

**CBSE Board**  
**Class X Mathematics**

**Time: 3 hrs**

**Total Marks: 80**

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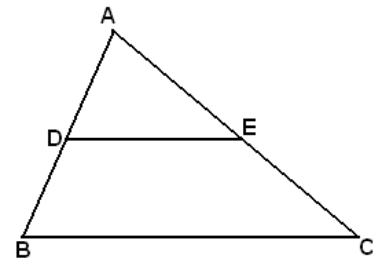
**General Instructions:**

1. All questions are **compulsory**.
  2. The question paper consists of **30** questions divided into **four sections** A, B, C, and D. **Section A** comprises of **6** 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 **8** questions of 4 marks each.
  3. Use of calculator is **not** permitted.
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**Section A**  
**(Questions 1 to 6 carry 1 mark each)**

1. If  $\alpha$  and  $\beta$  are the zeroes of the quadratic polynomial  $f(x) = x^2 + 2x + 1$ , find the value of  $\frac{1}{\alpha} + \frac{1}{\beta}$ .

2. In  $\triangle ABC$ , D and E are points on the sides AB and AC respectively such that  $DE \parallel BC$ . If  $\frac{AD}{DB} = \frac{2}{3}$  and  $EC = 4$  cm, then find AE.



**OR**

If the areas of two similar triangles are in the ratio 25 : 64, find the ratio of their corresponding sides.

3. If HCF of two numbers is 11 and their LCM is 7700. If one of the numbers is 161, find the other.
4. The radius of a cylindrical tank is 28 m. If its capacity is equal to that of a rectangular tank of size 28 m  $\times$  16 m  $\times$  11 m then. Find the depth of the cylindrical tank.

**OR**

Find the area of parallelogram one of whose sides measures 48 cm and the corresponding height measures 18.5 cm.

5. The radii of two circles are 19 cm and 9 cm respectively. Find the radius of the circle which has its circumference equal to the sum of the circumferences of the two circles.

6. If the probability of winning a game is 0.3, then what is the probability of losing it?

**Section B**

**(Questions 7 to 12 carry 2 marks each)**

7. Show that  $(a - b)$ ,  $a$  and  $(a + b)$  form consecutive terms of an A.P.

**OR**

Find the 12<sup>th</sup> term of the AP 14, 9, 4, -1, -6,...

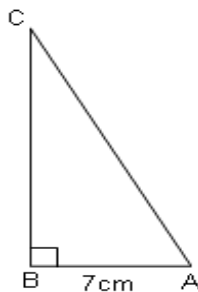
8. Determine the ratio in which the line  $3x + y - 9 = 0$  divides the segment joining the points  $(1, 3)$  and  $(2, 7)$ .

9. Determine the set of values of  $p$  for which the quadratic equation  $px^2 + 6x + 1 = 0$  has real roots.

10. Find the mean of the following data:

Classes	Frequency
0-10	7
10-20	3
20-30	15
30-40	5

11. In  $\triangle ABC$ ,  $m\angle B = 90^\circ$ ,  $AB = 7$  cm and  $AC - BC = 1$  cm. Determine the values of  $\sin C$  and  $\cos C$ .



**OR**

Find the value of  $\sin 60^\circ \cos 30^\circ + \cos 60^\circ \sin 30^\circ$ .

12. Find the zeroes of the quadratic polynomial  $x^2 + 7x + 12$  and verify the relationship between the zeroes and its coefficients.

**Section C**  
**(Questions 13 to 22 carry 3 marks each)**

13. The point P divides the join of (2, 1) and (-3, 6) in the ratio 2 : 3. Does P lie on the line  $x - 5y + 15 = 0$ ?

**OR**

Show that a quadrilateral with vertices (0, 0), (5, 0), (8, 4) and (3, 4) is a rhombus. Also find its area.

14. The cost of fencing a circular field at the rate of Rs. 24 per metre is Rs. 5280. The field is to be ploughed at the rate of Rs. 0.50 per  $m^2$ . Find the cost of ploughing the field.

$$\left( \text{Take } \pi = \frac{22}{7} \right)$$

15. Solve for x:

$$\left( \frac{4x-3}{2x+1} \right) - 10 \left( \frac{2x+1}{4x-3} \right) = 3, \quad x \neq -\frac{1}{2}, \frac{3}{4}$$

16. Construct a pair of tangents to a circle of radius 4 cm inclined at an angle of  $45^\circ$ .
17. If in a rectangle, the length is increased and breadth is reduced each by 2 metres, then the area is reduced by 28 sq metres. If the length is reduced by 1 metre and breadth is increased by 2 metres, then the area is increased by 33 sq metres. Find the length and breadth of the rectangle.

**OR**

If three times larger of the two numbers is divided by the smaller one, we get 4 as quotient and 3 as remainder. Also, if seven times the smaller number is divided by the larger one, we get 5 as quotient and 1 as remainder. Find the numbers.

18. Find the mode for the following data which gives the literacy rate (in %) in 40 cities of India.

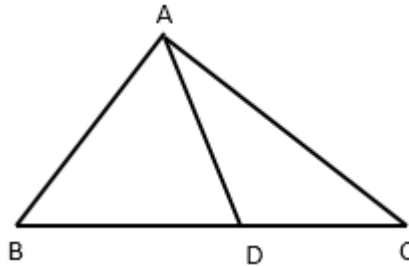
Literacy rate (%)	45-55	55-65	65-75	75-85	85-95
No. of cities	4	11	12	9	4

19. The sum of the numerator and denominator of a fraction is 8. If 3 is added to both the numerator and the denominator, the fraction becomes  $\frac{3}{4}$ . Find the fraction.
20. If one solution of the equation  $3x^2 = 8x + 2k + 1$  is seven times the other. Find the solutions and the value of k.

**OR**

A positive number is divided into two parts such that the sum of squares of the two parts is 208. The square of the larger part is 18 times the smaller part. Taking  $x$  as the smaller part, find the number.

21. If the zeros of the polynomial  $f(x) = x^3 - 3x^2 + x + 1$  are  $a - b$ ,  $a$ ,  $a + b$ , find  $a$  and  $b$ .
22. In the figure,  $\triangle ABC$  is such that  $\angle ADC = \angle BAC$ . Prove that  $CA^2 = CB \times CD$ .



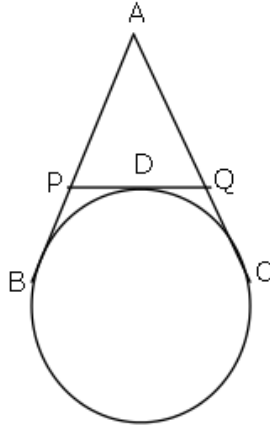
**OR**

One angle of a triangle is equal to one angle of another triangle and the bisectors of these equal angles divide the opposite sides in the same ratio. Prove that the triangles are similar.

### **Section D**

**(Questions 23 to 30 carry 4 marks each)**

23. A cylindrical container whose diameter is 12 cm and height is 15 cm is filled with ice-cream. Ice-cream is distributed to ten children in equal cones having hemispherical tops. If the height of conical portion is twice the diameter of its base, find the diameter of the ice-cream cone.
24. From a window of a house in a street,  $h$  metres above the ground, the angles of elevation and depression of the top and the foot of another house on the opposite side of the street are  $\alpha$  and  $\beta$  respectively. Show that the height of the opposite house is  $h(1 + \tan \alpha \cot \beta)$  metres.
25. For a Science exhibition Samy presented a diagrammatic representation of 'Rain Water Harvesting' as his project. AB and AC are 5 m long pipes bringing water from the terrace of a building (as shown in the given figure). The triangular space is developed as a garden.



What is the perimeter of the triangular garden? What qualities do you think are encouraged by such exhibitions?

26. Two dice are thrown simultaneously. Find the probability that the sum of the two numbers appearing on their top is less than or equal to 10.

**OR**

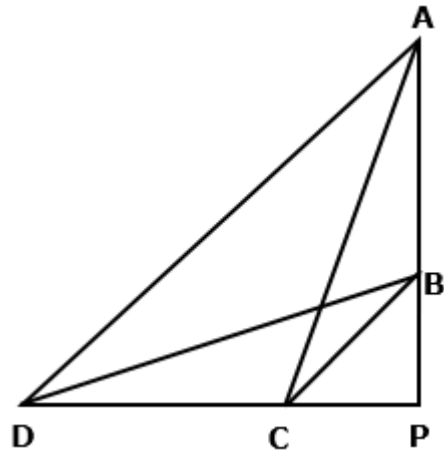
17 cards numbered 1, 2, 3, ..., 17 are put in a box and mixed thoroughly. One person draws a card from the box. Find the probability that the number on the card is :

1. Odd
  2. A prime
  3. Divisible by 3
  4. Divisible by 2 and 3 both
27. If  $m^{\text{th}}$  term of an A.P. is  $\frac{1}{n}$  and  $n^{\text{th}}$  term is  $\frac{1}{m}$ , then show that the sum of the  $m$  and  $n$  terms is  $\frac{1}{2}(mn + 1)$ .

**OR**

Determine the general term of an AP whose 7<sup>th</sup> term is -1 and 16<sup>th</sup> term is 17.

28. From a solid cylinder of height 7 cm and base diameter 12 cm, a conical cavity of same height and same base diameter is hollowed out. Find the total surface area of the remaining solid. [Use  $\pi = \frac{22}{7}$ ]
29. Solve the equations  $2x - y + 6 = 0$  and  $4x + 5y - 16 = 0$  graphically. Also determine the coordinate of the vertices of the triangle formed by these lines and the x-axis.
30. In a quadrilateral ABCD, given that  $\angle A + \angle D = 90^\circ$ . Prove that  $AC^2 + BD^2 = AD^2 + BC^2$ .



OR

If two triangles are equiangular, prove that the ratio of the corresponding sides is same as the ratio of the corresponding altitudes.