

1-9: Solve each quadratic using square roots. Write irrational answers in simplified radical form.

1. $x^2 - 81 = 0$
 $x^2 = 81$
 $x = \pm 9$

2. $x^2 + 324 = 0$
 $x^2 = -324$
 $x = \pm 18i$

3. $0 = -16x^2 + 120$
 $16x^2 = 120$
 $x^2 = \frac{15}{2}$
 $x = \pm \sqrt{\frac{15}{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \pm \frac{\sqrt{30}}{2}$
rationalize the denominator!

4. $-3(x+2)^2 = 48$
 $(x+2)^2 = -16$
 $x+2 = \pm 4i$
 $x = -2 \pm 4i$

5. $\frac{2}{3}x^2 - 4 = 16$
 $\frac{2}{3}x^2 = 20$
 $x^2 = 30$
 $x = \pm \sqrt{30}$

6. $3(x^2 - 3) = 207$
 $x^2 - 3 = 69$
 $x^2 = 72$
 $x = \pm \sqrt{72} = \pm 6\sqrt{2}$

7. $-2(x+3)^2 - 10 = 0$
 $-2(x+3)^2 = 10$
 $(x+3)^2 = -5$
 $x+3 = \pm i\sqrt{5}$
 $x = -3 \pm i\sqrt{5}$

8. $(2x-3)^2 = 5$
 $2x-3 = \pm \sqrt{5}$
 $2x = 3 \pm \sqrt{5}$
 $x = \frac{3 \pm \sqrt{5}}{2}$

9. $3(x-2)^2 + 4 = 52$
 $3(x-2)^2 = 48$
 $(x-2)^2 = 16$
 $x-2 = \pm 4$
 $x = 2+4 = 6$ and $x = 2-4 = -2$
 $x = \{2-4, 6\}$

10-12: Find the value of c that makes each trinomial a perfect square.

10. $x^2 - 10x + c$
 $(x-5)^2$
 $c = 25$

11. $x^2 + 60x + c$
 $(x+30)^2$
 $c = 900$

12. $x^2 - 3x + c$
 $(x-1.5)^2$
 $c = 2.25$

13-18: Solve each equation by completing the square.

13. $x^2 + 6x + 8 = 0$
 $x^2 + 6x + 9 = -8 + 9$
 $(x+3)^2 = 1$
 $x+3 = \pm 1$
 $x = -3 \pm 1 = \{-4, -2\}$

14. $x^2 + 18 = 9x$
 $x^2 - 9x + 18 = 0$
 $x^2 - 9x + \frac{81}{4} = -18 + \frac{81}{4}$
 $(x-4.5)^2 = 2.25$
 $x-4.5 = \pm 1.5$
 $x = 4.5 \pm 1.5 = \{3, 6\}$

15. $x^2 - 14x + 19 = 0$
 $x^2 - 14x + 49 = -19 + 49$
 $(x-7)^2 = 30$
 $x-7 = \pm \sqrt{30}$
 $x = 7 \pm \sqrt{30}$

16. $x^2 + 16x - 7 = 0$
 $x^2 + 16x + 64 = 7 + 64$
 $(x+8)^2 = 71$
 $x+8 = \pm \sqrt{71}$
 $x = -8 \pm \sqrt{71}$

17. $x^2 + x - 6 = 0$
 $x^2 + x + \frac{1}{4} = 6 + \frac{1}{4}$
 $(x+0.5)^2 = 6.25$
 $x+0.5 = \pm 2.5$
 $x = -0.5 \pm 2.5 = \{-3, 2\}$

18. $x^2 - 4x - 13 = 0$
 $x^2 - 4x + 4 = 13 + 4$
 $(x-2)^2 = 17$
 $x-2 = \pm \sqrt{17}$
 $x = 2 \pm \sqrt{17}$

19. ART - The area in square inches of the drawing *Foliage* by Paul Cezanne is approximated by the equation $y = x^2 - 40x + 396$. Complete the square and find the two roots, which are equal to the approximate length and width of the drawing.

$x^2 - 40x + 400 = -396 + 400$
 $(x-20)^2 = 4$
 $x-20 = \pm 2 \implies x = 20 \pm 2 = 22, 18$

The drawing is 18" by 22"