

Roll Number		
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SET A



INDIAN SCHOOL MUSCAT HALF YEARLY EXAMINATION MATHEMATICS

CLASS: X

Sub. Code: 041

Time Allotted: 3 Hrs

15.09.2019

Max. Marks: 80

General Instructions:

- All questions are compulsory.
- Section A contains 20 questions of 1 mark each. Section B contains 6 questions of 2 marks each. Section C contains 8 questions of 3 marks each. Section D contains 6 questions of 4 marks each.
- There is no overall choice. However, an internal choice has been provided in two questions of 2 marks each, three questions of 3 marks each and two questions of 4 marks. You have to attempt only one of the alternatives in all such questions.
- Use of calculators is not permitted.

SECTION A (20 x 1 = 20 marks) **(Question numbers 1 to 20 carry 1 mark each)**

- For questions 1 to 10, choose the correct answer from the options given. Write the answer also along with the chosen option:
 - If $x = a$ and $y = b$ is the solution of equations $x - y = 2$ and $x + y = 4$, find a and b .
 (a) $a=1, b=3$ (b) $a=2, b=-1$ (c) $a=3, b=1$ (d) $a=1, b=-1$
 - Find the value of 'k' for which one zero of $p(x) = 3x^2 + 12x - k$ is the reciprocal of the other.
 (a) 3 (b) -3 (c) 4 (d) -4
 - In a $\triangle ABC$, DE is parallel to BC. If $AB = 10$ cm, $AC = 8$ cm and $AD = 5$ cm, then find CE.
 (a) 6cm (b) 4cm (c) 5cm (d) 10cm
 - $(\sec A + \tan A)(1 - \sin A) = \text{-----}$
 (a) $\sec A$ (b) $\sin A$ (c) $\operatorname{cosec} A$ (d) $\cos A$
 - A ladder makes an angle of 60° with the ground when placed against a wall. If the foot of the ladder is 2m away from the wall, find the length of ladder.
 (a) 2 m (b) $\sqrt{3}/4$ m (c) $4/\sqrt{3}$ m (d) 4 m
 - If roots of $x^2 - 5x + a = 0$ are equal, then $a = \text{-----}$
 (a) $25/5$ (b) $\pm 25/4$ (c) $25/4$ (d) None
 - The abscissa of the point of intersection of the 'less than type' and of the 'more than type' cumulative frequency curve of grouped data gives _____
 (a) Mean (b) Median (c) Mode (d) All three

8. TP and TQ are two tangents to a circle with centre O such that $\angle POQ = 110^\circ$. Then find $\angle PTQ$.

- (a) 110° (b) 90° (c) 180° (d) 70°

9. Find the distance of the point $(-5, -7)$ from the y axis

- (a) 5 units (b) -5 units (c) 7units (d) -7units

10. If $p - 1, p + 3, 3p - 1$ are in A.P., then p is equal to

- (a) 2 (b) -4 (c) 4 (d) -2

II For questions 11 to 20, answer the following.

11. Find the value of k for which the pair of linear equations $4x + 6y - 1 = 0$ and $2x + ky - 7 = 0$ represent parallel lines.

12. The graph of $y = f(x)$ is given in the fig 1, how many zeroes are there for $f(x)$.

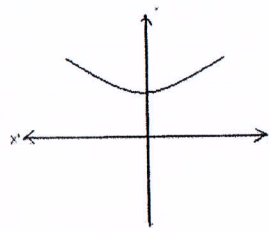


fig 1

13. $\triangle ABC \sim \triangle PQR$, perimeter of $\triangle ABC = 35$ cm and perimeter of $\triangle PQR = 42$ cm and $PR = 6$ cm. Find AC.

14. Write $\sin A$ in terms of $\cot A$

15. Check the nature of roots of the equation $2x^2 - 4x + 3 = 0$.

16. Write the empirical relation between mean, mode and median.

17. In figure 2, find the length of PR.

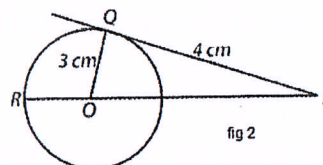


fig 2

18. Name the line that intersects the circle at two points?

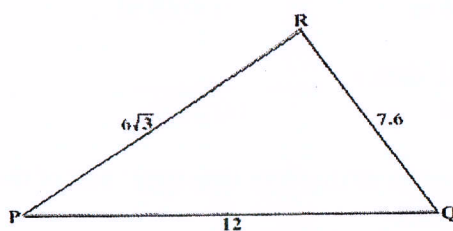
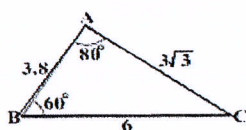
19. Find the distance between the points Q $(-5, 4)$ and R $(-1, 0)$.

20. Write the first four terms of an A.P. whose first term is -2 and common difference is -2.

SECTION B (6 x 2 = 12 marks)
(Question numbers 21 to 26 carry 2 marks each)

21.

fig 3



From fig3, find $\angle P$.

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

OR

Evaluate: $\frac{6 \sin 23^\circ + \sec 79^\circ + 3 \tan 48^\circ}{\operatorname{cosec} 11^\circ + 3 \cot 42^\circ + 6 \cos 67^\circ}$.

23. Find the roots of quadratic equation $6x^2 - x - 2 = 0$

24. The percentage of marks obtained by 100 students in an examination are given below:

Marks	30-35	35-40	40-45	45-50	50-55	55-60	60-65
Frequency	14	16	18	23	18	8	3

Find the Mode for the above data.

25. Find the values of y for which the distance between the points P (2, -3) and Q (10, y) is 10 units.

OR

If the point (7, 0), (1, 2) and (x, y) are collinear, find a relation between x and y.

26. Find the 10th term from end of the AP : 4, 9, 14,254

SECTION C (8 x 3 = 24 marks)
(Question numbers 27 to 34 carry 3 marks each)

27. Solve the following pair of equations: $\frac{2}{\sqrt{x}} + \frac{3}{\sqrt{y}} = 2$ and $\frac{4}{\sqrt{x}} - \frac{9}{\sqrt{y}} = -1$
28. Find the quadratic polynomial, sum and product of whose zeroes are -1 and -20 respectively. Also find the zeroes of the polynomial so obtained.
29. Sides AB and BC and median AD of a triangle ABC are respectively proportional to sides PQ and QR and median PM of Δ PQR. Show that $\Delta ABC \sim \Delta PQR$.

OR

BL and CM are medians of a triangle ABC right angled at A. Prove that $4(BL^2 + CM^2) = 5 BC^2$.

30. Prove that : $\frac{\cos A}{1 + \sin A} + \frac{1 + \sin A}{\cos A} = 2 \sec A$

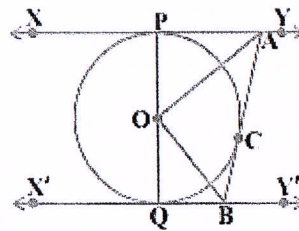
31. Find the mean of the following data:

Class Interval	100-120	120-140	140-160	160-180	180-200
Frequency	10	20	30	15	5

32. Find the ratio in which the point P $\left(\frac{1}{2}, y\right)$ divides the line segment joining the point A (3, -5) and B (-7, 9). Also find the value of y.
33. PQR is a right angled triangle at Q. PQ= 5 cm, QR=12 cm. A circle with centre O is inscribed in Δ PQR, touching all its sides. Find the radius of the circle.

OR

XY and X'Y' are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersecting XY at A and X'Y' at B. Prove that $\angle AOB = 90^\circ$.



34. If 7th term of an A.P is $\frac{1}{9}$ and 9th term is $\frac{1}{7}$, find 63rd term.

OR

The sum of n terms of an A.P is $3n^2 + 5n$. Find the A.P. Hence find its 15th term

SECTION D (6 x 4 = 24 marks)
(Question numbers 35 to 40 carry 4 marks each)

35. Draw the graphs of the pair of linear equations: $x + 2y = 5$ and $2x - 3y = -4$. Also find the points where the lines meet the x-axis.
36. Find all the zeroes of the polynomial $2x^4 - 11x^3 - 16x^2 + 55x + 30$ if two of its zeros are $\sqrt{5}, -\sqrt{5}$.
37. Prove that the ratio of the areas of two similar triangles is equal to the squares of the ratios of their corresponding sides.

OR

The diagonals of a quadrilateral ABCD intersect each other at the point O such that $\frac{AO}{CO} = \frac{BO}{DO}$. Show that ABCD is a trapezium.

38. The angle of elevation of the top of a hill from the foot of a tower is 60° and the angle of elevation of the top of the tower from the foot of the hill is 30° . If the tower is 50m high, find the height of the hill.

OR

From a point, 36 m above the surface of a lake, the angle of elevation of a bird is observed to 30° and angle depression of its image in the water of the lake is observed to be 60° . Find the actual height of the bird above the surface of the lake.

39. The sum of the squares of two consecutive odd numbers is 394. Find the numbers.
40. The median of the following data is 52.5. Find the values of x and y, if the total frequency is 100.

Class Interval	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	2	5	x	12	17	20	y

End of the Question Paper



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SECTION A (20 x 1 = 20 marks) (Question numbers 1 to 20 carry 1 mark each)

I For questions 1 to 10, choose the correct answer from the options given. Write the answer also along with the chosen option:

1. $(\sec A + \tan A)(1 - \sin A) = \text{-----}$
 (a) $\sec A$ (b) $\sin A$ (c) $\operatorname{cosec} A$ (d) $\cos A$
2. If $p - 1$, $p + 3$, $3p - 1$ are in A.P., then p is equal to
 (a) 4 (b) -4 (c) 2 (d) -2
3. In a $\triangle ABC$, DE is parallel to BC . If $AB = 10$ cm, $AC = 8$ cm and $AD = 5$ cm, then find CE .
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4. If $x = a$ and $y = b$ is the solution of equations $x - y = 2$ and $x + y = 4$, find a and b .
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6. Find the distance of the point $(-5, -7)$ from the y axis
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 (a) Mean (b) Median (c) Mode (d) All three

8. TP and TQ are two tangents to a circle with centre O such that $\angle POQ = 110^\circ$. Then find $\angle PTQ$.
 (a) 110° (b) 90° (c) 180° (d) 70°
9. If roots of $x^2 - 5x + a = 0$ are equal, then $a =$ _____
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10. Find the value of 'k' for which one zero of $p(x) = 3x^2 + 12x - k$ is the reciprocal of the other.
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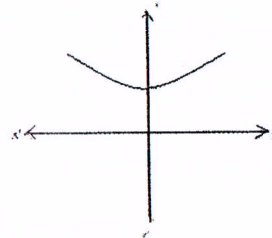


fig 1

13. Write the first four terms of an A.P. whose first term is -2 and common difference is -2.
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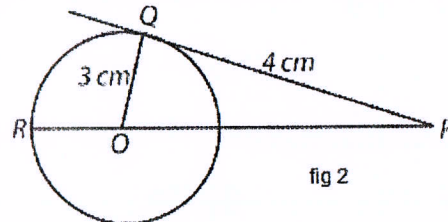


fig 2

18. Name the line that intersects the circle at two points?
19. Find the distance between the points Q (-5, 4) and R (-1, 0).
20. $\triangle ABC \sim \triangle PQR$, perimeter of $\triangle ABC = 35$ cm and perimeter of $\triangle PQR = 42$ cm and $PR = 6$ cm. Find AC.

SECTION B (6 x 2 = 12 marks)
(Question numbers 21 to 26 carry 2 marks each)

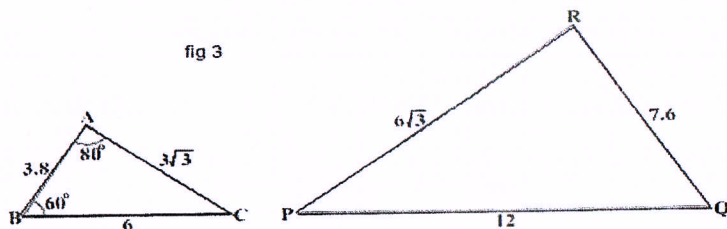
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fig 3

From fig3, find $\angle P$.

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Evaluate: $\frac{6 \sin 23^\circ + \sec 79^\circ + 3 \tan 48^\circ}{\operatorname{cosec} 11^\circ + 3 \cot 42^\circ + 6 \cos 67^\circ}$.

24. Find the roots of quadratic equation $2x^2 - 5x - 3 = 0$
25. Find the values of y for which the distance between the points $P(2, -3)$ and $Q(10, y)$ is 10 units.

OR

If the point $(7, 0)$, $(1, 2)$ and (x, y) are collinear, find a relation between x and y .

26. Find the 10th term from end of the AP : 11, 15, 19, 299

SECTION C (8 x 3 = 24 marks)
(Question numbers 27 to 34 carry 3 marks each)

27. If 7th term of an A.P is $\frac{1}{9}$ and 9th term is $\frac{1}{7}$, find 63rd term.

OR

The sum of n terms of an A.P is $3n^2 + 5n$. Find the A.P. Hence find its 15th term

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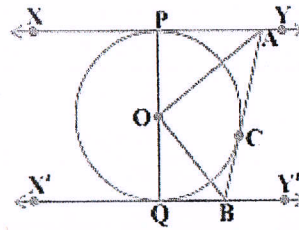
31. Find the mean of the following data:

Class Interval	100-120	120-140	140-160	160-180	180-200
Frequency	10	20	30	15	5

32. Find the ratio in which the y -axis divides the line segment joining the point $A(5, -6)$ and $B(-1, -4)$. Also, find the value of that point on the y -axis.
33. PQR is a right angled triangle at Q . $PQ = 5$ cm, $QR = 12$ cm. A circle with centre O is inscribed in ΔPQR , touching all its sides. Find the radius of the circle.

OR

XY and X'Y' are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersecting XY at A and X'Y' at B. Prove that $\angle AOB = 90^\circ$.



34. Solve the following pair of equations: $\frac{2}{\sqrt{x}} + \frac{3}{\sqrt{y}} = 2$ and $\frac{4}{\sqrt{x}} - \frac{9}{\sqrt{y}} = -1$

SECTION D (6 x 4 = 24 marks)
(Question numbers 35 to 40 carry 4 marks each)

35. The median of the following data is 52.5. Find the values of x and y, if the total frequency is 100.

Class Interval	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	2	5	x	12	17	20	y

36. Find all the zeroes of the polynomial $2x^4 - 11x^3 - 16x^2 + 55x + 30$ if two of its zeros are $\sqrt{5}, -\sqrt{5}$.
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OR

From a point, 36 m above the surface of a lake, the angle of elevation of a bird is observed to be 30° and angle depression of its image in the water of the lake is observed to be 60° . Find the actual height of the bird above the surface of the lake.

39. The sum of the squares of two consecutive even numbers is 340. Find the numbers.
40. Draw the graphs of the pair of linear equations: $x + 2y = 5$ and $2x - 3y = -4$. Also find the points where the lines meet the x-axis.

End of the Question Paper



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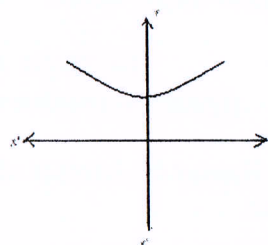


fig 1

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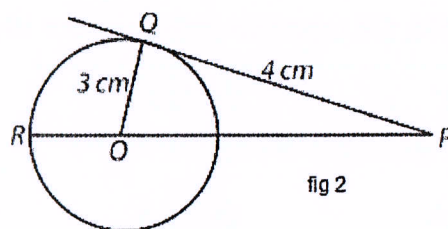


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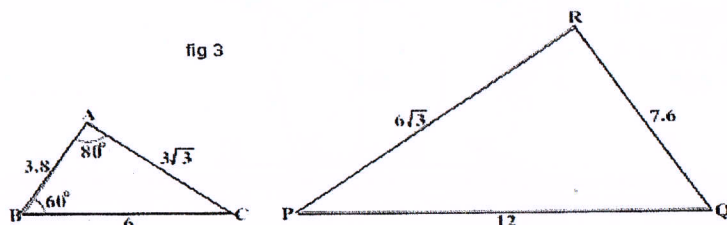
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29. Solve the following pair of equations: $\frac{2}{\sqrt{x}} + \frac{3}{\sqrt{y}} = 2$ and $\frac{4}{\sqrt{x}} - \frac{9}{\sqrt{y}} = -1$

30. Prove that : $\frac{\sin \theta - 2 \sin^3 \theta}{2 \cos^3 \theta - \cos \theta} = \tan \theta$

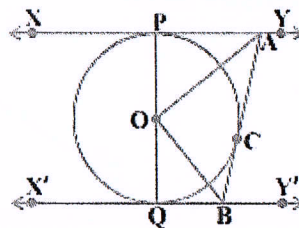
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The sum of n terms of an A.P is $3n^2 + 5n$. Find the A.P. Hence find its 15th term

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37. Prove that the ratio of the areas of two similar triangles is equal to the squares of the ratios of their corresponding sides.

OR

The diagonals of a quadrilateral ABCD intersect each other at the point O such that $\frac{AO}{CO} = \frac{BO}{DO}$. Show that ABCD is a trapezium.

38. Draw the graphs of the pair of linear equations: $x + 2y = 5$ and $2x - 3y = -4$. Also, find the points where the lines meet the x-axis.
39. The sum of the squares of two consecutive natural numbers is 421. Find the numbers.
40. The median of the following data is 52.5. Find the values of x and y , if the total frequency is 100.

Class Interval	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	2	5	x	12	17	20	y

End of the Question Paper