

Finding the zeros of $y = ax^2 + bx + c$
is the same as
 solving the equation $ax^2 + bx + c = 0$

To Solve a Quadratic Equation:

- write in the form $ax^2 + bx + c = 0$
- fully factor
- determine the value of x that makes each factor equal to zero

Ex. 1 Solve.

a) $(x - 5)(2x + 3) = 0$

$$\begin{array}{l} \downarrow \qquad \downarrow \\ x = 5 \qquad 2x + 3 = 0 \\ \qquad \qquad 2x = -3 \\ \qquad \qquad x = \frac{-3}{2} \end{array}$$

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

$$\begin{array}{l} \downarrow \qquad \downarrow \\ x = 0 \qquad 3x - 5 = 0 \\ \qquad \qquad 3x = 5 \\ \qquad \qquad x = \frac{5}{3} \end{array}$$

c) $x^2 + 4x - 5 = 0$

$$\begin{array}{l} (x + 5)(x - 1) = 0 \\ \downarrow \qquad \downarrow \\ x = -5 \qquad x = 1 \end{array}$$

d) $x^2 - 7x + 12 = 0$

$$\begin{array}{l} (x - 3)(x - 4) = 0 \\ \downarrow \qquad \downarrow \\ x = 3 \qquad x = 4 \end{array}$$

e) $2x^2 + 5x - 3 = 0$
 $(2x-1)(x+3) = 0$

M -6
 A 5

$2x-1=0$
 $x = \frac{1}{2}$

$x = -3$

N $\frac{2x}{-1}$ $\frac{2x}{6}$
 $\frac{x}{3}$

f) $10x^2 + 19x + 6 = 0$
 $(5x+2)(2x+3) = 0$

M 60
 A 19

$5x+2=0$
 $x = -\frac{2}{5}$

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

N $\frac{10x}{4}$ $\frac{10x}{15}$
 $\frac{5x}{2}$ $\frac{2x}{3}$

$\frac{60}{1, 60}$
 $2, 30$
 $3, 20$
 $4, 15$
 $5, 12$
 $6, 10$

1) Determine the vertex by completing the square.

$$y = 0.2x^2 - 10x + 63$$

2) Determine the x-intercepts and the vertex for the following.

$$y = x^2 + 4x - 45$$

3) Solve.

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

$$\textcircled{1} \quad y = 0.2x^2 - 10x + 63$$

$$y = 0.2(x^2 - 50x + 625 - 625) + 63$$

$$y = 0.2(x^2 - 50x + 625) - 125 + 63$$

$$y = 0.2(x - 25)^2 - 62$$

\therefore Vertex $(25, -62)$

$$\textcircled{2} \quad y = x^2 + 4x - 45$$

$$y = (x + 9)(x - 5)$$

$$\begin{array}{cc} \downarrow & \downarrow \\ x = -9 & x = 5 \end{array}$$

$$\begin{aligned} \text{AOS} \\ x &= \frac{-9+5}{2} \\ &= -2 \end{aligned} \quad \begin{array}{l} \rightarrow \text{Sub in to solve for } y \\ y = (-2)^2 + 4(-2) - 45 \\ y = 4 - 8 - 45 \\ y = -49 \end{array}$$

$$\therefore \text{Vertex}(-2, -49)$$

↓

X-ints are: -9, 5

$$\begin{aligned} \textcircled{3} \quad 0 &= 2x^2 - 8x \\ 0 &= 2x(x-4) \\ \downarrow \quad \downarrow \\ x &= 0 \quad x = 4 \end{aligned}$$

5.4 Graphing from Factored Form



Ex. 1 Determine the x-intercepts and vertex, then sketch.

a) $y = x^2 - 8x + 12$

$$y = (x-2)(x-6)$$

$$\begin{array}{cc} \downarrow & \downarrow \\ x=2 & x=6 \end{array}$$

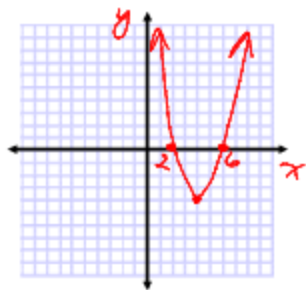
AOS $x = \frac{2+6}{2}$

$$x = 4$$

Sub in

$$y = (4-2)(4-6)$$

$$y = -4 \quad v(4, -4)$$



b) $y = 9 - x^2$

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

$$y = -(x^2 - 9)$$

$$y = -(x-3)(x+3)$$

AOS $x = \frac{-3+3}{2}$

$$= 0$$

Sub in

$$y = 9 - (0)^2$$

$$y = 9 \quad v(0, 9)$$

