

No calculator. Show all work for full credit.

1. Graph. If there are transformations, list them. Each graph must have a MINIMUM of FOUR points!

$$y = \frac{1}{x} - 3$$

Transformations: down 3

$$y = \frac{1}{x}$$

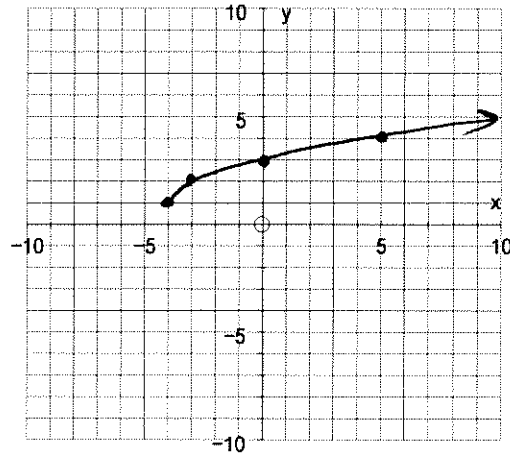
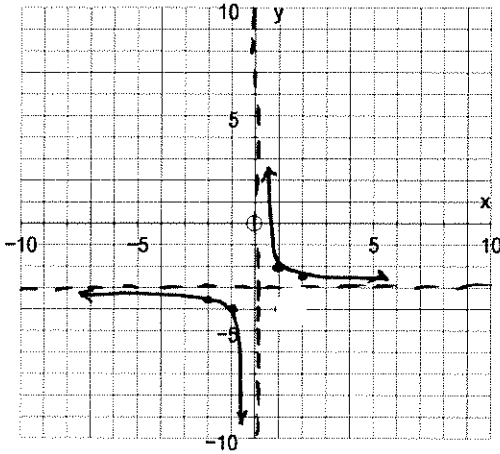
x	y
-2	-1/2
-1	-1
0	x
1	1
2	1/2

$$y = \sqrt{x+4} + 1$$

Transformations: left 4, up 1

$$y = \sqrt{x}$$

x	y
0	0
1	1
4	2
9	3



$$f(x) = -3|x|$$

Transformations: flip, vertical stretch x 3

$$y = |x|$$

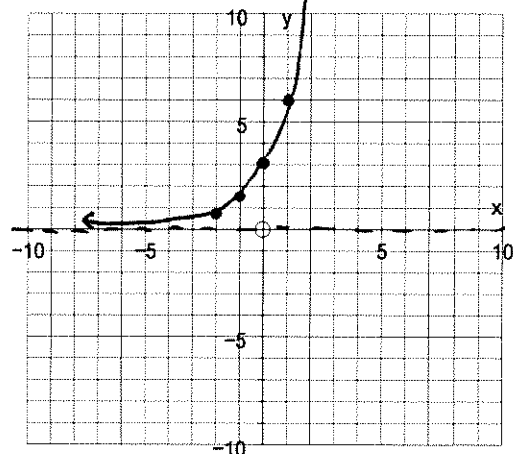
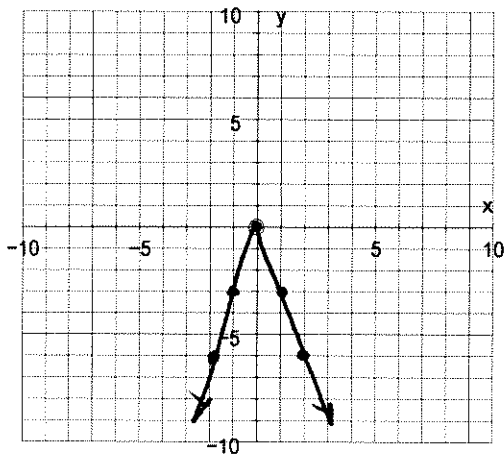
x	y
-2	2
-1	1
0	0
1	1
2	2

$$f(x) = 3(2)^x$$

Transformations (optional): vertical stretch x 3

$$y = 2^x$$

x	y
-2	1/4
-1	1/2
0	1
1	2
2	4



$$y = 3 \cdot 2^x$$

x	y
-2	3/4
-1	3/2
0	3
1	6
2	12

2. Graph the transformed functions. Include a table for the "parent" graph, and a SECOND table for the transformed graph.

$$f(x) = 3^x - 4$$

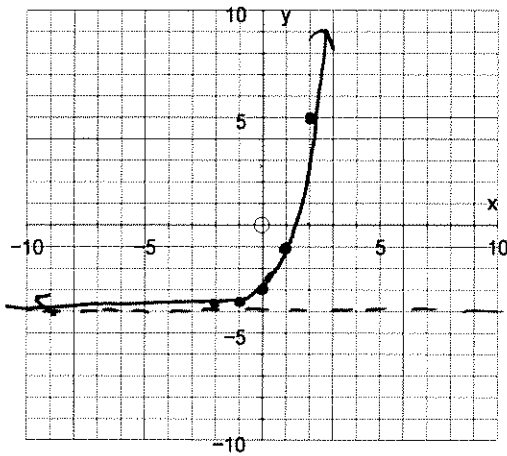
Transformations: down 4

parent $y = 3^x$

final

x	y
-2	1/9
-1	1/3
0	1
1	3
2	9

x	y
-2	-3 1/9
-1	-3 1/3
0	-3
1	-1
2	5



$$f(x) = 3\left(\frac{1}{2}\right)^{x-3}$$

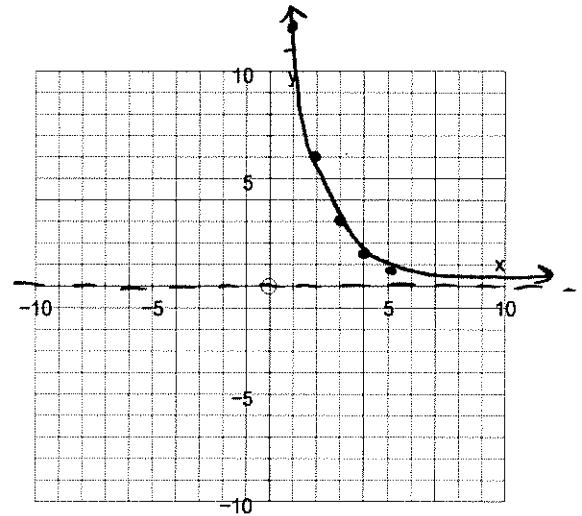
Transformations: right 3, vertical stretch x 3

parent $y = \left(\frac{1}{2}\right)^x$

final

x	y
-2	4
-1	2
0	1
1	1/2
2	1/4

x	y
1	12
2	6
3	3
4	1 1/2
5	3/4



3. Solve each equation. I recommend checking your answers!

2. $\frac{5\sqrt{x}}{2} = 3$ 2.

$$\frac{5\sqrt{x}}{5} = \frac{6}{5}$$

$$\sqrt{x} = \frac{6}{5}$$

$$x = \frac{36}{25}$$

$$(\sqrt{x})^2 = \left(\frac{6}{5}\right)^2$$

b. $-2\sqrt{x-4} = 6$

$$\sqrt{x-4} = -3$$

no solution

c. $3\sqrt{3x} - 2 = 4$

$$3\sqrt{3x} = 6$$

$$\sqrt{3x} = 2$$

$$(\sqrt{3x})^2 = (2)^2$$

$$3x = 4$$

$$x = \frac{4}{3}$$

4. Simplify.

a) $(\sqrt{3})(\sqrt{8})$

$$= \sqrt{24}$$

$$= \boxed{2\sqrt{6}}$$

b) $(2\sqrt{6})^2$

$$= 4 \cdot 6$$

$$= \boxed{24}$$

c) $\sqrt{2}(4-\sqrt{2})$

$$= \boxed{4\sqrt{2} - 2}$$

d) $(2+\sqrt{2})(3-\sqrt{2})$

$$6 - 2\sqrt{2} + 3\sqrt{2} - 2$$

$$= \boxed{4 + \sqrt{2}}$$

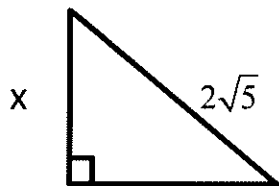
e) $(3+\sqrt{5})^2$

$$(3+\sqrt{5})(3+\sqrt{5})$$

$$9 + 3\sqrt{5} + 3\sqrt{5} + 5$$

$$= \boxed{14 + 6\sqrt{5}}$$

5. Solve for the missing side.



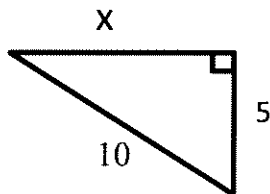
$$x^2 + (\sqrt{6})^2 = (2\sqrt{5})^2$$

$$x^2 + 6 = 4 \cdot 5$$

$$x^2 + 6 = 20$$

$$x^2 = 14$$

$$x = \sqrt{14}$$



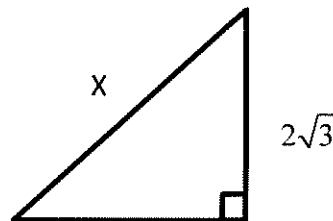
$$x^2 + 5^2 = 10^2$$

$$x^2 + 25 = 100$$

$$x^2 = 75$$

$$x = \sqrt{75}$$

$$x = 5\sqrt{3}$$



$$(2\sqrt{3})^2 + (2\sqrt{3})^2 = x^2$$

$$4 \cdot 3 + 4 \cdot 3 = x^2$$

$$12 + 12 = x^2$$

$$x^2 = 24$$

$$x = \sqrt{24}$$

$$x = 2\sqrt{6}$$

FINAL REVIEW!

6. a) Find the vertex;

b) Write the equation of the axis of symmetry and draw it on your graph;

c) Find the x-intercepts and the y-intercept (as points!);

d) Graph. Include FIVE points on your graph.

$$y = x^2 - x - 6$$

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

$$y = \left(\frac{1}{2}\right)^2 - \left(\frac{1}{2}\right) - 6$$

$$= \frac{1}{4} - \frac{1}{2} - 6$$

$$= \frac{1}{4} - \frac{2}{4} - \frac{24}{4} = \frac{-25}{4} = -6\frac{1}{4}$$

vertex:

$$\left(\frac{1}{2}, -6\frac{1}{4}\right)$$

equation of axis of symmetry:

$$x = \frac{1}{2}$$

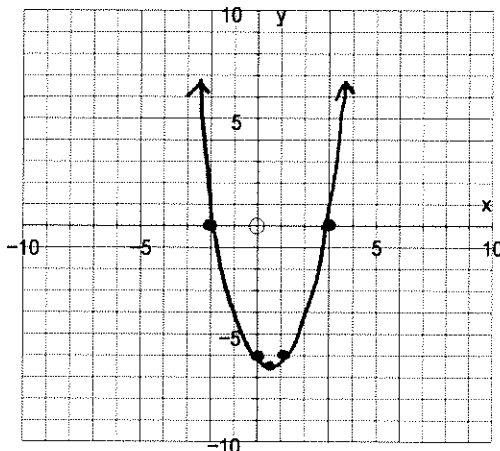
x-intercept(s):

$$(3, 0) \quad (-2, 0)$$

y-intercept:

$$(0, -6)$$

$$\begin{cases} x^2 - x - 6 = 0 \\ (x-3)(x+2) = 0 \\ x = 3 \quad x = -2 \end{cases}$$



7. Mental math! You don't need to show work.

a. 10% of 40

4

b. 20% of 6000

1200

c. 5% of \$8.00

\$ 0.40

d. 15% of \$8.00

\$ 1.20

(double 600)

(half of \$8.00)

(\$8.00 + \$4.00)

Calculator OK. But show all work for full credit.

1. The population of the town of Larkspur follows the function $f(x) = 10,000(1.03)^x$, where x is the number of years after 2000.

a. Find the population of Larkspur in 2007.

$$f(7) = 10,000(1.03)^7 = 12298.7 \text{ or } \boxed{12299 \text{ people}}$$

b. Is this exponential growth or exponential decay? How do you know?

Exponential growth. The growth rate of 1.03 is bigger than 1.

2. The amount of aspirin in mg in your bloodstream decreases over time with the function $y = 10(0.93)^x$, where x is the number of hours.

a. How much aspirin did you take initially?

$$\boxed{10 \text{ mg}}$$

(a = start # in $y = a(b)^x$, or plug in $x = 0$)

b. How much aspirin will there be in 7 hours?

$$y = 10(0.93)^7 = \boxed{6.02 \text{ mg}}$$

c. Is this exponential growth or exponential decay? How do you know?

Exponential decay The growth rate of 0.93 is less than 1.