

Class 10 - Mathematics

Quadratic Equations

CBSE NOTES

Quadratic Equations Worksheet

Strengthen your foundation with key concepts and basic applications.



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Solve the following questions. Write your answers in the space provided.

1. Write in standard form and identify a, b, c: $x(x-4)=5$.

Hint: Expand then bring all terms to one side.

2. Form a quadratic equation: A rectangle has breadth x cm and length $(x+3)$ cm. Area is 40 cm^2 .

Hint: Area = length $\times$ breadth.



Solve the following questions. Write your answers in the space provided.

3. Solve by factorisation: $x^2 - 9x + 20 = 0$.

Hint: Find two numbers with sum 9 and product 20.

4. Solve by factorisation: $x^2 + 7x + 10 = 0$.

Hint: Find numbers with sum 7 and product 10.



Solve the following questions. Write your answers in the space provided.

5. Solve by taking common factor: $3x^2 - 12x = 0$.

Hint: Factor out $3x$.

6. Solve: $2x^2 - 7x + 3 = 0$.

Hint: Try $(2x-1)(x-3)$.



Solve the following questions. Write your answers in the space provided.

7. From the area condition $x(2x+1)=300$, write the quadratic equation in standard form.

Hint: Expand and bring 300 to the left side.

8. Factorise and solve: $2x^2 + x - 300 = 0$.

Hint: Split x using product $a \cdot c = -600$; use 25 and -24.



Solve the following questions. Write your answers in the space provided.

9. A length is represented by x . The equation gives roots $x=25/2$ and $x=-12$. Which value is acceptable and why?

Hint: Lengths cannot be negative.

10. Compute the discriminant of $x^2 - 5x + 6 = 0$ and state the nature of roots.

Hint: $D=b^2-4ac$ with $a=1, b=-5, c=6$.



Solve the following questions. Write your answers in the space provided.

11. Find k such that $x^2 - 4x + k = 0$ has equal roots.

Hint: Equal roots means $D=0$.

12. State the nature of roots for $x^2 + 4x + 5 = 0$ without solving.

Hint: Compute D .



Solve the following questions. Write your answers in the space provided.

13. For $2x^2 + x - 300 = 0$, compute D and comment on rationality of roots.

Hint: $D=b^2-4ac$; check if D is a perfect square.

14. Expand and simplify: $(x-4)(x+1)=0$ into standard form.

Hint: Multiply the binomials.



Solve the following questions. Write your answers in the space provided.

15. Solve: $x^2 - 9 = 0$ and write both roots.

Hint: Use difference of squares.

16. A square has area 81 cm^2 . Form the quadratic equation for side x and find x .

Hint: $x^2=81$; also apply $x>0$.



Solve the following questions. Write your answers in the space provided.

17. Two consecutive integers have product 72. Form the quadratic equation for the smaller integer x .

Hint: Consecutive integers are x and $x+1$.

18. Solve the equation from the consecutive integer problem: $x^2 + x - 72 = 0$ and write the two integer solutions.

Hint: Look for factor pair of -72 with sum 1.



Solve the following questions. Write your answers in the space provided.

19. Solve: $x^2 - 6x + 9 = 0$ and interpret the result about roots.

Hint: It is a perfect square trinomial.

20. A rectangle has perimeter 34 m. If breadth is x m and length is $(x+4)$ m, find x .

Hint: Perimeter $2(L+B)=34$.



Solve the following questions. Write your answers in the space provided.

21. Explain why dividing both sides of $x(x-4)=0$ by x can lose a solution.

Hint: Consider $x=0$.

22. Find the nature of roots of $3x^2 + 2x + 5 = 0$.

Hint: Compute $D = b^2 - 4ac$.



Solve the following questions. Write your answers in the space provided.

23. A quadratic has discriminant 0. Write one possible example of such an equation and show $D=0$.

Hint: Use a perfect square like $(x-k)^2=0$.

24. Write a short method-mark style solution outline for solving $ax^2+bx+c=0$ by factorisation (no example needed).

Hint: Include: standard form, factorise, zero product, roots, check.



Solve the following questions. Write your answers in the space provided.

25. A rectangle has area 50 m^2 and length is 5 m more than breadth. Find breadth.

Hint: Let breadth= x ; length= $x+5$.

26. Without solving, decide if $x^2 - 2x + 10 = 0$ has real roots.

Hint: Use D.



Solve the following questions. Write your answers in the space provided.

27. Solve: $4x^2 - 12x = 0$ and state the roots clearly.

Hint: Factor out $4x$.



Check your answers with the solutions below.

1. Write in standard form and identify a, b, c: $x(x-4)=5$.

Solution: $x(x-4)=5 \Rightarrow x^2-4x=5 \Rightarrow x^2-4x-5=0$. So $a=1$, $b=-4$, $c=-5$.

2. Form a quadratic equation: A rectangle has breadth x cm and length $(x+3)$ cm. Area is 40 cm^2 .

Solution: $x(x+3)=40 \Rightarrow x^2+3x-40=0$.

3. Solve by factorisation: $x^2 - 9x + 20 = 0$.

Solution: $x^2-9x+20=(x-5)(x-4)=0 \Rightarrow x=5$ or $x=4$.

4. Solve by factorisation: $x^2 + 7x + 10 = 0$.

Solution: $(x+5)(x+2)=0 \Rightarrow x=-5$ or $x=-2$.

5. Solve by taking common factor: $3x^2 - 12x = 0$.

Solution: $3x(x-4)=0 \Rightarrow x=0$ or $x=4$.

6. Solve: $2x^2 - 7x + 3 = 0$.

Solution: $2x^2-7x+3=(2x-1)(x-3)=0 \Rightarrow x=1/2$ or $x=3$.



Check your answers with the solutions below.

7. From the area condition $x(2x+1)=300$, write the quadratic equation in standard form.

Solution: $2x^2+x=300 \Rightarrow 2x^2+x-300=0$.

8. Factorise and solve: $2x^2 + x - 300 = 0$.

Solution: $2x^2+x-300=2x^2+25x-24x-300=(x+12)(2x-25)=0 \Rightarrow x=-12$ or $x=25/2$.

9. A length is represented by x . The equation gives roots $x=25/2$ and $x=-12$. Which value is acceptable and why?

Solution: Accept $x=25/2$ because a length must be positive. Reject $x=-12$ as it is not meaningful for length.

10. Compute the discriminant of $x^2 - 5x + 6 = 0$ and state the nature of roots.

Solution: $D=25-24=1>0$, so two distinct real roots.

11. Find k such that $x^2 - 4x + k = 0$ has equal roots.

Solution: $D=16-4k=0 \Rightarrow k=4$.

12. State the nature of roots for $x^2 + 4x + 5 = 0$ without solving.

Solution: $D=16-20=-4<0$, so no real roots.



Check your answers with the solutions below.

13. For $2x^2 + x - 300 = 0$, compute D and comment on rationality of roots.

Solution: $a=2, b=1, c=-300 \Rightarrow D=1-4 \cdot 2 \cdot (-300)=2401=49^2$. $D>0$ so two distinct real roots, and since D is a perfect square, roots are rational.

14. Expand and simplify: $(x-4)(x+1)=0$ into standard form.

Solution: $x^2 + x - 4x - 4 = 0 \Rightarrow x^2 - 3x - 4 = 0$.

15. Solve: $x^2 - 9 = 0$ and write both roots.

Solution: $x^2 - 9 = (x-3)(x+3) = 0 \Rightarrow x=3$ or $x=-3$.

16. A square has area 81 cm^2 . Form the quadratic equation for side x and find x.

Solution: $x^2 - 81 = 0 \Rightarrow (x-9)(x+9) = 0 \Rightarrow x=9$ or $x=-9$. Since side length is positive, $x=9 \text{ cm}$.

17. Two consecutive integers have product 72. Form the quadratic equation for the smaller integer x.

Solution: $x(x+1)=72 \Rightarrow x^2+x-72=0$.

18. Solve the equation from the consecutive integer problem: $x^2 + x - 72 = 0$ and write the two integer solutions.

Solution: $(x+9)(x-8)=0 \Rightarrow x=-9$ or $x=8$. Integers are $(-9, -8)$ or $(8, 9)$.



Check your answers with the solutions below.

19. Solve: $x^2 - 6x + 9 = 0$ and interpret the result about roots.

Solution: $(x-3)^2=0 \Rightarrow x=3$ (repeated). Roots are real and equal.

20. A rectangle has perimeter 34 m. If breadth is x m and length is $(x+4)$ m, find x .

Solution: $2[(x+4)+x]=34 \Rightarrow 2(2x+4)=34 \Rightarrow 4x+8=34 \Rightarrow x=26/4=13/2$ m. Then length = $x+4 = 21/2$ m.

21. Explain why dividing both sides of $x(x-4)=0$ by x can lose a solution.

Solution: $x(x-4)=0$ has roots $x=0$ and $x=4$. If we divide by x , we implicitly assume $x \neq 0$ and lose the root $x=0$.

22. Find the nature of roots of $3x^2 + 2x + 5 = 0$.

Solution: $D=2^2-4 \cdot 3 \cdot 5=4-60=-56 < 0$, so no real roots.

23. A quadratic has discriminant 0. Write one possible example of such an equation and show $D=0$.

Solution: Example: $x^2-6x+9=0$. Here $a=1, b=-6, c=9$. $D=36-36=0$.

24. Write a short method-mark style solution outline for solving $ax^2+bx+c=0$ by factorisation (no example needed).

Solution: Outline: (1) Rewrite in standard form $ax^2+bx+c=0$. (2) Factorise into $(px+q)(rx+s)=0$. $AB=0 \Rightarrow px+q=0$ or $rx+s=0$. (4) Solve both linear equations to get roots. (5) Substitute to check.



Check your answers with the solutions below.

25. A rectangle has area 50 m^2 and length is 5 m more than breadth. Find breadth.

Solution: $x(x+5)=50 \Rightarrow x^2+5x-50=0$. Factorising: $(x+10)(x-5)=0 \Rightarrow x=5$ or $x=-10$. Breadth is positive, so $x=5 \text{ m}$.

26. Without solving, decide if $x^2 - 2x + 10 = 0$ has real roots.

Solution: $D=(-2)^2-4 \cdot 1 \cdot 10=4-40=-36<0$, so no real roots.

27. Solve: $4x^2 - 12x = 0$ and state the roots clearly.

Solution: $4x(x-3)=0 \Rightarrow x=0$ or $x=3$.



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