Roll Number		

INDIAN SCHOOL MUSCAT
FIRST PRE-BOARD EXAMINATION
MATHEMATICS

CLASS: X   Sub. Code: 041   Time Allotted: 3 Hrs.

28.02.2021   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.

Q. No.	Part – A	Marks

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

1. TP and TQ are the two tangents to a circle with center O such that $\angle POQ = (2x+3)^0$ and $\angle PTQ = (3x-8)^0$. What is the value of x?   1

2. In order to find the mode for the given distribution what is the value of $2f_1 - f_0 - f_2$ 1

Class interval	0-20	20-40	40-60	60-80
frequency	15	6	18	10

3. Find the common difference and write next term of the AP: 1.7, 2.3, 2.9.......   1

OR

The first term is $\frac{1}{2}$ and the common difference is $\frac{1}{2}$ then write the third and the fifth term of this AP.
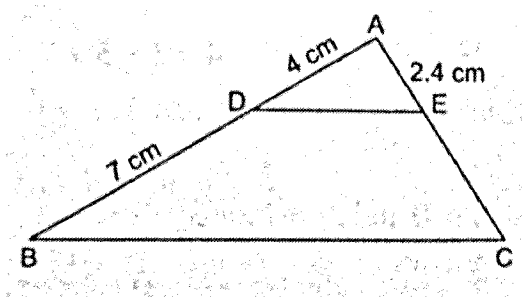
4. If the equation $2x^2 - 5x + (k+3) = 0$ has equal roots then find the value of k   1

5. What is the HCF of the smallest prime number and the smallest composite number?   1

OR

The decimal expansion of the rational number $\frac{14587}{1250}$ will terminate after how many places

6. Given ΔABC is similar to ΔPQR, if the ratio of area (ΔABC) to area (ΔPQR) is 121 : 225, find   1

the ratio of PR to AC

OR

If in the given figure, *DE* ∥ *BC*, then find AC.

7. Find a quadratic equation whose sum and product of the roots are $\frac{-5}{6}$ and -1   1

8. Calculate $\alpha^2 + \beta^2$ for the polynomial $2x^2 - 5x + 3$, where α *and* β are the zeroes of the polynomial.   1

9. For what value of k, the pair of linear equations $3x + y = 3$ *and* $6x + ky = 8$ have a unique solution.   1

OR

If 3 chairs and 1 table costs Rs.1500 and 6 chairs and 1 table costs Rs.2400, form a pair of linear equations to represent this situation if Rs. x is the cost of one chair and Rs. y is the cost of one table.
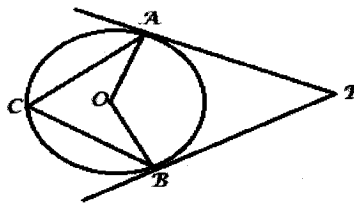
10. Two cones have their heights in the ratio of 1 : 3 and radii in the ratio 3 : 1. What is the ratio of their volumes?   1
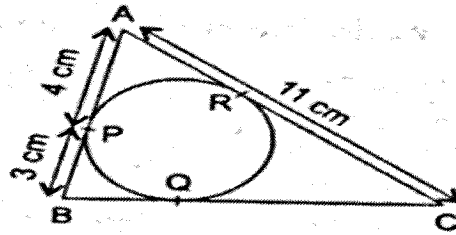
In figure, $\triangle ABC$ is circumscribing a circle. Find the length of BC.

OR

In the fig PA and PB are tangents to the circle from an external point P. If $\angle APB = 50^0$ then what is the measure of $\angle ACB$?

12.   In an AP, if the common difference is -4 and the seventh term is 4 find the first term.   1

13.   Find the distance of (4, -3) from the origin.   1

14.   The mean of a given distribution is 50. If $\sum fixi = 5160 + 30p$ and $\sum fi = 92 + p$, then what is the value of p?   1

15.   Find the radius of a right circular cylinder of height 7cm and volume $448\pi cm^3$ 1

16.   The radius of a circle is 5cm. Find the circumference of the circle whose area is 49 times the area of given circle.   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**

Application of Trigonometry – Height of Tree/Tower

Mr. Suresh is an electrician. He receives a call regarding a fault on a pole from the three different colonies A, B, C. he reaches one-by-one to each colony to repair that fault. He needs to reach a point 1.3 m below the top of each pole to undertake the repair work. Observe the following diagrams

P
1.3 m
Q

D ⟍60°⟍ R

A

S
1.3 m
T

V ⟍45°⟍ U

B

E
1.3 m
H

G ⟍ F

C
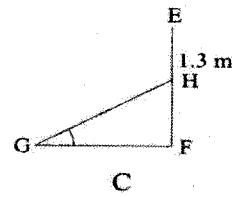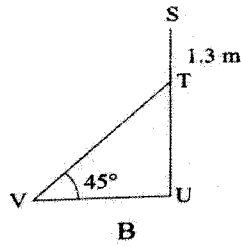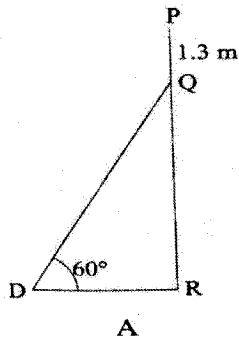
(i) **Refer to Diagram A** 1

What should be the length of ladder DQ that enable him to reach the required position if height of the pole is 4 m?

(a)$\frac{5\sqrt{3}}{7}$ m (b)$\frac{9\sqrt{3}}{5}$ m (c)$\frac{7\sqrt{2}}{5}$ m (d)$\frac{4\sqrt{3}}{5}$ m

(ii) **Refer to Diagram A** 1

What is the distance of the foot of the pole from the point where the ladder is placed on the ground if the height of pole is 4 m? (*use* $\sqrt{3} = 1.732$)

(a)2.5 m (b) 3.8 m (c)1.56 m (d)5.3 m

(iii) **Refer to Diagram B** 1

Given that, the length of ladder is $4\sqrt{2}$ m. What is height of pole?

(a)4 m (b)$4\sqrt{5}$ m (c) $5\sqrt{5}$ m (d)5.3 m

(iv) **Refer to Diagram B** 1

(a) The distance of the foot of the pole from the point where the ladder lies on the ground is

(a) $3\sqrt{5}$ m (b) $4\sqrt{2}$ m (c) 4 m (d) $4\sqrt{7}$ m

(v) **Refer to Diagram C** 1

(a) The angle of elevation of the point where the ladder meet the pole ,i.e., H, if the height of the pole is 8.3 m and the distance GF is $7\sqrt{3}$ m, is

(a)30° (b) 60° (c) 45° (d) 90°

18. **Case Study Based- 2**

Playing with Cards

A pack of playing cards consists of 52 cards which are divided into 4 suits of 13 cards each. Each unit consists of one ace, one king, one queen, one jack and 9 other cards numbered from 2 to 10. Four suits are named as spades (♠), hearts (♥), diamonds (♦) and clubs (♣). Observe the following
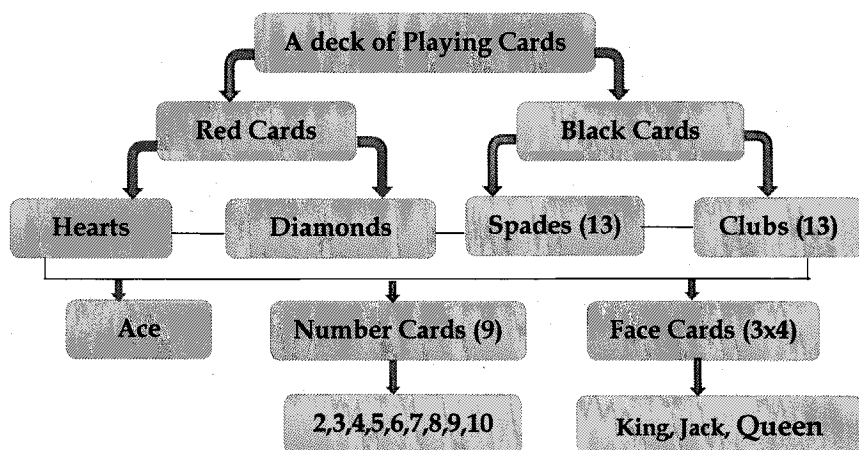
(i) A card is drawn at random from a well – shuffled pack of 52 cards. The probability of getting a red king card is   1

(a)$\frac{1}{52}$ (b)$\frac{1}{13}$ (c)$\frac{1}{26}$ (d)$\frac{2}{13}$

(ii) What is the probability of getting a queen or a jack card?   1

(a)$\frac{2}{13}$ (b)$\frac{1}{13}$ (c)$\frac{5}{13}$ (d)$\frac{3}{13}$

(iii) The king, queen and jack of clubs are removed from a deck of 52 playing cards and remaining   1
are shuffled. The probability of getting a card of queen is

(a)$\frac{4}{51}$ (b)$\frac{3}{49}$ (c)$\frac{3}{29}$ (d)$\frac{2}{49}$

(iv) The probability the card drawn is '10' of a black suit, is   1

(a)$\frac{2}{13}$ (b)$\frac{1}{13}$ (c)$\frac{1}{26}$ (d)$\frac{3}{13}$

     1

(v) The probability that the card drawn neither a jack nor a king is

$(a)\frac{9}{13}$ (b)$\frac{7}{13}$ (c)$\frac{8}{13}$ (d)$\frac{11}{13}$

19.   **Case Study Based- 3**
        Auto and Taxi Fare

The state government revise fares from time to time based on various factors such as inflation, fuel price, demand from various quarters etc. the government notifies different fares for different types of vehicles like Auto Rickshaws, Taxis, Radio Cab, etc.

The auto charges in a city comprise of a fixed charge together with the charge for the distance covered. Study the following situations:

Situation – I: In city A, for a journey of 10km, the charge paid is Rs.75 and for a journey of 15 km, the charge paid is Rs.110.

Situation –II: In city B, for a journey of 8 km, the charge is paid is Rs. 91 and for journey of 14 km, the charge paid is Rs. 145.

(i)   If the fixed charges of auto rickshaw be Rs. x and the running charges be Rs. y km/hr, then the   1
        pair of linear equations representing **Situation 1** is

        (a) $x + 10y = 110, \ x + 15y = 75$

        (b) $x + 10y = 75, \ \ x + 15y = 110$

        (c) $10x + y = 110, \ 15x + y = 75$

        (d) $10x + y = 75, \ \ 15x + y = 110$

(ii)   What will a person have to pay for travelling a distance of 25 km?   1

        (a)160   (b)280   (c)180   (d)260

(iii)   A person travels a distance of 50 km. The amount he has to pay is   1

        (a) 155   (b) 255   (c) 355   (d) 455

(iv)   Refer **Situation – II**   1

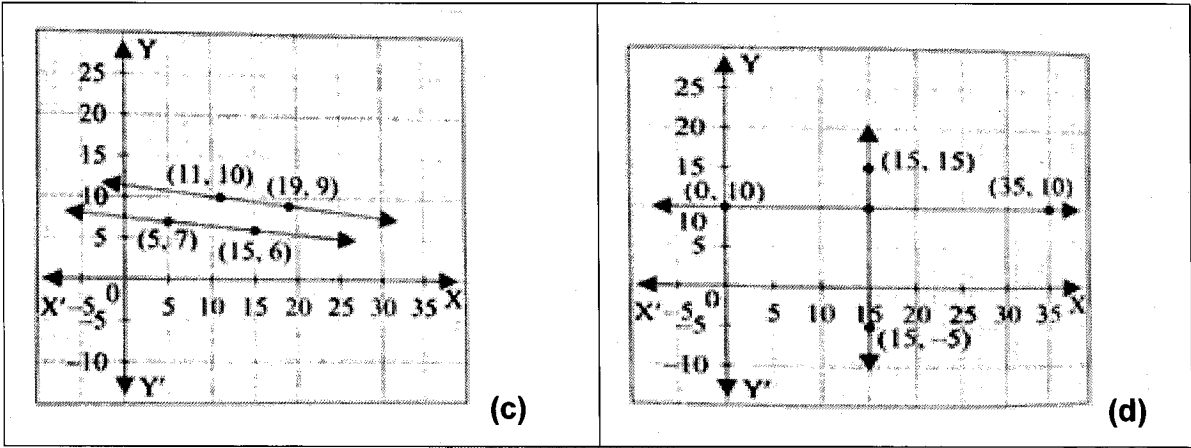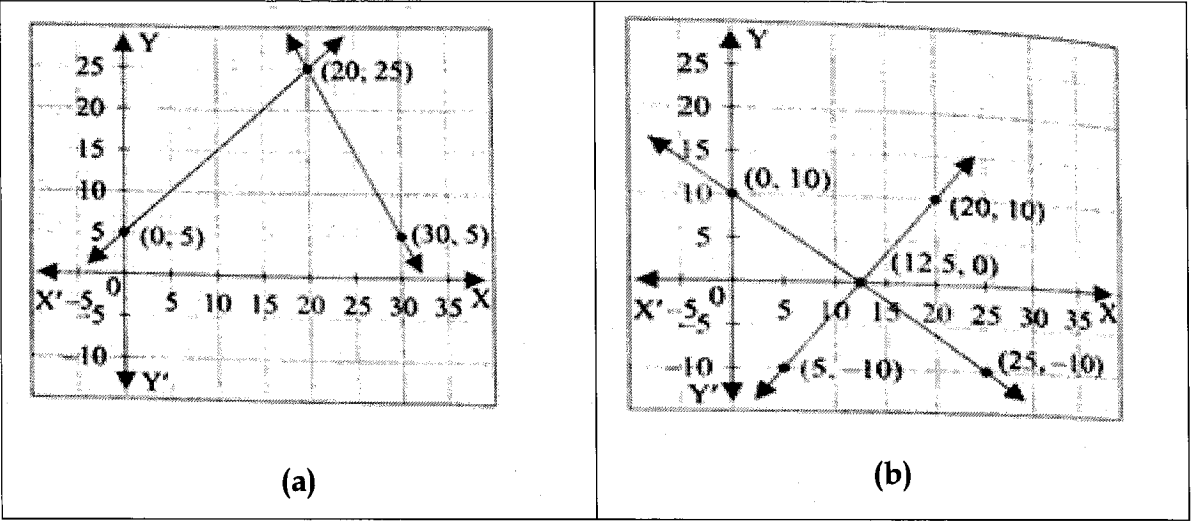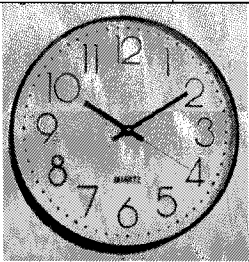What will a person have to pay for travelling a distance of 30 km?

(a)185   (b)289   (c)275   (d)305

(v)   The graph of the pair of lines representing the **Situation II** are   1

(a)

(b)

(c)

(d)

20.

Case Study Based- 4 Areas related to circle
Student of class 10th decided to create a model of a circular wall clock and try to paste the
numbers from 1 to 12 on its dial. But he is facing some problems. Give solutions to his
problems by looking at the figure.

(i) The angle between two consecutive points showing an hour is 1

        (a)15°   (b) 30°   (c) 45°   (d) 60°

(ii) What is the angle made at the center of the clock when minute and hour hands are at 1

12 and 3 respectively?

        (a) 30°   (b) 45°   (c) 60°   (d) 90°

(iii) Find the area covered by minute hand of a clock from 12 to 3 if the radius of the clock is 14 cm. 1

        (a)164 sq.cm   (b)77 sq.cm   (c)154 sq.cm   (d)308 sq.cm

(iv) The formula used in finding the area of sector with radius r and angle θ at the centre is 1

        (a)$\frac{\pi r^2 \theta}{360°}$ (b)$\frac{\pi r^2 \theta}{180°}$ (c)$\frac{2\pi r \theta}{180°}$ (d)$\frac{\pi \theta}{360°}$

(v) Distance covered by the minute hand as it travels from 3 to 6, if length of the hand is 14 cm, is 1

        (a) 22 cm   (b) 44 cm   (c) 66 cm   (d) 88 cm

Part –B

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

21. 3 bells ring at an interval of 4, 7 and 14 minutes respectively. All the three bells rang together at 2
6 am, at what time will the three bells ring together again?

22. Find k, if the sum of the zeroes of the polynomial $x^2 - (k + 6)x + 2(2k - 1)$ is half of their 2
product.

OR

If 2 and -3 are the zeroes of the polynomial $x^2 + (a + 1)x + b$ then find the values of a and b

23. In a rectangle ABCD, AB = 30cm, BC = x – y, DC = x + y and AD = 14cm. Find x and y. 2

24. The x coordinate of point P is twice the y coordinate. If P is equidistant from Q (2, -5) and 2
R (-3, 6), find the coordinates of point P.

25. A quadrilateral is drawn to circumscribe a circle. Prove that AB + CD = AD + BC 2

26. D is a point on side BC of a ∆ABC such 2
that $\angle ADC = \angle BAC$. Prove that $\frac{CA}{CD} = \frac{CB}{CA}$
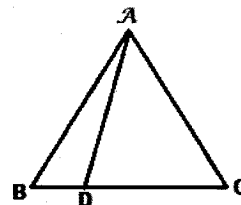
OR

ABC is an isosceles triangle with AC = BC. If AB² = 2AC², Prove that ABC is a right triangle

27. Find the greatest number of 5 digits exactly divisible by 24, 15 and 36.   3

OR

Find the largest positive integer that will divide 100, 245 and 343 leaving remainders 4, 5 and 7 respectively.

28. Solve for a: $(a - 2) + \dfrac{2}{(a-2)} = 3$; a≠2   3

OR

If − 2 is a root of the equation $x^2 + px - 6 = 0$ and the equation $x^2 - px + q = 0$ has equal roots, find the values of p and q

29. The first and the last term of an AP are 4 and 81 respectively. If the common difference is 7, how many terms are there and what is their sum?   3

30. Draw a circle of radius = 3cm. Construct a pair of tangents to this circle inclined to each other an angle of 90⁰.   3

31. Evaluate: $\dfrac{4}{3}tan^2 30^0 + sin^2 60^0 - 3cos^2 60^0 + \dfrac{3}{4}tan^2 60^0 - 2tan^2 45^0$ 3

32. Find the ratio in which the point (− 3, p) divides the line segment joining the points (− 5, − 4) and (− 2, 3). Hence find the value of p.   3

33. 504 cones of diameter 3.5cm and height 3cm are melted and recast into a metallic sphere. Find the diameter of the sphere.   3

34. Two poles of equal heights are standing opposite to each other on either side of a road 100m. From a point between them on a road, the angles of elevation of their tops are 30⁰ and 60⁰. Find the position of the point and also the heights of the poles. (√3 = 1.73)]   5

OR

From the top of a building 60m high the angles of depression of the top and the bottom of a tower are observed to be 30⁰ and 60⁰.Find the height of the tower.

35. Find the values of x and y, if the median of the data is 31.   5

Class interval	0-10	10-2	20-30	30-40	40-50	50-60	total
frequency	5	x	6	Y	6	5	40

36. State and prove Pythagoras theorem.   5

End of the Question Paper