**SEVEN SQUARE ACADEMY**
**Academic Year – 2018-2019**
**Secondary Section (Pre-Board)**

**Name:** _____ **Subject: Mathematics** **Date: 11/01/2019**

**Class: X** **Time: 3:00 Hours** **Marks: 80 Marks** **SET - A**

**General Instructions:**

1. All questions are compulsory.
2. The question paper consists of 30 questions divided into 4 sections A, B, C, D.
3. Section A contains 6 questions of 1 mark each.
4. Section B consists of 6 questions of 2 marks each.
5. Section C consists of 10 questions of 3 marks each.
6. Section D consists of 8 questions of 4 marks each.

## Section – A (6 x 1 = 6 M)

1. If point A (0, 2) is equidistant from the points B (3, P) and C (P, 5), then find the value of P?
2. If the quadratic equation $Px^2 - 2\sqrt{5}px + 15 = 0$ has two equal roots, then find the value of P?

**OR**

Find the value(s) of k for which the equation $x^2 + 5kx + 16 = 0$ has real and equal roots.

3. If cosec $\theta$, + cot $\theta = x$, find the value of cosec $\theta$ – cot $\theta$.

**OR**

Write the value of $\text{Cot}^2\theta - \frac{1}{sin^2\theta}$.

4. For what value of k will k + 9, 2k – 1 and 2k + 7 are the consecutive terms of an A.P?
5. In Δ ABC~ ΔRPQ; AB = 3 cm, BC = 5 cm, AC = 6 cm, RP = 6 cm and PQ = 10 cm then find QR.
6. The HCF of 45 and 105 is 15, write the LCM.

## Section – B (6 x 2 = 12 M)

7. Find the LCM and HCF of 120 and 144 by using fundamental theorem of arithematic.

**OR**

Prove that $15 + 17\sqrt{3}$ is an irrational number.

8. Find the sum of all three digit natural numbers, which are multiples of 11.

**OR**

The first and last terms of an AP are 8 and 65 respectively. If sum of all its terms is 730, find its common differences.

9. Find the ratio in which y-axis divides the line segment joining the points A(5, -6) and B(-1, -4). Also find the co-ordinates of the point of division.

10. A card is drawn at random from a well shuffled deck of 52 cards. Find the probability of getting neither a red card nor a queen.

11. Find the value of m for which the pair of linear equations $2x + 3y - 7 = 0$ and $(m-1)x + (m+1)y = 3m - 1$ has infinitely many solutions.

12. Two dice are thrown at the same time and the product of numbers appearing on them is noted. Find the probability the product is a prime number.

## Section – C

**(10 x 3 = 30 M)**

13. Using Euclid's division algorithm, find whether the pair of numbers 847, 2160 are co prime or not.

14. Find the value of b for which $(2x + 3)$ is a factor of $2x^3 + 9x^2 - x - b = 0$.

15. Places A and B are 80km apart from each other on a highway. A car starts from A and another from B at the same time. If they move in same direction they meet in 8 hours and if they move towards each other they meet in 1hour 20 minutes. Find the speed of the cars?

16. If the vertices of a triangle are (1, -3), (4, P) and (-9, 7) and its area is 15 square units, find the value(s) of P.

**OR**

Find the value of k for which the points (3k – 1, k -2), (k, k -7) and (k – 1, k -2) are collinear.

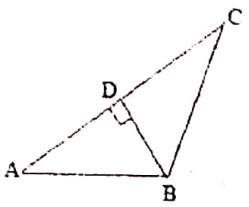
17. Prove that $\frac{1}{\sec A - \tan A} - \frac{1}{\cos A} = \frac{1}{\cos A} - \frac{1}{\sec A + \tan A}$

**OR**

Prove that $sin\theta(1 + tan\theta) + cos\theta(1 + cot\theta) = sec\theta + cosec\theta$

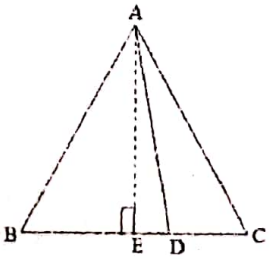
18. Prove that the Parallelogram circumscribing a circle is a rhombus.

19. In the figure, ABC is a triangle and BD ⊥ AC.
Prove that $AB^2 + CD^2 = AD^2 + BC^2$




**OR**

In ΔABC; if AD is the median, then show that $AB^2 + AC^2 = 2\,(AD^2 + BD^2)$




20. In a circle of radius 21 cm, an arc subtends an angle of 60° at the centre. Find (i) the length of arc (ii) area of sector formed by the arc. [Use $\pi = \frac{22}{7}$ ]

21. Solve the following pairs of equations by reducing them to a pair of linear equations:

(i) $\frac{5}{x-1}+\frac{1}{y-2}=2$

(ii) $\frac{6}{x-1}-\frac{3}{y-2}=1$

**OR**

2 women and 5 men can together finish an embroidery work in 4days, while 3 women and 6 men can finish it in 3 days. Find the time taken by 1 woman alone to finish the work; and also that taken by 1 man alone.

22. The following data gives the information as the observed life times of 150 electrical components:

| Life time | 0 – 20 | 20 - 40 | 40 - 60 | 60 -- 80 | 80 – 100 |
|---|---|---|---|---|---|
| Frequency | 15 | 10 | 35 | 50 | 40 |

Find the mode of distribution.

## Section – D

**(8 x 4 = 32)**

23. A motorboat whose speed in still water is 18km/h; takes 1 hour more to go 24km up stream than to return downstream to the same point. Find the speed of the stream.

**OR**

Solve for $x$: $\frac{1}{a+b+x}=\frac{1}{a}+\frac{1}{b}+\frac{1}{x}$

$[a \neq 0,\ b \neq 0,\ x \neq 0,\ x \neq -(a+b)$

24. The first and last terms of an AP are 8 and 350 respectively. If its common difference is 9, how many terms are there and what is their sum?

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

26. Draw a Δ ABC with sides 6cm, 8cm, 9cm and then construct a Δle similar to ΔABC whose sides are $\frac{3}{5}$ of the corresponding sides of ΔABC.

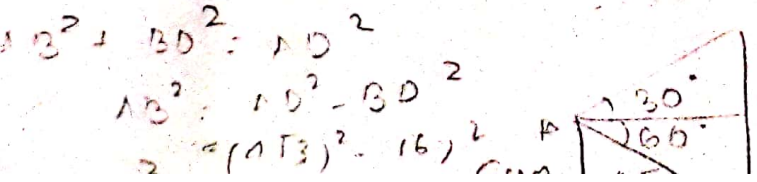
27. The angles of elevation and depression of the top and bottom of lighthouse from the top of a 60m high building are 30°and 60° respectively. Find -

a. the difference between the heights of the lighthouse and the building

b. the distance between the lighthouse and the building

**OR**

The angle of elevations of a cloud from a point 60m above the surface of the water of a lake is 30° and the angle of depression of its shadow from the same point in water of lake is 60°. Find the height of the cloud from the surface of water.



28. Find the value of $f1$ from the following data; if its mode is 65.

| Class | Frequency |
|---|---|
| 0 – 20 | 6 |
| 20 – 40 | 8 |
| 40 – 60 | $f1$ |
| 60 – 80 | 12 |
| 80 – 100 | 6 |
| 100 – 120 | 5 |

Where frequency 6, 8, $f1$ and 12 are in ascending order.

29. One card is drawn from a well shuffled deck of 52 cards. Find the probability of drawing.

a. An ace
b. '2' of spades
c. '10' of black suit

30. If $sec\theta + tan\theta = P$; then find the value of $cosec\theta$.