

1.4 Sketching Graphs of Functions

There are many ways to sketch the graph of a function. Some examples are described below.

1. For lines use table of values, slope/y-intercept or x and y -intercepts
2. For parabolas use zeros and vertex if in factored form, use vertex/a-value or transformations if in vertex form. If equation is in standard form, complete the square or factor to change form.
3. For square root, reciprocal, absolute value, exponential and sinusoidal functions use transformations.

Transformations are the steps you take to change a function from one form to another.

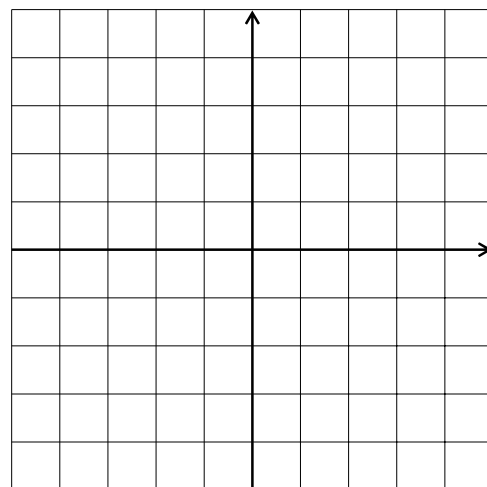
$$g(x) = a f[k(x - d)] + c \text{ are the transformations that can be applied to } f(x) \text{ to arrive at } g(x)$$

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① ② ③ ④ ⑤ ⑥

Description of Transformation	Mapping of Coordinates
1. reflection in the x -axis if a is negative	x stays the same, y is multiplied by -1
2. vertical stretch by a factor of a	x stays the same, y is multiplied by a
3. reflection in the y -axis if k is negative	x is multiplied by -1 , y stays the same
4. horizontal stretch by a factor of $\frac{1}{k}$	x is multiplied by $\frac{1}{k}$, y stays the same
5. horizontal shift of d units	add d to x , y stays the same
6. vertical shift of c units	x stays the same, add c to y

When graphing a function using transformations you can apply the transformations one at a time (left to right) to the key points of the parent function OR you can apply the transformations in one step by using the formula below.

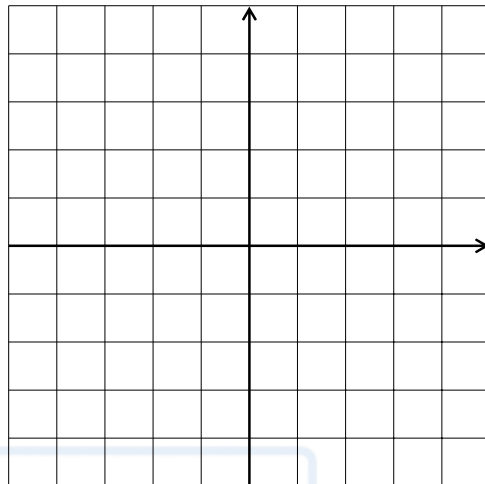
Ex. 1. State the transformations and sketch the graph $y=x^2$ if it is transformed to $p(t) = -3 f(2(x + 4)) + 1$.



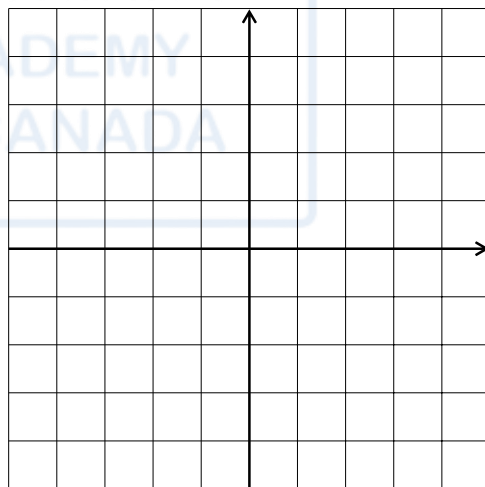
Worksheet: Graphing Functions Practice

State the transformations and sketch the graph of each function using the method of your choice. Be sure to label the appropriate number of points, any asymptotes, the equation and the appropriate scale.

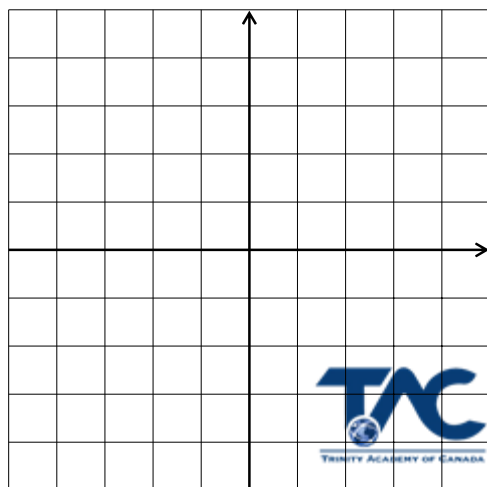
1. $g(x) = -4x^2 - 12x + 1$



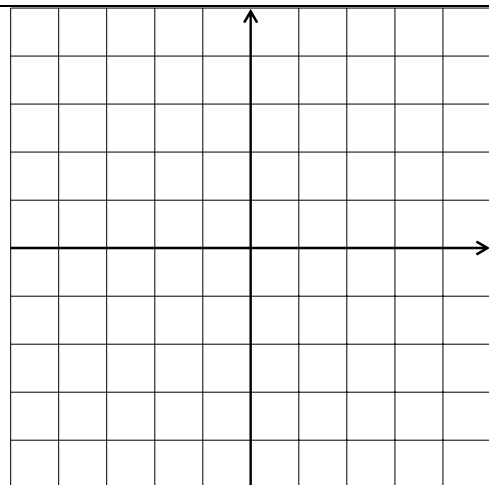
2. $p(x) = -f(2x - 8) + 6$ if $f(x) = |x|$



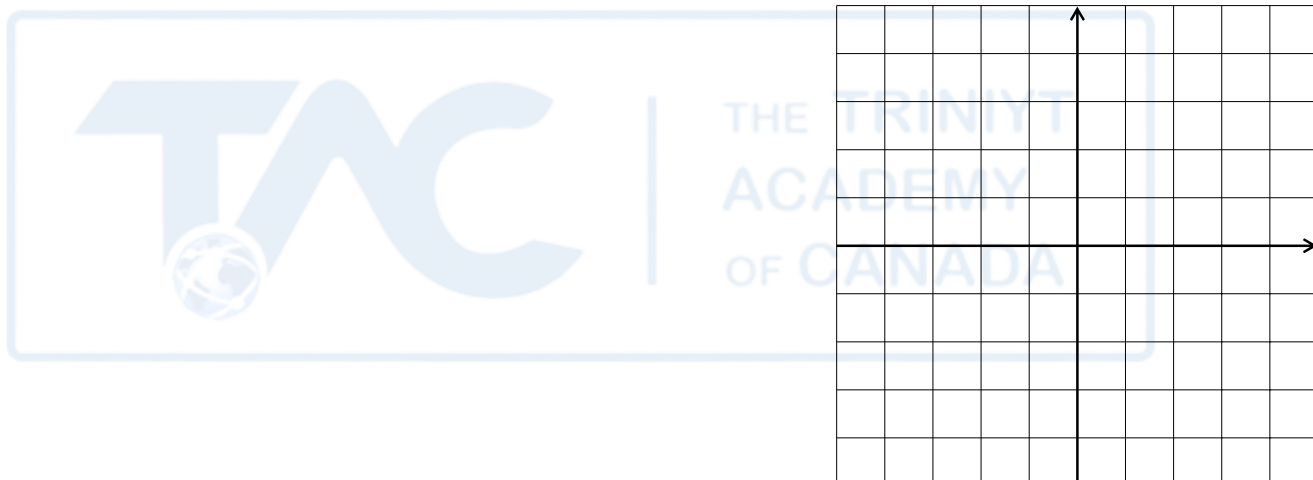
3. $k(x) = 2 + \frac{3}{2x - 1}$



4. $d(t) = 1 - \sqrt{-t + 3}$



5. $p(x) = -2g(x + 1) - 1$, if $g(x) = 2^x$



6. $y = -0.8(3x - 2)^2 + 6$

