Solutions

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2. How are the parabolas $f(x) = -3(x-2)^2 - 4$ and $g(x) = 6(x-2)^2 - 4$ the same? How are they different?

Same vertex $(2, -4)$

Different directions of opening

3. What point do the parabolas $f(x) = -2x^2 + 3x - 7$ and $g(x) = 5x^2 + 3x - 7$ have in common?

Both have the same y-intercept $(0, -7)$

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4. Determine the equation of the parabola with x-intercepts

b)   0 and 8, and that passes through $(-3, -6)$

Given the zeros, so write in factored form

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

(x,y) is $(-3,-6)$, $r=0$, $s=8$

$$\Rightarrow -6 = a(-3-(0))(-3-(8))$$

$$-6 = a(-3)(-11)$$

$$\frac{-6}{33} = \frac{33a}{33}$$

$$\frac{-2}{11} = a$$

$$\Rightarrow y = -\frac{2}{11}(x-0)(x-8)$$

$$\boxed{y = -\frac{2}{11}x(x-8)}$$

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5. Determine the equation of the parabola with vertex

b) $(1, 6)$ and that passes through $(0, -7)$ c) $(4, -5)$ and that passes through $(-1, -3)$

Both in vertex form, so write in vertex form

(h,k) is $(1,6)$ (h,k) is $(4,-5)$

(x,y) is $(0,-7)$ (x,y) is $(-1,-3)$

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

$$-7 = a(0-1)^2 + 6 \qquad -3 = a(-1-4)^2 - 5$$

$$-7 = a(1) + 6 \qquad\quad -3 = a(25) - 5$$

$$-13 = a \qquad\qquad \frac{2}{25} = \frac{25a}{25} \qquad a = \frac{2}{25}$$

$$\Rightarrow y = -13(x-1)^2 + 6 \qquad \Rightarrow y = \frac{2}{25}(x-4)^2 - 5$$

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8. Determine the equation of the parabola with x-intercepts ± 4 and passing
K through $(3, 6)$.

Given the zeros $\Rightarrow$ write in factored form

(x, y) is $(3, 6)$, $r = -4$, $s = 4$

$$y = a(x - r)(x - s)$$
$$6 = a(3 - (-4))(3 - (4))$$
$$6 = a(7)(-1)$$
$$\frac{6}{-7} = \frac{-7a}{-7}$$
$$a = -\frac{6}{7}$$
$$\Rightarrow y = -\frac{6}{7}(x + 4)(x - 4)$$

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12. Jason tossed a ball over a motion detector and it recorded these data.

Time (s)	0	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00
Height above Ground (m)	0	2.1875	3.75	4.6875	5		4.6875	3.75	2.1875	0

a) Draw a scatter plot of the data.
b) Draw a curve of good fit.
c) Determine an algebraic expression that models the data. Express the function in standard form.

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

(h, k) is $(1, 5)$

(x, y) is $(0, 0)$ $\leftarrow$ could use any other point

$$0 = a(0 - 1)^2 + 5$$
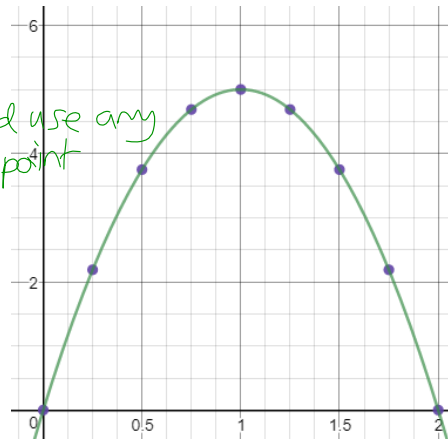$$0 = a(1) + 5$$
$$-5 = a$$
$$\Rightarrow y = -5(x - 1)^2 + 5$$
$$y = -5(x^2 - x - x + 1) + 5$$
$$y = -5(x^2 - 2x + 1) + 5$$
$$y = -5x^2 + 10x - 5 + 5$$
$$y = -5x^2 + 10x$$

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