MATHS

BOOKS - MTG IIT JEE FOUNDATION

QUADRATIC EQUATIONS

Illustrations

1. Check whether the following are quadratic equations :

$x(2x + 3) = x + 2$

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2. Check whether the following are quadratic equations :

$$(x - 2)^2 + 1 = 2x - 3$$

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3. Check whether the following are quadratic equations :

y(8y + 5) = y^2 + 3

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4. Check whether the following are quadratic equations :

$$y(2y + 15) = 2(y^2 + y + 8)$$

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5. A two digit number is such that the product, of the gitis is 24. When 18 is added to the number, the digits intercharge their places. Formulate the quadratic equation whose roots are the digits of the number.

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6. The product of two cosecutive positive integers is 201. Represent the above problem in the form of quadratic equation.

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7. Two water taps together can fill a tank in $4\dfrac{3}{8}$ hours. The larger takes 20 hours less than the smaller one to fill the tank separately. Formulate the quadratic equation to find the time in which each tap can separately fill the tank.
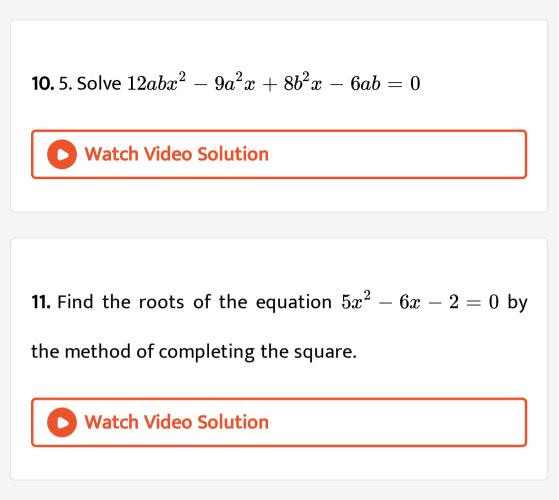
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8. Solve $x^2 + 2x - 143 = 0$

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9. Solve: $8x^2 - 22x - 21 = 0$ by the factorisation method.

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10. 5. Solve $12abx^2 - 9a^2x + 8b^2x - 6ab = 0$

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11. Find the roots of the equation $5x^2 - 6x - 2 = 0$ by the method of completing the square.

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12. Find the roots of $4x^2 + 3x + 5 = 0$ by the method of completing the square.

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13. Solve the following quadratic equations by completing the squares.

$$x^2 + 3x - 5 = 0$$

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14. Solve the following quadratic equations by completing the squares.

$$y^2 + \frac{1}{2}y - 1 = 0$$

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15. $6x^2 + 7x - 10 = 0$

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16. Solve each of the following quadratic equations:

$$15x^2 - 28 = x$$

17. Solve the following quadratic equations:

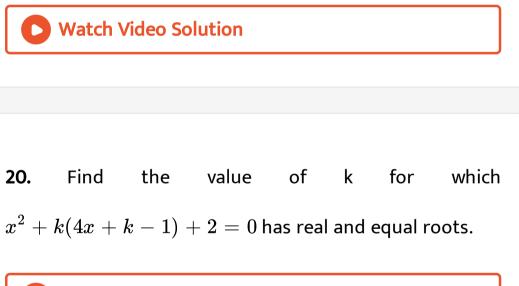$$25x^2 + 30x - 10 = 0$$

18. In the following, determine whether the given quadratic equations have real roots and if so, find the roots $9x^2 + 7x - 2 = 0$ (ii) $2x^2 + 5\sqrt{3}x + 6 = 0$

19. In the following, determine whether the given quadratic equations have real roots and if so, find the roots: $2x^2 + 5\sqrt{3}x + 6 = 0$ (ii) $\sqrt{2}x^2 + 7x + 5\sqrt{2} = 0$

20. Find the value of k for which $x^2 + k(4x + k - 1) + 2 = 0$ has real and equal roots.

Solved Example

1. Deepak and Sudhir together have 26 marbles. Both of them lost 3 marble each, and the product of the number of marbles they now have is 91. Represent it as a quadratic equation.

2. A train travels a distance of 720 km at a uniform speed. If the speed has been 12 km/hour less, then it would have taken 3 hours more to cover the same distance. Represent the above problem mathematically in terms of a quadratic equation.

3. If the roots of the equation

$$\left(a^2 + b^2\right)x^2 - 2(ac + bd)x + \left(c^2 + d^2\right) = 0 \text{ are equal,}$$

prove that $\dfrac{a}{b} = \dfrac{c}{..}$

4. Solve the following quadratic equations by fractorisation.

$$x^2 + 9x + 14 = 0$$

5. Solve the following quadratic equations by fractorisation.

$$x^2 + \left(\frac{a}{a+b} + \frac{a+b}{a} \right) x + 1 = 0$$

6. Solve the following quadratic equations by factorization method:

$$x^2 + \left(\frac{a}{a+b} + \frac{a+b}{a} \right) x + 1 = 0$$

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

$$x^2 + 3x - \left(a^2 + a - 2\right) = 0$$
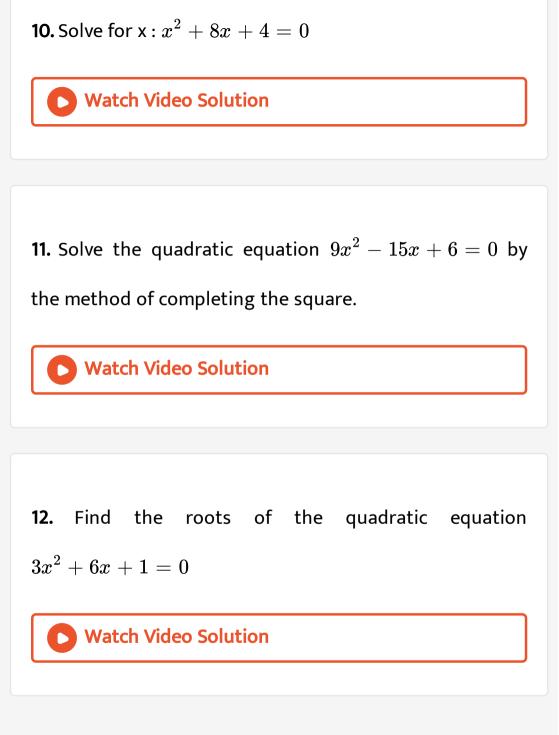
$$a^2 b^2 x^2 + b^2 x - a^2 x - a^2 x - 1 = 0$$

7. Solve each of the following quadratic equations:

$$4x^2 - 4a^2x + (a^4 - b^4) = 0$$

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8. Solve: $5^{(x+1)} + 5^{(2-x)} = 5^3 + 1$.

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9. Solve for x :

$$\frac{1}{(x-1)(x-2)} + \frac{1}{(x-2)(x-3)} + \frac{1}{(x-3)(x-4)} = \frac{1}{6}$$

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10. Solve for x : $x^2 + 8x + 4 = 0$

11. Solve the quadratic equation $9x^2 - 15x + 6 = 0$ by the method of completing the square.

12. Find the roots of the quadratic equation $3x^2 + 6x + 1 = 0$

13. Some students planned a picnic. The budget for food was Rs 500. But, 5 of them failed to go and thus the cost of food for each member increased by Rs 5. How many students attended the picnic? (a) 15 (b) 20 (c) 25 (d) 30

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14. $abx^2 + (b^2 - ac)x - bc = 0$

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15. Solve for x:

$$9x^2 - 9(a + b)x + (2a^2 + 5ab + 2b^2) = 0$$

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16. The side of a square exceeds the side of the another square by 4 cm and the sum of the areas of the two squares is 400 sq. cm. Find the dimensions of the squares.

17. Solve for : x : $\dfrac{x-1}{x-2} + \dfrac{x-3}{x-4} = 3\dfrac{1}{3}, x \neq 2, 4$

18. $\dfrac{1}{(x-3)} - \dfrac{1}{(x+5)} = \dfrac{1}{6}, (x \neq 3, -5)$

19. $If - 4$ is a root of the quadratic equation $x^2 + px - 4 = 0$ and the quadratic equation $x^2 + px + k = 0$ has equal roots, find the value of k.

20. If the sum of first n even natural numbers is 420, find the value of n.

21. The denominator of a fraction is one more than twice the numerator. If the sum of the fraction and its

reciprocal is $2\dfrac{16}{21}$, find the fraction.

22. The angry Arjun carried some arrows for fighting with Bheeshm. With half the arrows, he cut downthe arrows thrown by Bheeshm on his and with six other arrows he killed the rath driver of Bheeshm. With one arrow each he knocked down respectively the rath, flag and the bow of Bheeshm. Finally, with one more than four times the square root of arrows he laid Bheeshm unconscious on an arrow bed. Find the total number of arrows Arjun had.

23. A swimming pool is filled with three pipes with uniform flow. The first two pipes operating simultaneously, fill the pool in the same time during which the pool is filled by the third pipe alone. The second pipe fills the pool five hours faster than the first pipe and four hours slower than the third pipe. Find the time required by each pipe to fill the pool separately.
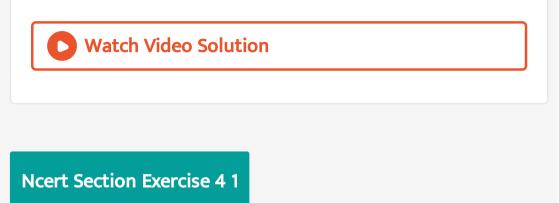
24. Two cars leave an intersection. One car travels North, other travels East. When the car travelling North had gone 24 km, the distance between the cars was 4 km more

than three times the distance travelled by the car heading East. Find the distance between two cars at theat time.

Ncert Section Exercise 4 1

1. Check whether the following are quadratic equations

$$(x + 1)^2 = 2(x - 3)$$

2. Check whether the following are quadratic equation (i)

$$(x + 1)^2 = 2(x - 3)\text{(ii)} \qquad x^2 - 2x = (-2)(3 - x)\text{(iii)}$$
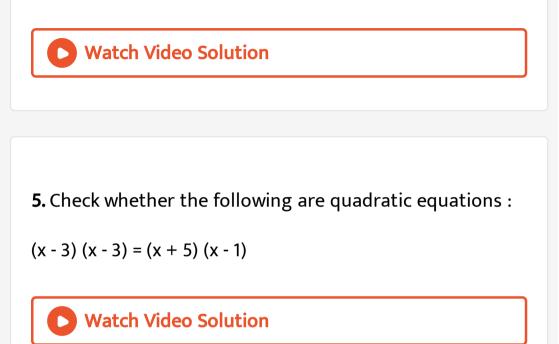
$(x - 2)(x + 1) = (x - 1)(x + 3)$(iv)

$(x - 3)(2x + 1) = x(x + 5)$(v)

$(2x1)(x3) = (x + 5)(x1)$(vi) $x^2 + 3x + 1 = (x - 2)^2$

(vii) $(x + 2)^3 = 2x(x^2 - 1)$ (viii) `x^3-

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3. Check whether the following are quadratic equation (i)

$(x + 1)^2 = 2(x - 3)$(ii) $x^2 - 2x = (- 2)(3 - x)$(iii)

$(x - 2)(x + 1) = (x - 1)(x + 3)$(iv)

$(x - 3)(2x + 1) = x(x + 5)$(v)

$(2x1)(x3) = (x + 5)(x1)$(vi) $x^2 + 3x + 1 = (x - 2)^2$

(vii) $(x + 2)^3 = 2x(x^2 - 1)$ (viii) `x^3-

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4. Check whether the following is a quadratic equation:

$$(x - 3)(2x + 1) = x(x + 5)$$

5. Check whether the following are quadratic equations :

(x - 3) (x - 3) = (x + 5) (x - 1)

6. Check whether the following are quadratic equation (i)

$$(x + 1)^2 = 2(x - 3) \text{(ii)} \qquad x^2 - 2x = (- 2)(3 - x)\text{(iii)}$$

$$(x - 2)(x + 1) = (x - 1)(x + 3)\text{(iv)}$$

$$(x - 3)(2x + 1) = x(x + 5)\text{(v)}$$

$(2x1)(x3) = (x+5)(x1)$(vi) $x^2 + 3x + 1 = (x-2)^2$

(vii) $(x+2)^3 = 2x(x^2 - 1)$ (viii) `x^3-

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7. Chek whether the following are quadratic equations :

$$(x+2)^3 = 2x(x^2 - 1)$$

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8. Chek whether the following are quadratic equations :

$$x^3 - 4x^2 - x + 1 = (x-2)^3$$

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9. Represent the following situations in the form of quadratic equations:

The area of a rectangular plot is $528m^2$. The length of the plot (in meters) is one more than twice its breadth. We need to find the length and breadth of the plot.

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10. Represent the following situations in the form of quadratic equations:

The produt of two consecutive positive integers is 306. We need to find the integers.

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11. Represent the following situations in the form of quadratic equations:

Rohan's mother is 26 years older than him. The product of their ages (in years) 3 years from now will be 360. We would like to find Rohan's present age.

12. A train covers a distance of 480 km at a uniform speed. If the speed had been 8 km/hr less then it would have taken 3 hours more to cover the same distance. Find the usual speed of the train.

1. Find the roots of the following quadratic equations by factorisation :

(i) $x^2 - 3x - 10 = 0$ (ii) $2x^2 + x - 6 = 0$ (iii) $\sqrt{2}x^2 + 7x + 5\sqrt{2} = 0$

(iv) $2x^2 - x + \dfrac{1}{8} = 0$ (v) $100x^2 - 20x + 1 = 0$ (vi) $2x^2 + az - a^2 = 0$

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2. The roots of the quadratic equation $2x^2 - x - 6 = 0$ are

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3. Find the roots of following quadratic equation by factorisation: $\sqrt{2}x^2 + 7x + 5\sqrt{2} = 0$

4. Find the roots of the following quadratic equations by factorisation:

(i) $\sqrt{2}x^2 + 7x + 5\sqrt{2} = 0$ (ii) $2x^2 - x + \dfrac{1}{8} = 0$

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$\sqrt{2}x^2 + 7x + 5\sqrt{2} = 0$

(iv) $2x^2 - x + \dfrac{1}{8} = 0$ (v) $100x^2 - 20x + 1 = 0$ (vi)

$2x^2 + az - a^2 = 0$

6. Represent the following situations mathematically: (i) John and Jivanti together have 45 marbles. Both of them lost 5 marbles each, and the product of the number of marbles they now have is 124. We would like to find out how many marbles they

7. Represent the following situations mathematically: (i) John and Jivanti together have 45 marbles. Both of them lost 5 marbles each, and the product of the number of marbles they now have is 124. We would like to find out how many marbles they
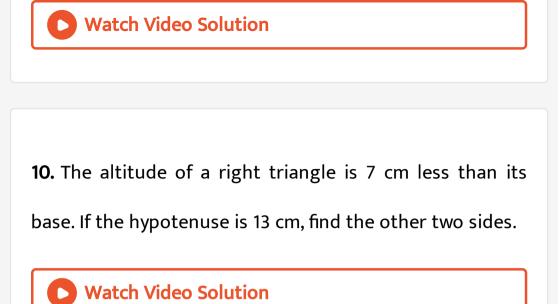
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8. Find two numbers whose sum is 27 and product is 182.

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9. Find two consecutive positive integers, sum of whose squares is 365

10. The altitude of a right triangle is 7 cm less than its base. If the hypotenuse is 13 cm, find the other two sides.

11. A cottage industry produces a certain number of pottery articles in a day. It was observed on a particular day that the cost of production of each article (in rupees) was 3 more than twice the number of articles produced on that day. If the to

1. Find the roots of the following quadratic equations, if they exist, by the method of completing the square:(i) $2x^2 - 7x + 3 = 0$ (ii) $2x^2 + x - 4 = 0$(iii) $4x^2 + 4\sqrt{3}x + 3 = 0$ (iv) $2x^2 + x + 4 = 0$

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2. Find the roots of the following quadratic equations, if they exist, by the method of completing the square:(i) $2x^2 - 7x + 3 = 0$ (ii) $2x^2 + x - 4 = 0$(iii) $4x^2 + 4\sqrt{3}x + 3 = 0$ (iv) $2x^2 + x + 4 = 0$
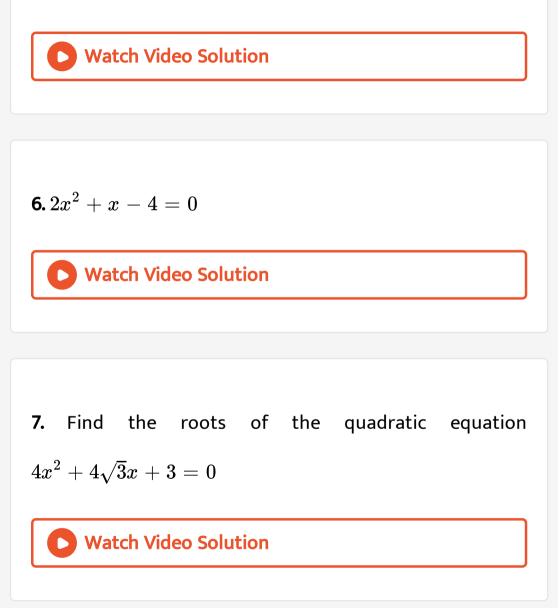
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5. Find the roots of the quadratic equations given in Question no. 1 above by applying the quadratic formula.

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6. $2x^2 + x - 4 = 0$

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7. Find the roots of the quadratic equation $4x^2 + 4\sqrt{3}x + 3 = 0$

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8. Find the roots of the quadratic equations given in Question no. 1 above by applying the quadratic formula.

9. Find the roots of the following equations :

$$x - \frac{1}{x} = 3, x \neq 0$$

10. Find the roots of the following equations : (i)

$$x - \frac{1}{x} = 3, x \neq 0$$ (ii)

$$\frac{1}{x+4} - \frac{1}{x-7} = \frac{11}{30}, x \neq -4, 7$$

11. The sum of the reciprocals of Rehmans ages, (in years) 3 years ago and 5 years from now is $\dfrac{1}{3}$. Find his present age.

12. In a class test, the sum of Shefalis marks in Mathematics and English is 30. Had she got 2 marks more in Mathematics and 3 marks less in English, the product of their marks would have been 210. Find her marks in the two subjects.

13. The diagonal of a rectangular field is 60 metres more than the shorter side. If the longer side is 30 metres more than the shorter side, find the sides of the field.

14. The difference of squares of two numbers is 180. The square of the smaller number is 8 times the larger number. Find the two numbers.

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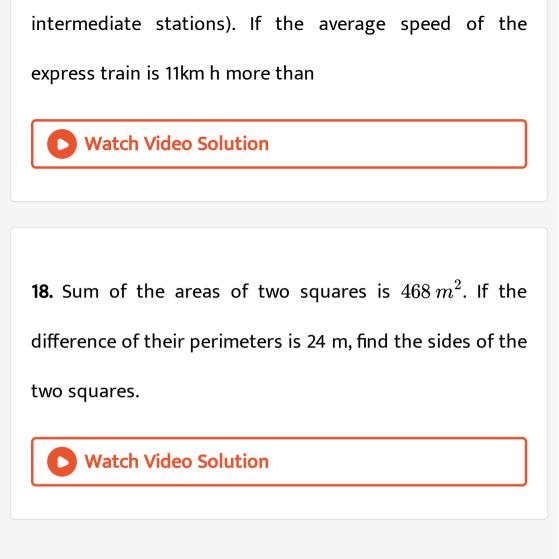
the same journey. Find the speed of the train.

16. Two water taps together can fill a tank in $9\dfrac{3}{8}$ hours. The tap of larger diameter takes 10 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank.

17. An express train takes 1 hour less than a passenger train to travel 132 km between Mysore and Bangalore (without taking into consideration the time they stop at

intermediate stations). If the average speed of the express train is 11km h more than

18. Sum of the areas of two squares is $468 \, m^2$. If the difference of their perimeters is 24 m, find the sides of the two squares.

Ncert Section Exercise 4 4

1. Find the nature of the roots of the following quadratic equations. If the real roots exist, find them :

$$2x^2 - 3x + 5 = 0$$

2. Find the nature of the roots of the following quadratic equations. If the real roots exist, find them :

$$3x^2 - 4\sqrt{3}x + 4 = 0$$

3. Find the nature of the roots of the following quadratic equations. If the real roots exist, find them:(i)

$$2x^2 - 3x + 5 = 0 \text{(ii)} \qquad\qquad 3x^2 - 4\sqrt{3}x + 4 = 0 \text{(iii)}$$

$$2x^2 - 6x + 3 = 0$$

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4. find the values k for which the quadratic equation

$2x^2 + Kx + 3 = 0$ has two real equal roots

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5. Find the values of k for each of the following quadratic

equations, so that they have two equal roots.(i)

$2x^2 + kx + 3 = 0$ (ii) $kx(x - 2) + 6 = 0$

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6. Is it possible to design a rectangular mango grove whose length is twice its breadth and the area is $800m^2$? If so, find its length and breadth.

7. Is the following situation possible ? If so, determine their present ages. Sum of the ages of two friends is 20 years. Four years ago, the product of their ages in years was 48.

8. Is it possible to design a rectangular park of perimeter 80 m and area $400m^2$? If so, find its length and breadth.
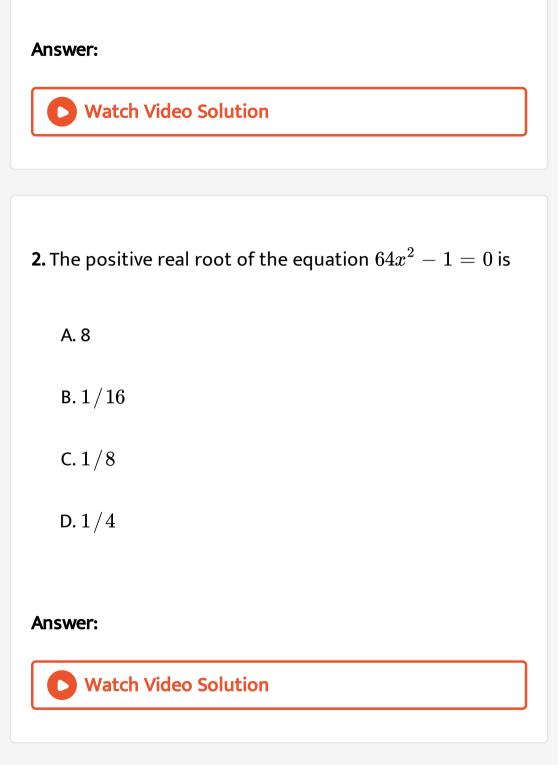
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Exercise Multiple Choice Question Level 1

1. If x = k be a solution of the quadratic equation $x^2 + 4x + 3 = 0$, then k = - 1 and

A. 2

B. -3

C. 3

D. -2

Answer:

2. The positive real root of the equation $64x^2 - 1 = 0$ is

A. 8

B. $1/16$

C. $1/8$

D. $1/4$

Answer:

3. The roots of the quadratic equation $x^2 + 5x + 6 = 0$ are

    A. -3

    B. $1/3$

    C. 2

    D. -2

Answer:

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4. The discriminant of the quadratic equation $3x^2 - 4x - 2 = 0$ is

A. 40

B. 0

C. 24

D. 48

Answer:

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5. The quadratic equation $ax^2 - 4ax + 2a + 1 = 0$ has

repeated roots, if a =

A. 0

B. $1/2$

C. 2

D. 4

Answer:

6. If α and β are the roots of the equation $x^2 + bx + c = 0$, then the roots of the equation $cx^2 - bx + 1 = 0$ are

A. α^2, β^2

B. $\dfrac{1}{\alpha}, \dfrac{1}{\beta}$

C. $\dfrac{\alpha}{\beta}, \dfrac{\beta}{\alpha}$

D. $2\alpha, 2\beta$

Answer:

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7. The roots of the equation $x^2 - 2\sqrt{2}x + 1 = 0$ are

    A. real and distinct

    B. not real

    C. rean and equal

    D. none of these

Answer:

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8. If the equation $x^2 + 4x - k = 0$ has real and distinct roots, then

    A. $k < -4$

    B. $k > -4$

    C. $k \leq -4$

    D. $k \geq -4$

Answer:

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9. If $ax^2 + bx + c = 0$ has equal roots, find the value of c.

A. $\dfrac{-b}{2a}$

B. $\dfrac{b}{2a}$

C. $\dfrac{-b^2}{4a}$

D. $\dfrac{b^2}{4a}$

Answer:

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10. If the quadratic equation $mx^2 + 2x + m = 0$ has two equal roots, then the values of m are

A. $a = \pm 1$

B. a = 0

C. a = 0, 1

D. `a = - 1, 0

Answer:

11. The value of $\sqrt{6 + \sqrt{6 + \sqrt{6 + .. \infty}}}$ is

A. 4

B. 3

C. -2

D. 3.5

Answer:

12. If the equation $x^2 - bx + 1 = 0$ does not possess real roots, then which one of the following is correct?

A. $-3 < b < 3$

B. $-2 < b < 2$

C. $b > 2$

D. $b < -2$

Answer:

13. If x = 1 is a common root of the equations $ax^2 + ax + 3 = 0$ and $x^2 + x + b = 0$, then ab =

A. 3

B. 3.5

C. 6

D. -3

Answer:

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14. If a and b can take values 1, 2, 3, 4. Then the number of the equations of the form $ax^2 + bx + 1 = 0$ having

real roots is (a) 10 (b) 7 (c) 6 (d) 12

A. 10

B. 7

C. 6

D. 12

Answer:

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15. The roots of the equations $2x - \dfrac{3}{x} = 1$ are

A. $\dfrac{1}{2}, \; -1$

B. $\dfrac{3}{2}, \; 1$

C. $\dfrac{3}{2} - 1$

D. none of these

Answer:

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16. For what values of k, the equation $2x^2 + kx + 8 = 0$

has real and equal roots ?

A. $-8, 1$

B. 8,-8

C. $-2\sqrt{2}, -8$

D. none of these

Answer:

17. The equation $k^2 x^2 + kx + 1 = 0$ has

A. one real root

B. two real roots

C. no real roots

D. none of these

Answer:

18. If α and β are the zeros of the quadratic polynomial $f(x) = x^2 - 5x + 4$, find the value of $\dfrac{1}{\alpha} + \dfrac{1}{\beta} - 2\alpha\beta$

A. $27/4$

B. $-37/4$

C. $37/4$

D. $-27/4$

Answer:

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19. For what value of k, the equation $x^2 + 4kx + 4 = 0$ has equal roots?

A. ± 5

B. ± 1

C. ± 4

D. ± 9

Answer:

20. If α, β roots of the equations $x^2 - 5x + 6 = 0$, find the value of $\alpha^2 - \beta^2$.

A. ± 5

B. ± 13

C. ± 6

D. ± 7

Answer:

21. An integer when added to its square equals 182. One of

the integer is

A. -15

B. -14

C. -13

D. None of these

Answer:

22. The quadratic equation $ax^2 + bx + c = 0$ has real roots if:

    A. $b^2 = 4ac$

    B. $b^2 < 4ac$

    C. $b^2 > 4ac$

    D. both (a) and (c)

Answer:

23. Study the statement carefully.

Statement I : Both the roots of the equation $x^2 - x + 1 = 0$ are real.

Statement II : The roots of the equations $ax^2 + bx + c = 0$ are real if and only $b^2 - 4ac > 0$.

Which of the following options hold?

    A. Both Statement I and Statement II are true .

    B. Both Statement I and Statement II are false.

    C. Statement I is true but Statement II is false.

    D. Statement I is false and Statement II is true.

Answer: D

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24. Two numbers differ by 3 and their product is 504. Find the number.

    A. 21,24

    B. 24,-21

    C. $-24, 21$

    D. None of these

Answer:

25. Find the value of k for the equation $2x^2 + kx + 2 = 0$, if it has equal roots.

A. 8

B. -4

C. Both (a) and (b)

D. 2

Answer:

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26. If -5 is a root of the quadratic equation $2x^2 + px - 15 = 0$ and the quadratic equation

$p(x^2 + x) + k = 0$ has equal roots, find the value of k.

A. $7/4$

B. $1/7$

C. $2/7$

D. $3/4$

Answer:

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27. Divide 16 into two parts such that twice the square of the larger part exceeds the square of the smaller part by 164.

A. 11m, 5m

B. 9m, 7m

C. 12m, 4m

D. 10m, 6m

Answer:

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28. Out of a number of saras birds, one-fourth of the number are moving about in lotus plants, 1/9th coupled along with 1/4th as well as 7 times the square root of the number move on a hill. 56 birds remain in vakula trees. What is the total number of birds?

A. 376

B. 576

C. 36

D. 144

Answer:

29. A farmer wishes to grow a $100m^2$ rectangular vegetable garden. Since he has with the only 30 m barbed wire, the fences three sides of the rectangular garden letting compound wall of his house act as the fourth side-fence. Find the dimensions of his garden.

A. 20 m, 5m

B. 25m, 4m

C. 22m, 4m

D. 50m, 2m

Answer:

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30. Find the vlaue of k for which the roots of the equation

kx (3x - 4) + 4 = 0, are equal

A. 1

B. 2

C. 3

D. 4

Answer:

31. If the equation $x^2 - 3kx + 2e^{2\log k} - 1 = 0$ has real roots such that the product of roots is 7 then the value of k is

A. ± 1

B. ± 2

C. ± 3

D. None of these

Answer:

32. A school decided to award prizes to the most punctual and the most obedient student. The sum of the two prizes is Rs 150 and their product is Rs 5600. Find the prize money for punctuality and obedience.

A. Rs 70, Rs 80

B. Rs 40, Rs 110

C. Rs 60, Rs 90

D. Rs 50, Rs 100

Answer:

33. The sum of the lives of the electric lamps one C.F.L and other ordianry lamp is 10 years. The product of the lives of these two lamps is 26 years. It this situtation possible ?

    A. No

    B. Yes

    C. Can't be determined

    D. None of thsee

Answer:

34. The number of real roots of the equation $(x-1)^2 + (x-2)^2 + (x-3)^2 = 0$ is

A. 2

B. 1

C. 0

D. 3

Answer:

Exercise Multiple Choice Question Level 2

1. If α, β are the roots of the equation $ax^2 + bx + c = 0$, then $\dfrac{\alpha}{\alpha\beta + b} + \dfrac{\beta}{a\alpha + b}$ is equal to -

A. 2/a

B. 2/b

C. 2/c

D. $-2/a$

Answer:

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2. A chess board contains 64 equal squares and the area of each square is $6.\,25\ cm^2$. A border round the board is

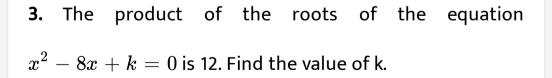2 cm wide. Find the length of the side of the chess board.

A. 36 cm

B. 24 cm

C. 16 cm

D. 32 cm

Answer:

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3. The product of the roots of the equation

$x^2 - 8x + k = 0$ is 12. Find the value of k.

A. 8

B. 12

C. -8

D. -12

Answer:

4. factorize the given expression $\sqrt{2}x^2 + 3x + \sqrt{2}$

A. $-\dfrac{1}{\sqrt{2}}, \ -\sqrt{2}$

B. $-\sqrt{2}, \ \dfrac{1}{2}$

C. $\dfrac{\sqrt{2}}{2}, \ \sqrt{2}$

D. None of these

Answer:

5. If the roots of the equation $\left(c^2 - ab\right)x^2 - 2\left(a^2 - bc\right)x + b^2 - ac = 0$ are equal, prove that either $a = 0$ or $a^3 + b^3 + c^3 = 3ab \cdot$

A. a = 0

B. $a^3 + b^3 + c^3 = -3abc$

C. $a^2 + b^2 + c^2 = 2abc$

D. none of these

Answer:

6. The numerator of a fraction is three less than the denominator. If 4 is added to both the numerator and the denominator, the value of the fraction increases by 1/8. Find the fraction.

A. $7/8$

B. $3/8$

C. $9/8$

D. $5/8$

Answer: D

7. If the diagonal of a rectangle is 50 m and its perimeter is 124 m, then the length and breadth of the rectangle (in metre) respectively are

A. 46, 10

B. 48, 14

C. 34, 6

D. 22, 5

Answer:

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8. The total cost of a certain length of cloth is $Rs200$. If the piece was 5 m longer and each metre of cloth costs $Rs2$ less, the cost of the piece would have remained unchanged. How longer is the piece and what is its original rate per metre?

A. Rs 2

B. Rs 20

C. Rs 100

D. Rs 10

Answer:

9. In a class test, the sum of Kamal's marks in mathematics and English is 40. Had he got 3 marks more in mathematics and 4 marks less in English, the product of the marks would have been 360. Find his marks in two subjects separately.

A. 21, 19

B. 20, 20

C. 18, 12

D. 12, 18

Answer:

10. On a Diwali day, komal purchases firecrackers and gave one-third to her sister Shurti and thrice the square root of the firecrackers to her brother Gobind. Still she had 27 firecrackers. Find the total number of firecrackers purchased by Komal.

A. 81

B. 20

C. 21

D. 80

Answer: 81

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11. If $\sin 87°$ and $\cos 87°$ are the roots of the equation $x^2 - bx + C = 0$, then the value of b^2 is :

A. c

B. 1 + 2c

C. $1 - c^2$

D. $1 + c^2$

Answer:

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12. If the roots of the equation $3ax^2 + 2bx + c = 0$ are in the ratio $2:3$, then

A. 8ac = 25b

B. $8ac = 9b^2$

C. $8b^2 = 9ac$

D. $8b^2 = 25ac$

Answer:

13. A takes 6 days less than the time taken by B to finish a piece of work. If both A and B together can finish it in 4 days . Find the time taken by B to finish the work.

A. 2 days

B. 12 days

C. 6 days

D. 10 days

Answer:

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14. The ratio of the roots of the equation $ax^2 + bx + c = 0$ is same equation $Ax^2 + Bx + C = 0$. If D_1 and D_2 are the discriminants of $ax^2 + bx + C = 0$ and $Ax^2 + Bx + C = 0$ respectively, then $D_1 : D_2$

A. $\dfrac{a^2}{p^2}$

B. $\dfrac{b^2}{q^2}$

C. $\dfrac{c^2}{r^2}$

D. None of these

Answer:

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Exercise Match The Following

1. List - II gives roots of quadratic equations given in List -

I, match them correctly.

List-I		List-II
(P) $6x^2 + x - 12 = 0$	(1)	$-6, 4$
(Q) $8x^2 + 16x + 10 = 202$	(2)	$9, 36$
(R) $x^2 - 45x + 324 = 0$	(3)	$3, -1/2$
(S) $2x^2 - 5x - 3 = 0$	(4)	$-3/2, 4/3$

A. P-4,k Q-1, R-2, S-3

B. P-4, Q-2, R-1, S-3

C. P-1, Q-2, R-3, S-4

D. P-1, Q-3, R-2, S-4

Answer:

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1. Find the roots of the given equation by splitting the middle term $9x^2 - 3x - 20 = 0$.

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2. Assertion : $5x^2 + 14x + 10 = 0$ has no real roots.

. Reason : $ax^2 + bx + c = 0$ has no real roots if $b^2 < 4ac$.

A. If both assertion and reson are true nad reason is

the correct explanation of assertion.

B. If both assertion and reason are true but reasosn is

not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer:

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3. Assertion : $4x^2 - 12x + 9 = 0$ has repeated roots.

Reason : The quadratic equation $ax^2 + bx + c = 0$ have repeated roots if $D > 0$.

A. If both assertion and reson are true nad reason is the correct explanation of assertion.

B. If both assertion and reason are true but reasosn is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer:

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4. Assertion : $3y^2 + 17y - 30 = 0$ have distinct roots.

Reason : The quadratic equation $ax^2 + bx + c = 0$ have distinct roots (real roots) is $D > 0$.

A. If both assertion and reson are true nad reason is the correct explanation of assertion.

B. If both assertion and reason are true but reasosn is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer:

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1. The product of two consecutive even integers is 168. Form the quadratic equation to find the integers.

A. $x^2 + 2x - 168 = 0$

B. $x^2 + x - 168 = 0$

C. $x^2 - x = 168 = 0$

D. $x^2 + 2x = -168$

Answer:

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2. A train travels a distance of 480 km at a uniform speed. If the speed had been 8 km/hr more, then it would have taken 2 hours less to cover the same distance. The quadratic equation in terms of speed "x" is

A. $x^2 + 8x + 480 = 0$

B. $x^2 - x + 200 = 0$

C. $x^2 - x + 200 = 0$

D. $x^2 + 8x - 480 = 0$

Answer:

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3. TO reprsent word problem in the form of quadratic equations, suppose the unknown required quantity can be taken as some variable x (say) and express the given condition in the form of x to form an equaiton in x. Then wew express the equation in the descending powers of x. Thus standard quadratic equations is $ax^2 + bx + c = 0, a \neq 0.$

Sandeep's father is 30 years older than him. The product of their ages 2 years from now will be 400. To find Sandeep's present age, the equation is

A. $x^2 + 9x - 13 = 0$

B. $x^2 + 32x + 400 = 0$

C. $x^2 + 34x - 336 = 0$

D. $x^2 - 34x + 90 = 0$

Answer:

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4. Roots of the quadratic eauation of the type (ax + b) (cx

+ d) = 0 are given by the linear equations ax + b = 0 and cx

+ d = 0.

Find roots of $16x^2 - 9 = 0$.

A. $x = \dfrac{4}{3}$

B. $x = \dfrac{4}{3}, \dfrac{-4}{3}$

C. $x = \dfrac{2}{3}, \dfrac{-2}{3}$

D. $x = \dfrac{-3}{4}, \dfrac{3}{2}$

Answer:

5. Find roots of $a^2x^2 - (a^2b^2 + 1)x + b^2 = 0$.

A. x = a, b

B. $x = \dfrac{1}{a^2}, a^2$

C. $x = a^2b^2, b^2$

D. $x = \dfrac{1}{2}, a^2$

Answer:

6. Find the roots of the quadratic equation

$$3x^2 - 2\sqrt{6}x + 2 = 0$$

A. $x = \dfrac{9}{4}, \dfrac{3}{2}$

B. $x = \dfrac{4}{3}, \dfrac{-9}{8}$

C. $x = \sqrt{\dfrac{2}{3}}$

D. $x = \pm\sqrt{\dfrac{2}{3}}$

Answer:

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7. The roots of the quadratic equation $ax^2 + bx + c = 0$

$(a! = 0)$ are given x = $\dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ are

(i) real and distinct roots if $D > 0$

(ii) repeated roots if D = 0

no real roots if $D < 0$, where $D = b^2 - 4ac$

The nature of the roots of quadratic equation $4x^2 + 20x + 25 = 0$ is

A. real and distinct

B. real and repeated

C. not real

D. none of these

Answer:

8. The value of k for which the quadratic equation $8x^2 + 3x + k = 0$ has both roots real and equal is

A. $\dfrac{4}{3}$

B. 0

C. $\dfrac{9}{32}$

D. $\dfrac{5}{6}$

Answer:

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9. The value of p for which the quadratic equation $2px^2 + 6x + 5 = 0$ has real and distinct roots is

A. $\dfrac{1}{2}$

B. 1

C. 2

D. $\dfrac{9}{10}$

Answer:

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1. Solve: $6x^2 + 40 = 31x$.

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2. Find the values of k for which the following equation has equal roots: $(k - 12)x^2 + 2(k - 12)x + 2 = 0$

3. Arun's brother is 20 years older than Arun. The product of their ages after 2 years will be 341. Formulate the quadratic equation to find their ages.

4. Solve the following quadratic equations by factorization method: $x^2 - 9 = 0$ (ii) $x^2 - 8x + 16 = 0$

5. Simplify the equation $\left(x + 2\sqrt{2}\right)\left(x + \sqrt{3}\right) = 2\sqrt{6} + 4$

and find the coefficients a,b and c in $ax^2 + bx + c = 0$

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6. Solve the following quadratic equations by factorization method: $4x^2 - 2\left(a^2 + b^2\right)x + a^2b^2 = 0$

$9x^2 - 9(a + b)x + \left(2x^2 + 5ab + 2b^2\right) = 0$

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7. Solve for z : $z^2 - 6z + 6 = 0$.

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8. Determine the value (s) of p for which the quadratic equation $4x^2 - 3px + 9$ has real roots.

9. Determine the nature of roots of $5y^2 - 2y - 2 = 0$.

10. Solve the quadratic equation $16x^2 - 24x - 1 = 0$ by using the quadratic formula.

1. If $x = 2$ and $x = 3$ are roots of the equation $3x^2 - 2kx + 2m = 0$, find the value of k and m.

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2. Solve: $2\left(\dfrac{2x - 1}{x + 3}\right) - 3\left(\dfrac{x + 3}{2x - 1}\right) = 5, x \neq -3, \dfrac{1}{2}$.

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3. Is the following situtation possible ? If so, then determine the present ages of the mother and her

daughter in the problem given below. : The sum of the ages of a mother and her daughter is 25 years. Five years ago, the product of their ages was 58.

4. Solve : $\sqrt{3}x^2 + 10x - 8\sqrt{3} = 0.$

5. $36x^2 - 12ax + \left(a^2 - b^2\right) = 0$

6. A factory kept increasing its output by the same percentage every year. Find the percentage if it is known that the output is doubled in the last two years.
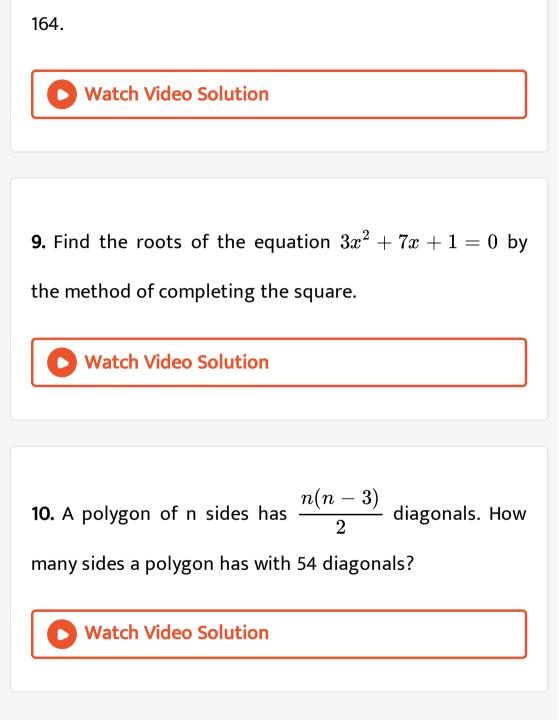
7. The length of a hall is 5 m more than its breadth. If the area of the floor of the hall is $84m^2$, what are the length and breadth of the hall?

8. Divide 16 into two parts such that twice the square of the larger part exceeds the square of the smaller part by

164.

9. Find the roots of the equation $3x^2 + 7x + 1 = 0$ by the method of completing the square.

10. A polygon of n sides has $\dfrac{n(n-3)}{2}$ diagonals. How many sides a polygon has with 54 diagonals?

Exercise Subjective Problems Long Answer Type

1. By increasing the list price of a book by Rs 10 a person can buy 10 books less for Rs 1200. Find the original list price of the book.

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2. Swati can row her boat at a speed of 5km/hr in still water. if it takes her 1 hour more to row the boat 5.25 km upstream than to return downstream, Find the speed of the stream.

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3. Two trains leave a railway station at the same time. The first train travels towards west and the second train towards north. The first train travels 5 km/hr faster than the second train. If after two hours they are 50 km apart find the average speed of each train.

4. One fourth of a herd of camels was seen in the forest. Twice the square root of the herd had gone to mountains and the remaining 15 camels were seen on the bank of a river. Find the total number of camels.

5. There is a square field whose side is 44 m. A square flower bed is prepared in its centre leaving a gravel path all round the flower bed. The total cost of laying the flower bed and gravelling the path at Rs 2.75 and Rs 1.50 per square metre, respectively, is Rs 4904. Find the width of the gravel path.

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Exercise Integer Numerical Value Type

1. Two non-integer roots of

$$\left(\frac{3x-1}{2x+3} \right)^4 - 5 \left(\frac{3x-1}{2x+3} \right)^2 + 4 = 0 \qquad \text{(1) are}$$

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2. If

$$\alpha = \left(-b + \frac{\sqrt{b^2 - 12c}}{k} \right) \text{ and } \beta = \frac{-b - \sqrt{b^2 - 12c}}{k}$$

be two roots of the quadratic equation $3x^2 + bx + c = 0$

, then value of 3k is

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3. What is the sum of roots of quadratic equation

$4x^2 - 12x + 5 = 0$?

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4. The difference of the squares of two numbers is 45. The square of the smaller number is 4 times the larger number. Determine the numbers.

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5. The speed of a boat in still water is 8 km/hr It can go 15 km upstream and 22 km downstream in 5 hours. Find the speed of the stream.

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6. Find the least positive value of k for which the equation $x^2 + kx + 4 = 0$ has real roots.

7. A rectangular park 60 m long and 40 m wide has two concrete crossroads running in the middle of the park and rest of the park has been used as a lawn. If the area of the lawn is 2109 sq. m, then what is the width of the road? (a) 2.91m (b) 3m (c) 5.82m (d) None of these

8. If x = 2 is a root of $3x^2 - 2kx + 2m = 0$ where m = 3, then value of 4k is

9. If the roots of the equation $(b - c)x^2 + (c - a)x + (a - b) = 0$ are equal, then prove that $2b = a + \cdot$

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Olympaid Hots Corner

1. If $x^2 + px + q = 0$ and $x^2 + qx + p = 0$, $(p \neq q)$ have a common roots, show that $p + q = 0$. Also, show that their other roots are the roots of the equation $x^2 + x + pq = 0$.

    A. p = q

B. 1 + p + q = 0

C. p + q = 0

D. Both (a) and (b)

Answer:

2. Find the values of p and q respectively for which the equation $2x^2 + px = q$ has root - 3 and factor (x-5).

A. $-5, \ -25$

B. $-4, 30$

C. $5, \ -25$

D. $-4,\ -30,$

Answer:

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3. Solve : $3(81)^x + 3 = 9^{x+1} + 9^x.$

    A. 3,2

    B. $\pm 1/2$

    C. 4,5

    D. ± 1

Answer:

4. In the Maths two representativesm, while solving a quadratic equation, committed the following mistakes :

(i) One of them made a mistake in the constant term and got the roots as 5 and 9.

(ii) Another of x and got the roots as 12 and 4. But in the meantime, they realised that they are wrong and they managed to get it right jointly. FInd the corrent quadratic equation.

A. $x^2 + 4x + 14 = 0$

B. $2x^2 + 7x - 24 = 0$

C. $x^2 - 14x + 48 = 0$

D. $3x^2 - 17x + 52 = 0$

Answer:

5. Which of the following equations are not quadratic ?

A. $x(2x + 3) = x + 2$

B. $(x - 2)^2 + 1 = 2x - 3$

C. $y(8y + 5) = y^2 + 3$

D. $y(2y + 15) = 2(y^2 + y + 8)$.

Answer:

6. If $\alpha \neq \beta$ and $\alpha^2 = 5\alpha - 3$, $\beta^2 = 5\beta - 3$, form the quadratic equation whose roots are $\dfrac{\alpha}{\beta}, \dfrac{\beta}{\alpha}$.

A. $3x^2 - 19x + 3 = 0$

B. $3x^2 + 19x + 3 = 0$

C. $3x^2 - 19x - 3 = 0$

D. $3x^2 - 3x + 1 = 0$

Answer:

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7. If the roots of the quadratic equation

$x^2 - 4x - \log_3 a = 0$ are real, then the least value of a is

A. 64

B. $1/81$

C. $1/64$

D. 81

Answer:

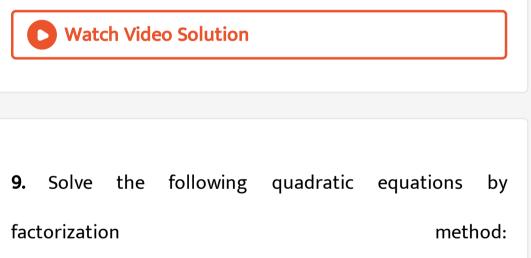**8.** The sum of integral values of k for which the equations $(k-12)x^2 + 2(k-12)x + 2 = 0$ possess no real roots is

A. 12

B. 13

C. 14

D. All of the above

Answer:

9. Solve the following quadratic equations by factorization method:

$$\frac{1}{a+b+x} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}, \quad a+b \neq 0$$

A. a,b

B. $-a, b$

C. a,-b

D. $-a, \; -b$

Answer:

---

10. The positive value of k for which the equation $x^2 + kx + 64 = 0$ and $x^2 - 8x + k = 0$ will both have real roots, is 4 (b) 8 (c) 12 (d) 16

A. 16

B. -16

C. 12

D. -12

Answer:

11. If the ratio of roots of equation $lx^2 + nx + n = 0$ is $p:q$ then find the value $\sqrt{\dfrac{p}{q}} + \sqrt{\dfrac{q}{p}} + \sqrt{\dfrac{n}{l}} = ?$

A. 1

B. -1

C. 2

D. 0

Answer:

12. Solve the following quadratic equation for

$x : 4x^2 + 4bx - \left(a^2 - b^2\right) = 0$

A. $\dfrac{a + b}{2}, \dfrac{a + b}{2}$

B. $\dfrac{a - b}{2}, \dfrac{a + b}{2}$

C. $\dfrac{a - b}{2}, \dfrac{a - b}{2}$

D. $\dfrac{a - b}{2}, \dfrac{(a + b)}{2}$

Answer:

13. If 2 is a root of the equation $x^2 + bx + 12 = 0$ and the equation $x^2 + bx + q = 0$ has equal roots, then $q =$

(a) 8 (b) -8 (c) 16 (d) -16

A. 8

B. -8

C. 16

D. -16

Answer:

14. If -5 is a root of the quadratic equation $2x^2 + px - 15 = 0$ and the quadratic equation $p(x^2 + x) + k = 0$ has equal roots, find the value of k.

A. k = 1, p = 4

B. k = 2, p = 8

C. k = 4, p = 8

D. k = 2, p = 4

Answer:

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15. If α and β are the roots of the quatratic equation $4x^2 - 20x = p^2$, what is the difference between α and β?

A. $\sqrt{25 + p^2}$

B. $\sqrt{25 - p^2}$

C. 5 + q

D. 5 - p

Answer:

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