

**DEVAMATHA CMI PUBLIC SCHOOL**  
**MID TERM EXAMINATION 2017-2018**  
**MATHEMATICS**

**Std. X**

Time : 3 h.

Marks : 80

General Instructions :

- All questions are compulsory.

**Section - A**

- If the ratio of the sides of the two similar triangles is  $\sqrt{3} : 4$ , then find the ratio of the area of the similar triangles.
- If  $\mu$  and  $b$  are the roots of  $cx^2 + dx + e = 0$  ( $c \neq 0$ ), then find the value of  $\mu + b$ .
- If the curves for more than ogive and less than ogive of a given grouped data meet at (33, 45), then what is the median of the data.
- $\tan 30 = \frac{1}{\tan \theta}$  find the value of  $\theta$ .
- ABCD is a trapezium. Such that  $AB \parallel DC$  and  $AB = 3$  cm. If the diagonals AC and BD intersect at 'O' such that  $\frac{AO}{OC} = \frac{BO}{OD} = \frac{1}{2}$ , then find DC.
- Find L.C.M of  $2^3 \times 3^2$  and  $2^2 \times 3^3$  (1x6=6)

**Section - B**

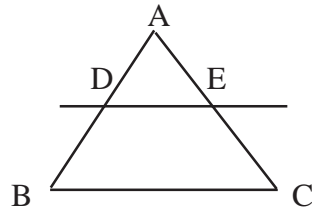
- If  $\mu$  and  $b$  are the Zeros of the polynomial  $f(x) = x^2 - x - k$ , such that  $\mu - b = 9$ , find the value of  $k$ .
- If  $\tan(A+B) = \sqrt{3}$ ,  $\tan(A-B) = \frac{1}{\sqrt{3}}$   $0^\circ < A+B < 90^\circ$  and  $A > B$ , then find A and B.
- For which value of 'k' does the pair of linear equations given below has a no solution.  
 $4x + ky + 8 = 0$ ,  $2x + 2y + 2 = 0$ .
- Convert the following distribution to a more than type cumulative frequency distribution.

Classes	50 - 60	60 - 70	70 - 80	80 - 90	90 - 100
Frequency	12	18	10	15	5

- Find the H.C.F. by Euclid's division algorithm of the numbers 450 and 165.

12. In the given figure,  $DE \parallel BC$ . If  $AD = 15$  cm,  $BD = 2AD$ , then find

$$\frac{\text{ar}(\triangle ADE)}{\text{ar}(\triangle ABC)}$$



Section - C

13. Prove that  $\sqrt{5}$  is an irrational number

14. Divide :  $6x^3 + x^2 - 5x + 4$  by  $2x^2 - 3x + 1$

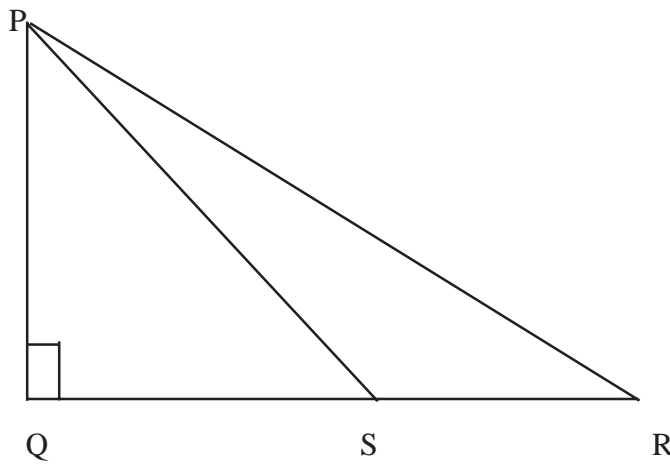
and verify the division Algorithm.

15. Prove that the sum of squares on the sides of a Rhombus is equal to sum of squares on its diagonals.

16. In the given figure, PQR is right angled triangle  $\angle Q = 90^\circ$  S is the mid point of QR.

Show that  $PR^2 = PS^2 + 3RS^2$ .

(2x6=12)



17. Prove that : 
$$\frac{\cos^3 \theta + \sin^3 \theta}{\cos \theta + \sin \theta} + \frac{\cos^3 \theta - \sin^3 \theta}{\cos \theta - \sin \theta} = 2$$

18. Verify : 
$$\sqrt{\frac{1 - \cos^3 \theta}{1 + \cos \theta}} = \frac{\sin \theta}{1 + \cos \theta} \quad \text{for } \theta = 60^\circ$$

19. Find the mean of the following data.

Classes	0-10	10-20	20-30	30-40	40-50
Frequency	8	16	36	34	6

20. Out of a distance 360 km if 240 km is covered by bus and rest by train, It takes 8 hours to complete the journey. However if 120 km is travelled by the bus and rest by train, it takes one hour less. What is the speed of the bus and the train.

- 21 Find whether the following pair of linear equations has a unique solution. If yes, found the solution.

$$7x - 4y = 49, \quad 5x - 6y = 57.$$

22. Show that any positive integer is of the form  $6q+1$ ,  $6q+3$  or  $6q+5$  where  $q$  is some integer.

(3x10=30)

#### Section - D

23. Find the H. C. F. of 81 and 237 and express it as a linear combination of 81 and 237. ie H. C. F. of 81,  $237 = 81x + 237y$  for some  $x$  and  $y$ .

24. A fraction becomes  $\frac{9}{11}$  if 2 is added to both numerator and denominator. If 3 is added to both numerator and denominator, it becomes  $\frac{5}{6}$ . Find the fraction.

25. Sides AB and AC and median AD of a triangle ABC are respectively propotional to sides PQ and PR and median PM of another triangle PQR. Show that  $\triangle ABC \sim \triangle PQR$ .

26. Prove : 
$$\sqrt{\frac{1 + \sin \theta}{1 - \sin \theta}} + \sqrt{\frac{1 - \sin \theta}{1 + \sin \theta}} = 2 \sec \theta$$

27. Evaluate : 
$$\frac{\sec^2 (90^\circ - \theta) - \cot^2 \theta}{2 (\sin^2 25^\circ + \sin^2 65^\circ)} - \frac{2\cos^2 60^\circ \cdot \tan^2 28^\circ \cdot \tan^2 62^\circ}{2 (\sec^2 43^\circ - \cot^2 47^\circ)}$$

28. A vertical tree 12 m long casts a shadow 8 m long on the ground. At the same time a tower casts the shadow 40 m long on the ground.

- Determine the height of the tower.
- What mathematical concept is used in this problem ?
- What is the value stressed upon in the problem ?

29. If  $\mu$  and  $b$  are the zeroes of the polynomial  $p(x) = 3x^2 + 2x + 1$ , find the polynomial, whose

zeroes are  $\frac{1}{\mu^2}$  and  $\frac{1}{b^2}$ .

30. The following distribution gives the daily income of 50 workers of a factory.

Daily Income	200-250	250-300	300-350	350-400	400-450	450-600
No. of workers	10	5	11	8	6	10

Convert the distribution to a less than type cumulative frequency distribution and draw its ogive.

(4x8=32)

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