

## Mathematics Exam [ NCERT Based ] CBSE Class 10

Time: 90m

80 Marks

1. The lines represented by the pair of linear equations  $x + 2y = 8$  and  $2x + 4y = 10$  are  
(a) intersecting each other                      (b) perpendicular to each other **1 x 20 = 20**  
(c) coincident                                      (d) parallel to each other
2. Sum of the zeroes of the polynomial  $p(x) = x^2 - 2x - 8$  is.....  
(a)  $-8$                                       (b)  $2$                                       (c)  $-2$                                       (d)  $8$
3. If  $\tan \theta = 1$ , then the value of  $\sec \theta$  is.....  
a)  $\frac{1}{\sqrt{3}}$                                       (b)  $\sqrt{3}$                                       (c)  $\sqrt{2}$                                       (d)  $\frac{1}{\sqrt{2}}$
4. In  $\Delta ABC$ ,  $AB = 3$  units,  $BC = 1$  unit,  $AC = 2$  units and  $\angle ACB = \theta$ , then value of ' $\theta$ ' is  
(a)  $0^\circ$                                       (b)  $60^\circ$                                       (c)  $45^\circ$                                       (d)  $90^\circ$
5. The HCF and LCM of two numbers are 4 and 60 respectively. If one of the numbers is 12, then the other number is .....  
a) 30                                      b) 20                                      c) 45                                      d) 56
6. If  $\sin A = \frac{1}{2}$ ,  $\cos A = \frac{\sqrt{3}}{2}$ , then the value of  $\tan A$  is.....  
a)  $\frac{2}{3}$                                       b)  $\frac{1}{3}$                                       c)  $\frac{1}{\sqrt{3}}$                                       d)  $\frac{2}{\sqrt{3}}$
7. On a morning walk, three persons step off together and their steps measure 40 cm, 42 cm and 45 cm, respectively. What is the minimum distance each should walk so that each can cover the same distance in complete steps?  
(a) 2540                                      (b) 2560                                      (c) 2650                                      (d) 2520
8. Find the quadratic polynomial whose zeros are -3 and 4.  
(a)  $x^2 - 7x - 12$                       (b)  $x^2 + x + 12$                       (c)  $x^2 - x - 12$                       (d)  $x^2 + 3x - 4$
9. Which of the following equations has no real roots?  
(a)  $x^2 - 4x + 3\sqrt{2} = 0$  (b)  $x^2 + 4x - 3\sqrt{2} = 0$  (c)  $x^2 - 4x - 3\sqrt{2} = 0$  (d)  $3x^2 + 4\sqrt{3}x + 4 = 0$
10. The roots of  $ax^2 + bx + c = 0$ ,  $a \neq 0$  are real and unequal. Which of these is true about the value of discriminant, D?  
(a)  $D < 0$                                       (b)  $D > 0$                                       (c)  $D = 0$                                       (d)  $D \leq 0$
11. Two APs have the same common difference. The first term of one of these is  $-1$  and that of the other is  $-8$ . Then the difference between their 4th terms is.....  
(a) 7                                      (b) 8                                      (c) 9                                      (d) 10

12. If the numbers  $n - 2$ ,  $4n - 1$  and  $5n + 2$  are in AP, then the value of  $n$  is .....
- (a) 3                                      (b) 4                                      (c) 1                                      (d) 2
13. If  $\Delta ABC \sim \Delta PQR$ ,  $AB = 6.5$  cm,  $PQ = 10.4$  cm. Perimeter of  $\Delta ABC$  is 60 cm, then the perimeter of  $\Delta PQR$  is
- (a) 100cm                                      (b) 60cm                                      (c) 96 cm                                      (d) none
14. XY is drawn parallel to the base BC of a  $\Delta ABC$  cutting AB at X and AC at Y.  
If  $AB = 4 BX$  and  $YC = 2$  cm, then AY is.....
- (a) 2cm                                      (b) 4cm                                      (c) 6 cm                                      (d) 8cm
15. The coordinates of a point A, where AB is the diameter of a circle, whose center is  $(2, -3)$  and B  $(1, 4)$  is.....
- a.  $(10, 3)$                                       b.  $(3, -10)$                                       c.  $(-3, 10)$                                       d.  $(-3, -10)$
16. The points  $(-4, 0)$ ,  $(4, 0)$  and  $(0, 3)$  are the vertices of a .....
- (a) right triangle (b) isosceles triangle (c) equilateral triangle (d) scalene triangle
17. If  $\sin \theta + \cos \theta = \sqrt{2}$ , then  $\tan \theta + \cot \theta =$
- (a) 1                                      (b) 2                                      (c) 3                                      (d) 4
18.  $\frac{1 + \tan A}{1 + \cot A} = \dots\dots\dots$
- (a)  $\sec^2 A$  (b) -1 (c)  $\cot^2 A$  (d)  $\tan^2 A$
19. Assertion (A): The polynomial  $f(x) = x^2 - 2x + 2$  has two real zeros.  
Reason (R): A quadratic polynomial can have at most two real zeroes.
20. Assertion(A): The equation  $9x^2 + 3kx + 4 = 0$  has equal roots for  $k = 9$ .  
Reason (R): If discriminant 'D' of a quadratic equation is equal to zero, then roots of equation are real and equal.
- 21. Prove that  $3 + \sqrt{2}$  is an irrational number. **2 x 5 = 10****
22. Solve the given pair of linear equations by Elimination method :
- $2x + y = 8$  and  $3x - y = 7$
23. Prove that:  $\frac{\cos \theta - \sin \theta \cdot \cos \theta}{\cos \theta + \sin \theta \cdot \cos \theta} = \frac{\operatorname{cosec} \theta + 1}{\operatorname{cosec} \theta - 1}$
24. Find the coordinates of the point which divides the line segment joining the points  $(4, -3)$  and  $(8, 5)$  in the ratio 3 : 1 internally.
25. 'D' is a point on the side BC of a  $\Delta ABC$  such that  $\angle ADC = \angle BAC$ . Then prove that  $AC^2 = BC \cdot CD$ . **3 x 6 = 18**
26. Age of mother is twice the square of age of her son. After 8 years mother's age is 4 years more than the thrice of age of her son. Find their present ages. [OR]

The sum of a two -digit number obtained by reversing the digits is 66. If the digits of the number differ by 2, find the number, how many such numbers are there.

27. Prove that  $\sqrt{3}$  is an Irrational number.

28. Find the zeros of the quadratic polynomial  $4x^2 - 4x + 1$  and verify the relationship between its zeros and coefficients.

29. Prove that :  $(\operatorname{cosec} \theta - \cot \theta)^2 = \frac{1-\cos}{1+\cos}$  [OR]

Prove that :  $\sec A(1-\sin A)(\sec A + \tan A) = 1$

30. The sum of third and seventh terms of an AP is 6 and their product is 8. Find the sum of the first sixteen terms of the AP. [OR]

The sum of 4<sup>th</sup> and 8<sup>th</sup> terms of an AP is 24 and the sum of 6<sup>th</sup> and 10<sup>th</sup> terms is 44. Find the first three terms of the AP.

31. If AD and PM are medians of triangles ABC and PQR respectively where

$\Delta ABC \sim \Delta PQR$ , Prove that  $\frac{AB}{PQ} = \frac{AD}{PM}$  [OR]

A girl of height 90 cm is walking away from the base of a lamp post at a speed of 1.2m/s, If the lamp is 3.6m above the ground, find the length of her shadow after 4 seconds. **4 x 5 = 20**

32. If a Train travels 360 km at a uniform speed. If the speed had been 5km/h more, it would have taken 1 hour less for the same journey. Find the speed of the train. [OR]

A motor boat whose speed is 18 km/h in still water takes 1 hour more to go 24 km upstream than to return downstream to the same spot. Find the speed of the stream.

33. State and prove Basic Proportionality theorem.

34. Find the solution of the given pair of linear equations by graphical method:

$$2x + y = 8 \text{ and } x + y = 5$$

35. Places A and B are 100km apart on a highway. If one car starts from A and another from B at the same time. If the cars travel in the same direction at different speeds, they meet in 5 hours, if they travel towards each other they meet in one hour, what are the speeds of the two cars? [OR]

The ratios of incomes of two persons is 9:7 and the ratio of their expenditures is 4:3. If each of them manages to save 2000 Rs per month, find their monthly incomes.

### Case Study Questions

**3 x 4 = 12**

36. The below picture are few natural examples of parabolic shape which is represented

by a quadratic polynomial. A parabolic arch is an arch in the shape of a parabola. In structures, their curve represents an efficient method of load, and so can be found in bridges and in architecture in a variety of forms.

1. In the standard form of quadratic polynomial, a, b, c are

- a) All are real numbers.
- b) All are rational numbers.
- c) 'a' is a non zero real number b and c are real numbers.
- d) All are integers.



2. If the roots of the quadratic polynomial are equal, where the discriminant  $D = -4ac$ , then

- a)  $D > 0$  b)  $D < 0$  c)  $D \geq 0$  d)  $D = 0$

3. If  $\alpha$  and  $\frac{1}{\alpha}$  are the zeroes of the quadratic polynomial  $2x^2 - x + 8k$  then k is.....

- a)  $4b) \frac{1}{4}c) -\frac{1}{4}d) 2$

4. The graph of  $x^2 + 1 = 0$

- a) Intersects x-axis at two distinct points. b) Touches x-axis at a point.
- c) Neither touches nor intersects x-axis. d) Either touches or intersects x-axis.

2. Raj and Ajay are very close friends. Both the families decide to go to Ranikhet by their own cars. Raj's car travels at a speed of x km/h while Ajay's car travels 5 km/h faster than Raj's car. Raj took 4 hours more than Ajay to complete journey of 400km.



1. What will be the distance covered by Ajay's car in two hours?

- a)  $2(x + 5)$  km b)  $(x - 5)$  km c)  $2(x + 10)$  km d)  $(2x + 5)$  km

2. Which of the following quadratic equation describe the speed of Raj's car?

- a)  $x^2 - 5x - 500 = 0$  b)  $x^2 + 4x - 400 = 0$  c)  $x^2 + 5x - 500 = 0$  d)  $x^2 - 4x + 400 = 0$

3. What is the speed of Raj's car?

- a) 20 km/hour b) 15 km/hour c) 25 km/hour d) 10 km/hour

4. How much time took Ajay to travel 400 km?

- a) 20 hour b) 40 hour c) 25 hour d) 16 hour

3. Your elder brother wants to buy a car and plans to take loan from a bank for his car. He repays his total loan of Rs 1,18,000 by paying every month starting with the first instalment of Rs 1000. If he increases the instalment by Rs 100 every month, answer the following:



1. The amount paid by him in 30th installment is

- a) 3900 b) 3500 c) 3700 d) 3600

2. The amount paid by him in the 30 installments is

- a) 37000 b) 73500 c) 75300 d) 75000

3. What amount does he still have to pay after 30th installment?

- a) 45500 b) 49000 c) 44500 d) 54000

4. If total installments are 40 then amount paid in the last installment?

- a) 4900 b) 3900 c) 5900 d) 9400