Equations From Key Points

The general form of a quadratic, in vertex form, is:

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

- a: shape / vertical scaling
- h: horizontal translation
- k: vertical translation

The vertex is at $(4, 23)$ so that gives us h and k:

$$y = a(x-4)^2 + 23$$

If we want the graph to go through $(1, 15)$ that gives us x and y:

$$15 = a(1-4)^2 + 23$$

Now we can solve for a:

$$15 = a(-3)^2 + 23$$

$$15 = a(9) + 23$$

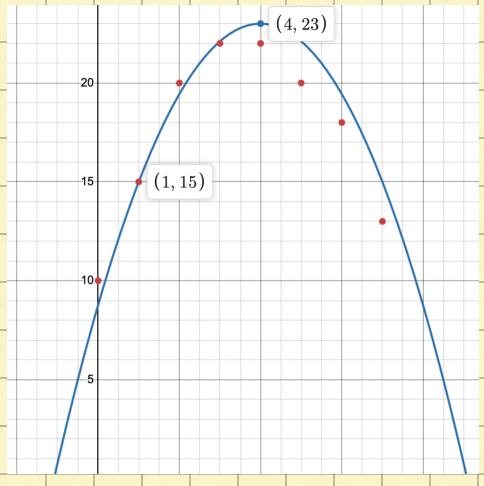
$$15 = 9a + 23$$

$$-23 \qquad -23$$

$$15 - 23 = 9a$$

$$\frac{-8}{9} = \frac{9a}{9}$$

$$-\frac{8}{9} = a$$



∴ the equation of a quadratic that has its vertex at $(4, 23)$ and goes through $(1, 15)$ is $y = -\frac{8}{9}(x-4)^2 + 23$.