Best Practice #3

AusVELS 10.0 Students will be able to explore the connection between algebraic & graphical representations of relations such as simple quadratics.

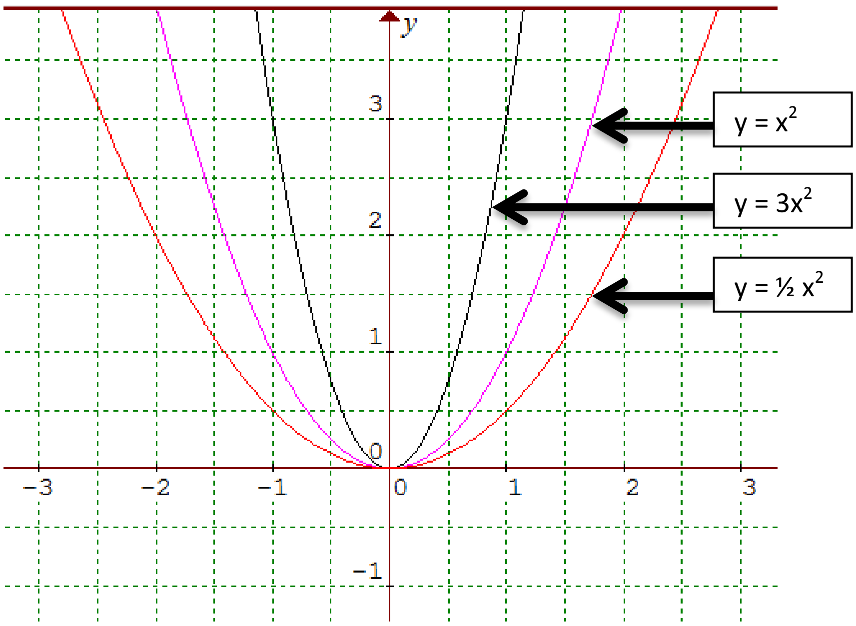
GALLERY OF QUADRATIC RELATIONSHIPS

Dilations from $y = x^2$

Indicate:

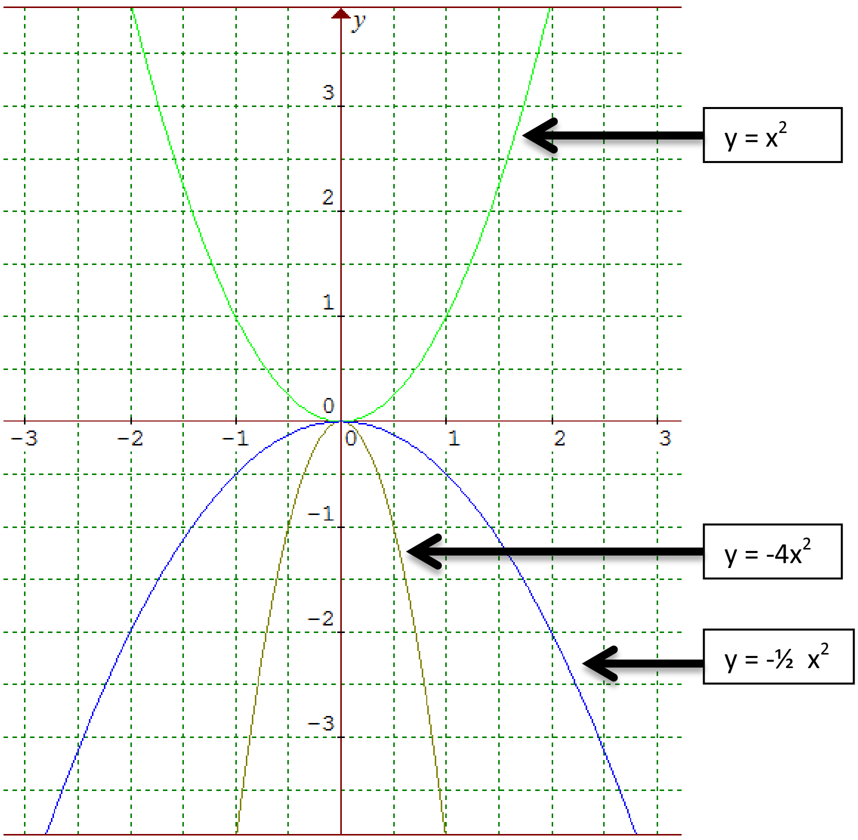
- 'a' is the co-efficient of x^2. It determines whether the graph will be wider or narrower than $y = x^2$
- The co-efficient is called the dilation factor
- A dilation factor less than one (but greater than zero) produces a wider parabola i.e. when $0<a<1$
- A co-efficient greater than one produces a wider parabola i.e. when $a>1$
- A positive co-efficient of x^2 produces a **minimum turning point**

Sketch $y = x^2$, then $y = 3x^2$ and $y = \frac{1}{2} x^2$ **and comment on the dilation.**



A co-efficient of 3 makes the parabola narrower than $y = x^2$, a co-efficient of ½ makes the parabola wider than $y = x^2$

Best Practice #3

Reflections of $y = x^2$ Indicate: ➢ a negative co-efficient of x will produce a reflection of $y = x^2$ about the x-axis and a **maximum turning point**	**Sketch** $y = x^2$, then $y = -4x^2$ and $y = -½ x^2$  A negative co-efficient of x^2 produces a reflection of the parabola about the x-axis. A co-efficient of 4 makes the parabola narrower than $y = x^2$, a co-efficient of ½ makes the parabola wider than $y = x^2$
Vertical Translations-	

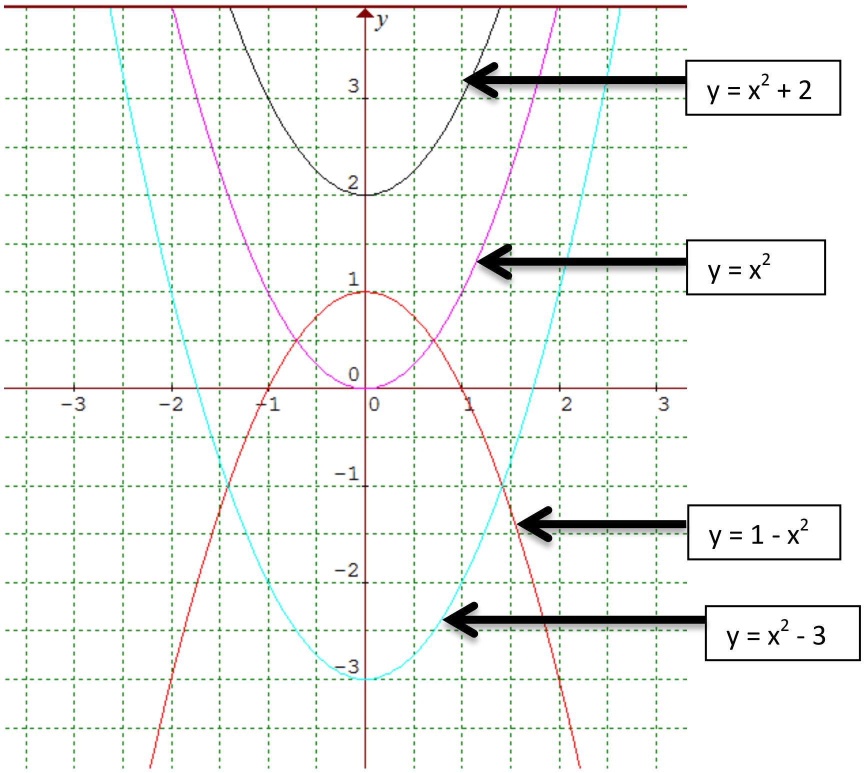
Best Practice #3

Translations up or down the y-axis from $y = x^2$

Indicate:

- for an equation written in the form $y = x^2 + k$, the value of k represents the y-intercept and the size and direction of the translation from $y = x^2$
- a positive 'k' moves the graph up the y-axis from the origin
- a negative 'k' moves the graph down the y-axis from the origin

Sketch $y = x^2$, then $y = x^2 + 2$, $y = x^2 – 3$ and $y = 1 –x^2$ and **state the translation from** $y = x^2$



$y = x^2 + 2$ has shifted $y = x^2$ by 2 units up the y-axis so that the y-intercept is (0,2)

$y = x^2 - 3$ has shifted $y = x^2$ by 3 units down the y-axis so that the y-intercept is (0,-3)

$y = 1 - x^2$ has shifted $y = x^2$ by 1 unit up the y-axis so that the y-intercept is (0, 1) and also reflected $y = x^2$ about the y-axis due to the negative co-efficient of x^2

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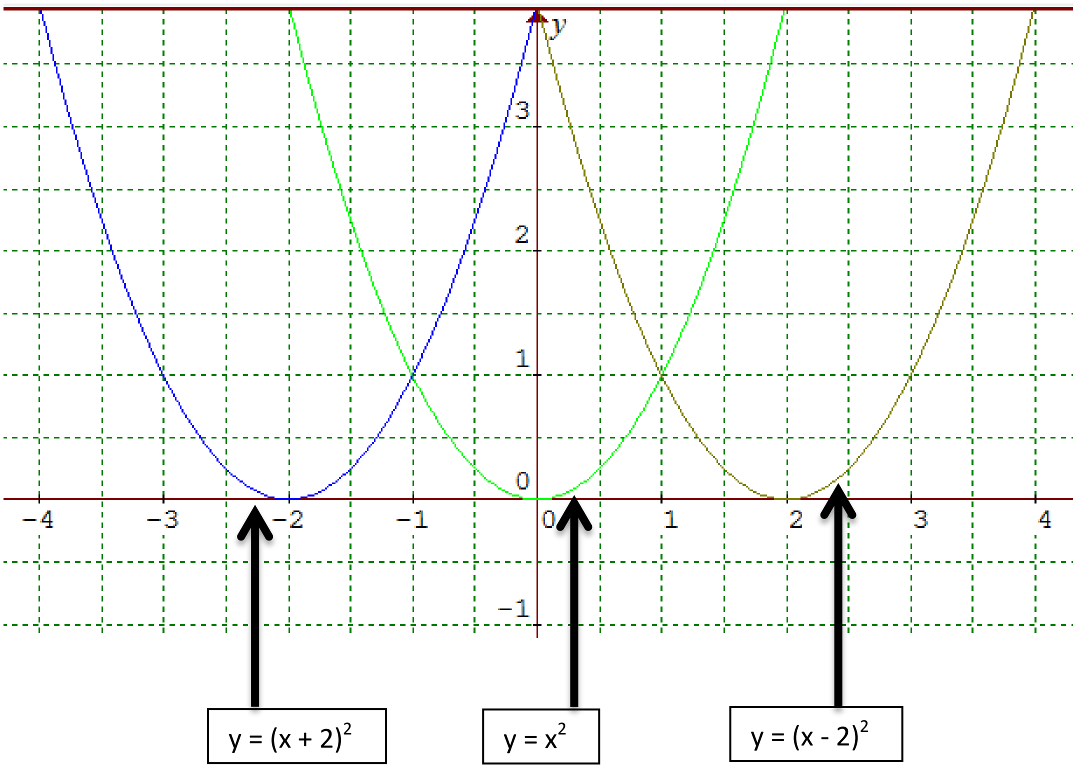
Horizontal Translations- Translations across the x-axis from $y = x^2$

Indicate:

- for an equation written in the form $y = (x + h)^2$, the graph of $y = x^2$ moves 'h' units to the left of the origin on the x-axis
- for an equation written in the form $y = (x - h)^2$, the graph of $y = x^2$ moves 'h' units to the right of the origin on the x-axis

Sketch $y = x^2$**, then** $y = (x - 2)^2$ **and** $y = (x + 2)^2$ and **state the translation from** $y = x^2$



$y = (x + 2)^2$ has shifted $y = x^2$ across the x-axis 2 units to the left, so that the x-intercept is (-2, 0)

$y = (x - 2)^2$ has shifted $y = x^2$ across the x-axis 2 units to the right, so that the x-intercept is (2, 0)

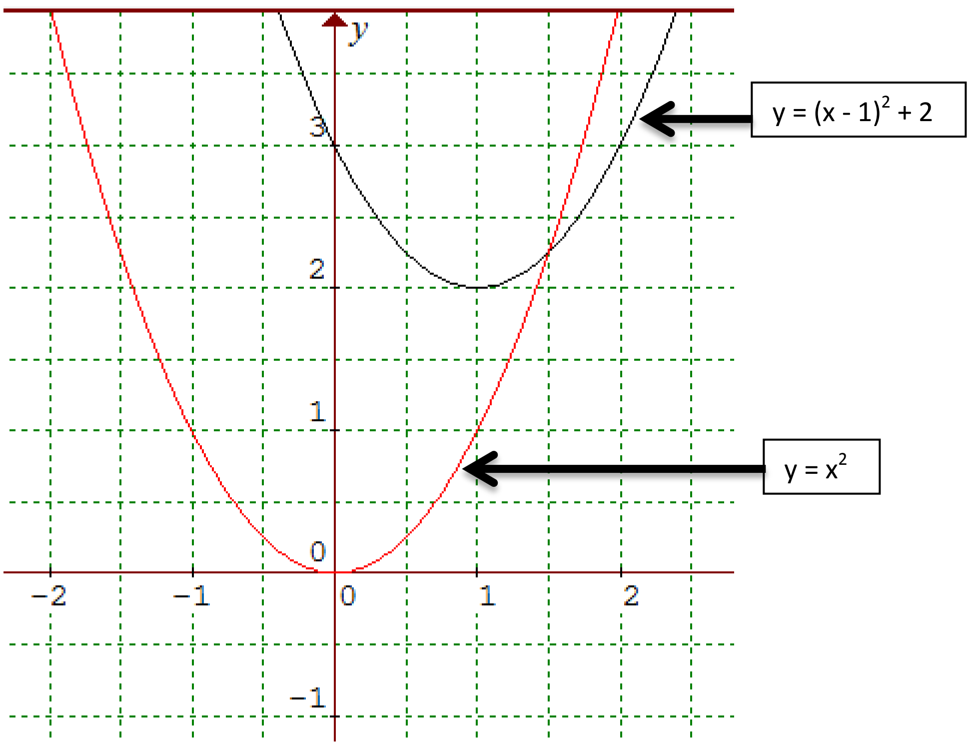
Best Practice #3

Combined Translations
$y = (x - h)^2 + k$

Steps:

1. Sketch $y = x^2$
2. Move the graph of $y = x^2$ across the x-axis by 2 units to the right (h)
3. From there, move the graph up 3 units (k)

Sketch $y = x^2$ and then **use transformations to sketch** $y = (x - 1)^2 + 2$



$y = (x - 1)^2 + 2$ has shifted $y = x^2$ across the x-axis 1 unit to the right and 2 units up, so that the turning point is (1, 2)