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Moving Parabolas Around

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

Review

1. These questions are about the graph of $y=ax^2$.
   a. What is the graph called?
   b. Where are its x- and y-intercepts?
   c. Where is its vertex?
   d. What determines whether it is a smile or a frown?
   e. How does changing *a* appear to change the shape of the graph?

2. These questions are about the graph of $y=a(x–p)(x–q)$.
   a. What is this form of a quadratic function called?
   b. Where are the x- and y-intercepts? (Hint: answer in terms of a, p, q.)
   c. How does one find the vertex?
   d. What determines whether the parabola is a smile or a frown?
   e. How does changing *a* appear to change the shape of the graph?

Moving Left and Right

3. What does the graph look like if p=q?

4. Find the equation of three parabolas whose vertex is at:
   a. (3, 0) a smile, then a frown
   b. (-2, 0)
   c. (h, 0). Explain.

Moving Up and Down

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

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

Moving Anywhere

7. Find the equation of a parabola whose vertex is at:
   a. (3, -2) a smile, then a frown
   b. (-2, 3)
   c. (h, v). Explain.

8. Tell where the vertex of these parabolas is just by looking at the formulas. Be careful about plus and minus.
   a. $y=(x–4)^2$
   b. $y=x^2+5$
   c. $y=(x–4)^2+5$
   d. $y=(x–4)^2–5$
   e. $y=(x+4)^2+5$
   f. $y=(x+4)^2–5$
   g. $y=.5(x+4)^2–5$
   h. $y=-.5(x+4)^2–5$

9. Using the format of the previous problem, write the equations of five different-looking parabolas each with vertex at (1, 2). How do you change the apparent shape and the orientation?

10. This is called *vertex form:*

$$y=a(x-h)^2+v$$

   a. Where is the vertex for this parabola?
   b. What does *a* do?
   c. What does *h* do?
   d. What does *v* do?