2.1 Answer Key

Practice 2.1-2-1:

Answer the following questions and find zeros of the function.

$$f(x) = 2x^2 - 16x$$

a) What is the greatest common factor?

$$2 \cdot \mathrm{x} \cdot \mathrm{x} - 16 \cdot x$$

$$2 \cdot \mathrm{x} \cdot \mathrm{x} - 8 \cdot 2 \cdot x$$

Thus the greates common factor is $\boldsymbol{2x}$

b) What is the factor form?

$$2 \cdot \mathrm{x} \cdot \boxed{\mathrm{x} - 8} \cdot 2 \cdot x$$

$$\boldsymbol{2x(x - 8)}$$

Thus the factor form is $\boldsymbol{2x(x - 8)}$

c) What are x-values?

$$\boldsymbol{2x = 0} \qquad \boldsymbol{x - 8 = 0}$$

$$\boldsymbol{x_1 = 0} \qquad \boldsymbol{x_2 = 8}$$

Thus x values are $\boldsymbol{x = 0, x = 8}$

Practice 2.1-2-2:

Answer the following questions and find zeros of the function.

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

a) What is the greatest common factor?

$$\mathrm{x} \cdot \mathrm{x} + 3 \cdot x$$

Thus the greates common factor is $\boldsymbol{x}$

b) What is the factor form?

$$x \cdot \boxed{x + 3} \cdot x$$

$$\boldsymbol{x(x+3)}$$

Thus the factor form is $\boldsymbol{x(x+3)}$

c) What are x-values?

$$\boldsymbol{x = 0} \qquad \boldsymbol{x + 3 = 0}$$
$$x_1 = \boldsymbol{0} \qquad x_2 = \boldsymbol{-3}$$

Thus x values are $\boldsymbol{x = 0, x = -3}$

Practice 2.1-2-3:

Find zeros of the function.

$$f(x) = x^2 + 8x + 15$$

1. **Check the equation** — it should be in the expanded (standard) form: $f(x) = ax^2 + bx + c$.
   Yes, it is in the expanded (standard) form: $f(x) = ax^2 + bx + c$.

2. **Identify** the values of a, b, and c.

   a=1, b=8, c=15

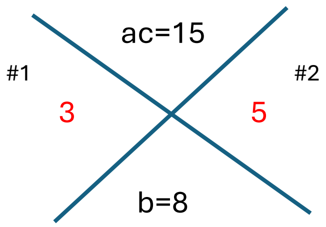
3. **Multiply** a and c and use the **AC method**.

   ac=15

4. **Find two numbers** such as:

   #1·#2=ac, #1+ #2=b

(AC graph)



ac=15

|ac|=15

#1	#2
1	15
3	5

ac is **positive**, both numbers in the pair must have the **same sign.**

Since #1+#2 = b, thus only 3 and 5 is possible.

5. **Rewrite** the function
   $\boldsymbol{a} = \mathbf{1}$ rewrite as $(x + \#1)(x + \#2)$
   Since $\boldsymbol{a} = \mathbf{1}$, then we can rewrite the function as
   $\big(x + (+3)\big)\big(x + (+5)\big) = 0 => (x + 3)(x + 5) = 0$

6. **Set each factor equal to 0** and solve the resulting equations using the **zero-product property**: $\cdot \boldsymbol{B} = \mathbf{0}, \boldsymbol{then}\ \boldsymbol{A} = \mathbf{0}$ **or** $\boldsymbol{B} = \mathbf{0}$

$$(x + 3)(x + 5) = 0$$

$$x + 3 = 0 \qquad\qquad x + 5 = 0$$

$$x_1 = -3 \qquad\qquad x_2 = -5$$

Answer: $\boldsymbol{x = -3}$**, and** $\boldsymbol{x = -5}$

Practice 2.1-2-4:

Find zeros of the function.

$$f(x) = x^2 - 2x - 15$$

1. **Check the equation** — it should be in the expanded (standard) form:
   $f(x) = ax^2 + bx + c.$
   Yes, it is in the expanded (standard) form: $f(x) = ax^2 + bx + c.$

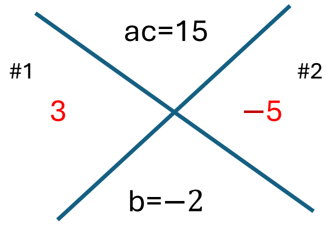
2. **Identify** the values of a, b, and c.

   a=1, b=–2, c=–15

3. **Multiply** a and c and use the **AC method**.

ac=-15

4. **Find two numbers** such as:
   #1·#2=ac, #1+ #2=b
   (AC graph)



ac=-15	
|ac|=15	
#1	#2
2	15
3	-5

ac is **negative**, the pair must consist of **one positive and one negative** number.

Since #1+#2 = b, thus only 3 and -5 is possible.

5. **Rewrite** the function
   $\boldsymbol{a} = \mathbf{1}$ rewrite as $(x + \#1)(x + \#2)$
   Since $\boldsymbol{a} = \mathbf{1}$, then we can rewrite the function as
   $\big(x + (+3)\big)\big(x + (-5)\big) = 0 => (x + 3)(x - 5) = 0$

6. **Set each factor equal to 0** and solve the resulting equations using the **zero-product property**: $\cdot \boldsymbol{B} = \mathbf{0}, \boldsymbol{then}\ \boldsymbol{A} = \mathbf{0}$ **or** $\boldsymbol{B} = \mathbf{0}$

$$(x + 3)(x - 5) = 0$$

$$x + 3 = 0 \qquad\qquad x - 5 = 0$$

$$x_1 = -3 \qquad\qquad x_2 = 5$$

Answer: $\boldsymbol{x = -3}$**, and** $\boldsymbol{x = 5}$

Practice 2.1-2-5:

Find zeros of the function.

$$f(x) = 3x^2 + 10x - 8$$

1. **Check the equation** — it should be in the expanded (standard) form:
   $f(x) = ax^2 + bx + c.$
   Yes, it is in the expanded (standard) form: $f(x) = ax^2 + bx + c.$

2. **Identify** the values of a, b, and c.

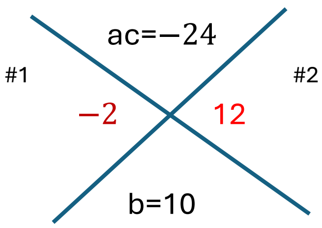
   a=3, b=10, c=-8

3. **Multiply** a and c and use the **AC method**.

   ac=-24

4. **Find two numbers** such as:

   #1·#2=ac, #1+ #2=b
   (AC graph)



ac= -24

\|ac\|=24

#1	#2
1	24
-2	12
3	8
4	6

ac is **negative**, the pair must consist of **one positive and one negative** number.

Since #1+#2 = b, thus only -2 and 12 is possible.

5. **Rewrite** the function
   If $\boldsymbol{a} = \mathbf{1}$ rewrite as $(x + \#1)(x + \#2)$
   If $a \neq 1$ rewrite as $(x + \frac{\#1}{a})(x + \frac{\#2}{a})$
   Since $a \neq 1$, then we can rewrite the function as
   $\left(x + \left(\frac{-4}{10}\right)\right)\left(x + \left(\frac{-15}{10}\right)\right) = 0 => \left(x - \frac{2}{5}\right)\left(x - \frac{3}{2}\right) = 0$

6. **Set each factor equal to 0** and solve the resulting equations using the **zero-product property**: $\cdot\, \boldsymbol{B} = \mathbf{0}, \boldsymbol{then}\ \boldsymbol{A} = \mathbf{0}$ **or** $\boldsymbol{B} = \mathbf{0}$

$$\left(x - \frac{2}{3}\right)\left(x + \frac{12}{3}\right) = 0$$

$x - \frac{2}{3} = 0$ $\qquad\qquad$ $x + \frac{12}{3} = 0$

$x_1 = \frac{2}{3}$ $\qquad\qquad$ $x + 4 = 0$

$x_2 = -4$

Answer: $\boldsymbol{x} = \frac{\mathbf{2}}{\mathbf{3}}$**, and** $\boldsymbol{x} = -\mathbf{4}$

Practice 2.1-3-1:

Find zeros of the function.

$$f(x) = 3x^2 - 75$$

The given a quadratic equation in the form $f(x) = ax^2 + c$, and ask for finding real zeros/x-intercept/solve for x, we set the equation equal to zero, then solve.

$$3x^2 - 75 = 0$$

$$3x^2 = 75$$

$$x^2 = \frac{75}{3}$$

$$x^2 = 25 \qquad Since\ 25 \geq 0\ we\ continue\ the\ rest\ steps$$

$$\sqrt{x^2} = \pm\sqrt{25}$$

$$x = \pm\sqrt{25}$$

$$x = \pm 5$$

Thus $x = 5$ and $x = -5$

Practice 2.1-3-2:

Find zeros of the function.

$$f(x) = 2(x-3)^2 - 8$$

The given a quadratic equation in the form $f(x) = a(x-h)^2 + k$, and ask for finding real zeros/x-intercept/solve for x, we set the equation equal to zero, then solve.

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

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

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

$$(x-2)^2 = 4 \quad Since\ 4 \geq 0\ we\ continue\ the\ rest\ steps$$

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

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

$$x - 2 = \pm 2$$

$$x - 2 = 2 \qquad x - 2 = -2$$

$$x_1 = 4 \qquad x_2 = 0$$

Thus $x = 4$ and $x = 0$

Practice 2.1-4-1:

Find zeros of the function.

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

1. Write in standard form $ax^2 + bx + c = 0$.
   $$2x^2 - 8x + 5 = 0$$
2. Identify the variables a, b and c.
   $$a = 2, \qquad b = -8\ , \qquad c = 5$$
3. Substitute the variables a, b, and c into the quadratic formula:
   $$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
   $$x = \frac{-(-8) \pm \sqrt{(-8)^2 - 4(2)(5)}}{2(2)}$$
4. Simplify.
   Find $\triangle$ first: $b^2 - 4ac$
   $$(-8)^2 - 4(2)(5)$$
   $$= 64 - 40$$
   $$= 24$$
   Since $\triangle > 0$, thus we have two answers, continue the rest.
   $$x = \frac{8 \pm \sqrt{24}}{4}$$
   $$x = \frac{8 \pm \sqrt{4 \cdot 6}}{4}$$
   $$x = \frac{8 \pm 2\sqrt{6}}{4}$$
   $$x = \frac{4 \pm \sqrt{6}}{2}$$

Simplify the fraction

GCD: common divisor is 2

Answer: $x = \frac{4+\sqrt{6}}{2}$, $x = \frac{4-\sqrt{6}}{2}$