

In 1-4, complete the square for each function. Then write a sequence of transformations that will produce its graph from the graph of $y = x^2$. In each case, find the vertex and the line of symmetry of the parabola.

1. $f(x) = x^2 - 4x + 6$ $b = -4$

$$\left(-\frac{b}{2}\right)^2 = 4$$

$$y = x^2 - 4x + \underline{4} + 6 - \underline{4}$$

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

• VP 2

• Right 2

vertex: (2, 2)

AoS: $x = 2$

3. $f(x) = 2x^2 - 8x + 20$

$$f(x) = 2(x^2 - 4x) + 20$$

$$f(x) = 2\left(x^2 - 4x + \underline{4}\right) + 20 - \underline{8}$$

$$f(x) = 2(x - 2)^2 + 28$$

- Transformations
- ① _____
 - ② _____
 - ③ _____

vertex: (2, 28)

AoS: $x = 2$

2. $f(x) = x^2 - 6x + 12$

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

$b^2 - 4ac$

POSITIVE \rightarrow TWO
ZERO \rightarrow ONE
NEGATIVE \rightarrow NONE

In 5-10, use the discriminant to determine how many real-number zeroes each quadratic function has.

5. $f(x) = 2x^2 + 5x + 1$

$$a=2 \quad b=5 \quad c=1$$

$$5^2 - 4(2)(1)$$

POSITIVE

6. $f(x) = x^2 - 2x + 1$

one

2 zeroes

7. $f(x) = x^2 + x + 1$

NONE

8. $f(x) = 2x^2 - 4x + 1$

TWO

4. $f(x) = 10 - 16x - x^2$

$$f(x) = -(x^2 + 16x - 10)$$

$$f(x) = -(x + 8)^2 - 54$$

9. $f(x) = 3x^2 - 7x - 3$

TWO

10. $f(x) = 2x^2 - x + 3$

NONE