

**General Instructions:**

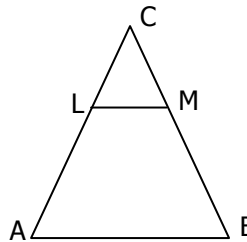
1. Attempt all the questions.
2. This question paper consists of 31 questions divided into four sections A, B, C and D. Section A comprises of 4 questions of 1 mark each, section B comprises of 6 questions of 2 marks each, section C comprises of 10 questions of 3 marks each and section D comprises of 11 questions of 4 marks each.

**Section – A (4 x 1 = 4 marks)**

1. Without actually using long division, find the decimal form of  $\frac{7}{80}$ .
2. Write the quadratic polynomial, whose zeroes are 1 & -2.
3. If  $\bar{x}$  is the arithmetic mean of n observations  $x_1, x_2, \dots, x_n$ , find the arithmetic mean of  $ax_1, ax_2, \dots, ax_n$ .
4. State 'Fundamental Theorem of Arithmetic'.

**Section – B (6 x 2 = 12 marks)**

5. If  $15 \cot A = 8$ , then find  $\sin A$  &  $\sec A$ .
6. Find the HCF of 82 & 396 by Euclid's division algorithm.
7. If  $x + a$  is a factor of  $2x^2 + 2ax + 5x + 10$ , then find 'a'.
8. In the fig.  $LM \parallel AB$ . If  $AL = x - 3$ ,  $AC = 2x$ ,  $BM = x - 2$  &  $BC = 2x + 3$ , then find x.



9. If  $\angle A$  &  $\angle B$  are acute angles of  $\triangle ABC$  such that  $\sin A = \sin B$ , then show that  $\angle A = \angle B$ .
10. Write the empirical relationship between the mean, median and mode. Also find the mode of a data if its median is 20 and mean is 18.

**Section – C (10 x 3 = 30 marks)**

11. In  $\triangle ABC$ ,  $DE \parallel BC$ , where D & E are points on AB & AC respectively. If  $DE = \frac{2}{3} BC$  &  $\text{area}(\triangle ABC) = 81 \text{ cm}^2$ , find the  $\text{area}(\triangle ADE)$ .
12. Show that  $5 - \sqrt{7}$  is an irrational number.
13. Prove that  $\sec A(1 - \sin A)(\sec A + \tan A) = 1$ .
14. The father's age is 3 years more than 3 times the son's age. 3 years hence, the age of father will be 10 years more than twice the son's age. Find their present ages. (Use elimination method).
15. Find the mode of the following data:

Classes	0 – 50	50 – 100	100 – 150	150 – 200	200 – 250
Frequency	12	13	15	8	12

16. Show that  $\tan 48^\circ \tan 23^\circ \tan 42^\circ \tan 67^\circ = 1$ .
17. If  $\alpha$  and  $\beta$  are the zeroes of  $x^2 - 2x - 15$ , then form a quadratic polynomial, whose zeroes are  $2\alpha$  and  $2\beta$ .

18. During a survey of 40 cities for ascertaining the literacy rate, following data was obtained.

Literacy rate (%)	45 – 55	55 – 65	65 – 75	75 – 85	85 – 95
No. of cities	4	11	12	9	4

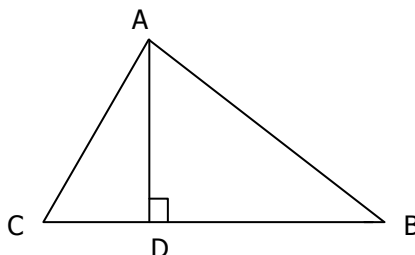
Find the mean literacy rate for the data. What value is indicated from the data?

19. Find the zeroes of  $p(t) = t^2 - 15$ . Also verify the relation between the zeroes and the co-efficients.
20. Find the value of  $k$  for which  $kx + 3y = k - 3$  &  $12x + ky = k$  represent coincident lines.

**Section – D (11 x 4 = 44 marks)**

21. Show that the square of an odd position integer can be of the form  $6m + 1$  or  $6m + 3$  for some integer  $m$ .
22. Prove that in a triangle, if the square of one side is equal to the sum of the squares of the other two sides, then the angle opposite to the first side is a right angle.
23.  $(\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2 = 7 + \tan^2 A + \cot^2 A$ .

24. In the fig., if  $AD \perp BC$ , &  $BD = 3CD$ , then prove that  $2 AB^2 = 2 AC^2 + BC^2$ .



25. A polynomial  $p(x) = x^4 + 1$ , when divided by  $g(x)$ , gives a quotient  $x^3 - x^2 + x - 1$  and remainder 2. Find  $g(x)$ .
26.  $\frac{\tan \theta}{1 - \cot \theta} + \frac{\cot \theta}{1 - \tan \theta} = 1 + \sec \theta \operatorname{cosec} \theta$ .
27. Prove that the sum of the squares of the sides of a rhombus is equal to the sum of the squares of its diagonals.
28. Find the missing frequency in the following frequency distribution table, if mean is 50.

Class interval	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100	Total
Frequency	17	$f_1$	32	$f_2$	19	120

29. Prove that  $\frac{\sin \theta - \cos \theta + 1}{\sin \theta + \cos \theta - 1} = \frac{1}{\sec \theta - \tan \theta}$  using  $\sec^2 \theta - \tan^2 \theta = 1$ .
30. Draw the graphs of the following equations  $2x - y = 1$  &  $x + 2y = 13$ , and  
 i) Find the solution of the equations from the graph.  
 ii) Shade the region formed by the lines and the y-axis.
31. During a medical check up of 35 students of a class, their weights were recorded as

Weights (in Kg)	No. of students
36 – 38	0
38 – 40	3
40 – 42	2
42 – 44	4
44 – 46	5
46 – 48	14
48 – 50	4
50 – 52	3

Convert the distribution into a less than type cumulative frequency distribution and draw its ogive. Also obtain median weight from the graph.