

Roll Number

SET B



INDIAN SCHOOL MUSCAT
FINAL EXAMINATION
MATHEMATICS

CLASS: X

Sub. Code: 041

Time Allotted: 3 Hrs.

28.01.2021

Max. Marks: 80

General Instructions:

1. All questions are compulsory; however internal choices are provided in a few questions whose guidelines are given below.
2. Calculators are not allowed.
3. This question paper contains two parts A and B.
4. Both Part A and Part B have internal choices.

Part – A:

1. It consists two sections- I and II.
2. Section I has 16 questions of 1 mark each. Internal choice is provided in 5 questions.
3. Section II has 4 questions on case study. 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 choices are provided in 2 questions of 2 marks, 2 questions of 3 marks and 1 question of 5 marks in which any one out of two are only to be answered in each question.

Note: One graph sheet to be provided

Q.
No.

Part - A

**Marks
Allocated**

Section-I

Section I has 16 questions of 1 mark each. Internal choice is provided in 5 questions.

- | | | |
|----|--|---|
| 1. | What is the diameter of a circle whose area is equal to the sum of the areas of two circles of radii 24 cm and 7 cm? | 1 |
| 2. | A and B are respectively the points on the sides PQ and PR of a triangle PQR such that $PQ = 12.5$ cm, $PA = 5$ cm, $BR = 6$ cm and $PB = 4$ cm. Is $AB \parallel QR$? Give reason. | 1 |
| 3. | What is the ratio of volume of a cube to that of a sphere which will fit inside it? | 1 |

OR

If two solid hemi-spheres of same base radius are joined together along their bases, then find the total surface area of this new solid.

4. If $\frac{4 - \sin^2 45^\circ}{\cot \theta \cdot \tan 30^\circ} = 3.5$, then find θ . 1

5. If a pair of dice is thrown, find the probability of getting different numbers on the dice. 1

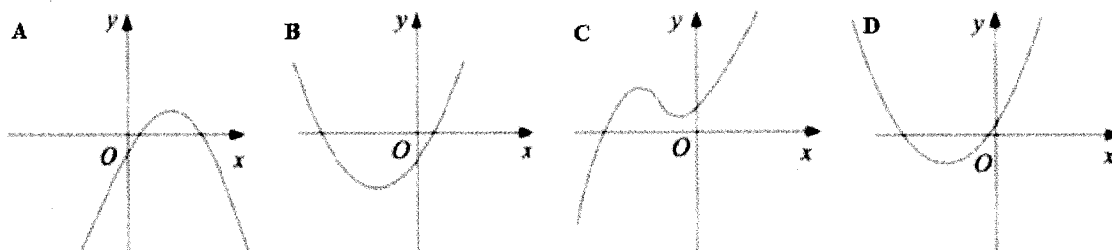
OR

A card is drawn at random from a well shuffled pack of 52 playing cards. Find the probability of getting neither a black card nor a king.

6. If $x = 3 \operatorname{cosec}^2 \theta$ and $y = 3 \cot^2 \theta + 2$, then find $x - y$. 1

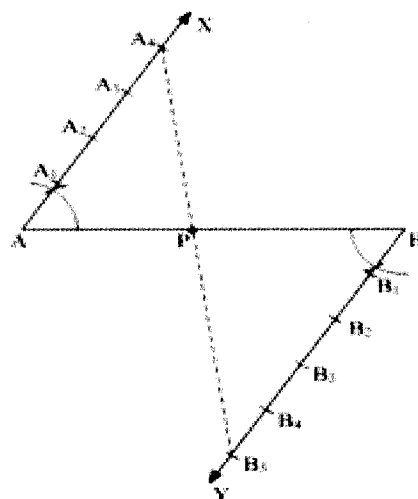
7. If $b - 1$, $b + 3$ and $3b - 1$ are in A.P., then find b . 1

8. 1

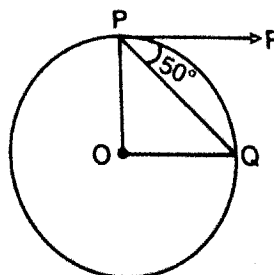


From the four graphs A, B, C and D which one could have the equation $y = 2x^2 + 7x + 3$

9. In the figure, if $\angle XAB = \angle YBA$ and B_1, B_2, \dots and A_1, A_2, A_3, \dots have been marked at equal distances. In what ratio does P divide AB? 1



10. In the figure, O is the centre of the circle, PQ is a chord and the tangent PR at P makes an angle of 50° with PQ. Find $\angle POQ$. 1



11. Find if $\frac{395}{10500}$ will have terminating or non-terminating decimal expansion without actual division. (Give reason)

OR

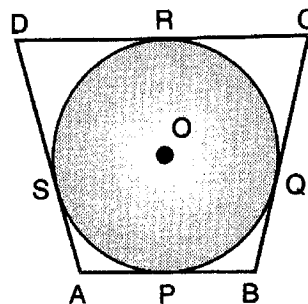
The HCF and LCM of two numbers a and b are 3 and 18. Find ab .

12. Find the distance between two parallel tangents of a circle with radius 5 cm.

1

OR

In the adjoining figure, if $\angle COD = 125^\circ$, what is the measure of $\angle AOB$.



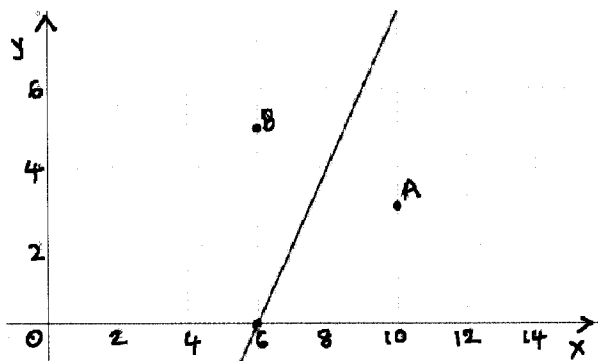
13. Find the nature of the roots of the quadratic equation $2x^2 - 3x + 5 = 0$ 1
14. If $x = 3m + 1$ and $y = 4$ is a solution of the equation $x - y = 6$, then find the value of m . 1
15. Find the value of k for which the equations $x + 2y = 5$ and $3x + ky + 15 = 0$ are inconsistent. 1
- OR
- Find the point of intersection of the line $-2x + 3y = -7$ with Y axis.
16. If the product of the roots of the equation $x^2 - 9x + p = 10$ is 5, then find the value of p . 1

Section - II

Case study based questions are compulsory. Attempt any four sub parts of each question. Each subpart carries 1 mark

17. Case Study based-1

Villages A and B are located on the graph at A (10, 3) and B (6, 5). Government is planning to construct a highway running in-between these two villages in a straight line. Also the government has decided to keep a bus stop at a point D (not shown in the figure).



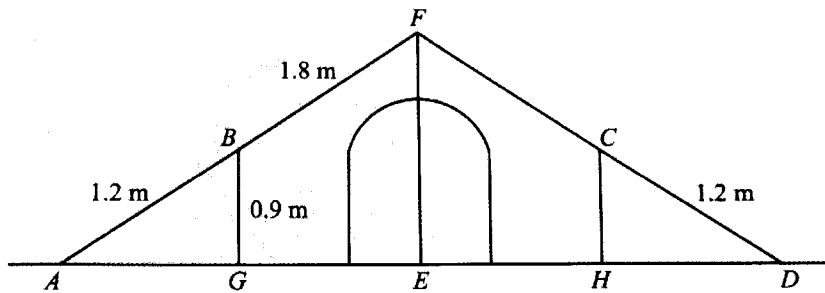
On the basis of the above information, answer **any four** of the following questions:

- (i) What should the criterion be to lay the highway so that both villages will be always equidistant from the highway? 1
- (a) perpendicular bisector to AB (b) parallel to the line joining AB
- (c) a circular road connecting A and B (d) any line passing through the mid-point of AB

- (ii) Find the exact location for the bus stop D, so that the bus stop is equidistant for both the villages A and B and at the shortest distance from each of the villages? 1
 (a) (6, 0) (b) (8, 4) (c) (7.5, 3) (d) (4, 8)
- (iii) The distance between the two villages A and B 1
 (a) 4 (b) 2 (c) $5\sqrt{2}$ (d) $2\sqrt{5}$
- (iv) On another road along X axis, they are planning for a Children's park. What should be the location of the park so that it is equidistant for both the villages. 1
 (a) (0, 0) (b) (7, 0) (c) (6, 0) (d) (10, 0)
- (v) What will the distance from the villages to the park? 1
 (a) 5 (b) 6 (c) $5\sqrt{2}$ (d) 25

18. Case Study Based- 2

Aliya and her friends is out for a camping trip. The diagram shows their tent that has been attached to the ground using ropes AB and CD. ABF and DCF are straight lines.



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

- (i) What is the height of the tent? 1
 (a) 5 m (b) 3.75 m (c) 2.25 m (d) 4.25 m
- (ii) Length AG (approximately) is 1
 (a) 0.7 m (b) 0.8 m (c) 1 m (d) 1.2 m
- (iii) The ratio of the areas of the triangles AGB and AEF is 1
 (a) $\frac{2}{5}$ (b) $\frac{4}{25}$ (c) $\frac{4}{5}$ (d) $\frac{2}{25}$
- (iv) Which option below is wrong for triangles AGB and AEF? 1
 (a) $\frac{AG}{AE} = \frac{AB}{BF}$ (b) $\frac{AG}{AE} = \frac{AB}{AF}$ (c) $\frac{AG}{GE} = \frac{AB}{BF}$ (d) $\frac{GE}{AE} = \frac{BF}{AF}$
- (v) The circular arc of the tent is exactly 40cm below the top vertex. What is the maximum height for a person to walk inside without bending? 1
 (a) 185 cm (b) 175 cm (c) 190 cm (d) 160 cm

19. Case Study Based- 3

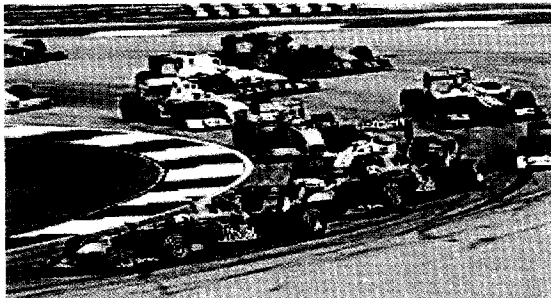
A 40-year old building programme for new houses began in Oldtown in the year 1951 (Year 1) and finished in 1990 (year 40). The number of houses built in each year form an Arithmetic sequence with first term **a** and common difference **d**. Given that 2400 new houses were built in 1960 and 600 new houses were built in 1990. On the basis of the above information, answer **any four** of the following questions:



- (i) The value of d is 1
(a) - 60 (b) - 30 (c) - 20 (d) 10
- (ii) The value of a is 1
(a) 2300 (b) 2000 (c) 2940 (d) 2504
- (iii) Number of houses built in the 40th year is 1
(a) 500 (b) 600 (c) 450 (d) 300
- (iv) What is the total number of houses built? 1
(a) 35000 (b) 45000 (c) 70800 (d) 90700
- (v) In which year the number of houses became less than 1000? 1
(a) 1983 (b) 1984 (c) 1986 (d) 1985

20. Case Study Based- 4

The technical team of an international motor race are analyzing last year data of drivers’ performance to provide valuable inferences on how the drivers can improve this year.



The length of time taken by 80 drivers to complete a journey is given in the table below:

Time (in minutes)	70 – 80	80 - 90	90 - 100	100 – 110	110 - 120	120 -130
No. of drivers	4	10	y	20	24	8

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

- (i) How many drivers are there in the range 90 – 100? 1
(a) 14 (b) 60 (c) 24 (d) 80

- (ii) The median class of the distribution is 1
 (a) 80 – 90 (b) 90 – 100 (c) 100 – 110 (d) 110 – 120
- (iii) Class mark of the modal class is 1
 (a) 105 (b) 115 (c) 120 (d) 100
- (iv) Modal time taken to complete the journey is 1
 (a) 115 mins (b) 24 mins (c) 112 mins (d) 102 mins
- (v) Sum of the upper limits of the median and modal classes is 1
 (a) 200 (b) 210 (c) 220 (d) 230

Part –B

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

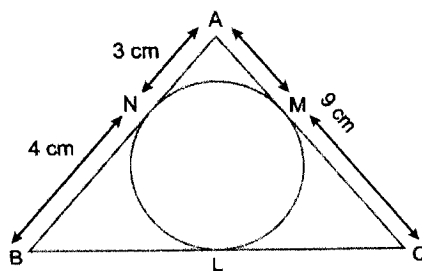
21. Find a point on Y axis which is equidistant from the points A (4, 8) and B (–6, 6) 2

OR

Find the coordinates of the point P which divides the line segment joining the points A (2, 1) and B (5, -8) such that $\frac{AP}{AB} = \frac{1}{3}$

22. Draw a circle of radius 3 cm and a point P at a distance of 7 cm from the centre of the circle. 2
 From point P, draw two tangents to the circle and write their measures.

23. In the figure $\triangle ABC$ is circumscribing a circle. Find the length of BC. 2



24. Form a quadratic polynomial whose one zero is 4 and the product of the zeroes is 28. 2

OR

Find the zeroes of the polynomial $p(x) = x^2 - 27$

25. Show that 9^n cannot end with the digit 0 or 5 for any natural number n. 2

26. If a pole 10 m high casts a shadow on the ground, when the sun's elevation is 45° , find the length of the shadow. 2

27. The area of an equilateral triangle is $49\sqrt{3}cm^2$. With each vertex as centre, circles are drawn with radius equal to half the length of the side of the triangle. Find the area of the circles included in the triangle. 3

OR

A chord of a circle of radius 10 cm subtends a right angle at the centre. Find the area of the corresponding minor segment. (Take $\pi = 3.14$)

28. Solve for x : $\frac{1}{x} + \frac{2}{2x-3} = \frac{1}{x-2}$, $x \neq 0, \frac{3}{2}, 2$ 3
29. Prove that $\sqrt{5}$ is irrational. 3
30. Prove the following identity: $\frac{\sin\theta - 2\sin^3\theta}{2\cos^3\theta - \cos\theta} = \tan\theta$ 3
31. Prove that a line drawn through the midpoint of one side of a triangle, parallel to another side, bisects the third side. 3

OR

Prove that the sum of the squares of the sides of a rhombus is equal to the sum of the squares of its diagonals.

32. The mean of the following frequency distribution is 18. The frequency f in the class interval 19 – 21 is missing. Determine f . 3

Class interval	11 - 13	13 - 15	15 - 17	17 - 19	19 - 21	21 - 23	23 - 25
Frequency	3	6	9	13	f	5	4

33. Rima's mother bought some apples and oranges from a store. Rima counted those and found there were 15 apples and 12 oranges in the bag. 3
- (i) If her brother picks one fruit from the bag, what is the probability that he picks an apple?
 - (ii) He didn't put the apple back and now if Rima picks one fruit from the bag, what is the probability that she picks an orange?
 - (iii) Rima kept the remaining apples and oranges in two separate baskets. She found 13 apples were left of which 2 were rotten. What is the probability of picking a good apple from the apple basket now?
34. If the angle of elevation of a cloud from a point 10 metres above a lake is 30° and the angle of depression of its reflection in the lake is 60° , find the height of the cloud from the surface of the lake? 5

OR

The shadow of a tower at a time is three times as long as its shadow when the angle of elevation of the sun is 60° . Find the angle of elevation of the sun at the time of the longer shadow.

35. A solid iron cuboidal block of dimensions $4.4m \times 2.6m \times 1m$ is cast into a hollow cylindrical pipe of internal radius 30 cm and thickness 5 cm. Find the length of the pipe. 5
36. The cost of 4 pens and 4 pencil boxes is ₹100. Three times the cost of a pen is ₹15 more than the cost of a pencil box. Form a pair of linear equations for the above situation and find the costs of a pen and a pencil box graphically. 5

End of the Question Paper