

Determining the Equation of Quadratic Relations in Factored Form

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Recall:

1. Factored Form: $y = a(x - s)(x - t)$
2. If $a > 0$, the parabola opens up
If $a < 0$, the parabola opens down
3. s and t are the zeroes (x-intercepts)

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Ex.1 Determine an equation, in factored form, using the given information:

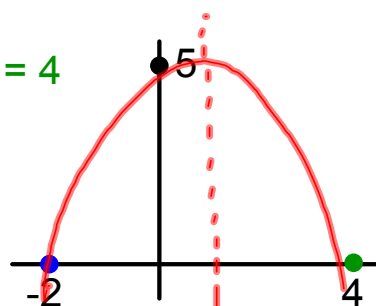
- (a) the ^{zeroes} x-intercepts are ^s-2 and ^t4, and the y-intercept is 5.

zeroes are -2 and 4, so $s = -2$ and $t = 4$

$$y = a(x - s)(x - t)$$

$$y = a(x - (-2))(x - (4))$$

$$y = a(x + 2)(x - 4)$$



To find a , we require another point on the parabola.

The y-intercept is 5, which is the point (0, 5).

$$5 = a(0 + 2)(0 - 4)$$

$$5 = a(2)(-4)$$

$$5 = -8a$$

$$a = -5/8$$

$\therefore \text{equation is } y = -\frac{5}{8}(x + 2)(x - 4)$

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(b) the zeroes are -3 and 5, and a point on the graph is (7, 2).

$$y = a(x+3)(x-5)$$

$$y = a(x-s)(x-t)$$

Sub (7, 2)

$$2 = a(7+3)(7-5)$$

$$2 = a(10)(2)$$

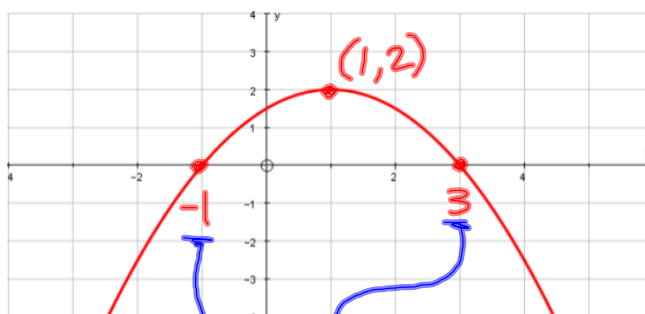
$$\frac{2}{20} = \frac{20a}{20}$$

$$a = \frac{1}{10}$$

$$y = \frac{1}{10}(x+3)(x-5)$$

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(c)



$$y = a(x-s)(x-t)$$

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

Sub (1, 2)

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

$$2 = a(2)(-2)$$

$$\frac{2}{-4} = \frac{-4a}{-4}$$

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

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

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(d) there is only one zero which is 2, and the parabola passes through the point (5, -2).

$$y = a(x-s)(x-t)$$

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

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

sub (5, -2)

$$-2 = a(5-2)^2$$

$$\frac{-2}{9} = \frac{a(9)}{9}$$

$$a = -\frac{2}{9}$$

$$y = -\frac{2}{9}(x-2)^2$$

both
zeros
are
the same.

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(e) the zeroes are -1 and 5, and the optimal value is -7.

$\begin{matrix} s & t \end{matrix}$

$\begin{matrix} y_v \end{matrix}$

$$y = a(x+1)(x-5)$$

sub (2, -7)

$$-7 = a(2+1)(2-5)$$

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

$$\frac{-7}{-9} = \frac{-9a}{-9}$$

$$a = \frac{7}{9}$$

$$y = \frac{7}{9}(x+1)(x-5)$$

$$x_v = ?$$

$$x_v = \frac{-1+5}{2}$$

$$= \frac{4}{2}$$

$$= 2$$

vertex (2, -7)

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Assigned Work:

p. 280 # 1 - 4, 5odd, 8, 9ace, 12