



## Class – X Mathematics

Times Allowed – 3 Hours

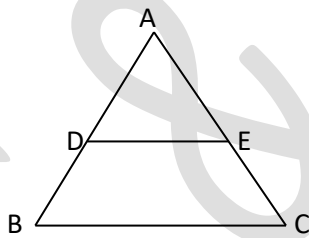
Maximum Marks – 80

### General Instruction:-

- All questions are **compulsory**.
- Q. no. 1 to 6 are very short answer questions and carry 1 mark each.
- Q. no. 7 to 12 are short answer questions and carry 2 marks each.
- Q. no. 13 to 22 are also short answer questions and carry 3 marks each.
- Q. no. 23 to 30 is a value based question and carries 4 marks.
- Use log tables if necessary, use of calculators is **not** allowed.

### SECTION A

- Given that H.C.F (14, 35) = 7, find L.C.M (14, 35)
- Is  $x = -4$ , a solution of the equation  $2x^2 + 5x - 12 = 0$ ?
- Find the number of terms in the following series  $5 + 8 + 11 + 14 + \dots$  if the last term is 95.
- Prove that the distance of the point  $(a \cos \alpha, a \sin \alpha)$  from the origin is independent of  $\alpha$
- In the given figure,  $DE \parallel BC$ . If  $\frac{AD}{DB} = \frac{2}{3}$  and  $AC = 18\text{cm}$ , find  $AE$ .



- Prove that:  $\frac{2 \tan 53^\circ}{\cot 37^\circ} - \frac{\cot 80^\circ}{\tan 10^\circ} = 1$ .

### SECTION B

- Using euclid's division algorithm, find the H.C.F of 867 and 255.
- The sum of three numbers in A.P is 21 and their product is 231. Find the numbers.
- For which value of  $k$ , will the following pair of linear equations have no solution?  $3x + y = 1$ ;  $(2k - 1)x + (k - 1)y = 2k + 1$
- Find the ratio in which the line-segment joining the point  $(3, -4)$  and  $(-2, 5)$  is divided by  $(-\frac{1}{3}, 2)$ .
- A pair of die is thrown once. Find the probability of getting the same number on each die.
- What is the probability that a leap year selected randomly will have 53 Sundays?

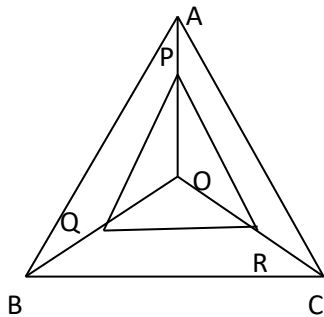
### SECTION C

13. Show that one and only one out of  $n, n + 2, n + 4$  is divisible by 3, where  $n$  is any positive integer.
14. If  $\alpha$  and  $\beta$  are the zeroes of the polynomial  $f(x) = 4x^2 - 5x + 1$ , find a quadratic polynomial whose zeroes are  $\frac{\alpha^2}{\beta}$  and  $\frac{\beta^2}{\alpha}$ .
15. Meena went to a bank to withdraw Rs.2,000 she asked the cashier to give her Rs.50 and Rs.100 notes only. Meena got 25 notes in all. Find how many notes of Rs.50 and Rs.100 she received.
16. Find the ratio in which the point  $(x, -1)$  divides the line segment joining the points  $(-3, 5)$  and  $(2, -5)$ . Also find the value of  $x$ .

OR

Find the area of the triangle formed by joining the midpoints of the sides of a triangle  $ABC$  whose vertices are  $A(0, -1)$ ,  $B(2, 1)$  and  $C(0, 3)$ . Find the ratio of this area to the area of the given triangle  $ABC$ .

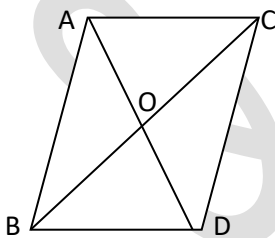
17. In the given figure,  $PQ \parallel AB$  and  $PR \parallel AC$ , show that  $QR \parallel BC$ .



OR

In the figure  $\triangle ABC$  and  $\triangle DBC$  are on the same base  $BC$ .  $AD$  and  $BC$  intersect at  $O$ .

Prove that  $\frac{\text{area}(\triangle ABC)}{\text{area}(\triangle DBC)} = \frac{AO}{DO}$



18. In fig.,  $AB$  is a chord of length 9.6 cm, of a circle with centre  $O$  and radius 6 cm. The tangents at  $A$  and  $B$  intersect at  $P$ . Find the length of  $PA$ .

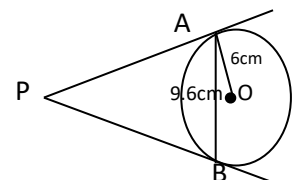


Fig. 3.41

19. Prove that

$$\frac{\sin\theta + \cos\theta}{\sin\theta - \cos\theta} + \frac{\sin\theta - \cos\theta}{\sin\theta + \cos\theta} = \frac{2\sec^2\theta}{\tan^2\theta - 1}$$

OR

Evaluate without using trigonometric tables

$$\frac{\sec^2(90^\circ - \theta) - \cot^2 \theta}{2(\sin^2 25^\circ + \sin^2 65^\circ)} + \frac{2\cos^2 60^\circ \tan^2 28^\circ \tan^2 62^\circ}{3(\sec^2 43^\circ - \cot^2 47^\circ)}$$

20. A well with inner radius 4 m is dug 14 m deep. Earth out of it and spread all around to a width of 5 m of form an embankment. Find the height of the embankment.

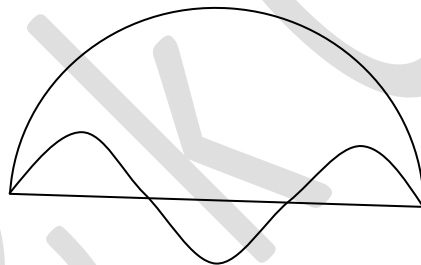
OR

The internal and external diameters of a hollow hemispherical shell are 6 cm and 10 cm respectively. If it is melted and recast into a solid cylinder of diameter 14 cm, find the height of the cylinder.

21. Find the missing frequencies in the following frequency distribution table, it is given that the mean of the distribution is 56.

C.I	f
0-20	16
20-40	$f_1$
40-60	25
60-80	$f_2$
80-100	12
100-120	10
Total	90

22. In the given figure, the boundary of shaded region consists of four semicircular arcs, two smallest being equal. If diameter of the largest is 14 cm and that of the 3.5cm, calculate the area of the shaded region. [Use  $\pi = \frac{22}{7}$ ]



#### SECTION D

23. Find what values of  $k$  are the roots of the quadratic equation  $(k + 4)x^2 + (k + 1)x + 1 = 0$  equal ?

OR

24. The sum of two numbers  $a$  and  $b$  is 15, and the sum of their reciprocals  $\frac{1}{a}$  and  $\frac{1}{b}$  is  $\frac{3}{10}$ . Find the numbers  $a$  and  $b$ .

25. Show that in a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

OR

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

26. If the median of the distribution given below is 28.5, find the value of  $x$  and  $y$ .

Class interval	0-10	10-20	20-30	30-40	40-50	50-60	Total
Frequency	5	$x$	20	15	$y$	5	60

27. During the medical check-up of 35 students of a class, their weight were recorded as follow :

Weight(in kg)	Number of students
Less than 38	0
Less than 40	3
Less than 42	5
Less than 44	9
Less than 46	14
Less than 48	28
Less than 50	32
Less than 52	35

Draw a less than type ogive for the given data. Hence, obtain the median weight from the graph and verify the result by using the formula.

28. A conical vessel whose internal radius is 5 cm and height 24 cm is full of water. The water is emptied into a cylindrical vessel with internal radius 10 cm. find the height to which the water rises.

29. Prove that  $\frac{1}{\sec x - \tan x} - \frac{1}{\cos x} = \frac{1}{\cos x} - \frac{1}{\sec x + \tan x}$

30. A 1.2 m tall girl spots a balloon moving with the wind in a horizontal line at a height of 88.2 m from the ground. The angle of elevation of the balloon from the eyes of the girl at that instant is  $60^\circ$ . After some time, the angle of elevation reduces to  $30^\circ$ . Find the distance travelled by the balloon during the interval.