Vertex of any quadratic in the form of $ax^2 + bx + c$

1. Follow the link to a geogebra file: http://www.geogebra.org/m/PPZRyzUT
2. Use sliders p and q
3. Describe how p and q changes the $y = x^2$ curve

4. Describe how p and q relate to the vertex

5. Are there any obvious patterns between $y = ax^2 + bx + c$ and $y = a(x - p)^2 + q$ expressions.

6. Write down the equation of the curve that passes through the following vertex:
   a. V=(1,1)
   b. V=(2,-1)
   c. V=(-2,-3)
   d* V=(1.5, -2.25)

7. Write down the equation of a vertex for the curves:
   a. $x^2 + 2x - 2$
   b. $x^2 + 6x + 11$
   c. $x^2 - 2x + 4$
   d. $x^2 - 6x + 9$

8. Set p and q sliders back to 0 and check box ☑ a

9. Describe how slider a changes the $y = x^2$

10. Write down the vertices of the following curves:
    a. $2x^2 - 8x + 6$
    b. $2x^2 + 4x + 1$
    c. $-x^2 - 2x + 1$

11. Check the box ☑ NOTES and copy the notes into your book. The objective is: **Finding the vertex of a quadratic.**

12. Find the vertices of the following quadratics (show your working out):

a $y = (x-1)^2 + 3$	b $y = 2(x+2)^2 + 1$	c $y = -2(x-1)^2 - 3$
d $y = \frac{1}{2}(x-3)^2 + 2$	e $y = -\frac{1}{3}(x-1)^2 + 4$	f $y = -\frac{1}{10}(x+2)^2 - 3$

13. Find the turning point or vertex for the following quadratic functions:

a $y = x^2 - 4x + 2$	b $y = x^2 + 2x - 3$	c $y = 2x^2 + 4$
d $y = -3x^2 + 1$	e $y = 2x^2 + 8x - 7$	f $y = -x^2 - 4x - 9$

Answers:

12. a) V=(1,3) b) V=(-2,1) c) V=(1,-3) d) V=(-3,2) e) V=(-1,4) f) V=(-2,-3)
13. a) V=(2,-2) b) V=(-1,-4) c) V=(0,4) d) V=(0,1) e) V=(-2,-15) f) V=(-2,-5)