

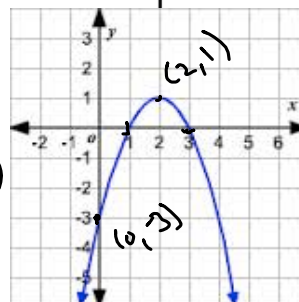
Date: _____

3.4 Continued - Writing Equations in Standard Form



Determine the equation of the parabola shown.

$$\begin{aligned}
 r=1 & \quad y = a(x-r)(x-s) \\
 s=3 & \quad 1 = a(2-1)(2-3) \\
 x=2 & \quad 1 = a(1)(-1) \\
 y=1 & \quad 1 = -a \\
 & \quad a = -1 \\
 & \quad y = -(x-1)(x-3)
 \end{aligned}$$



What did you need to know to be able to write an equation in factored form?

zeros and any point on the curve

What would we need to do to write the equation in standard form?

Expand it!

What is the equation in standard form?

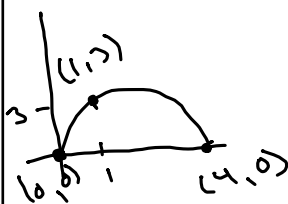
$$\begin{aligned}
 y &= (-x+1)(x-3) \\
 &= -x(x-3) + 1(x-3) \\
 &= -x^2 + 3x + 1x - 3 \\
 &= -x^2 + 4x - 3
 \end{aligned}$$

More Practice

- 1) Determine the equation of a parabola that has zeros at -2 and 4 and passes through the point (3, -5) in standard form.

$$\begin{aligned}
 y &= a(x-r)(x-s) & y &= (x+2)(x-4) \\
 -5 &= a(3+2)(3-4) & &= x^2 - 4x + 2x - 8 \\
 -5 &= a(5)(-1) & &= x^2 - 2x - 8 \\
 -5 &= -5a & & \\
 \frac{-5}{-5} &= \frac{-5a}{-5} & & \rightarrow a=1
 \end{aligned}$$

- 2) A soccer ball is kicked from the ground and follows a parabolic path. It reaches a height of 3 m after 1 second and hits the ground 4 seconds after it was kicked. Determine an equation in standard form to model the flight of the ball.



$$\begin{aligned}
 r=0 & \quad x=1 \\
 s=4 & \quad y=3
 \end{aligned}$$

$$\begin{aligned}
 y &= a(x-r)(x-s) \\
 3 &= a(1-0)(1-4) \\
 3 &= a(1)(-3) \\
 3 &= -3a \\
 \frac{3}{-3} &= \frac{-3a}{-3} \\
 -1 &= a
 \end{aligned}$$

$$\begin{aligned}
 y &= -(x-0)(x-4) \\
 &= -x(x-4) \\
 &= -x^2 + 4x \\
 &\rightarrow
 \end{aligned}$$

