**1** *Suppose that* $-5$ *is an* $x$*-intercept of the graph of* $y = f(x)$*; so in other words,* $(-5, 0)$ *is an intercept of that graph. For each of the following equations, state what must be an* $x$*-intercept of its graph.*

*a* $y = f(x + 2)$

Since $(-5, 0)$ is on the original graph, $0 = f(-5)$. Now, $x + 2 = -5$ if $x = -7$, so $0 = f(-7 + 2)$. Therefore,

$$(-7, 0)$$

must be on this graph; that is, $-7$ is an $x$-intercept.

*b* $y = 4f(x)$

Since $(-5, 0)$ is on the original graph, $0 = f(-5)$. Multiplying both sides by 4, $0 = 4f(-5)$. Therefore,

$$(-5, 0)$$

must be on this graph too; that is, $-5$ is still an $x$-intercept.

**2** *On the number plane below, draw the graphs of these three equations. (Be sure to label which is which.)*

*a* $y = x^2$

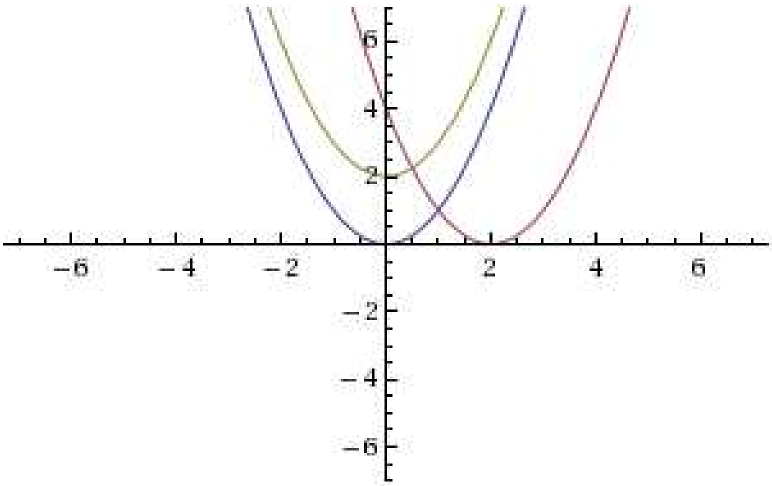
You should be familiar with this graph; the key points are $(0, 0)$, $(1, 1)$, $(-1, 1)$, $(2, 4)$, and $(-2, 4)$. The graph appears below in blue.

*b* $y = x^2 + 2$

This is shifted up by 2; in other words, add 2 to the second coordinate of each point. The key points become $(0, 2)$, $(1, 3)$, $(-1, 3)$, $(2, 6)$, and $(-2, 6)$. The graph appears below in brown.

*c* $y = (x - 2)^2$

This graph is shifted to the right by 2; in other words, add 2 to the first coordinate of each point. The key points become $(2, 0)$, $(3, 1)$, $(1, 1)$, $(4, 4)$, and $(0, 4)$. The graph appears below in purple.




(These graphs were produced by Wolfram Alpha.)