V & C Patel English School
Half Yearly Exam

Std.: X — Max. Marks: 80
Subject: Mathematics — Date: 18/09/2017
Time: 3hrs.

General Instructions:-

- Section A : Q.No. 1 to 4 carries 1 mark each.
- Section B : Q.No. 5 to 11 carries 2 marks each.
- Section C : Q.No. 12 to 21 carries 3 marks each.
- Section D : Q.No. 22 to 29 carries 4 marks each.
- *All questions are compulsory.*
- *Use of calculator is not allowed.*

Section A

1) If both the zeroes of the quadratic polynomial $ax^2 + bx + c$ are equal and opposite in sign then find the value of b.

2) Two sides and the perimeter of one triangle are respectively three times the corresponding sides and the perimeter of other triangle. Are the two triangles similar? Give reason.

3) Find the acute angle θ satisfying $\sqrt{3}\sin\theta = \cos\theta$.

4) A data has 13 observations arranged in descending order. Which observation represents the median of the data?

Section B

5) Show that any positive odd integer is of the form 6q+1 or 6q+3 or 6q+5 where q is some integer.

6) Does the following pair of equations represent a pair of coincident lines? Justify your answer.

$$\frac{x}{2} + y + \frac{2}{5} = 0 \quad ; \quad 4x + 8y + \frac{5}{16} = 0$$

7) The length of the diagonals of a rhombus are 16cm and 12cm. Find the length of the side of the rhombus.

8) Evaluate $\cos48°\cos42° - \sin48°\sin42°$.

9) Given $15\cot A = 8$, find sinA and secA.

10) If x_i 's are the midpoints of the class intervals of a grouped data, f_i 's are the corresponding frequencies and $\bar{x}$ is the mean then find $\Sigma f_i (x_i - \bar{x})$.

11) Find the class marks of classes 15.5 – 18.5 and 50 – 75.

Section C

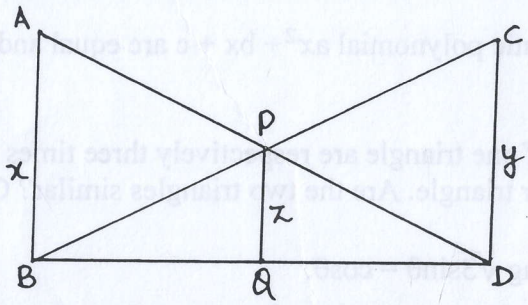
12) An army contingent of 616 members is to march behind an army band of 32 members in a parade. The two groups are to march in the same number of columns. What is the maximum number of columns in which they can march?

13) Check whether the polynomial $3x^2 - 5x + 2$ is a factor of the polynomial $3x^4 - 5x^3 - 10x^2 + 20x - 8$. Verify by division algorithm.

14) Form the pair of linear equations in this problem and find their solutions graphically. 10 students of class X took part in math quiz. If the number of girls is 4 more than the number of boys, find the number of boys and girls who took part in the quiz.

15) In an equilateral triangle ΔABC, AD $\perp$ BC. Prove that $3AB^2 = 4AD^2$.

16) In the given figure AB || PQ || CD, AB = x units, CD = y units and PQ = z units. Prove $\frac{1}{x} + \frac{1}{y} = \frac{1}{z}$.



17) An aeroplane leaves an airport and flies due North at 300km/hr. At the same time, another aeroplane leaves the same airport and flies due West at 400km/hr. How far apart the two aeroplanes would be after 1 ½ hours?

18) Without using trigonometric tables prove that $\frac{sec^2\theta - cot^2(90°-\theta)}{cosec^2 67° - tan^2 23°} + (sin^2 40° + sin^2 50°) = 2$

19) If $sec\theta = x + \frac{1}{4x}$, prove that $sec\theta + tan\theta = 2x$ or $\frac{1}{2x}$.

20) If the mean of the following distribution is 6, find the value of p.

x	2	4	6	10	p+5
f	3	2	3	1	2

21) Calculate the median from the following data.

Marks	0-10	10-30	30-60	60-80	80-90
No. of students	5	15	30	8	2

Section D

22) The median of the distribution given below is 14.4, find the values of x and y if the total frequency is 20.

Class	0-6	6-12	12-18	18-24	24-30
Freq	4	x	5	y	1

23) If $\text{cosec}\theta - \sin\theta = n$ and $\sec\theta - \cos\theta = m$ prove that $n^2m^2(n^2 + m^2 + 3) = 1$.

24) In an equilateral triangle ΔABC, D is a point on side BC such that BD = $\frac{1}{3}$BC. Prove that $9AD^2 = 7AB^2$.

25)Two poles of height a metres and b metres are p metres apart. Prove that the height of the point of intersection of the lines joining the top of each pole to the foot of the opposite pole is given by $\frac{ab}{a+b}$ metres.

26) 8 men and 12 boys can finish a piece of work in 10 days while 6 men and 8 boys can finish it in 14 days. Find the time taken by one man alone and that by one boy alone to finish the work.

27) Find the zeroes of the polynomial $3x^4 + 6x^3 - 2x^2 - 10x - 5$ if two of its zeroes are $\sqrt{\frac{5}{3}}$ and $-\sqrt{\frac{5}{3}}$.

28) Using prime factorization find H.C.F and L.C.M of 30, 72 and 432. Also show that H.C.F x L.C.M ≠ product of three numbers.

29) Prove that $\sqrt{7}$ is irrational.

********** *Good Luck* **********