

## Sample student worksheet on translations and reflections

In this worksheet you will use an interactive web page to help you explore translations and reflections of graphs. You will do this by studying the effects of constants  $a$ ,  $h$  and  $k$  on the graph of an equation like  $y = a(x - h)^2 + k$ . Using a PC connected to the Internet, point your web browser (Netscape or Internet Explorer) to

<http://www.jcu.edu/cspitzna/calculus/>

This will open a page titled *Interactive Calculus Activities*. From here, click on the link to *Translations and Reflections*. [Note to PC owners: If you are not using a PC in one of the labs, you will need to install a plug-in in order to use any of the *Interactive Calculus* web pages. Follow the link to information on how to get and install the plug-in.]

Read and follow directions carefully--especially the part about how to change the values of constants:

1. **Click on the box** with the dot in it, in front of the definition of the constant that you want to change. (This will highlight the entire expression.)
2. Press the **right arrow** cursor key. (This should move the cursor to the end of that line.)
3. Use the **Backspace** key to delete the current value, and then type a new value.

### Notes:

- *Do not press Enter*. The mathematics and the graph will change automatically.
- To make further changes to any given constant, you do not need to repeat steps 1 and 2; simply use the backspace key and then supply a new value. The graph should be redrawn almost instantaneously.

Use the *Graphs of Quadratic Equations* web page to perform the following experiments, and to help you answer questions 1-8.

1. What are the initial values of  $a$ ,  $h$  and  $k$  on the web page?

$a =$  \_\_\_\_\_  $h =$  \_\_\_\_\_  $k =$  \_\_\_\_\_

What is the corresponding (simplified) formula for  $y$ ? \_\_\_\_\_

2. To get  $y = 0.2(x - 3)^2 + 8$ , what values must  $a$ ,  $h$  and  $k$  have?

$a =$  \_\_\_\_\_  $h =$  \_\_\_\_\_  $k =$  \_\_\_\_\_

3. Reload (or Refresh) the web page, to restore the original values of the constants. Then begin to try a dozen or so different values for  $a$ . (Leave  $h$  and  $k$  unchanged.) Observe the effects that these changes to  $a$  have on the graph, until you can answer the following questions with