

## Moving Parabolas Around

You may experiment on your calculator to help you answer these questions.

### Review

- These questions are about the graph of  $y=ax^2$  where  $a \neq 0$ .
  - What is the graph called?
  - Where are its x- and y-intercepts?
  - Where is its vertex?
  - What determines whether it is a smile or a frown?
  - How does changing  $a$  change the shape of the graph?
- These questions are about the graph of  $y=a(x-p)(x-q)$  where  $a \neq 0$ .
  - What is this form of a quadratic function called?
  - Where are the x- and y-intercepts?  
(Hint: answer in terms of  $a$ ,  $p$ ,  $q$ .)
  - How does one find the vertex?
  - What determines whether the parabola is a smile or a frown?
  - How does changing  $a$  change the shape of the graph?

### Moving Left and Right

- What does the graph look like if  $p=q$ ?
- Find the equation of a parabola whose vertex is at:
  - $(3, 0)$  a smile, then a frown
  - $(-2, 0)$
  - $(h, 0)$ . Explain.

### Moving Up and Down

- These questions are about the graph of the function  $y=ax^2+c$ 
  - Where is its vertex?
  - How is it related to the graph of  $y=ax^2$ ?

- Find the equation of a parabola whose vertex is at:
  - $(0, -3)$  a smile, then a frown
  - $(0, 2)$
  - $(0, v)$ . Explain.

### Moving Anywhere

- Find the equation of a parabola whose vertex is at:
  - $(3, -2)$  a smile, then a frown
  - $(-2, 3)$
  - $(h, v)$ . Explain.
- Tell where the vertex of these parabolas is just by looking at the formulas. Be careful about plus and minus.
  - $y=(x-4)^2$
  - $y=x^2+5$
  - $y=(x-4)^2+5$
  - $y=(x-4)^2-5$
  - $y=(x+4)^2+5$
  - $y=(x+4)^2-5$
  - $y=.5(x+4)^2-5$
  - $y=-.5(x+4)^2-5$
- Using the format of the previous problem, write the equations of five different-shaped parabolas each with vertex at  $(1, 2)$ . How do you change the shape and the orientation?
- This is called *vertex form*:
 
$$y=a(x-h)^2+v$$
  - Where is the vertex for this parabola?
  - What does  $a$  do?
  - What does  $h$  do?
  - What does  $v$  do?