

Quadratic Expressions

Review Exercise Questions

Level – 1

Single Choice Correct

Q 1. Which of the following options is correct?

- A. A quadratic equation *always* has two roots.
- B. If the discriminant of a quadratic equation is negative, then it has no roots.
- C. If the coefficient of the square term in a quadratic equation is negative, then it has no real roots.
- D. If the discriminant is 0, then the quadratic equation has *exactly* one root.

Q 2. When graphing a quadratic expression, the coordinates of the vertex are

- A. $\left(-\frac{b}{a}, -\frac{D}{2a}\right)$
- B. $\left(-\frac{b}{4a}, -\frac{D}{2a}\right)$
- C. $\left(-\frac{b}{2a}, -\frac{D}{2a}\right)$
- D. $\left(-\frac{b}{2a}, -\frac{D}{4a}\right)$

Q 3. Consider the following equation:

$$x^2 - 2ax + (a^2 - b^2) = 0$$

The difference of the roots of this equation is

- A. a
- B. b
- C. $2a$
- D. $2b$

Q 4. Suppose that the roots of the following equation are equal:

$$(a-b)x^2 + (b-c)x + (c-a) = 0$$

Which of the following options is correct?

- A. $a+c=2b$
- B. $a+c=b$
- C. $b+c=a$
- D. $b+c=2a$

Q 5. The equation $kx^2 - 6x - 2 = 0$ has real roots for

- A. $k \geq -\frac{19}{2}$
- B. $k \geq -\frac{9}{2}$
- C. $k \leq -\frac{19}{2}$
- D. $k \leq -\frac{9}{2}$

Q 6. Consider the following equation:

$$2(a^2 + b^2)x^2 + 2(a+b)x + 1 = 0$$

a and b are real numbers. Can this equation have non-real roots?

- A. Yes, if $a=b$
- B. Yes, but only if $a > b$
- C. Yes, but only if $a < b$
- D. Yes, if $a \neq b$
- E. No

Question 7. The sum of the reciprocals of the roots of the equation $3x^2 + 8x + 2 = 0$ is

- A. -4
- B. 4
- C. $-\frac{3}{8}$
- D. $\frac{2}{3}$
- E. None of these

Q 8. The roots of the equation $ax^2 + bx + c = 0$ are reciprocals of each other. Which of the following is true?

- A. $a = b$
- B. $b = c$
- C. $c = a$
- D. None of these

Q 9. Consider the equation $ax^2 + bx + c = 0$. If a and c are of opposite signs, what can you say about the nature of the roots of the equation?

- A. Real and unequal
- B. Real and equal
- C. Non-real
- D. Nothing can be said – the information is insufficient

Q 10. The equation whose roots are k times the roots of the equation $ax^2 + bx + c = 0$ is

- A. $ax^2 + kbx + kc = 0$
- B. $ax^2 + kbx + k^2c = 0$
- C. $kax^2 + kbx + kc = 0$
- D. $ax^2 + k^2bx + kc = 0$
- E. None of these

Q 11. The equation whose roots are squares of the roots of the equation $ax^2 + bx + c = 0$ is

- A. $a^2x^2 - (4ac - b^2)x + c^2 = 0$
- B. $a^2x^2 - (2ac - b^2)x + c^2 = 0$
- C. $a^2x^2 + (4ac - b^2)x + c^2 = 0$
- D. $a^2x^2 + (2ac - b^2)x + c^2 = 0$

Multiple Choices Correct

Q 12. Which of the following equations have real roots?

- A. $x^2 + 4x + 4 = 0$
- B. $2x^2 + 5x + 7 = 0$
- C. $5x^2 + 4x - 3 = 0$
- D. $2y^2 - 3y + 1 = 0$

Q 13. Which of the following equations have real roots?

- A. $2x^2 - 4 - 5x = 0$
- B. $3 - 11x + 15x^2 = 0$
- C. $9x^2 + 1 - 6x = 0$
- D. $p^2x^2 + px + 1 = 0$, p is real

Q 14. Which of the following equations have rational roots?

- A. $5x^2 - 6x + 1 = 0$
- B. $7x^2 + 50x + 7 = 0$
- C. $2x^2 + 10x + 1 = 0$
- D. $1 - 2x + 20x^2 = 0$

Q 15. Consider the equation

$$12abx^2 - (9a^2 - 8b^2)x - 6ab = 0$$

Which of the following are the roots of this equation?

- A. $\frac{3a}{4b}$
- B. $\frac{3b}{4a}$
- C. $-\frac{2b}{3a}$
- D. $-\frac{2a}{3b}$

Integer Type

Q 16. Let p be the larger root of the equation

$$\sqrt{3}x^2 + 10x - 8\sqrt{3} = 0$$

The value of $\sqrt{3}p$ is _____.

Q 17. Let k be that root of the equation

$$p^2x^2 + (p^2 - q^2)x - q^2 = 0$$

which does not depend upon the values of p and q . The value of $-5k$ is _____.

Q 18. If $4x^2 - 3kx + 1 = 0$ has real and equal roots, then the value of $9k^2$ is _____.

Q 19. If $2x^2 + kx + 3 = 0$ has real and equal roots, then the value of $\frac{k^2}{4}$ is equal to _____.

Q 20. Consider the following equations:

$$x^2 + px + 64 = 0$$

$$x^2 - 8x + p = 0$$

How many positive integer values of p exist for which both these equations have real roots?

Q 21. What is the sum of all the values of k for which the roots of the equation

$$(k+4)x^2 + (k+1)x + 1 = 0$$

are real and equal? _____

Q 22. The value of p for which the equation

$$(p-12)x^2 + 2(p-12)x + 2 = 0$$

has equal roots, is _____

Q 23. The positive difference of the roots of the equation $3^{x+2} + 3^{-x} = 10$ is _____.

Q 24. Consider the following equation:

$$\sqrt{\frac{x}{1-x}} + \sqrt{\frac{1-x}{x}} = 5\frac{1}{5}$$

Let k be the positive different of the roots of this equation. The value of $26k$ is _____.

Q 25. The sum of the squares of two consecutive natural numbers is 421. The larger of the two numbers is _____.

Q 26. In a right-angled triangle, the hypotenuse is 6 cm more than twice the shortest side, and 2 cm more than the third side. The shortest side of the triangle is _____ cm long.

Q 27. The sum of two numbers is 15 and the sum of their reciprocals is $\frac{3}{10}$. The product of the two numbers is _____.

Q 28. A two-digit number is 5 times the sum of its digits and is also equal to 5 more than twice the product of its digits. The number is _____.

Q 29. The sum of the areas of two squares is 260 m^2 . If the difference of their perimeters is 24 m, then the side of the smaller square is _____ m.

Q 30. The length of a rectangle is 30 m more than its breadth, while its diagonal is 60 m more than its breadth. The length of the rectangle is _____ m.

Q 31. The sum of two numbers is 28. If the first number is increased by 3 and the second number is decreased by 4, the product of the new numbers is 180. Of the original numbers, the largest possible is _____.

Q 32. Three consecutive positive integers are such that the sum of the square of the first and the product of the other two is 46. The sum of the three numbers is _____.