N: D: P: 1 2 3 4 5 6

Solving Quadratics // Practice 4

A. Simplify the following square roots:

1) $\sqrt{8}$ → $\sqrt{4}\cdot\sqrt{2}$ → $2\cdot\sqrt{2}$ → $2\sqrt{2}$

2) $\sqrt{12}$ → $\sqrt{4}\cdot\sqrt{3}$ → $2\cdot\sqrt{3}$ → $2\sqrt{3}$

3) $\sqrt{32}$ → $\sqrt{16}\cdot\sqrt{2}$ → $4\cdot\sqrt{2}$ → $4\sqrt{2}$

4) $\sqrt{40}$ → $\sqrt{4}\cdot\sqrt{10}$ → $2\cdot\sqrt{10}$ → $2\sqrt{10}$

5) $\sqrt{20}$ → $\sqrt{4}\cdot\sqrt{5}$ → $2\cdot\sqrt{5}$ → $2\sqrt{5}$

B. Solve each quadratic equation by using square roots or by factoring.

1) $2x^2 = 32$

$\frac{2x^2}{2} = \frac{32}{2}$

$\sqrt{x^2} = \sqrt{16}$

$x = \pm 4$

2) $3x^2 = 27$

$\frac{3x^2}{3} = \frac{27}{3}$

$\sqrt{x^2} = \sqrt{9}$

$x = \pm 3$

3) $x^2 - 4x - 12 = 0$

$1\cdot 1$, $1\cdot -12$, $-1\cdot 12$, $2\cdot -6$, $-2\cdot 6$, $3\cdot -4$, $-3\cdot 4$

$1 \quad -4 \quad -12$

$(x-6)(x+2) = 0$

$x-6=0$ → $x=6$

$x+2=0$ → $x=-2$

4) $3x^2 - 15x - 72 = 0$

$3(x^2 - 5x - 24) = 0$

$1\cdot 1$, $1\cdot -24$, $-1\cdot 24$, $2\cdot -12$, $-2\cdot 12$, $3\cdot -8$, $-3\cdot 8$, $4\cdot -6$, $-4\cdot 6$

$(x-8)(x+3) = 0$

$x-8=0$ → $x=8$

$x+3=0$ → $x=-3$

5) $4x^2 - 5 = 9$

$+5 \quad +5$

$\frac{4x^2}{4} = \frac{14}{4}$

$\sqrt{x^2} = \sqrt{\frac{7}{2}}$

$x = \pm\sqrt{\frac{7}{2}}$

6) $x^2 + 7x + 12 = 0$

$1\cdot 1$, $1\cdot 12$, $2\cdot 6$, $3\cdot 4$

$1 \quad 7 \quad 12$

$(x+3)(x+4) = 0$

$x+3=0$ → $x=-3$

$x+4=0$ → $x=-4$

7) $\frac{1}{2}x^2 - 5 = 13$

$+5 \quad +5$

$\left(\frac{2}{1}\right)\frac{1}{2}x^2 = 18\left(\frac{2}{1}\right)$

$\sqrt{x^2} = \sqrt{36}$

$x = \pm 6$

8) $x^2 + 4x = -3$

$+3 \quad +3$

$x^2 + 4x + 3 = 0$

$1\cdot 1$, $1\cdot 3$

$(x+1)(x+3) = 0$

$x+1=0$ → $x=-1$

$x+3=0$ → $x=-3$

9) $x^2 + 8x + 16 = 0$

$1\cdot 1$, $1\cdot 16$, $2\cdot 8$, $4\cdot 4$

$(x+4)(x+4) = 0$

$x+4=0$ → $x=-4$

10) $x^2 = 5x$

$-5x \quad -5x$

$x^2 - 5x = 0$

$x(x-5) = 0$

$x=0$

$x-5=0$ → $x=5$

11) $-x^2 + 9 = 2x^2 - 6$

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

$-3x^2 + 15 = 0$

$-15 \quad -15$

$\frac{-3x^2}{-3} = \frac{-15}{-3}$

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

$x = \pm\sqrt{5}$

12) $\frac{3}{2}\frac{2}{3}x^2 = \frac{6}{1}\frac{3}{2}$

$x^2 = \frac{18}{2}$

$\sqrt{x^2} = \sqrt{9}$

$x = \pm 3$

13) $x^2 - x - 6 = 0$

$1 \cdot 1$ (1, -3) $1 \cdot -6$ $-1 \cdot 6$ $2 \cdot -3$ $-2 \cdot 3$

(1, 2)

$1 \quad -1 \quad -6$

$(x-3)(x+2) = 0$

$x - 3 = 0$ $+3 \ +3$ → $x = 3$

$x + 2 = 0$ $-2 \ -2$ → $x = -2$

14) $3x^2 - 7 = 2(x^2 + 3)$

$3x^2 - 7 = 2x^2 + 6$

$-2x^2 \ +7 \quad -2x^2 \ +7$

$\sqrt{x^2} = \sqrt{13}$

$x = \pm\sqrt{13}$

15) $\frac{2}{3}x^2 + 6 = 18$

$-6 \quad -6$

$\left(\frac{3}{2}\right)\frac{2}{3}x^2 = \frac{12}{1}\left(\frac{3}{2}\right)$

$x^2 = \frac{36}{2}$

$\sqrt{x^2} = \sqrt{18}$

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

$\sqrt{18}$ → $\sqrt{9}\ \sqrt{2}$ → $3\sqrt{2}$

16) $x^2 - 2x = 48$

$-48 \quad -48$

$x^2 - 2x - 48 = 0$ $-3 \cdot 16$

$1 \cdot 1$ (1, 6) $1 \cdot -48$ $-1 \cdot 48$ $2 \cdot -24$ $-2 \cdot 24$ $3 \cdot -16$ $-4 \cdot 12$ $4 \cdot -12$ $6 \cdot -8$ $6 \cdot -8$

(1, -8)

$1 \quad -2 \quad -48$

$(x+6)(x-8) = 0$

$x + 6 = 0$ $-6 \ -6$ → $x = -6$

$x - 8 = 0$ $+8 \ +8$ → $x = 8$

17) $\frac{3}{1}\frac{1}{3}x^2 = 4\left(\frac{3}{1}\right)$

$\sqrt{x^2} = \sqrt{12}$

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

$\sqrt{12}$ → $\sqrt{4}\ \sqrt{3}$ → $2\sqrt{3}$

18) $9x^2 = 9$

$\frac{9}{9} \quad \frac{9}{9}$

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

$x = \pm 1$

19) $x^2 + 14x = 33$

$-33 \quad -33$

$a=1 \quad b=14 \quad c=-33$

$x^2 + 14x - 33 = 0$

$x = \frac{-14 \pm \sqrt{14^2 - 4(1)(-33)}}{2(1)}$

14×14: 56, 140, 196

$= \frac{-14 \pm \sqrt{196 + 132}}{2} = \frac{-14 \pm \sqrt{328}}{2}$

$\sqrt{328}$ → $\sqrt{4}\ \sqrt{82}$ → $2\sqrt{82}$

$= \frac{-14}{2} \pm \frac{2\sqrt{82}}{2} = -7 \pm \sqrt{82}$

20) $x^2 = -9x - 14$

$+9x+14 \quad +9x \ +14$

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

$a=1 \quad b=9 \quad c=14$

$x = \frac{-9 \pm \sqrt{9^2 - 4(1)(14)}}{2(1)} = \frac{-9 \pm \sqrt{81-56}}{2}$

$= \frac{-9 \pm \sqrt{25}}{2} = \frac{-9 \pm 5}{2}$

① $\frac{-9+5}{2} = \frac{-4}{2} = -2$ → $x = -2$

② $\frac{-9-5}{2} = \frac{-14}{2} = -7$ → $x = -7$

21) $2x^2 + 11x = -12$

$+12 \quad +12$

$2x^2 + 11x + 12 = 0$

(2, 3) (1, 4)

$(2x+3)(x+4) = 0$

$2x + 3 = 0$ $-3 \ -3$ → $\frac{2x}{2} = \frac{-3}{2}$ → $x = -\frac{3}{2}$

$x + 4 = 0$ $-4 \ -4$ → $x = -4$

22) $3x^2 = 6x$

$-6x \quad -6x$

$3x^2 - 6x = 0$

$3x(x-2) = 0$

$3x = 0$ → $\frac{3x}{3} = \frac{0}{3}$ → $x = 0$

$x - 2 = 0$ $+2 \ +2$ → $x = 2$

23) $5x^2 + 10x = 40$

$-40 \quad -40$

$5x^2 + 10x - 40 = 0$

$5(x^2 + 2x - 8) = 0$

(1, $+4$) (1, -2)

$(x+4)(x-2) = 0$

$x + 4 = 0$ $-4 \ -4$ → $x = -4$

$x - 2 = 0$ $+2 \ +2$ → $x = 2$

24) $x^2 + 100 = 0$

$-100 \quad -100$

$\sqrt{x^2} = \sqrt{-100}$

No Real Solution