

Directions: Find the vertex, x-intercepts, and y-intercepts for each equation.

If it can be factored, solve it that way.

If it can't be factored, solve it by completing the square (vertex form).

Then, use the information to graph.

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

Vertex: $(-4, -14)$

X-intercepts: -0.26 and -7.74

y-intercept: $(0, 2)$



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

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

$$y + 14 = (x + 4)^2$$

$$y = (x + 4)^2 - 14$$

$$\pm\sqrt{14} = x + 4 \quad x = -4 \pm \sqrt{14}$$

y-scale = 2

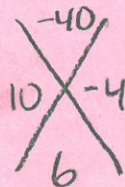


2. $y = x^2 + 6x - 40$

Vertex: $(-3, -49)$

X-intercepts: $(-10, 0)$ and $(4, 0)$

y-intercept: $(0, -40)$



$$y = (x + 10)(x - 4)$$

$$0 = (x + 10)(x - 4)$$

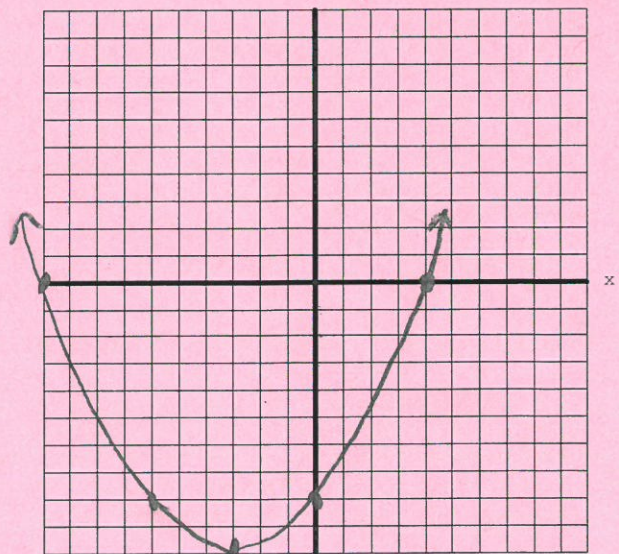
$$x = -10 \quad x = 4$$

$$x = \frac{-6}{2(1)} = -3$$

$$y = (-3)^2 + 6(-3) - 40$$

$$= 9 - 18 - 40 = -49$$

y-scale = 5

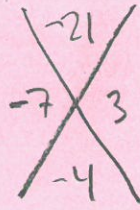


3. $y = x^2 - 4x - 21$

Vertex: $(2, -25)$

X-intercepts: $(7, 0)$ and $(-3, 0)$

y-intercept: $(0, -21)$



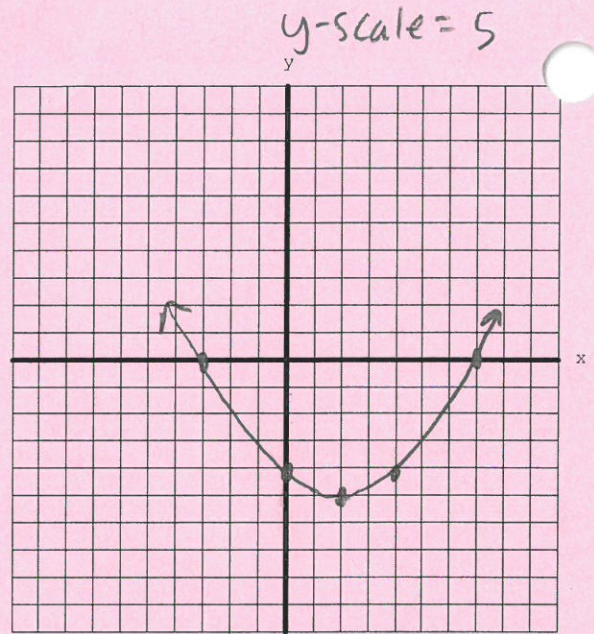
$y = (x-7)(x+3)$

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

$x = 7, x = -3$

$x = \frac{-b}{2a} = \frac{4}{2(1)} = 2$

$y = (2)^2 - 4(2) - 21 = -25$



4. $y = x^2 - 24x + 124$

Vertex: $(12, -20)$

X-intercepts: $12 + \sqrt{5}$ and $12 - \sqrt{5}$

y-intercept: $(0, 124)$

$y - 124 + 144 = x^2 - 24x + 144$

$y + 20 = (x-12)^2$

$y = (x-12)^2 - 20$

$\pm \sqrt{20} = (x-12)$

$x = 12 \pm 2\sqrt{5}$

$x \approx 16.47$

$x \approx 7.53$



- 1. 124
- 2. 62
- 4. 31

