



# MODERN MIDDLE EAST INTERNATIONAL SCHOOL

Academic Year 2020 – 2021

## PRE-BOARD EXAM-I-EXAMINATION

### MATHEMATICS

#### SET-1

**CLASS : X**

**Sub Code: 241(B)/041(S)**

**Time Allotted: 3 Hours**

**Name:..... Max. Marks: 80**

**Date: 10.12.2020**

#### General Instructions:

1. This question paper contains two parts A and B.
2. Both Part A and Part B have internal choices.

#### Part – A:

1. It consists three 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. Section III has Question No 21 to 26 are Very short answer Type questions of 2 mark each,
2. Section IV has Question No 27 to 33 are Short Answer Type questions of 3 marks each
3. Section V has Question No 34 to 36 are Long Answer Type questions of 5 marks each. 4.

Internal choice is provided in 2 questions of 2 marks, 2 questions of 3 marks and 1 question of 5 marks

3. All questions must be answered.
  4. Use of calculator is not permitted.
  5. Please check that this question paper contains 10 printed pages.
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**PART A**

**SECTION-I**

**( 16 × 1= 16)**

- 1) If two positive integers a and b are written as  $a = x^3y^2$  and  $b = xy^3$ , where x, y are prime numbers, then HCF (a, b) is \_\_\_\_\_

**(OR)**

The decimal expansion of the rational number  $\frac{6}{1250}$  will terminate after how many places of decimals.

- 2) If the zeroes of the polynomial  $x^2 + 4x + 2k$  are  $\alpha$  and  $\frac{2}{\alpha}$ , then find the value of k.
- 3) Find whether the following pair of linear equations are consistent or inconsistent:  
 $3x + 2y = 5$  and  $2x - 3y = 7$ .
- 4) Sum of the ages of a father and the son is 40 years. If father's age is three times that of his son, then find their respective ages.
- 5) Find the sum of first ten natural number.

**(OR)**

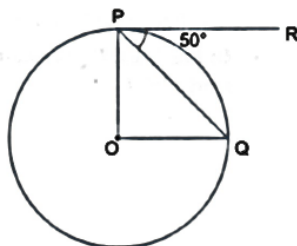
Which term of the A.P 5,2,-1, ..., is -49?

- 6) Find the values of p for which the quadratic equation  $4x^2 + px + 3 = 0$  has equal roots.
- 7) Find the roots of the quadratic equation  $x^2 - (\sqrt{3} + 1)x + \sqrt{3} = 0$ .

**(OR)**

Find the nature of the roots of the quadratic equation:  $2x^2 - 3x + 5 = 0$

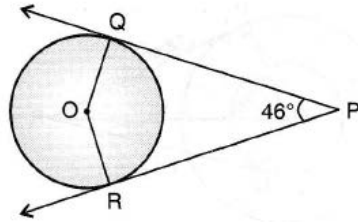
- 8) In the given figure, O is the center of a circle, PQ is a chord and the tangent PR at P makes an angle of  $50^\circ$  with PQ. Find  $\angle POQ$ .



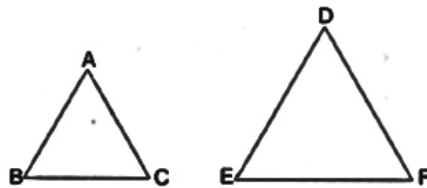
- 9) The length of a tangent drawn from a point at a distance of 10 cm of circle is 8 cm. Find the radius of the circle.

(OR)

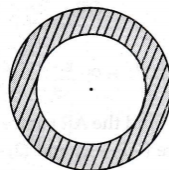
If PQ and PR are two tangents to a circle with center O. If  $\angle QPR=46^\circ$ , find  $\angle QOR$ .



- 10) If  $\triangle ABC \sim \triangle DEF$  such that  $2AB = DE$  and  $BC = 8$  cm, then the length of EF = \_\_\_\_\_



- 11) To divide a line segment AB of length 7.6cm in the ratio 5:8, a ray AX is drawn first such that  $\angle BAX$  forms an acute angle and then points A<sub>1</sub>, A<sub>2</sub>, A<sub>3</sub>, ... are located at equal distances on the ray AX and the point B is joined to which point?
- 12) If  $(\tan\theta + \cot\theta) = 5$ , then find the value of  $(\tan^2\theta + \cot^2\theta)$ .
- 13) If  $\tan\theta = \frac{4}{3}$  then find the value of  $\sin\theta + \cos\theta$ .
- 14) Two coins of diameter 2cm and 4cm respectively are kept one over the other. Find the area of the shaded ring-shaped region in terms of  $\pi$ .



- 15) Three cube of iron whose edges are 3cm, 4cm, 5 cm respectively are melted and formed into a single cube. What will be the edge of new cube formed?

16) A letter of English alphabet is chosen at random. Determine the probability that the chosen letter is a consonant.

**(OR)**

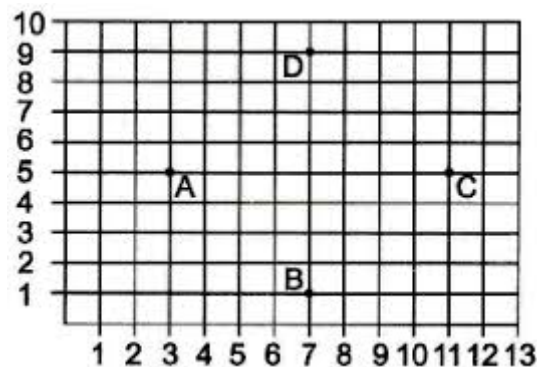
A card is drawn from a well shuffled deck of playing cards. Find the probability of drawing red face card.

### 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

Students of a school are standing in rows and columns in their playground for a drill practice. A,B,C and D are the positions of four students as shown in figure.



a) What are the coordinate positions of A and B?

- i) (3,5) and (7,9)
- ii) (3,5) and (7,1)
- iii) (7,9) and (3,5)
- iv) (7,1) and (9,4)

b) B and D are apart at a distance of \_\_\_\_\_ units

- i) 9
- ii) 8
- iii) 7
- iv) 6

c) What is the midpoint of AD?

- i) (5,4)
- ii) (7,5)
- iii) (3,5)
- iv) (5,7)

d) Distance between C and D is :

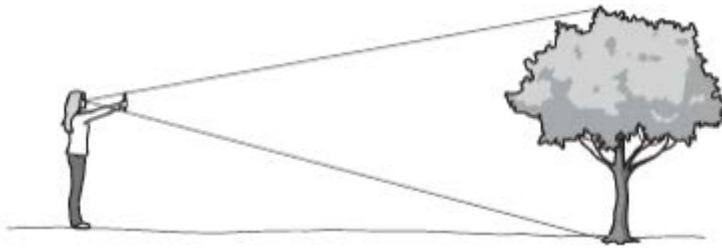
- i) 4                      ii)  $4\sqrt{2}$                       iii) 8                      iv)  $\sqrt{2}$

e) How many sides of quadrilateral are equal?

- i) 2                      ii) 3                      iii) all                      iv) None

18) **Case Study Based-2**

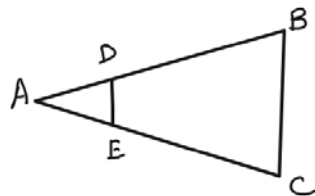
Anna estimates the height of a tree. Anna holds a ruler vertically so the height of the tree which is standing vertically is exactly covered by the ruler.



She is 10 meters from the tree.

The ruler is 10 cm long.

The horizontal distance from her eyes to the ruler is 50 cm. The following figure depicts the problem.



$$AD = 50\text{cm}, DE = 10\text{cm}, AB = 1000\text{cm}$$

**Scale factor** is ratio of corresponding sides of similar triangles.

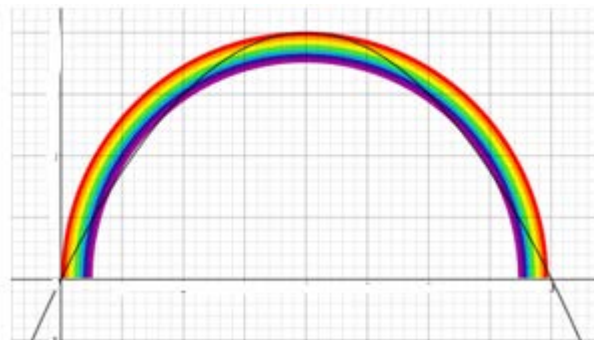
a)  $\triangle ADE \sim \triangle ABC$  is \_\_\_\_\_

- i) SAS similarity
- ii) AA similarity
- iii) SSS similarity
- iv) None of the above

- b) The height of the tree BC is \_\_\_\_
- i) 2m      ii) 3m      iii) 1m      iv) 500cm
- c) The ratio of sides  $\frac{AE}{AC} =$  \_\_\_\_\_
- i)  $\frac{1}{20}$       ii)  $\frac{1}{30}$       iii)  $\frac{1}{10}$       iv)  $\frac{1}{5}$
- d) Name the theorem used in finding height of the tree.
- i) Basic proportionality Theorem  
 ii) Converse of BPT  
 iii) Pythagoras theorem  
 iv) Areas of similar triangles theorem
- e) The ratio of areas of similar triangles  $\frac{ar(ADE)}{ar(ABC)} =$
- i)  $\frac{1}{200}$       ii)  $\frac{1}{400}$       iii)  $\frac{1}{900}$       iv) None of the these

19) **Case Study Based-3**

After a dreary day of rain, the sun peeks through the clouds and rainbow forms. The rainbow so formed is in the shape of a parabola.



The rainbow is represented by a quadratic polynomial  $x^2 - 2x$

- a) The zeroes of the polynomial are \_\_\_\_\_
- i) 0,2  
 ii) 2,-1  
 iii) -1,-2  
 iv) -2,-2
- b) The sum and product of the zeroes of the polynomial  $x^2 - 2x$  are \_\_\_\_\_
- i) 1 and 2  
 ii) 2 and 0

- iii) 0 and -2  
 iv) -5 and -6
- c) If the product of the zeroes of the polynomial  $(ax^2 - 6x - 6)$  is 4, then the value of a is \_\_\_\_\_
- i)  $\frac{3}{2}$                       ii)  $\frac{-3}{2}$                       iii)  $\frac{-1}{2}$                       iv)  $\frac{1}{2}$
- d)  $3x + 5$  is an example of
- i) Linear polynomial  
 ii) Quadratic polynomial  
 iii) Cubic polynomial  
 iv) Bi-quadratic polynomial
- e) If  $p(x) = 2x^2 - 3x + 5$ , then the value of polynomial  $p(2)$  is
- i) 5                      ii) 7                      iii) 9                      iv) 2

20) **Case Study Based-4**

The weight (in kg) of 50 wrestlers are recorded in the following table:



Weight (in kg)	100-110	110-120	120-130	130-140	140-150
No. of Wrestlers	4	14	21	8	3

- a) What is the upper limit of modal class?
- i)120                      ii)130                      iii)100                      iv)150
- b) What is the modal frequency of the given data?
- i) 21                      ii) 50                      iii)25                      iv) 80
- c) How many wrestlers weighs more than 120kg weight?

- i) 32                      ii) 50                      iii)16                      iv)21

d) What is the class mark for class 130-140?

- i) 105                      ii) 125                      iii) 135                      iv)145

e) Empirical relationship between mean, median and mode is

- i)  $\text{Mode} = 3\text{Median} - 2\text{Mean}$                       ii)  $\text{Mean} = 3\text{Median} - 2\text{Mode}$   
iii)  $\text{Median} = 3\text{Mode} - 2\text{Mean}$                       iv) None of these

### Part –B

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

#### SECTION-III

( 6 × 2= 12)

21) 144 cartons of coke cans and 90 cartons of pepsi cans are to be stacked in a canteen. If each stack is of same height and is to contain cartons of the same drink, what would be the greatest number of cartons each stack would have?

22) A(5,1), B(1,5) and c(-3,-1) are the vertices of  $\Delta ABC$ . Find the length of median AD.

(OR)

Find the ratio in which y-axis divides the line segment joining the points A(5, -6) and B(-1, -4).

23) Find a quadratic polynomial, the sum and product of whose zeroes are 6 and 9 respectively. Hence find the zeroes.

24) Construct a tangent to a circle of radius 4 cm from a point on the concentric circle of radius 6 cm and measure its length. Also verify the measurement by actual calculation.

25) Solve the equation for  $\theta$ :

$$\frac{\cos^2 \theta}{\cot^2 \theta - \cos^2 \theta} = 3$$

(OR)

If  $\cos(A - B) = \frac{\sqrt{3}}{2}$  and  $\sin(A + B) = \frac{\sqrt{3}}{2}$ , find A and B where (A+B) and (A-B) are acute angles.



26) Prove that the tangents drawn at the ends of a diameter of a circle are parallel.

**SECTION-IV** **( 7 × 3= 21)**

27) Prove that  $7 + 2\sqrt{3}$  is an irrational number, given that  $\sqrt{3}$  is irrational.

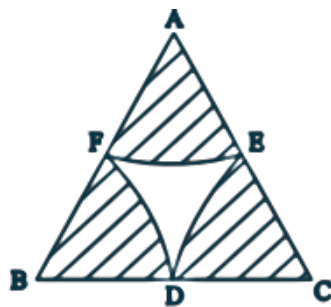
28) The sum of the squares of two consecutive natural numbers is 421. Find the numbers.

**(OR)**

Solve the equation for x:

$$\frac{4}{x} - 3 = \frac{5}{2x+3}; x \neq 0, \frac{-3}{2}$$

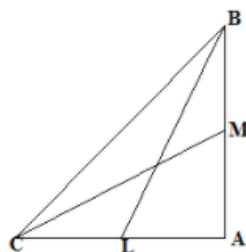
29) In the given figure, arcs are drawn by taking vertices A, B and C of an equilateral triangle of side 10 cm. to intersect the sides BC, CA and AB at their respective mid-points D, E and F. Find the area of the shaded region (Use  $\pi = 3.14$ ).



30) State and prove Basic proportionality Theorem.

**(OR)**

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



31) If the mean of the following distribution is 54, find the missing frequency x:

Class	0-20	20-40	40-60	60-80	80-100
Frequency	16	14	24	26	x

32) Two men on either side of a 75 m high building and in line with base of building observe the angles of elevation of the top of the building as  $30^\circ$  and  $60^\circ$ . Find the distance between the two men.

33) A group of students conducted a survey of their locality to collect the data regarding number of plants and recorded it in the following table:

Number of plants	0-3	3-6	6-9	9-12	12-15
Number of houses	2	4	5	1	2

Find the mode for the above data.

### SECTION V

(3×5=15)

34) The angle of elevation of the top Q of a vertical tower PQ from a point X on the ground is  $60^\circ$ . From a point Y, 40 m vertically above X, the angle of elevation of the top Q of tower is  $45^\circ$ . Find the height of the tower PQ and the distance PX.

(Use  $\sqrt{3} = 1.73$ )

(OR)

The angle of elevation of the top of a building from the foot of the tower is  $30^\circ$  and the angle of elevation of the top of the tower from the foot of the building is  $60^\circ$ . If the tower is 60m high, find the height of the building.

35) A solid toy is in the form of a hemisphere surmounted by a right circular cone.

The height of the cone is 2 cm and the diameter of the base is 4 cm. Determine the volume of the toy. If a right circular cylinder circumscribes the toy, find the difference of the volume of the cylinder and toy. (Take  $\pi = 3.14$ )

36) The area of a rectangle gets reduced by 9 square units, if its length is reduced by 5 units and breadth is increased by 3 units. If we increase the length by 3 units and the breadth by 2 units, the area increases by 67 square units. Find the dimensions of the rectangle. Also find the perimeter of the rectangle.