Solutions

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1. Which of the following quadratic functions will have a maximum value? Explain how you know.

a) $y = -x^2 + 7x$

$a = -1$

$\Rightarrow$ opens down

$\Rightarrow$ maximum value

c) $f(x) = -4(x + 2)(x - 3)$

$a = -4$

$\Rightarrow$ opens down

$\Rightarrow$ maximum value

b) $f(x) = 3(x - 1)^2 - 4$

$a = 3$

$\Rightarrow$ opens up

$\Rightarrow$ minimum value
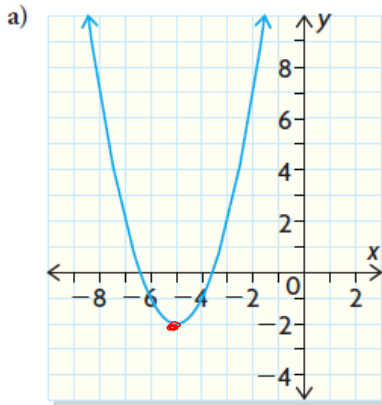
d) $g(x) = 4x^2 + 3x - 5$

$a = 4$
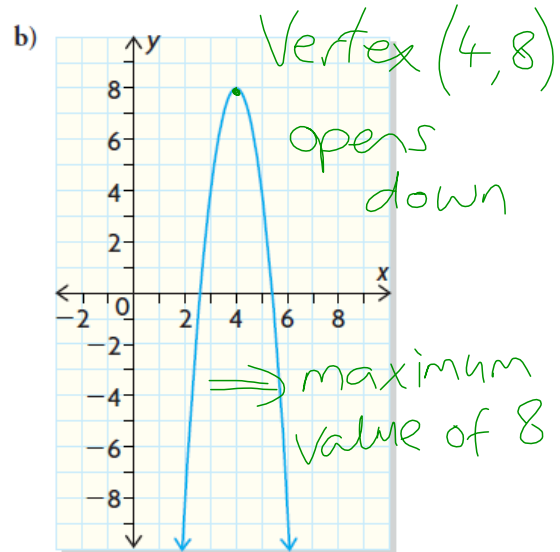
$\Rightarrow$ opens up

$\Rightarrow$ minimum value

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2. State the vertex of each parabola and indicate the maximum or minimum value of the function.

a)

Vertex $(-5, -2)$

opens up

$\Rightarrow$ minimum value of -2

b)

Vertex $(4, 8)$

opens down

$\Rightarrow$ maximum value of 8

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3. Determine the maximum or minimum value for each.

a) $y = -4(x+1)^2 + 6$

$a = -4$
$k = 6$
$\Rightarrow$ maximum value of 6

b) $f(x) = (x-5)^2$

$a = 1$
$k = 0$
$\Rightarrow$ minimum value of 0

c) $f(x) = -2x(x-4)$

$r = 0, \ s = 4$

$h = \dfrac{r+s}{2} = \dfrac{0+4}{2} = \dfrac{4}{2} = 2$

$k = -2(2)(2-4) = 8$

$\Rightarrow$ maximum value of 8

d) $g(x) = 2x^2 - 7$

Think of it as $2(x-0)^2 - 7$
$a = 2$　[if that helps]
$k = -7$
$\Rightarrow$ minimum value of -7

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4. Determine the maximum or minimum value. Use at least two different

K methods.

a) $y = x^2 - 4x - 1$

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

$$k = (2)^2 - 4(2) - 1 = -5$$

$$\Rightarrow \text{minimum of } -5$$

d) $y = -3x^2 - 12x + 15$

$$\frac{-b}{2a} = \frac{-(-12)}{2(-3)} = \frac{12}{-6} = -2$$

$$k = -3(-2)^2 - 12(-2) + 15 = 27$$

$$\Rightarrow \text{maximum of } 27$$

b) $f(x) = x^2 - 8x + 12$

$$\frac{-b}{2a} = \frac{-(-8)}{2(1)} = \frac{8}{2} = 4$$

$$k = (4)^2 - 8(4) + 12 = -4$$

$$\Rightarrow \text{minimum of } -4$$

e) $y = 3x(x - 2) + 5$

$$= 3x^2 - 6x + 5$$

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

$$k = 3(1)(1-2) + 5 = 2$$

$$\Rightarrow \text{minimum of } 2$$

c) $y = 2x^2 + 12x$

$$\frac{-b}{2a} = \frac{-12}{2(2)} = \frac{-12}{4} = -3$$

$$k = 2(-3)^2 + 12(-3) = -18$$

$$\Rightarrow \text{minimum of } -18$$

f) $g(x) = -2(x + 1)^2 - 5$

Already in vertex form

$$\Rightarrow k = -5$$

$$\Rightarrow \text{maximum of } -5$$

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