

Completing the Square $a \neq 1$ Day 2

p 260 8-13, 32-43, 58

Key

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

$$x^2 + 2x = 8$$

$$x^2 + 2x + 1 = 8 + 1$$

$$\sqrt{(x+1)^2} = \sqrt{9}$$

$$x+1 = \pm 3$$

$$\begin{array}{r} +1 \\ -1 \end{array}$$

$$\boxed{x = 2, -4}$$

$$(11) 2x^2 + 6x - 12 = 0$$

$$2x^2 + 6x = 12$$

$$2(x^2 + 3x) = 12$$

$$2(x^2 + 3x + \frac{9}{4}) = 12 + \frac{9}{2}$$

$$\frac{2(x + \frac{3}{2})^2 = \frac{33}{2}}$$

$$\sqrt{(x + \frac{3}{2})^2} = \sqrt{\frac{33}{4}}$$

$$x + \frac{3}{2} = \pm \frac{\sqrt{33}}{2}$$

$$\begin{array}{r} -\frac{3}{2} \\ -\frac{3}{2} \end{array}$$

$$\boxed{x = -\frac{3}{2} \pm \frac{\sqrt{33}}{2} \text{ or } \frac{-3 \pm \sqrt{33}}{2}}$$

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

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

$$x^2 - 4x + 4 = -9 + 4$$

$$\sqrt{(x-2)^2} = \sqrt{-5}$$

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

$$\begin{array}{r} +2 \\ +2 \end{array}$$

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

$$(12) x^2 + 4x + 6 = 0$$

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

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

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

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

$$\begin{array}{r} -2 \\ -2 \end{array}$$

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

$$(10) 2x^2 - 3x - 3 = 0$$

$$2x^2 - 3x = 3$$

$$2(x^2 - \frac{3}{2}x) = 3$$

$$2(x^2 - \frac{3}{2}x + \frac{9}{16}) = 3 + \frac{9}{8}$$

$$\frac{2(x - \frac{3}{4})^2 = \frac{33}{8}}$$

$$\sqrt{(x - \frac{3}{4})^2} = \sqrt{\frac{33}{16}}$$

$$x - \frac{3}{4} = \pm \frac{\sqrt{33}}{4}$$

$$\begin{array}{r} +\frac{3}{4} \\ +\frac{3}{4} \end{array}$$

$$\boxed{x = \frac{3}{4} \pm \frac{\sqrt{33}}{4}}$$

OR

$$\boxed{x = \frac{3 \pm \sqrt{33}}{4}}$$

$$(13) x^2 + 8x + 10 = 0$$

$$x^2 + 8x = -10$$

$$x^2 + 8x + 16 = -10 + 16$$

$$\sqrt{(x+4)^2} = \sqrt{6}$$

$$x+4 = \pm \sqrt{6}$$

$$\begin{array}{r} -4 \\ -4 \end{array}$$

$$\boxed{x = -4 \pm \sqrt{6}}$$

$$\begin{aligned} (32) \quad x^2 + 6x + 8 &= 0 \\ x^2 + 6x &= -8 \\ x^2 + 6x + 9 &= -8 + 9 \end{aligned}$$

$$\begin{aligned} \sqrt{(x+3)^2} &= \sqrt{1} \\ x+3 &= \pm 1 \\ \underline{-3} \quad \underline{-3} \end{aligned}$$

$$\boxed{x = -2, -4}$$

$$\begin{aligned} (33) \quad x^2 - 4x + 3 &= 0 \\ x^2 - 4x &= -3 \\ x^2 - 4x + 4 &= -3 + 4 \end{aligned}$$

$$\begin{aligned} \sqrt{(x-2)^2} &= \sqrt{1} \\ x-2 &= \pm 1 \\ \underline{+2} \quad \underline{+2} \end{aligned}$$

$$\boxed{x = 3, 1}$$

$$\begin{aligned} (34) \quad 2x^2 + x - 3 &= 0 \\ 2x^2 + x &= 3 \\ 2(x^2 + \frac{1}{2}x) &= 3 \\ 2(x^2 + \frac{1}{2}x + \frac{1}{16}) &= 3 + \frac{1}{8} \end{aligned}$$

$$\frac{2(x + \frac{1}{4})^2 = \frac{25}{8}}{2} \quad \frac{25}{8}$$

$$\sqrt{(x + \frac{1}{4})^2} = \sqrt{\frac{25}{16}}$$

$$\begin{aligned} x + \frac{1}{4} &= \pm \frac{5}{4} \\ \underline{-\frac{1}{4}} \quad \underline{-\frac{1}{4}} \end{aligned}$$

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

$$\begin{aligned} (35) \quad 2x^2 - 3x + 5 &= 0 \\ 2x^2 - 3x &= -5 \\ 2(x^2 - \frac{3}{2}x) &= -5 \\ 2(x^2 - \frac{3}{2}x + \frac{9}{16}) &= -5 + \frac{9}{8} \\ \frac{2(x - \frac{3}{4})^2 = -\frac{31}{8}}{2} \quad \frac{9}{8} \end{aligned}$$

$$\begin{aligned} \sqrt{(x - \frac{3}{4})^2} &= \sqrt{\frac{-31}{16}} \\ x - \frac{3}{4} &= \pm i \sqrt{\frac{31}{4}} \\ \underline{+\frac{3}{4}} \quad \underline{+\frac{3}{4}} \end{aligned}$$

$$\begin{aligned} \boxed{x = \frac{3}{4} \pm i \frac{\sqrt{31}}{4}} \\ \text{OR} \\ \boxed{x = \frac{3 \pm i\sqrt{31}}{4}} \end{aligned}$$

$$\begin{aligned} (36) \quad 2x^2 + 5x + 7 &= 0 \\ 2x^2 + 5x &= -7 \\ 2(x^2 + \frac{5}{2}x) &= -7 \\ 2(x^2 + \frac{5}{2}x + \frac{25}{16}) &= -7 + \frac{25}{8} \\ \frac{2(x + \frac{5}{4})^2 = -\frac{31}{8}}{2} \quad \frac{25}{8} \end{aligned}$$

$$\sqrt{(x + \frac{5}{4})^2} = \sqrt{\frac{-31}{16}}$$

$$\begin{aligned} x + \frac{5}{4} &= \pm i \sqrt{\frac{31}{4}} \\ \underline{-\frac{5}{4}} \quad \underline{-\frac{5}{4}} \end{aligned}$$

$$\begin{aligned} \boxed{x = -\frac{5}{4} \pm i \frac{\sqrt{31}}{4}} \\ \text{OR} \\ \boxed{x = \frac{-5 \pm i\sqrt{31}}{4}} \end{aligned}$$

$$\begin{aligned} (37) \quad 3x^2 - 6x - 9 &= 0 \\ 3x^2 - 6x &= 9 \\ 3(x^2 - 2x) &= 9 \\ 3(x^2 - 2x + 1) &= 9 + 3 \\ 3(x-1)^2 &= 12 \end{aligned}$$

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

$$x-1 = \pm 2$$

$$\pm 1 \quad \pm 1$$

$$\boxed{x = 3, -1}$$

$$\begin{aligned} (38) \quad x^2 - 2x + 3 &= 0 \\ x^2 - 2x &= -3 \\ x^2 - 2x + 1 &= -3 + 1 \end{aligned}$$

$$\sqrt{(x-1)^2} = \sqrt{-2}$$

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

$$\pm 1 \quad \pm 1$$

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

$$\begin{aligned} (39) \quad x^2 + 4x + 11 &= 0 \\ x^2 + 4x &= -11 \end{aligned}$$

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

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

$$x+2 = \pm i\sqrt{7}$$

$$\underline{-2} \quad \underline{-2}$$

$$\boxed{x = -2 \pm i\sqrt{7}}$$

$$\begin{aligned} (40) \quad x^2 - 6x + 18 &= 0 \\ x^2 - 6x &= -18 \\ x^2 - 6x + 9 &= -18 + 9 \\ \sqrt{(x-3)^2} &= \sqrt{-9} \\ x-3 &= \pm 3i \end{aligned}$$

$$\pm 3 \quad \pm 3$$

$$\boxed{x = 3 \pm 3i}$$

$$\begin{aligned} (41) \quad x^2 - 10x + 29 &= 0 \\ x^2 - 10x &= -29 \\ x^2 - 10x + 25 &= -29 + 25 \end{aligned}$$

$$\sqrt{(x-5)^2} = \sqrt{4}$$

$$x-5 = \pm 2i$$

$$\pm 5 \quad \pm 5$$

$$\boxed{x = 5 \pm 2i}$$

$$\begin{aligned} (42) \quad 3x^2 - 4x &= 2 \\ 3(x^2 - \frac{4}{3}x) &= 2 \\ 3(x^2 - \frac{4}{3}x + \frac{4}{9}) &= 2 + \frac{12}{9} \\ 3(x - \frac{2}{3})^2 &= \frac{10}{3} \end{aligned}$$

$$\sqrt{(x - \frac{2}{3})^2} = \sqrt{\frac{10}{9}}$$

$$x - \frac{2}{3} = \pm \frac{\sqrt{10}}{3}$$

$$\pm \frac{2}{3} \quad \pm \frac{2}{3}$$

$$\boxed{x = \frac{2}{3} \pm \frac{\sqrt{10}}{3}}$$

OR

$$\boxed{x = \frac{2 \pm \sqrt{10}}{3}}$$

$$\begin{aligned} (43) \quad 2x^2 - 7x &= -12 \\ 2(x^2 - \frac{7}{2}x) &= -12 \\ 2(x^2 - \frac{7}{2}x + \frac{49}{16}) &= -12 + \frac{98}{8} \\ 2(x - \frac{7}{4})^2 &= -\frac{47}{8} \end{aligned}$$

$$\sqrt{(x - \frac{7}{4})^2} = \sqrt{-\frac{47}{16}}$$

$$x - \frac{7}{4} = \pm i \sqrt{\frac{47}{16}}$$

$$\underline{+\frac{7}{4}} \quad \underline{+\frac{7}{4}}$$

$$\boxed{\begin{aligned} x &= \frac{7}{4} \pm i \sqrt{\frac{47}{16}} \\ \text{OR} \\ x &= \frac{7 \pm i\sqrt{47}}{4} \end{aligned}}$$

(58) Alonso is correct.
Aida did not add 16 to both sides

$$\begin{aligned} (59) \quad x^2 + bx + c &= 0 \\ x^2 + bx &= -c \\ x^2 + bx + (\frac{b}{2})^2 &= -c + (\frac{b}{2})^2 \\ \sqrt{(x + \frac{b}{2})^2} &= \sqrt{\frac{b^2}{4} - c} \\ x + \frac{b}{2} &= \pm \sqrt{\frac{b^2}{4} - c} \end{aligned}$$

$$\boxed{x = -\frac{b}{2} \pm \sqrt{\frac{b^2}{4} - c}}$$

$$\begin{aligned} (68) \quad 4(3-i) + 6(2-5i) \\ 12 - 4i + 12 - 30i \\ \boxed{24 - 34i} \end{aligned}$$

$$\begin{aligned} (69) \quad \frac{5-2i}{6+9i} \cdot \frac{6-9i}{6-9i} \\ \frac{30 - 45i - 12i + 18i^2}{36 - 54i + 54i - 81i^2} \end{aligned}$$

$$\begin{aligned} (67) \quad (8+5i)(8+5i) \\ 64 + 40i + 40i + 25i^2 \\ \boxed{39 + 80i} \end{aligned}$$

$$= \frac{12 - 57i}{117} - \boxed{\frac{4 - 19i}{39}}$$