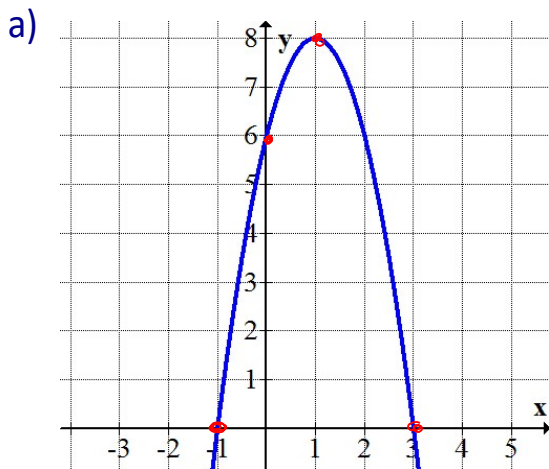




3.7 Creating Quadratic Equations

Ex. 1 Determine the equation of the parabola in factored form.



Zeros $(-1, 0)$ & $(3, 0)$ $y = a(x-r)(x-s)$

$$y = a(x - (-1))(x - 3)$$

$$y = a(x + 1)(x - 3)$$

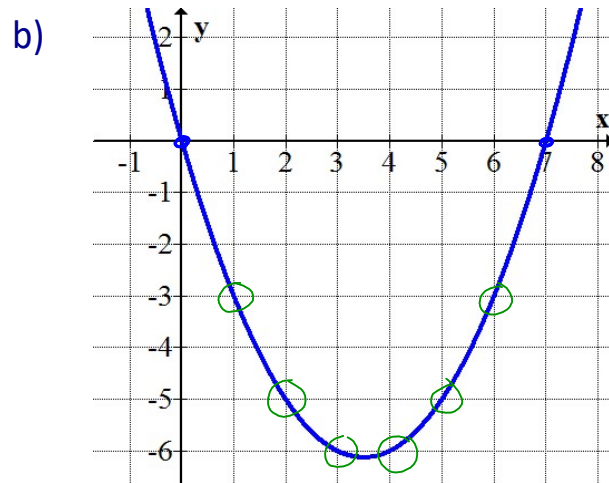
Sub in point $(0, 6)$

$$6 = a(0 + 1)(0 - 3)$$

$$6 = a(-3)$$

$$-2 = a$$

$$\therefore y = -2(x + 1)(x - 3)$$



Zeros: $(0, 0)$ & $(7, 0)$

$$y = a(x - 0)(x - 7)$$

Sub $(1, -3)$

$$-3 = a(1)(1 - 7)$$

$$-3 = a(-6)$$

$$\frac{3}{6} = a$$

$$\frac{1}{2} = a$$

$$\therefore y = \frac{1}{2}(x)(x - 7)$$



2) Find the equation of a parabola that has:

a) vertex at $(-2, 5)$ and goes through $(1, -3)$

$$y = a(x - h)^2 + k$$

$$y = a(x - (-2))^2 + 5$$

$$y = a(x + 2)^2 + 5$$

Sub in $(1, -3)$

$$-3 = a(1 + 2)^2 + 5$$

$$-8 = a(9)$$

$$a = -\frac{8}{9}$$

$$\therefore y = -\frac{8}{9}(x + 2)^2 + 5$$

b) stretch factor of 2, reflected about the x-axis, equation of the axis of symmetry $x = 3$ and goes through the point $(2, 5)$

$$y = a(x - h)^2 + k$$

$V(3, ?)$

$$y = -2(x - 3)^2 + k$$

Sub in $(2, 5)$

$$5 = -2(2 - 3)^2 + k$$

$$5 = -2(1) + k$$

$$7 = k$$

$$\therefore y = -2(x - 3)^2 + 7$$



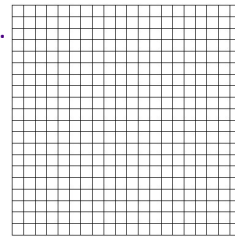
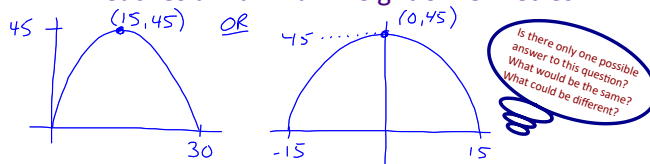
Strategies?

- 1) Find the equation of a parabola in vertex form that has:
 - a) vertex at $(-3, 2)$ and goes through $(-1, 14)$
 - b) vertex at $(5, -3)$ and goes through $(1, -8)$
 - c) vertex at $(2, 0)$ and goes through $(5, 9)$

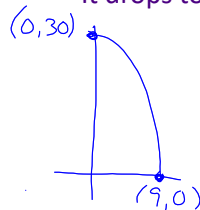
Vertex Form \rightarrow Sub in Vertex \rightarrow Sub in point to solve for a

- 2) Sketch each parabola, then determine its equation. determine the value of 'a'.

- a) The parabola is 30 metres wide and reaches a maximum height of 45 metres.

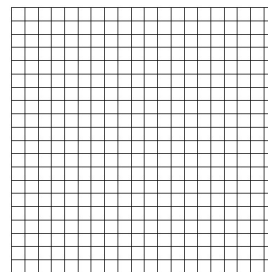
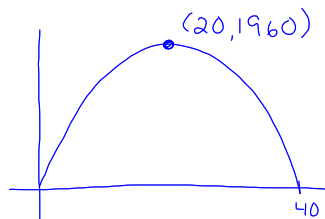


- b) The parabola starts at the highest point of 30 m. It drops to zero 9 metres to the right of the highest point.



- 3) A bullet is launched from ground level and reaches a maximum height of 1960 feet after 20 seconds.

- a) Write an equation to model this situation. Find "a" algebraically.
- b) When does the bullet hit the ground?
- c) What is the projectile's height after 10 seconds? At what other time does it reach the same height?



c) Sub in $x=10$ into eqⁿ



Symmetrical
at $x=30$

Practice:

Set 1: p. 186 #7b,8,9,10a,18

Set 2: p. 186 #8,9,10,13,15,18