

Part 1: Write the expression that fits each blank. Then name the transformation(s).

$f(x) = x^2$

$g(x) = |x|$

$h(x) = \sqrt{x}$

$j(x) = x^3$

$k(x) = \sqrt[3]{x}$

Expression	$f(x+2) = (x+2)^2$	$2g(x) = 2 x $	$h(x) - 4 = \sqrt{x} - 4$	$j(0.1x) = (0.1x)^3$
Transformation	Left 2	Vertical Stretch by 2	Down 4	Horizontal Stretch by 0.1
Expression:	$2k(x-1) = 2\sqrt[3]{x-1}$	$g(2x) + 4 = 2x + 4$	$f(2(x-5)) = (2(x-5))^2$	$4h(x) + 3 = 4\sqrt{x} + 3$
Transformation	Right 1 Vert. Stretch by 2	Horizontal Stretch by 2 Up 4	Right 5 Horiz. Stretch by 2	Up 3 Vert. Stretch by 4

Part 2: Write the equation for each function described below:

1. Parent Quadratic function ($y = x^2$) is reflected over the x-axis, translated down 4 units and left 2 units.

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

2. Parent Cubic function ($y = x^3$) is stretched vertically by a factor of 3, translated right 5 units and up 1 unit.

$$y = 3(x-5)^3 + 1$$

3. Parent Square Root function ($y = \sqrt{x}$) is reflected over the y-axis, compressed vertically by a factor of $\frac{1}{2}$ and translated left 4 units.

$$y = \frac{1}{2}\sqrt{-(x+4)}$$

4. Parent Cube Root function ($y = \sqrt[3]{x}$) is reflected over the y-axis, compressed horizontally by a factor of 8 and translated up 3.

$$y = \sqrt[3]{-8x} + 3$$

5. Parent Absolute Value function ($y = |x|$) is stretched vertically by a factor of 2, translated right 3 units and reflected over the x-axis.

$$y = -2|x-3|$$

6. Parent Linear function ($y = x$) is reflected over the x-axis, stretched vertically by a factor of 4 and translated right 2 units.

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

Part 3: Find the exact equation of each function described below.

1. Parent *quadratic* function with a vertex of (2,-3) that passes through the point (3,12)

$$y = a(x-2)^2 - 3$$

$$12 = a(3-2)^2 - 3 \rightarrow 12 = a(1) - 3 \rightarrow 15 = a$$

$$y = 15(x-2)^2 - 3$$

2. Parent *cubic* function with an inflection point of (-4, -3) that passes through the point (-5,2)

$$y = a(x+4)^3 - 3$$

$$2 = a(-5+4)^3 - 3 \rightarrow 2 = a(-1) - 3 \rightarrow 5 = a(-1) \rightarrow -5 = a$$

$$y = -5(x+4)^3 - 3$$

3. Parent *square root* function with a vertex of (3,5) that passes through the point (7,-3)

$$y = a\sqrt{x-3} + 5$$

$$-3 = a\sqrt{7-3} + 5 \rightarrow -3 = a\sqrt{4} + 5 \rightarrow -8 = a \cdot 2 \rightarrow -4 = a$$

$$y = -4\sqrt{x-3} + 5$$

4. Parent *cube root* function with an inflection point of (-1,-1) that passes through the origin

$$y = a\sqrt[3]{x+1} - 1$$

$$0 = a\sqrt[3]{0+1} - 1 \rightarrow 1 = a$$

$$y = \sqrt[3]{x+1} - 1$$

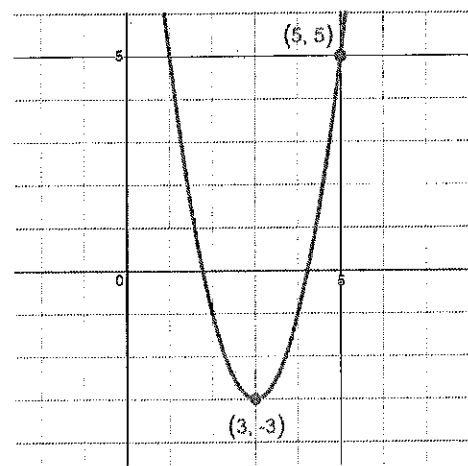
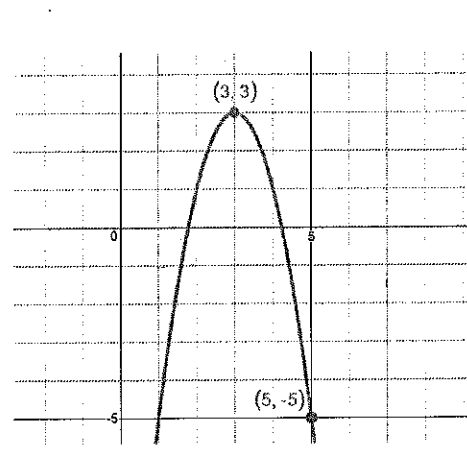
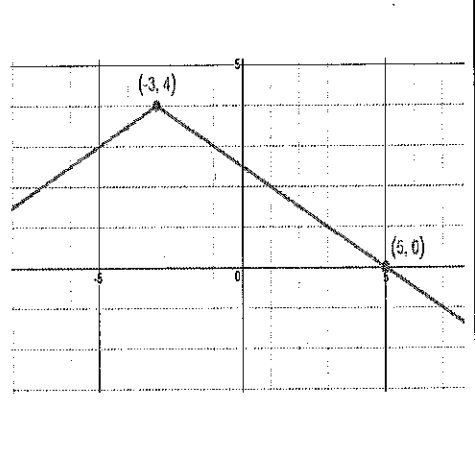
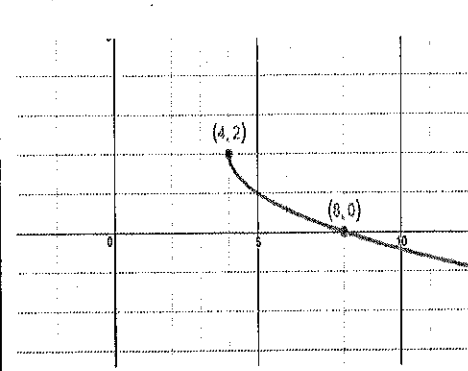
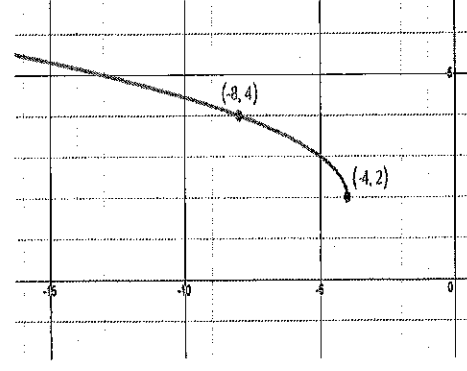
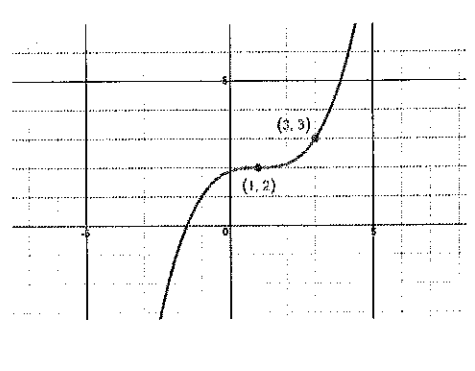
5. Parent *absolute value* function with a vertex of (7, -3) that passes through the origin

$$y = a|x-7| - 3$$

$$0 = a|0-7| - 3 \rightarrow 0 = a \cdot 7 - 3 \rightarrow 3 = a \cdot 7 \rightarrow \frac{3}{7} = a$$

$$y = \frac{3}{7}|x-7| - 3$$

Part 4: Find the exact equation of each graph below:

		
Equation: $y = 2(x-3)^2 - 3$	Equation: $y = -2(x+3)^2 + 3$	Equation: $y = -\frac{1}{2} x+3 + 4$
		
Equation: $y = -\sqrt{x-4} + 2$	Equation: $y = \sqrt{-(x+4)} + 2$	Equation: $y = \frac{1}{8}(x-1)^3 + 2$