

Converting Forms Of A Quadratic Function

- As we have seen in this section of the course, the different forms of an equation have advantages over each other for determining various characteristics of the function. Because of this, it is important to know how to convert from one form to another so that we can find the values that we want in the quickest way possible. We will now look at the various forms of conversion that exist between Transformational Form (TF), Standard Form (SF) and General Form (GF).

Converting Transformational Form To Standard Form

- Basically, Transformational Form (TF) can be converted to Standard Form (SF) by solving for the variable y .
- Example:

Convert the function $\frac{1}{2}(y + 3) = (x + 1)^2$ from Transformational Form to Standard Form.

Solution:

$$\frac{1}{2}(y + 3) = (x + 1)^2 \quad \leftarrow \text{TF}$$

$$(y + 3) = 2(x + 1)^2$$

$$y = 2(x + 1)^2 - 3 \quad \leftarrow \text{SF}$$

Converting Transformational Form To General Form

- To convert Transformational Form (TF) to General Form (GF), we must expand the brackets and solve for the variable y.
- Example:

Convert the function $\frac{1}{3}(y - 5) = (x + 2)^2$ from Transformational Form to General Form.

Solution:

$$\frac{1}{3}(y - 5) = (x + 2)^2 \quad \leftarrow \text{TF}$$

$$(y - 5) = 3(x + 2)^2$$

$$y - 5 = 3(x + 2)(x + 2)$$

$$y - 5 = 3(x^2 + 2x + 2x + 4)$$

$$y - 5 = 3(x^2 + 4x + 4)$$

$$y - 5 = 3x^2 + 12x + 12$$

$$y = 3x^2 + 12x + 12 + 5$$

$$y = 3x^2 + 12x + 17 \quad \leftarrow \text{GF}$$

Converting Standard Form To Transformational Form

- The Standard Form (SF) of an equation can be converted to Transformational Form (TF) by moving the Vertical Stretch and Vertical Translation to the left side.
- Example:

Convert the function $y = 3(x - 1)^2 + 4$ from Standard Form to Transformational Form.

Solution:

$$y = 3(x - 1)^2 + 4 \quad \leftarrow \text{SF}$$

$$y - 4 = 3(x - 1)^2$$

$$\frac{1}{3}(y - 4) = (x - 1)^2 \quad \leftarrow \text{TF}$$

Converting Standard Form To General Form

- To convert from Standard Form (SF) to General Form (GF), we must expand the brackets and simplify.
- Example:
Convert the function $y = 2(x + 3)^2 - 7$ from Standard Form to General Form.

Solution:

$$y = 2(x + 3)^2 - 7 \quad \leftarrow \text{SF}$$

$$y = 2(x + 3)(x + 3) - 7$$

$$y = 2(x^2 + 3x + 3x + 9) - 7$$

$$y = 2(x^2 + 6x + 9) - 7$$

$$y = 2x^2 + 12x + 18 - 7$$

$$y = 2x^2 + 12x + 11 \quad \leftarrow \text{GF}$$