

# 5.2 Change Quadratic Relations to Standard Form

Monday, December 14, 2020 10:45 AM



## 5.2 Change Quadratic Relations to Standard Form

## 5.2 Change Quadratic Relations to Standard Form

### A Forms of Quadratic Relations

Standard Form	Vertex Form	Factored Form
$y = ax^2 + bx + c$	$y = a(x - h)^2 + k$	$y = a(x - x_1)(x - x_2)$
The y-intercept is: $y - \text{int} = c$	The vertex point is: $V(h, k)$	The x-intercepts are: $x_1$ and $x_2$

### B Convert the vertex form to the standard form

To convert the vertex form into the standard form, expand the brackets and simplify.

Example 1. Convert the vertex form into the standard form.

$$\begin{aligned} \text{a) } y &= (x + 2)^2 = (x + 2)(x + 2) = x^2 + 2x + 2x + 4 \\ &= x^2 + 4x + 4 \end{aligned}$$

$$\begin{aligned} \text{b) } y &= (x - 1)^2 + 2 = (x - 1)(x - 1) + 2 = x^2 - x - x + 1 + 2 \\ &= x^2 - 2x + 3 \end{aligned}$$

$$\begin{aligned} \text{c) } y &= 2(x - 1)^2 - 3 = 2(x - 1)(x - 1) - 3 = 2(x^2 - x - x + 1) - 3 \\ &= 2x^2 - 2x - 2x + 2 - 3 \\ &= 2x^2 - 4x - 1 \end{aligned}$$

### B Convert the factored form to the standard form

To convert the factored form into the standard form, expand the brackets and simplify.

Example 2. Convert the vertex form into the standard form.

$$\text{a) } y = x(x - 1)$$

$$\text{b) } y = (x - 1)(x + 2)$$

$$\text{c) } y = 2(x + 1)(x + 2)$$

$$\text{c) } y = -(x + 3)(x - 2)$$

### C Application

Example 3. The curve of a suspension cable on the Golden Gate Bridge in San Francisco, California, can be modelled by the quadratic relation  $h = 0.000549x^2 + bx + c$ , where  $h$  is the cable's height above the ground, and  $x$  is the horizontal distance from one tower, both in metres. The centre of the cable is 640 m from the tower and 227 m above the ground.



- a) Write the quadratic relation that models the curve of the cable in vertex form.
  
  
  
  
  
  
  
  
  
  
- b) Write the quadratic relation in standard form.
  
  
  
  
  
  
  
  
  
  
- c) At what height does a cable attach to a tower?
  
  
  
  
  
  
  
  
  
  
- d) Graph the relations from parts a) and b) on the same set of axes.

Notes: Textbook Pages 242-244  
Homework: Textbook Pages 245 #3ab, 4ab, 6ab, 11