

# section 9.1

9.1 11

$$2) b^2 = 144$$

$$b = \pm \sqrt{144}$$

$$b = \pm 12$$

$$\boxed{b = -12, b = +12}$$

$$4) x^2 - 75 = 0$$

$$\begin{array}{r} +75 \quad +75 \\ \hline \end{array}$$

$$x^2 = 75$$

$$x = \pm \sqrt{75} = \pm \sqrt{25} \sqrt{3} = \pm 5\sqrt{3}$$

$$\boxed{x = -5\sqrt{3}, x = +5\sqrt{3}}$$

$$6) v^2 - 80 = 0$$

$$\begin{array}{r} +80 \quad +80 \\ \hline \end{array}$$

$$v^2 = 80$$

$$v = \pm \sqrt{80} = \pm \sqrt{16} \sqrt{5} = \pm 4\sqrt{5}$$

$$\boxed{v = -4\sqrt{5}, v = +4\sqrt{5}}$$

$$8) \frac{3n^2}{3} = \frac{48}{3}$$

$$n^2 = 16$$

$$n = \pm \sqrt{16} = \pm 4$$

$$\boxed{n = -4, n = +4}$$

$$10) \frac{5}{3} y^2 = 60$$

$$\left(\frac{3}{5}\right) \left(\frac{5}{3} y^2\right) = (60) \left(\frac{3}{5}\right)$$

$$y^2 = 36$$

$$y = \pm \sqrt{36} = \pm 6$$

$$\boxed{y = -6, y = +6}$$

$$12) y^2 + 64 = 0$$

$$\begin{array}{r} -64 \quad -64 \\ \hline \end{array}$$

$$y^2 = -64$$

$$y = \pm \sqrt{-64}$$

$$\boxed{\text{no real \# solution}}$$

$$14) y^2 + 45 = 0$$

$$\begin{array}{r} -45 \quad -45 \\ \hline \end{array}$$

$$y^2 = -45$$

$$y = \pm \sqrt{-45}$$

$$\boxed{\text{no real \# solution}}$$

$$16) \quad \frac{2}{3}y^2 - 8 = -2$$

$$\quad \quad \quad +8 \quad +8$$


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$$\frac{2}{3}y^2 = 6$$

$$\left(\frac{3}{2}\right)\left(\frac{2}{3}y^2\right) = (6)\left(\frac{3}{2}\right)$$

$$y^2 = 9$$

$$y = \pm\sqrt{9} = \pm 3$$

$$\boxed{y = -3, y = +3}$$

$$18) \quad \frac{3}{2}b^2 - 7 = 41$$

$$\quad \quad \quad +7 \quad +7$$


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$$\frac{3}{2}b^2 = 48$$

$$\left(\frac{2}{3}\right)\left(\frac{3}{2}b^2\right) = (48)\left(\frac{2}{3}\right)$$

$$b^2 = 32$$

$$b = \pm\sqrt{32} = \pm\sqrt{16}\sqrt{2} = \pm 4\sqrt{2}$$

$$\boxed{b = -4\sqrt{2}, b = +4\sqrt{2}}$$

$$20) \quad 2q^2 + 5 = 30$$

$$\quad \quad \quad -5 \quad -5$$


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$$\frac{2q^2}{2} = \frac{25}{2}$$

$$q^2 = \frac{25}{2}$$

$$q = \pm\sqrt{\frac{25}{2}}$$

$$q = \pm\frac{\sqrt{25}}{\sqrt{2}}$$

$$q = \frac{\pm 5}{\sqrt{2}} = \frac{\pm 5\sqrt{2}}{2}$$

$$\boxed{q = -\frac{5\sqrt{2}}{2}, q = +\frac{5\sqrt{2}}{2}}$$

$$22) \quad 3x^2 - 8 = 46$$

$$\quad \quad \quad +8 \quad +8$$


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$$\frac{3x^2}{3} = \frac{54}{3}$$

$$x^2 = 18$$

$$x = \pm\sqrt{18} = \pm\sqrt{9}\sqrt{2} = \pm 3\sqrt{2}$$

$$\boxed{x = -3\sqrt{2}, x = +3\sqrt{2}}$$

$$24) (v+10)^2 = 121$$

$$(v+10) = \pm\sqrt{121} = \pm 11$$

$$\begin{array}{r|l} v+10 = -11 & v+10 = +11 \\ -10 & -10 \\ \hline v = -21 & v = 1 \end{array}$$

$$v = -21, v = 1$$

$$26) (n+5)^2 = 32$$

$$(n+5) = \pm\sqrt{32} = \pm\sqrt{16}\sqrt{2} = \pm 4\sqrt{2}$$

$$\begin{array}{r} n+5 = \pm 4\sqrt{2} \\ -5 \quad -5 \\ \hline n = -5 \pm 4\sqrt{2} \end{array}$$

$$n = -5 - 4\sqrt{2}, n = -5 + 4\sqrt{2}$$

$$28) \left(x + \frac{1}{5}\right)^2 = \frac{7}{25}$$

$$x = \frac{-1 \pm \sqrt{7}}{5}$$

$$\left(x + \frac{1}{5}\right) = \pm\sqrt{\frac{7}{25}} = \frac{\pm\sqrt{7}}{\sqrt{25}} = \frac{\pm\sqrt{7}}{5}$$

$$\begin{array}{r} x + \frac{1}{5} = \frac{\pm\sqrt{7}}{5} \\ -\frac{1}{5} \quad -\frac{1}{5} \\ \hline x = \frac{-1}{5} \pm \frac{\sqrt{7}}{5} \end{array}$$

$$x = \frac{-1 - \sqrt{7}}{5}, x = \frac{-1 + \sqrt{7}}{5}$$

$$30) \left(x - \frac{5}{6}\right)^2 = \frac{11}{25}$$

$$\left(x - \frac{5}{6}\right) = \pm \sqrt{\frac{11}{25}} = \frac{\pm \sqrt{11}}{\sqrt{25}} = \frac{\pm \sqrt{11}}{5}$$

$$x - \frac{5}{6} = \frac{\pm \sqrt{11}}{5}$$

$$\begin{array}{r} + \frac{5}{6} \quad + \frac{5}{6} \\ \hline \end{array}$$

$$x = \frac{5}{6} \pm \frac{\sqrt{11}}{5}$$

$$x = \frac{5}{6} - \frac{\sqrt{11}}{5}, \quad x = \frac{5}{6} + \frac{\sqrt{11}}{5}$$

$$32) (b-1)^2 - 9 = 39$$

$$\begin{array}{r} + 9 \quad + 9 \\ \hline \end{array}$$

$$(b-1)^2 = 48$$

$$(b-1) = \pm \sqrt{48} = \pm \sqrt{16} \sqrt{3} = \pm 4\sqrt{3}$$

$$b-1 = \pm 4\sqrt{3}$$

$$\begin{array}{r} + 1 \quad + 1 \\ \hline \end{array}$$

$$b = 1 \pm 4\sqrt{3}$$

$$\begin{array}{l} b = 1 + 4\sqrt{3} \\ b = 1 - 4\sqrt{3} \end{array}$$

$$34) 5(x+3)^2 - 7 = 68$$

$$\begin{array}{r} + 7 \quad + 7 \\ \hline \end{array}$$

$$\frac{5(x+3)^2}{5} = \frac{75}{5}$$

$$(x+3)^2 = 25$$

$$(x+3) = \pm \sqrt{25} = \pm 5$$

$$x+3 = \pm 5$$

$$\begin{array}{r} - 3 \quad - 3 \\ \hline \end{array}$$

$$x = -3 \pm 5$$

$$\begin{array}{l|l} x = -3 - 5 & x = -3 + 5 \\ x = -8 & x = 2 \end{array}$$

$$x = -8, x = 2$$

$$36) (8d-6)^2 = -24$$

$$(8d-6) = \pm \sqrt{-24}$$

no real # solution

$$38) (2y+1)^2 - 5 = -23$$

$$\begin{array}{r} +5 \quad +5 \\ \hline (2y+1)^2 = -18 \end{array}$$

$$(2y+1) = \pm \sqrt{-18}$$

no real # solution

$$40) n^2 + 8n + 16 = 27$$

$$(n+4)^2 = 27$$

$$(n+4) = \pm \sqrt{27} = \pm \sqrt{9} \sqrt{3} = \pm 3\sqrt{3}$$

$$\begin{array}{r} n+4 = \pm 3\sqrt{3} \\ -4 \quad -4 \\ \hline \end{array}$$

$$n = -4 \pm 3\sqrt{3}$$

$$n = -4 + 3\sqrt{3}$$

$$n = -4 - 3\sqrt{3}$$

$$42) y^2 + 12y + 36 = 32$$

$$(y+6)^2 = 32$$

$$(y+6) = \pm \sqrt{32} = \pm \sqrt{16} \sqrt{2} = \pm 4\sqrt{2}$$

$$y+6 = \pm 4\sqrt{2}$$

$$\begin{array}{r} -6 \quad -6 \\ \hline \end{array}$$

$$y = -6 \pm 4\sqrt{2}$$

$$y = -6 + 4\sqrt{2}$$

$$y = -6 - 4\sqrt{2}$$

$$44) 9y^2 + 12y + 4 = 9$$

$$(3y+2)^2 = 9$$

$$(3y+2) = \pm\sqrt{9} = \pm 3$$

$$\begin{array}{r} 3y+2 = \pm 3 \\ -2 \quad -2 \\ \hline 3y = -2 \pm 3 \end{array}$$

$$\frac{3y}{3} = \frac{-2 \pm 3}{3}$$

$$y = \frac{-2 \pm 3}{3}$$

$$y = \frac{-2+3}{3} = \frac{1}{3}$$

$$y = \frac{-2-3}{3} = \frac{-5}{3}$$

$$\boxed{y = \frac{-5}{3}, y = \frac{1}{3}}$$

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$$\begin{array}{r} 9y^2 + 12y + 4 = 9 \\ -9 \quad -9 \\ \hline 9y^2 + 12y - 5 = 0 \end{array}$$

$$(3y+5)(3y-1) = 0$$

$$\begin{array}{r} 3y+5 = 0 \\ -5 \quad -5 \\ \hline 3y = -5 \end{array}$$

$$\frac{3y}{3} = \frac{-5}{3}$$

$$y = \frac{-5}{3}$$

$$\begin{array}{r} 3y-1 = 0 \\ +1 \quad +1 \\ \hline 3y = 1 \end{array}$$

$$\frac{3y}{3} = \frac{1}{3}$$

$$y = \frac{1}{3}$$

$$46) 64x^2 + 144x + 81 = 25$$

$$(8x+9)^2 = 25$$

$$(8x+9) = \pm\sqrt{25} = \pm 5$$

$$8x+9 = \pm 5$$

$$\begin{array}{r} 8x+9 = \pm 5 \\ -9 \quad -9 \\ \hline 8x = -9 \pm 5 \end{array}$$

$$\frac{8x}{8} = \frac{-9 \pm 5}{8}$$

$$x = \frac{-9 \pm 5}{8}$$

$$x = \frac{-9+5}{8} = \frac{-4}{8} = \frac{-1}{2}$$

$$x = \frac{-9-5}{8} = \frac{-14}{8} = \frac{-7}{4}$$

$$\boxed{x = \frac{-7}{4}, x = \frac{-1}{2}}$$

$$\begin{array}{r} 64x^2 + 144x + 81 = 25 \\ -25 \quad -25 \\ \hline 64x^2 + 144x + 56 = 0 \end{array}$$

$$64x^2 + 144x + 56 = 0$$

$$8(8x^2 + 18x + 7) = 0$$

$$8(4x+7)(2x+1) = 0$$

$$4x+7 = 0$$

$$\begin{array}{r} 4x+7 = 0 \\ -7 \quad -7 \\ \hline 4x = -7 \end{array}$$

$$\frac{4x}{4} = \frac{-7}{4}$$

$$x = \frac{-7}{4}$$

$$2x+1 = 0$$

$$\begin{array}{r} 2x+1 = 0 \\ -1 \quad -1 \\ \hline 2x = -1 \end{array}$$

$$\frac{2x}{2} = \frac{-1}{2}$$

$$x = \frac{-1}{2}$$

$$48) 4t^2 = 16$$

$$t^2 = 4$$

$$t = \pm\sqrt{4} = \pm 2$$

$$\boxed{t = -2, t = 2}$$

$$50) (b+7)^2 = 8$$

$$(b+7) = \pm\sqrt{8} = \pm\sqrt{4}\sqrt{2} = \pm 2\sqrt{2}$$

$$b+7 = \pm 2\sqrt{2}$$

$$\begin{array}{r} -7 \quad -7 \\ \hline b = -7 \pm 2\sqrt{2} \end{array}$$

$$\begin{array}{l} b = -7 + 2\sqrt{2} \\ b = -7 - 2\sqrt{2} \end{array}$$

$$52) 4z^2 + 4z + 1 = 49$$

$$(2z+1)^2 = 49$$

$$(2z+1) = \pm\sqrt{49} = \pm 7 \quad z = \frac{-1+7}{2} = \frac{6}{2} = 3$$

$$\begin{array}{r} 2z+1 = \pm 7 \\ -1 \quad -1 \\ \hline 2z = -1 \pm 7 \end{array}$$

$$\frac{2z}{2} = \frac{-1 \pm 7}{2}$$

$$z = \frac{-1 \pm 7}{2}$$

$$z = -4, z = 3$$

$$\begin{array}{r} 4z^2 + 4z + 1 = 49 \\ -4z \quad -49 \\ \hline \end{array}$$

$$4z^2 + 4z - 48 = 0$$

$$4(z^2 + z - 12) = 0$$

$$4(z+4)(z-3) = 0$$

$$\begin{array}{r|l} z+4=0 & z-3=0 \\ -4 \quad -4 & +3 \quad +3 \\ \hline z=-4 & z=3 \end{array}$$

$$54) b^2 - 108 = 0$$

$$\begin{array}{r} +108 \quad +108 \\ \hline \end{array}$$

$$b^2 = 108$$

$$b = \pm\sqrt{108} = \pm\sqrt{36}\sqrt{3} = \pm 6\sqrt{3}$$

$$\begin{array}{l} b = +6\sqrt{3} \\ b = -6\sqrt{3} \end{array}$$

$$56) \left(q - \frac{3}{5}\right)^2 = \frac{3}{4}$$

$$\left(q - \frac{3}{5}\right) = \pm \sqrt{\frac{3}{4}} = \frac{\pm \sqrt{3}}{\sqrt{4}} = \frac{\pm \sqrt{3}}{2}$$

$$q - \frac{3}{5} = \frac{\pm \sqrt{3}}{2}$$

$$\begin{array}{r} + \frac{3}{5} \quad + \frac{3}{5} \\ \hline \end{array}$$

$$q = \frac{3}{5} \pm \frac{\sqrt{3}}{2}$$

$$q = \frac{3}{5} + \frac{\sqrt{3}}{2}$$

$$q = \frac{3}{5} - \frac{\sqrt{3}}{2}$$

$$58) x^2 + 48 = 0$$

$$-48 \quad -48$$

$$x^2 = -48$$

$$x = \pm \sqrt{-48}$$

no real # solution

$$60) v^2 + 18v + 81 = 50$$

$$(v + 9)^2 = 50$$

$$(v + 9) = \pm \sqrt{50} = \pm \sqrt{25 \cdot 2} = \pm 5\sqrt{2}$$

$$v + 9 = \pm 5\sqrt{2}$$

$$\begin{array}{r} -9 \quad -9 \\ \hline \end{array}$$

$$v = -9 \pm 5\sqrt{2}$$

$$v = -9 + 5\sqrt{2}$$

$$v = -9 - 5\sqrt{2}$$



$$62) \begin{array}{r} (n-7)^2 - 8 = 64 \\ +8 \quad +8 \\ \hline \end{array}$$

$$(n-7)^2 = 72$$

$$(n-7) = \pm\sqrt{72} = \pm\sqrt{36}\sqrt{2} = \pm 6\sqrt{2}$$

$$\begin{array}{r} n-7 = \pm 6\sqrt{2} \\ +7 \quad +7 \\ \hline \end{array}$$

$$n = 7 \pm 6\sqrt{2}$$

$$\begin{array}{l} n = 7 + 6\sqrt{2} \\ n = 7 - 6\sqrt{2} \end{array}$$

$$64) (y-4)^2 = 64$$

$$(y-4) = \pm\sqrt{64} = \pm 8$$

$$y-4 = \pm 8$$

$$\begin{array}{r} +4 \quad +4 \\ \hline y = 4 \pm 8 \end{array}$$

$$y = 4 + 8 = 12$$

$$y = 4 - 8 = -4$$

$$y = -4, y = 12$$

$$66) \begin{array}{r} 2d^2 - 4 = 77 \\ +4 \quad +4 \\ \hline \end{array}$$

$$\frac{2d^2}{2} = \frac{81}{2}$$

$$d^2 = \frac{81}{2}$$

$$d = \pm\sqrt{\frac{81}{2}} = \frac{\pm\sqrt{81}}{\sqrt{2}} = \frac{\pm 9}{\sqrt{2}}$$

$$d = \frac{\pm 9}{\sqrt{2}} = \frac{\pm 9\sqrt{2}}{2}$$

$$d = \frac{-9\sqrt{2}}{2}, d = \frac{+9\sqrt{2}}{2}$$

$$68) (y-4)^2 + 10 = 9$$

$$\begin{array}{r} -10 \quad -10 \\ \hline \end{array}$$

$$(y-4)^2 = -1$$

$$(y-4) = \pm\sqrt{-1}$$

no real # solution