Name: Period: Date:

Practice Worksheet: Square Root Method

Solve the quadratic equation using the square root method. Show all work.

1 $x^2 - 25 = 25$

$x^2 = 50$

$x = \pm\sqrt{25 \cdot 2}$

$x = \pm 5\sqrt{2}$

2] $20 - x^2 = -29$

$-x^2 = -49$

$x^2 = 49$

$x = \pm 7$

3] $2x^2 - 1 = 7$

$2x^2 = 8$

$x^2 = 4$

$x = \pm 2$

4] $\frac{x^2}{25} - 6 = -2$

$25 \cdot \frac{x^2}{25} = 4 \cdot 25$

$x^2 = 100$

$x = \pm 10$

5] $\frac{2}{3}x^2 - 4 = 12$

$\frac{2}{3}x^2 = 16$

$x^2 = \frac{16}{1}\left(\frac{3}{2}\right)$

$x^2 = \frac{48}{2}$

$x^2 = 24 \rightarrow x = \pm\sqrt{24} \rightarrow x = \pm\sqrt{4 \cdot 6} \rightarrow x = \pm 2\sqrt{6}$

6] $4(x^2 - 8) = 84$

$x^2 - 8 = 21$

$x^2 = 29$

$x = \pm\sqrt{29}$

7] $4(x-1)^2 = 8$

$(x-1)^2 = 2$

$x - 1 = \pm\sqrt{2}$

$x = 1 \pm \sqrt{2}$

8] $(x+2)^2 - 6 = 30$

$(x+2)^2 = 36$

$x + 2 = \pm 6$

$x = -2 \pm 6$

$x = -2 + 6 \quad x = -2 - 6$

$x = 4 \quad x = -8$

9] $7(x-4)^2 - 18 = 10$

$7(x-4)^2 = 28$

$(x-4)^2 = 4$

$x - 4 = \pm\sqrt{4}$

$x - 4 = \pm 2$

$x - 4 = 2 \quad x - 4 = -2$

$x = 6, \; x = 2$

10] $\frac{1}{2}(x-4)^2+2=10$

$\frac{1}{2}(x-4)^2=8$

$(x-4)^2=16$

$x-4=\pm 4$

$x-4=4 \quad x-4=-4$

$x=8 \quad x=0$

11] $(4x-5)^2=64$

$4x-5=\pm 8$

$4x-5=8 \quad 4x-5=-8$

$4x=13 \quad 4x=-3$

$x=\frac{13}{4} \quad x=\frac{-3}{4}$

12] $(3x+6)^2-18=0$

$(3x+6)^2=18$

$3x+6=\pm\sqrt{18}$

$3x=-6\pm 3\sqrt{2}$

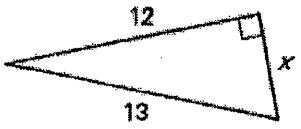
$x=\frac{-6\pm 3\sqrt{2}}{3}$

$x=-2\pm\sqrt{2}$

Find the length of the missing side of the right triangle. Show all work.

Choose only positive values

13]



$x^2+12^2=13^2$

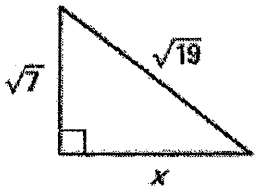
$x^2+144=169$

$x^2=25$

$x=\pm 5$

$x=5$

14]



$(\sqrt{7})^2+x^2=(\sqrt{19})^2$

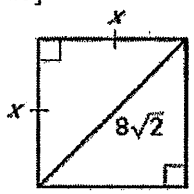
$7+x^2=19$

$x^2=12$

$x=\pm\sqrt{4\cdot 3}$

$x=\pm 2\sqrt{3}$

15]



$x^2+x^2=(8\sqrt{2})^2$

$2x^2=(8\sqrt{2})(8\sqrt{2})$

$2x^2=64\cdot 2$

$2x^2=128$

$x^2=64$

$x=8$

$x=8,-8$

From 1970 to 1990, the average cost of a new car, C, can be approximated by the model $C=30.5t^2+4192$ where t is the number of years since 1970.

16] What was the average cost of a car in 1987? Show all work.

$t=17$

$C=30.5(17)^2+4192$

$C=30.5(289)+4192$

$C=\$13,065$

17] During which year was the average cost of a new car $7,242? Show all work.

Let $C=7,242$ and solve

$7242=30.5t^2+4192$

$3050=30.5t^2$

$100=t^2$

$t=\pm\sqrt{100}$

$t=\pm 10$

$t=10$

∴ the year is 1980

$(3x+6)^2 - 18 = 0$ Isolate the binomial

$\sqrt{(3x+6)^2} = \pm\sqrt{18}$ take square roots

$3x+6 = \pm\sqrt{18}$

$3x = -6 \pm \sqrt{18}$

your answer will be irrational (it will contain a radical sign)

$x = \dfrac{-6 \pm \sqrt{18}}{3}$ ← simplify radicand

$\sqrt{18}$

$\sqrt{9 \cdot 2}$

Substitute $\sqrt{9} \cdot \sqrt{2}$

$3\sqrt{2}$

$x = \dfrac{-6 \pm 3\sqrt{2}}{3}$

If there is a GCF in the triangle, you may simplify

$x = -2 \pm \sqrt{2}$

Algebra III Worksheet: Solving Quadratics by Completing the Square

Find the value of c that makes a perfect square trinomial.

1. $x^2 + 8x + c$ — $\frac{8}{2} \to 4^2$ — 16

2. $x^2 - 22x + c$ — $\frac{-22}{2} \to (-11)^2$ — 121

3. $x^2 - 9x + c$ — $\frac{-9}{2} \to \left(\frac{-9}{2}\right)^2$ — $\frac{81}{4}$

4. $x^2 + 76x + c$ — $\frac{76}{2} \to (38)^2$ — 1444

5. $x^2 + 1.5x + c$ — $\frac{1.5}{2} \to (.75)^2$ — $.5625$

6. $x^2 + \frac{2}{3}x + c$ — $\frac{\frac{2}{3}}{2} \to \frac{2}{6} \to \left(\frac{1}{3}\right)^2$ — $\frac{1}{9}$

Solve the equation by completing the square. Show all steps.

7. $x^2 - 4x + 1 = 0$

$x^2 - 4x + \underline{4} = -1 + \underline{4}$

$(x-2)^2 = 3$

$x - 2 = \pm\sqrt{3}$

$x = 2 \pm \sqrt{3}$

8. $x^2 - 10x = 4$

$x^2 - 10x + \underline{25} = 4 + \underline{25}$

$(x-5)^2 = 29$

$x - 5 = \pm\sqrt{29}$

$x = 5 \pm \sqrt{29}$

9. $x^2 + 6x + 10 = 0$

$x^2 + 6x + \underline{9} = -10 + \underline{9}$

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

$x + 3 = \pm\sqrt{-1}$

$x = -3 \pm i$

10. $3x^2 + 36x + 42 = 0$

$x^2 + 12x + 14 = 0$

$x^2 + 12x + \underline{36} = -14 + \underline{36}$

$(x+6)^2 = 22$

$x + 6 = \pm\sqrt{22}$

$x = -6 \pm \sqrt{22}$

11. $x^2 + 81 = 24x$

$x^2 - 24x + \underline{144} = -81 + \underline{144}$

$(x-12)^2 = 63$

$x - 12 = \pm\sqrt{63}$

$x = 12 \pm \sqrt{9 \cdot 7}$

$x = 12 \pm 3\sqrt{7}$

12. $x^2 + 8x + 4 = 0$

$x^2 + 8x + \underline{16} = -4 + \underline{16}$

$(x+4)^2 = 12$

$x + 4 = \pm\sqrt{12}$

$x = -4 \pm \sqrt{4 \cdot 3}$

$x = -4 \pm 2\sqrt{3}$

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

$x^2 - 2x + \underline{1} = 9 + \underline{1}$

$(x-1)^2 = 10$

$x - 1 = \pm\sqrt{10}$

$x = 1 \pm \sqrt{10}$

14. $x^2 + 14x + 11 = 0$

$x^2 + 14x + \underline{49} = -11 + \underline{49}$

$(x+7)^2 = 38$

$x + 7 = \pm\sqrt{38}$

$x = -7 \pm \sqrt{38}$

15. $2x^2 + 10x + 1 = 13$

$2x^2 + 10x = 12$

$x^2 + 10x + \underline{25} = 6 + \underline{25}$

$(x+5)^2 = 31$

$x + 5 = \pm\sqrt{31}$

$x = -5 \pm \sqrt{31}$

16. $3x^2 - 24x + 27 = 0$

$x^2 - 8x + 9 = 0$

$x^2 - 8x + \underline{16} = -9 + \underline{16}$

$(x-4)^2 = 7$

$x - 4 = \pm\sqrt{7}$

$x = 4 \pm \sqrt{7}$