Name _____

Transformations of Functions Practice

1. Write the equation that results in the desired translation. $g(x) = a \cdot f(x-h)+k$

a) The quadratic function, shifted 2 units to the right $h=2$

$f(x)=x^2$

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

b) The radical function, shifted 7 units up $f(x)=\sqrt{x}$ $k=7$

$f(x)=\sqrt{x}+7$

c) The absolute value function, shifted 2 units to the left and 4 units up $k=4$

$f(x)=|x|$

$f(x)=|x-(-2)|+4$

$f(x)=|x+2|+4$

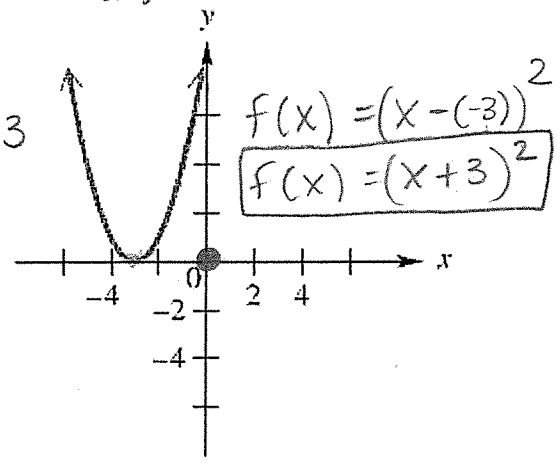
d) The polynomial (cubic) function, shifted 1 unit to the right and 6 units down $h=1$ $k=-6$

$f(x)=x^3$

$f(x)=(x-1)^3-6$

2. Write the equation that best fits each graph.

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

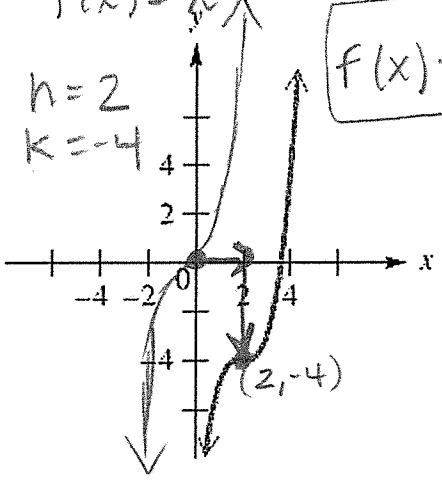


$h=-3$

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

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

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

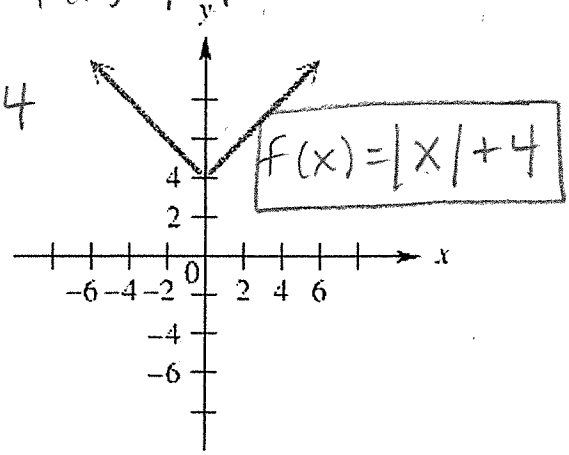


$h=2$

$k=-4$

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

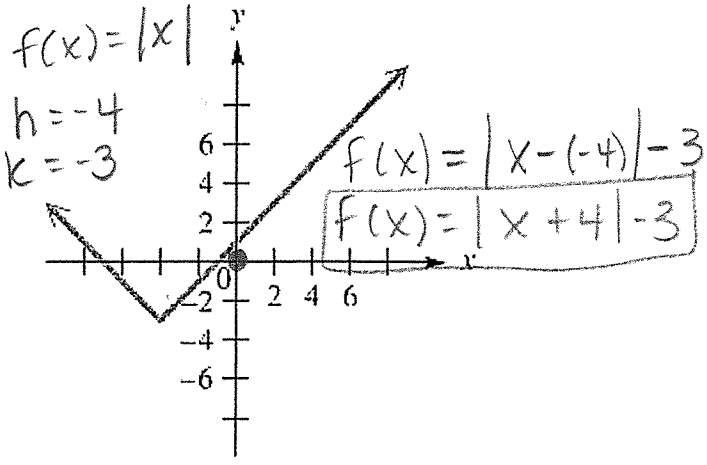
b) $f(x)=|x|$



$k=4$

$f(x)=|x|+4$

d) $f(x)=|x|$



$h=-4$

$k=-3$

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

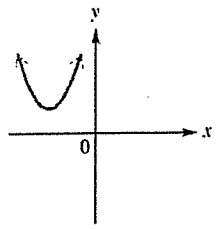
$f(x)=|x+4|-3$

3. Match each equation with the graph. (Assume h and k are both positive.)

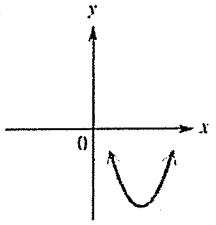
$y=(x+h)^2+k$: A $y=(x-h)^2-k$: B

$y=(x-h)^2+k$: C $y=(x+h)^2-k$: D

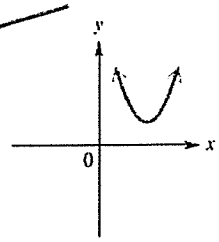
A.



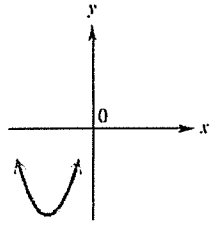
B.



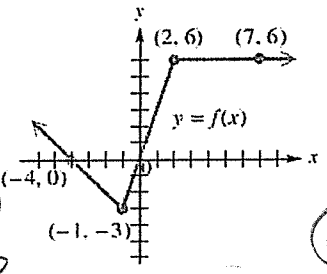
C.



D.



4. Given the graph shown, sketch by hand the graph of each function described, indicating how the four points labeled on the original graph have been translated.



a) $y = f(x) + 3$

up 3

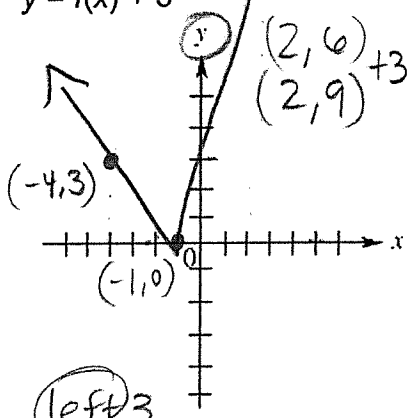
(2,9) (7,9)

(-4,0) +3 (-4,3)

(-1,-3) +3 (-1,0)

(2,6) +3 (2,9)

(7,6) +3 (7,9)



b) $y = f(x) - 3$

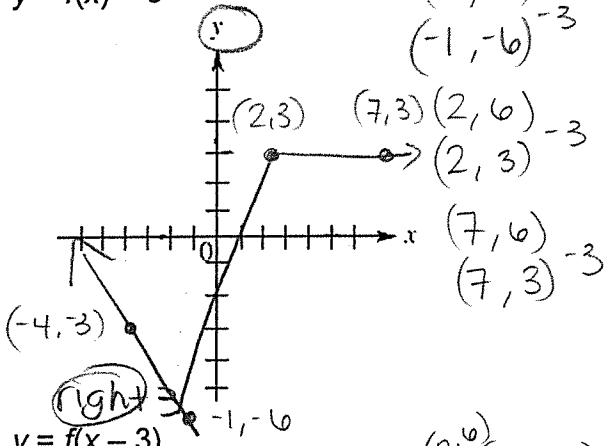
down 3

(-4,0) -3 (-4,-3)

(-1,-3) -3 (-1,-6)

(2,6) -3 (2,3)

(7,6) -3 (7,3)



c) $y = f(x + 3)$

left 3

(-4,0) -3 (-7,0)

(-1,-3) -3 (-4,-3)

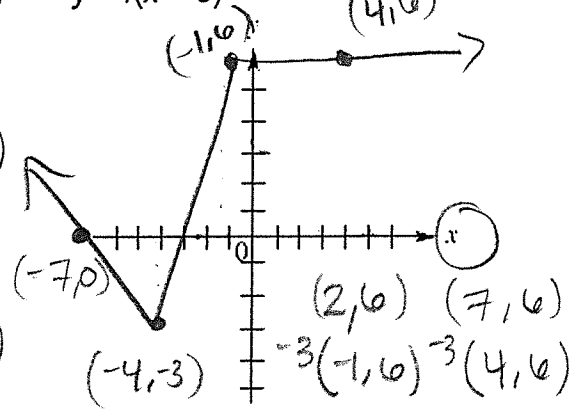
(-1,6) (4,6)

(-7,0)

(-4,-3)

(2,6) -3 (-1,6)

(7,6) -3 (4,6)



d) $y = f(x - 3)$

right 3

(-4,0) +3 (-1,0)

(-1,-3) +3 (2,-3)

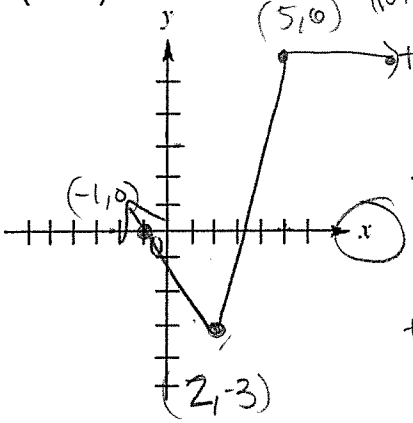
(2,6) +3 (5,6)

(7,6) +3 (10,6)

(5,0) (10,6)

(-1,0)

(2,-3)



Name _____ Hour: _____ Date: _____

Transformations of Functions Practice 2

1. For each equation, 1) identify the parent function, 2) find a, h, and k, and 3) describe the changes to the parent function.

a) $g(x) = 4|x + 3| - 1$

1) $g(x) = |x|$ 2) $a = 4$ $h = -3$ $k = -1$

3) Vertical stretch of 4, translates left 3 and down 1.

b) $g(x) = -0.5(2^{x-1})$

1) $g(x) = 2^x$ 2) $a = -0.5$ $h = 1$ $k = 0$

3) x-axis Reflection, Vertical shrink of .5 translates right 1.

c) $g(x) = -x^2 - 11$

1) $g(x) = x^2$ 2) $a = -1$, $h = 0$, $k = -11$

3) x-axis reflection, translates down 11 units.

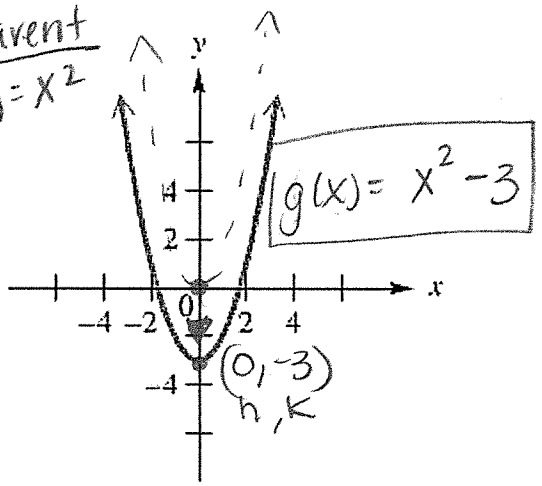
d) $g(x) = (x - 5)^3 - 9$

1) $g(x) = x^3$ 2) $a = 1$, $h = 5$, $k = -9$

3) Translates 5 right and down 9.

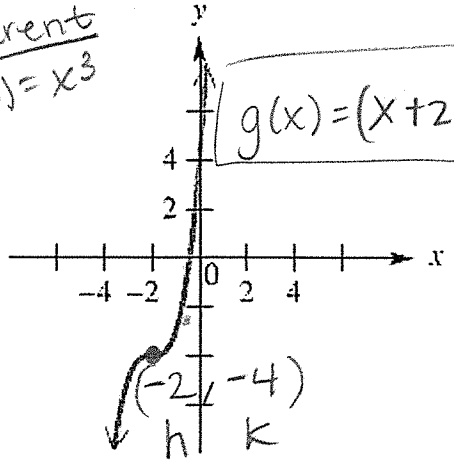
2. Write the **equation** that best fits each transformed graph (in c and d, g(x)).

a) Parent $f(x) = x^2$



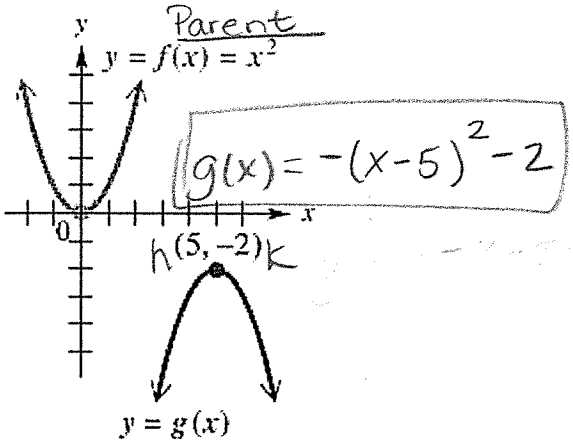
$g(x) = x^2 - 3$

b) Parent $f(x) = x^3$



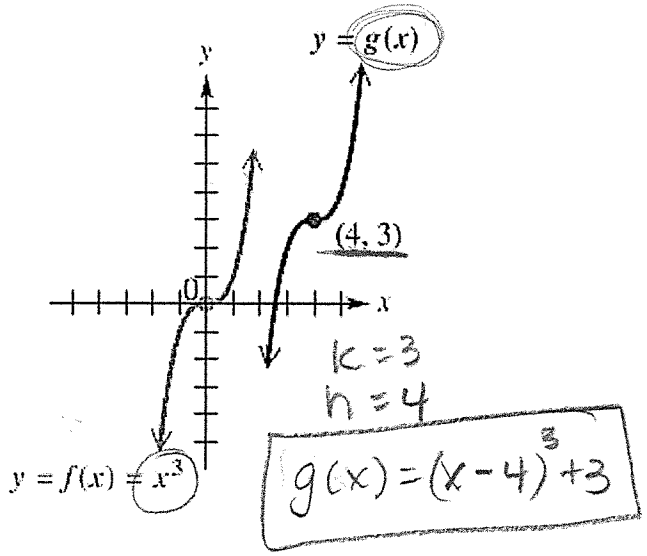
$g(x) = (x + 2)^3 - 4$

c)



$g(x) = -(x - 5)^2 - 2$

d)



$g(x) = (x - 4)^3 + 3$

3. For each equation below, describe the effect of the transformations, then draw the graph by transforming the parent graph using a table of values.

a) $f(x)=(x-3)^2-5$

Quadratic parent is translated right 3 and down 5.

$f(x)=x^2$

x	f(x)
-2	4
-1	1
0	0
1	1
2	4

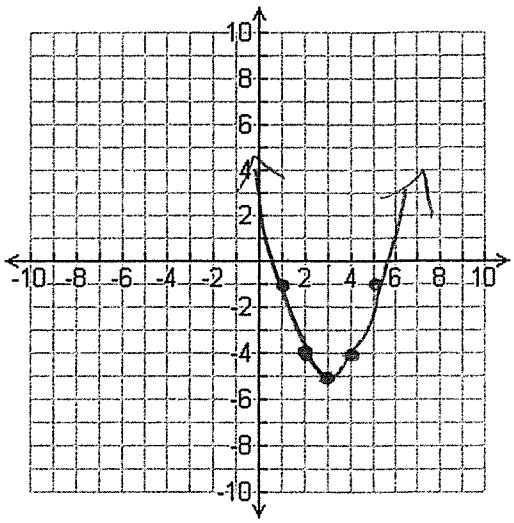
$-2+3=1 \mid 4-5=-1$

$-1+3=2 \mid 1-5=-4$

$0+3=3 \mid 0-5=-5$

$1+3=4 \mid 1-5=-4$

$2+3=5 \mid 4-5=-1$



b) $f(x)=\sqrt{x-3}+2$

Radical parent is translated right 3 and up 2.

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

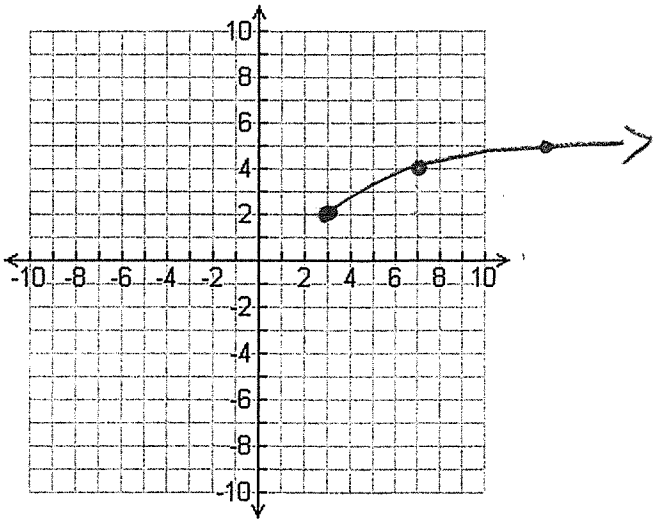
X	f(x)
0	0
4	2
9	3
16	4

Parent

$0+3=3 \mid 0+2=2$

$4+3=7 \mid 2+2=4$

$9+3=12 \mid 3+2=5$



c) $f(x)=-|x-6|+4$

Absolute value with a x-axis reflection, translated right 6 and up 4.

$f(x)=|x|$

X	f(x)
-2	2
-1	1
0	0
1	1
2	2