ROLL NUMBER				

SET	C

INDIAN SCHOOL MUSCAT
FIRST PREBOARD EXAMINATION 2022-2023
MATHEMATICS (Standard)-041

CLASS : X
DATE: 09.01.2023

TIME ALLOTED : 3 HRS.
MAXIMUM MARKS: 80

GENERAL INSTRUCTIONS:

- *All Questions must be attempted, however there are internal choices for 2 marks, 3 marks and 5 marks questions.*
- *Section A has 20 Questions of 1 mark each.*
- *Section B has 5 Questions of 2 marks each.*
- *Section C has 6 Questions of 3 marks each.*
- *Section D has 4 Questions of 5 marks each.*
- *Section E has 3 case-based Questions of 4 marks each.*
- ***Do all the working neatly in the working column.***
- ***Any rough work elsewhere should be canceled.***
- ***Give proper labeled diagrams wherever necessary.***

SECTION A - Multiple Choice Questions – (1 mark each)

1. The pair of equations x + 2y = 8 and 2x + 4y – 16 = 0 is
(a) consistent (b) consistent and dependent
(c) inconsistent (d) none of these

2. If the HCF and LCM of two numbers are respectively (n - 1) and $(n^2-1)(n^2-4)$ then the product of the two numbers will be
(a) $(n^2-1)(n^2-4)$ (b) $(n^2-1)(n^2-4)(n^2+1)$
(c) $(n+1)(n^2-4)(n-1)^2$ (d) $(n-1)(n^2+4)(n+1)^2$

3. If $x-4=\frac{12}{x}$, $x \neq 0$ then the value of x is
(a) 4, 3 (b) −4, 3 (c) 6, −2 (d) - 6, 2

4. For any natural number n, $6^n - 5^n$ will always end with
(a) 1 (b) 2 (c) 3 (d) 4

5. If α and β are the zeroes of polynomial p(x) = $px^2-2x+3p$ and $\alpha+\beta=\alpha\beta$ then the value of p is
(a) $\frac{-2}{3}$ (b) $\frac{2}{3}$ (c) $\frac{-1}{3}$ (d) $\frac{1}{3}$

6. In ΔABC and ΔDEF, ∠B = ∠E, ∠F = ∠C and AB = 3DE. Then, the two triangles are
   (a) congruent but not similar (b) similar but not congruent
   (c) neither congruent nor similar (d) congruent as well as similar

7. Given that $sin\theta = \frac{a}{b}$, then $\cos\theta$ is equal to

   (a) $\frac{b}{\sqrt{b^2-a^2}}$ (b) $\frac{b}{a}$ (c) $\frac{\sqrt{b^2-a^2}}{b}$ (d) $\frac{a}{\sqrt{b^2-a^2}}$

8. The perpendicular bisector of the line segment joining the points A (2, 3) and B (5, 6) cuts the y axis at
   (a)(8, 0) (b) (0, 8) (c) (0, -8) (d) (-8, 0)

9. If $sec^2\theta$ (1 + sin θ)(1- sin θ) = k, find k
   (a) $\frac{-1}{2}$ (b) $\frac{1}{2}$ (c) -1 (d) 1

10. ΔABC is such that AB = 3cm, BC = 2cm and CA= 2.5 cm. If ΔABC~ΔDEF and EF= 4cm then perimeter of ΔDEF is
    (a) 7.5cm (b) 15cm (c) 22.5cm (d) 30cm

11. PQ and PR are two tangents from an external point P to a circle with centre O. If ∠POR= 55^0, then ∠QPR is
    (a) 35^0 (b) 55^0 (c) 70^0 (d)80^0

12. In a circle with centre O and radius 6cm, AB is a chord of length 6cm. Then area of sector AOB is
    (a)$10\pi\ cm^2$ (b) $6\ \pi\ cm^2$ (c) $8\ \pi\ cm^2$ (d) $5\ \pi\ cm^2$

13. Find the area of a quadrant of a circle whose circumference is 22cm.
    $(a)\frac{61}{8}cm^2$ (b) $\frac{69}{8}cm^2$ (c) $\frac{71}{8}cm^2$ (d) $\frac{77}{8}cm^2$

14. The volume of the largest right circular cone that can be cut out from a cube of edge 7cm is
    (a) 89.83 cm^3 (b) 98.83 cm^3 (c) 79.83 cm^3 (d) 97.83 cm^3

15. A number is chosen at random from the numbers -6, -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, 6. The probability that square of this number is less than or equal to 1 is

    (a) $\frac{9}{13}$ (b)$\frac{3}{13}$ (c) $\frac{8}{13}$ (d) $\frac{7}{13}$

16. If the mean of the frequency distribution is 7.5 and $\sum f_i\, x_i$= 120 + 3k, $\sum f_i$= 30 then k is equal to
    (a) 30 (b) 35 (c) 40 (d) 45

17. If the mode of a data is 45, mean is 27 then the median is
    (a) 30 (b) 27 (c) 46 (d)33

18. If $\cos\theta = \frac{1}{2}$, then the value of $\frac{2\,Sec\theta}{1+tan^2\theta}$ is

$(a)\,\frac{1}{2}$ (b) $\frac{-1}{2}$ (c) 1 (d)-1

19. **Assertion:** $\sqrt{x}$ is an irrational number, where x is a prime number.
Reason: Square root of any prime number is an irrational number.

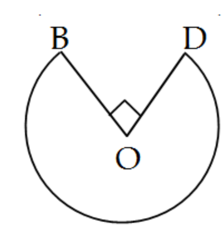
(a) Both assertion and reason are correct and reason is the correct explanation for the assertion.
(b) Both assertion and reason are correct and reason is not the correct explanation for the assertion.
(c) Assertion is correct but reason is false.
(d) Assertion is false but reason is correct.

20. **Assertion:** If the coordinates of the midpoints of the sides of the sides AB and AC of ΔABC are D (3, 5) and E (-3, -3) respectively then BC = 20 units.
Reason: The line joining the midpoints of two sides of a triangle is parallel to the third side and is equal to half the length of it.

(a) Both assertion and reason are correct and reason is the correct explanation for the assertion.
(b) Both assertion and reason are correct and reason is not the correct explanation for the assertion.
(c) Assertion is correct but reason is false.
(d) Assertion is false but reason is correct.

SECTION B – Very Short Answer Questions – (2 marks each)

21. In the given figure (on the right), the shape of a table top in a restaurant is that of a sector of a circle with centre O and ∠BOD= 90°. If OB = OD= 60cm, find the perimeter of the table top. (Use π = 3.14)



OR

In a circle of radius 10.5 cm, the minor arc is one fifth of the major arc. Find the area of the sector corresponding to the major arc.

22. Evaluate $tan^2 45^0 sec^2 60^0 + cosec^2 45^0\ tan 60^0$

OR

If sec θ + tan θ = x, then find the value of sec θ in terms of x.

23. In figure (b) below, CP and CQ are tangents to a circle with centre O. ARB is another tangent touching the circle at R. If CP = 11cm and BC = 7cm, then find the length of BR.

24. In figure (a) below, O is the centre of the circle, PQ is a chord and PT is the tangent at P. If $\angle POQ = 70°$, then calculate $\angle TPQ$.

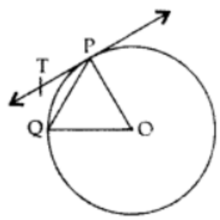


fig (a)

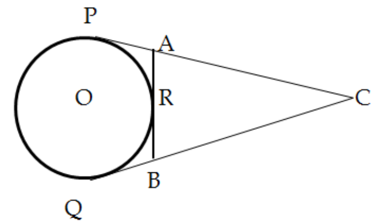


fig (b)

25. Find the value of a so that the point (3, a) lies on the line represented by 2x - 3y = 5.

SECTION C – Short Answer Questions – (3 marks each)

26. Prove that $2\sqrt{5} - 3$ is an irrational number.

27. In fig (c), XY and X'Y' are two parallel tangents to a circle with centre O and another tangent AB with point of contact C interesting XY at A and X'Y' at B, what is the measure of ∠AOB?

OR

If from an external point P of a circle with centre O two tangents PQ and PR are drawn such that ∠QPR= 120^0. Prove that 2PQ= PO [Refer fig (d)]

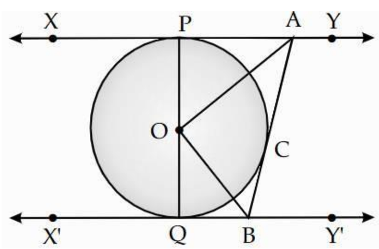


fig (c)

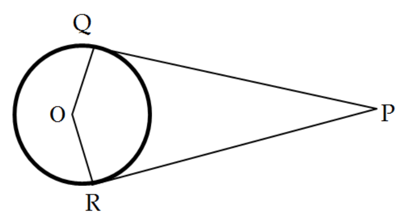


fig (d)

28. For what values of a and b does the following pair of linear equations have an infinite number of solutions?
2x + 3y = 7 and a(x + y) – b(x - y) = 3a + b - 2

OR

If 217x + 131y = 913, 131x + 217y = 827, then find the value of x and y

29. Prove that $\sqrt{\frac{1+sinA}{1-sinA}} = secA + tanA$

30. From a pack of 52 playing cards jacks, queens, kings and aces of red colour are removed. Find the probability that the card drawn is
(i) a black queen (ii) a red card (iii) a face card

31. If α and β are the zeroes of the quadratic polynomial p(x)= $2x^2$ - 4x + 5, then find the value of $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$.

SECTION D – Long Answer Questions – (5 marks each)

32. A man drives his car on a highway where the speed limit is 60km/hr. He has to cover a distance of 240km at a uniform speed on this road. If he increases his speed by 20km/hr, he can reach his destination one hour earlier. What is his original speed at which he travels?

33. ABCD is a trapezium with $AB \parallel DC$. E and F are points on non-parallel sides AD and BC respectively such that EF is parallel to AB. Show that $\frac{AE}{ED} = \frac{BF}{FC}$.

34. A building is in the form of a right circular cylinder surmounted by a hemispherical dome. The base diameter of the dome is equal to $\frac{2}{3}$ of the total height of the building. Find the height of the building if it contains $67\frac{1}{21}\, m^3$ of air.

OR

Due to sudden floods, some welfare association jointly requested the government to get 100 tents fixed immediately and offered to contribute 50% of the cost. If the lower part of each tent is in the form of a cylinder of diameter 4.2m and height 4m with the conical upper part of same diameter but of height 2.8m and the canvas to be used costs Rs100per m^2 find the amount the associations will have to pay.

35. If the median of the following data is 14.4, find x and y. Given, the total frequency is 20.

Class Intervals	0 - 6	6 - 12	12 - 18	18 - 24	24 - 30
Frequency	4	x	5	y	1

OR

The following data gives the distribution of total monthly household expenditure of 200 families of a village. Find the modal and mean monthly expenditure. Also interpret the two measures.

Expenditure (in rupees)	1000-1500	1500-2000	2000-2500	2500-3000	3000-3500	3500-4000	4000-4500	4500-5000
Number of families	24	40	33	28	30	22	16	7

SECTION E – Case Based Questions – (4 marks each)

36. Aditya is celebrating his birthday. He invited his friends. He bought a packet of toffees which contains 1230 toffees. He arranged the candies such that in the first row there are 3 candies, in the second there are 5 candies, in the third there are 7 and so on.

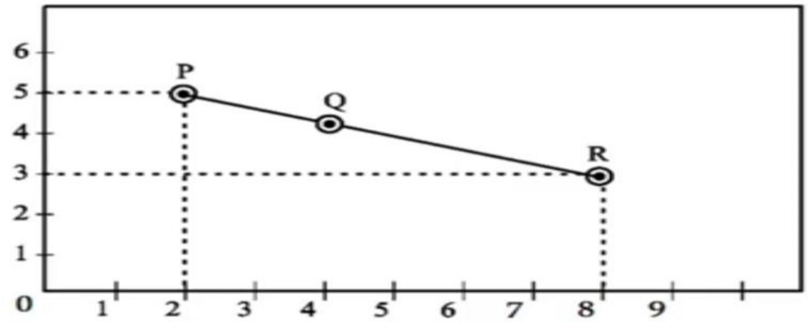
(a) Find the difference in number of candies placed in the 9^{th}row and 4^{th}row.
(b) If Aditya decided to make 15 rows, then how many total candies will be placed by him in the same arrangement.

(c) Find the total number of rows of candies.

OR

How many candies are there in the last row?

37. A group of class X students goes to picnic during vacation. There were three different slides and three friends Kevin, Ria and Tania are sliding in the three slides. The position of the three friends shown by P, Q, R in three different slides are given below.



(a) Find the distance PQ.

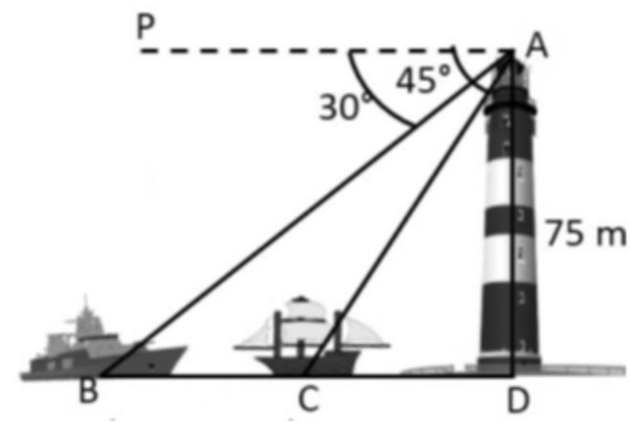
(b) Find the midpoint of PR.

(c) Find the coordinates of the point on X axis which is equidistant from P and Q.

OR

Find the coordinates of the point B which divides the line segment internally in the ratio 2 : 1

38. A light house is a tower with a bright light at the top and serves as a navigational aid and also warns ships of dangerous areas. In the given figure, a man on top of a 75m high light house is observing two ships approaching towards its base. Observe the figure carefully and answer the following questions.



(a) Is $\angle PAB = \angle DBA$? Give reason.

(b) Find the distance of ship B from the foot of the light house.

(c) What is the distance between the two ships?

OR

What would have been the distance between the two ships if the ships were on either side of the light house?

******END OF THE QUESTION PAPER******