

1.5C – Transforming Polynomial Functions

Recall the general transformation on a function form:

$$g(x) = a f [k(x - h)] + v$$

Where:

a = effects vertical stretch by “ a ” and reflection if a is negative

k = effect the horizontal stretch by “ $1/k$ ” and reflection if k is negative

h = effects the horizontal translation by “ $-h$ ” (left or right)

v = effects the vertical translation by “ v ” (up or down)

Use the general cubic and quadratic functions to explore the effects these variables have on these functions. Remember to focus on key points such as vertices, maximum and minimum points and any hard end points. It is also very useful to keep the general pattern of points surround these points. For instance, if $f(x)=x^3$, then every horizontal move away from another point will change the output value cubically given there are no other variable terms (quadratic or linear)

Ex. Cubic pattern

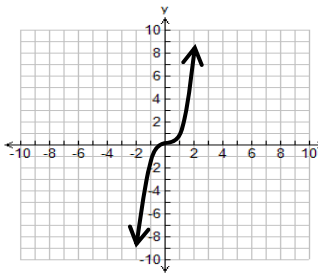
1 over 1 up
2 over 8 up
3 over 27 up

Ex. Quadratic

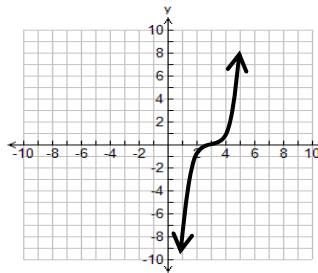
1 over 1 up
2 over 16 up
3 over 64 up

Investigate: Graph the following and make observations on the transformational effects

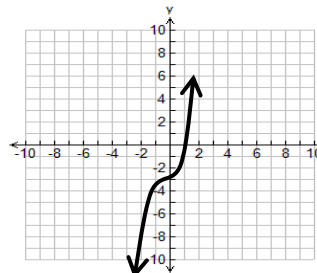
a) $g(x) = x^3$



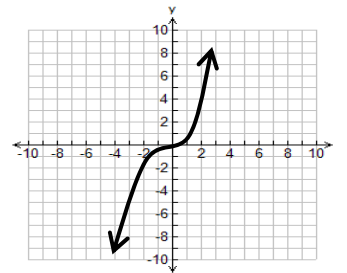
b) $g(x) = (x - 3)^3$



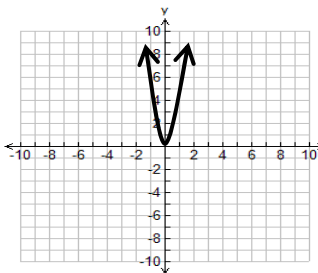
c) $g(x) = x^3 - 3$



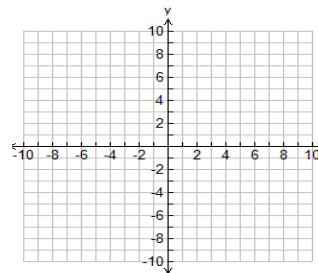
d) $f(x) = (\frac{1}{2}x)^3$



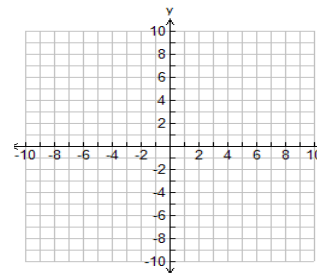
e) $f(x) = x^4$



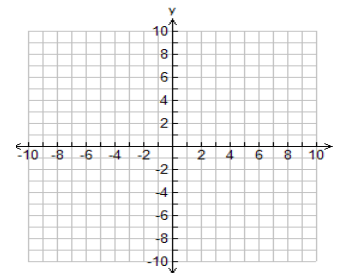
f) $f(x) = \frac{1}{2}x^4$



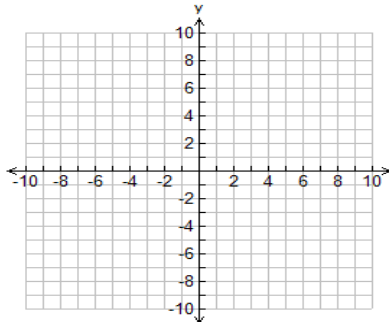
g) $f(x) = (\frac{1}{2}x)^4$



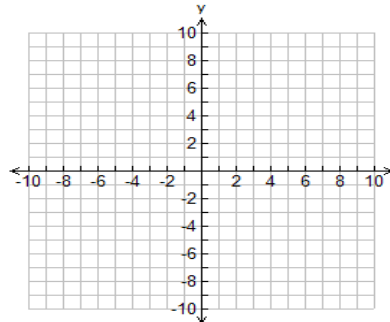
h) $f(x) = (x - 1)^4 + 2$



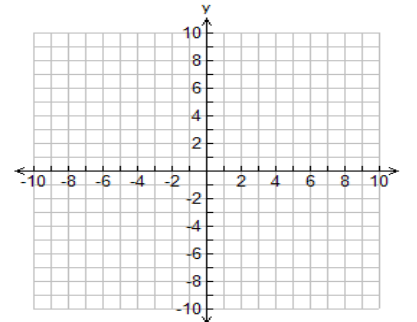
i) $h(x) = -2(x + 1)^3 + 2$



j) $m(x) = -\frac{1}{4}(x)^3 + 2$



k) $g(x) = (-x - 2)^3 - 1$



1.5C – Transforming Polynomial Functions Practice Questions

1. Sketch the following functions. Check using graphing calculator if available.

a) $h(x) = (x - 2)^3 + 2$

b) $m(x) = (-1/4x)^4$

c) $g(x) = (-x)^3 - 1$

d) $h(x) = 1/2(x + 1)^3 - 2$

e) $m(x) = -(x - 1)^4 - 1$

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

g) $h(x) = 3(1/2x - 20)^4 + 10$

h) $m(x) = (0.5(x - 3))^3 + 1$

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

j) $y = (x - 3)^5 + 2$

k) $y = [1/3(x - 2)]^4 + 1$

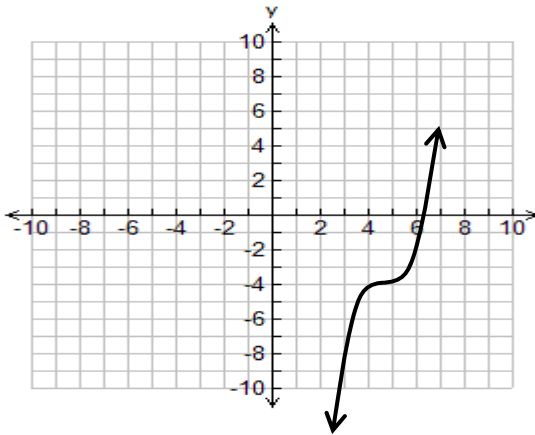
l) $y = 1/3(2x - 4)^3 - 2$

2. Sketch the following functions. Check using graphing calculator if available.

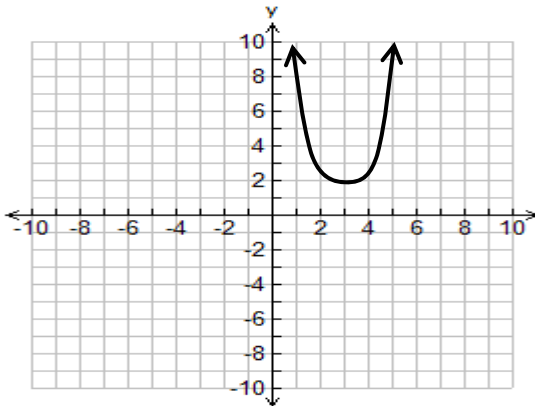
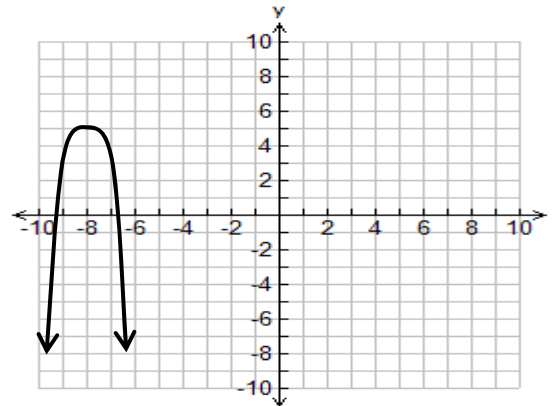
a) 3rd degree function that has a vertical stretch of -2 and a horizontal translation of +2

b) 4th degree function that has horizontal stretch of 1/2, horizontal translation of -3 and a vertical translation of +2

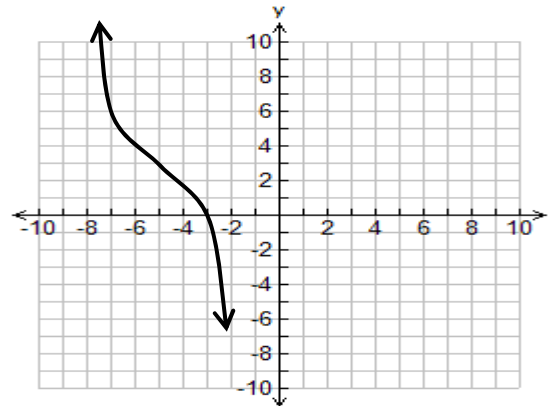
3. Determine the equation of the following functions in the form $g(x) = a[k(x - h)]^2 + v$



b)



d)



Answers 1. check on calculator 2. check on calculator 3. a) $g(x) = (x - 5)^3 - 4$ b) $g(x) = -1(x + 8)^4 + 5$
 c) $g(x) = 1/2(x - 3)^4 + 2$ d) $g(x) = -3[1/2(x + 5)]^3 + 3$

1.5C - Sketching Practice Sheet

