [5]

OR

Solve the quadratic equation by factorization:

$\frac{3}{x+1} - \frac{1}{2} = \frac{2}{3x-1}, x \neq -1, \frac{1}{3}$

33. In $\triangle ABC$, if $\angle ADE = \angle B$, then prove that $\triangle ADE \sim \triangle ABC$. Also, if AD = 7.6 cm, AE = 7.2 cm, BE = 4.2 cm [5] and BC = 8.4 cm, then find DE.
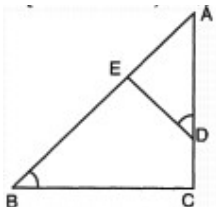
34. From a solid cylinder of height 30 cm and radius 7 cm, a conical cavity of height 24 cm and same radius is [5] hollowed out. Find the total surface area of the remaining solid.

OR

A solid toy is in the form of a hemisphere surmounted by a right circular cone of same radius. The height of the cone is 10 cm and the radius of the base is 7 cm. Determine the volume of the toy. Also find the area of the coloured sheet required to cover the toy. (Use $\pi = \frac{22}{7}$ and $\sqrt{149}$ = 12.2)

35. In a retail market, fruit vendors were selling mangoes kept in packing boxes. These boxes contained varying [5] number of mangoes. The following was the distribution of mangoes according to the number of boxes.

Number of mangoes	50-52	53-55	56-58	59-61	62-64
Number of boxes	15	110	135	115	25

Find the mean number of mangoes kept in a packing box. Which method of finding the mean did you choose?

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.
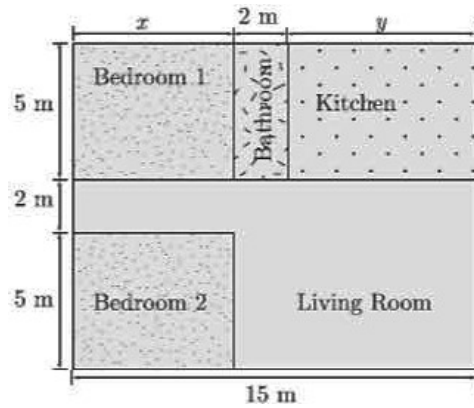
(i)   Which pair of linear equations does describe this situation?

(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]**

To raise social awareness about the hazards of smoking, a school decided to start a 'No smoking' campaign. 10
students are asked to prepare campaign banners in the shape of a triangle. The vertices of one of the triangles are
P(-3, 4), Q(3, 4) and R(-2, -1).

(i)   What are the coordinates of the centroid of $\triangle$PQR?

(ii)   If T be the mid-point of the line joining R and Q, then what are the coordinates of T?

OR

What are the coordinates of centroid of $\triangle$STU?

(iii)   If U be the mid-point of line joining R and P, then what are the coordinates of U?

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

Pawan had a farm with many animals like cows, dogs, horses etc. He had sufficient grassland for the cows and
horses to graze, One day Three of his horses were tied with 7 metre long ropes at the three corners of a triangular
lawn having sides 20 m, 34 m and 42 m.

(i)   Find the area of the triangular lawn.

(ii)   Find the area of the field that can be grazed by the horses.

OR

If $\angle A = 60^o$, find the area grazed by horses tied at corner B and C.

(iii) Find the area that cannot be grazed by the horses.