

Algebra 2 3.3 Completing the Square
Pg. 116 [25-32, 37, 41-47]

$$\begin{aligned} (25) \quad x^2 + 6x + 3 &= 0 \\ (x^2 + 6x + 9 - 9) + 3 &= 0 \\ (3)^2 &= 9 \\ (x^2 + 6x + 9) - 6 &= 0 \\ (x+3)^2 - 6 &= 0 \\ \sqrt{(x+3)^2} &= \sqrt{6} \\ x+3 &= \pm\sqrt{6} \\ \boxed{x = -3 \pm \sqrt{6}} \end{aligned}$$

$$\begin{aligned} (26) \quad s^2 + 2s - 6 &= 0 \\ (s^2 + 2s + 1 - 1) - 6 &= 0 \\ (1)^2 &= 1 \\ (s^2 + 2s + 1) - 7 &= 0 \\ (s+1)^2 - 7 &= 0 \\ \sqrt{(s+1)^2} &= \sqrt{7} \\ s+1 &= \pm\sqrt{7} \\ \boxed{s = -1 \pm \sqrt{7}} \end{aligned}$$

$$\begin{aligned} (27) \quad x^2 + 4x - 2 &= 0 \\ (x^2 + 4x + 4 - 4) - 2 &= 0 \\ (2)^2 &= 4 \\ (x^2 + 4x + 4) - 6 &= 0 \\ (x+2)^2 - 6 &= 0 \\ \sqrt{(x+2)^2} &= \sqrt{6} \\ x+2 &= \pm\sqrt{6} \\ -2 \quad -2 \\ \boxed{x = -2 \pm \sqrt{6}} \end{aligned}$$

$$\begin{aligned} (28) \quad t^2 - 8t - 5 &= 0 \\ (t^2 - 8t + 16 - 16) - 5 &= 0 \\ (4)^2 &= 16 \\ (t^2 - 8t + 16) - 21 &= 0 \\ (t-4)^2 - 21 &= 0 \\ \sqrt{(t-4)^2} &= \sqrt{21} \\ t-4 &= \pm\sqrt{21} \\ \boxed{t = 4 \pm \sqrt{21} \text{ or } 4 \pm 4.6} \end{aligned}$$

$$(29) \quad z(z+9)=1$$

this is tough... multiply together ^{1st}

$$z^2 + 9z - 1 = 0$$

Now...

$$(z^2 + 9z + 20.25 - 20.25) - 1 = 0$$

$$(4.5)^2 =$$

$$(z^2 + 9z + 20.25) - 21.25 = 0$$

$$(z + 4.5)^2 - 21.25 = 0$$

$$\sqrt{(z + 4.5)^2} = \sqrt{21.25}$$

$$z + 4.5 = \pm 4.61$$

$$z = -4.5 \pm 4.61$$

$$z = .11 \text{ \& } -9.11$$

$$(31) \quad 7t^2 + 28t + 56 = 0$$

$$7(t^2 + 4t + 4 - 4) + 56 = 0$$

$$(2)^2 = 4$$

$$7(t^2 + 4t + 4) + 28 = 0$$

$$\frac{7(t^2 + 4t + 4)}{7} = \frac{-28}{7}$$

$$(t^2 + 4t + 4) = -4$$

$$\sqrt{(t+2)^2} = \sqrt{-4}$$

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

$$t+2 = \pm 2i$$

$$t = -2 \pm 2i$$

$$(30) \quad x(x+8) = -20$$

$$x^2 + 8x + 20 = 0$$

$$(x^2 + 8x + 16 - 16) + 20 = 0$$

$$(4)^2 = 16$$

$$(x^2 + 8x + 16) + 4 = 0$$

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

$$\sqrt{(x+4)^2} = \sqrt{-4}$$

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

$$x+4 = \pm 2i$$

$$x = -4 \pm 2i$$

Now solve

$$\frac{\sqrt{-4}}{\sqrt{4} \cdot \sqrt{-1}} = \frac{2i}{2}$$

$$(32) \quad 6r^2 + 6r + 12 = 0$$

$$(6r^2 + 6r) + 12 = 0$$

$$6(r^2 + 1r + 2.5 - 2.5) + 12 = 0$$

$$(1.5)^2 = 2.25$$

$$6(r^2 + 1r + 2.25) + 10.5 = 0$$

$$6(r+0.5)^2 + 10.5 = 0$$

$$6(r+0.5)^2 = -10.5$$

$$\sqrt{(r+0.5)^2} = \sqrt{-1.75}$$

$$r+0.5 = \pm \sqrt{-1.75}$$

$$r = -0.5 \pm \sqrt{1.75}i$$

$$\frac{\sqrt{1.75} \cdot \sqrt{-1}}{\sqrt{1.75} \cdot 1}$$

37.

$$4x^2 + 24x - 11 = 0$$

$$(4x^2 + 24x) - 11 = 0$$

$$4(x^2 + 6x + 9 - 9) - 11 = 0$$

$\swarrow -36$

$(3)^2 = 9$

$$4(x^2 + 6x + 9) - 47 = 0$$

~~4x^2~~

$$4(x+3)^2 - 47 = 0 \rightarrow$$

$$4(x+3)^2 = 47 \rightarrow \sqrt{(x+3)^2} = \sqrt{\frac{47}{4}}$$

$$x+3 = \pm \sqrt{\frac{47}{4}}$$

$$\rightarrow \underline{x = -3 \pm \sqrt{\frac{47}{4}}}$$

mistake:



they added 9 to both sides... need to b

$4(9) = 36$ to the right side

41

$$x^2 - 4x - 21 = 0$$

$\begin{matrix} 21 \cdot 1 \\ 7 \cdot 3 \end{matrix}$

$$(x - 7)(x + 3) = 0$$

Factoring!

$$x - 7 = 0 \quad x + 3 = 0$$

$$\boxed{x = 7 \quad ; \quad x = -3}$$

42

$$x^2 + 13x + 22 = 0$$

Factoring \rightarrow b/c its factorable!

$$(x + 11)(x + 2) = 0$$

$\begin{matrix} 22 \cdot 1 \\ 11 \cdot 2 \end{matrix}$

$$x + 11 = 0 \quad x + 2 = 0$$

$$\boxed{x = -11 \quad ; \quad -2}$$

43) $(x+4)^2 = 16$ square-roots; b/c its in vertex form

$$\sqrt{(x+4)^2} = \sqrt{\pm 16}$$

$$x+4 = \pm 4 \rightarrow x = -4 \pm 4 \rightarrow \boxed{x = 0 \text{ ; } -8}$$

44) $(x-7)^2 = 9$ square-roots; b/c its in vertex form

$$\sqrt{(x-7)^2} = \sqrt{\pm 9}$$

$$x-7 = \pm 3 \rightarrow x = 7 \pm 3 \rightarrow \boxed{x = 10 \text{ ; } 4}$$

45) $x^2 + 12x + 36 = 0$

36 · 1
18 · 2
12 · 3
9 · 4
6 · 6
Factoring

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

$$x + 6 = 0 \quad x + 6 = 0$$

$$\boxed{x = -6}$$

46) $x^2 - 16x + 64 = 0$

64 · 1
32 · 2
16 · 4
8 · 8
Factoring

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

$$x - 8 = 0 \quad x - 8 = 0$$

$$\boxed{x = 8}$$

47) $2x^2 + 4x - 3 = 0$ $\frac{6 \cdot 1}{3 \cdot 2}$ Not Factorable; Complete the square

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

$$2(x^2 + 2x + 1 - 1) - 3 = 0$$

$$(1)^2 = 1$$

$$2(x^2 + 2x + 1) - 5 = 0$$

$$2(x+1)^2 - 5 = 0$$

$$2(x+1)^2 = 5$$

$$\sqrt{(x+1)^2} = \sqrt{\frac{5}{2}}$$

$$x+1 = \pm \sqrt{\frac{5}{2}}$$

$$\boxed{x = -1 \pm \sqrt{\frac{5}{2}}}$$