Worksheet 2

Completing the square

1.

a. +64

b. + 9/4

c. +144

2.

$x^2 - 4x + 6 = 0$

$x^2 - 4x = -6$

$x^2 - 4x + \square = -6 + \square$

$x^2 - 4x + \boxed{4} = -6 + \boxed{4}$

$x^2 - 4x + 4 = -2$

$(x-2)^2 = -2$

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

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

$x = 2 + i\sqrt{2}; \quad x = 2 - i\sqrt{2}$

3.

$x^2 + 20x + 40 = 0$

$x^2 + 20x = -40$

$x^2 + 20x + \square = -40 + \square$

$x^2 + 20x + \boxed{100} = -40 + \boxed{100}$

$x^2 + 20x + 100 = 60$

$(x+10)^2 = 60$

$x + 10 = \pm\sqrt{60}$

$x = -10 \pm \sqrt{60} = -10 \pm 2\sqrt{15}$

$x = -10 + 2\sqrt{15}; \quad x = -10 - 2\sqrt{15}$

4.

$-x^2 - 2x - 5 = 0$

$x^2 + 2x + 5 = 0$

$x^2 + 2x = -5$

$x^2 + 2x + \square = -5 + \square$

$x^2 + 2x + \boxed{1} = -5 + \boxed{1}$

$x^2 + 2x + 1 = -4$

$(x+1)^2 = -4$

$x + 1 = \pm\sqrt{-4}$

$x = -1 \pm \sqrt{-4} = -1 \pm 2i$

$x = -1 + 2i; \quad x = -1 - 2i$

5.

$4x^2 + 4x = 3$

$\frac{4x^2}{4} + \frac{4x}{4} = \frac{3}{4}$

$x^2 + x + \square = \frac{3}{4} + \square$

$x^2 + x + \boxed{\frac{1}{4}} = \frac{3}{4} + \boxed{\frac{1}{4}}$

$x^2 + x + \frac{1}{4} = 1$

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

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

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

$x = -1 - \frac{1}{2} = -\frac{3}{2}$