Minds on

Secant Lines and Tangent Lines

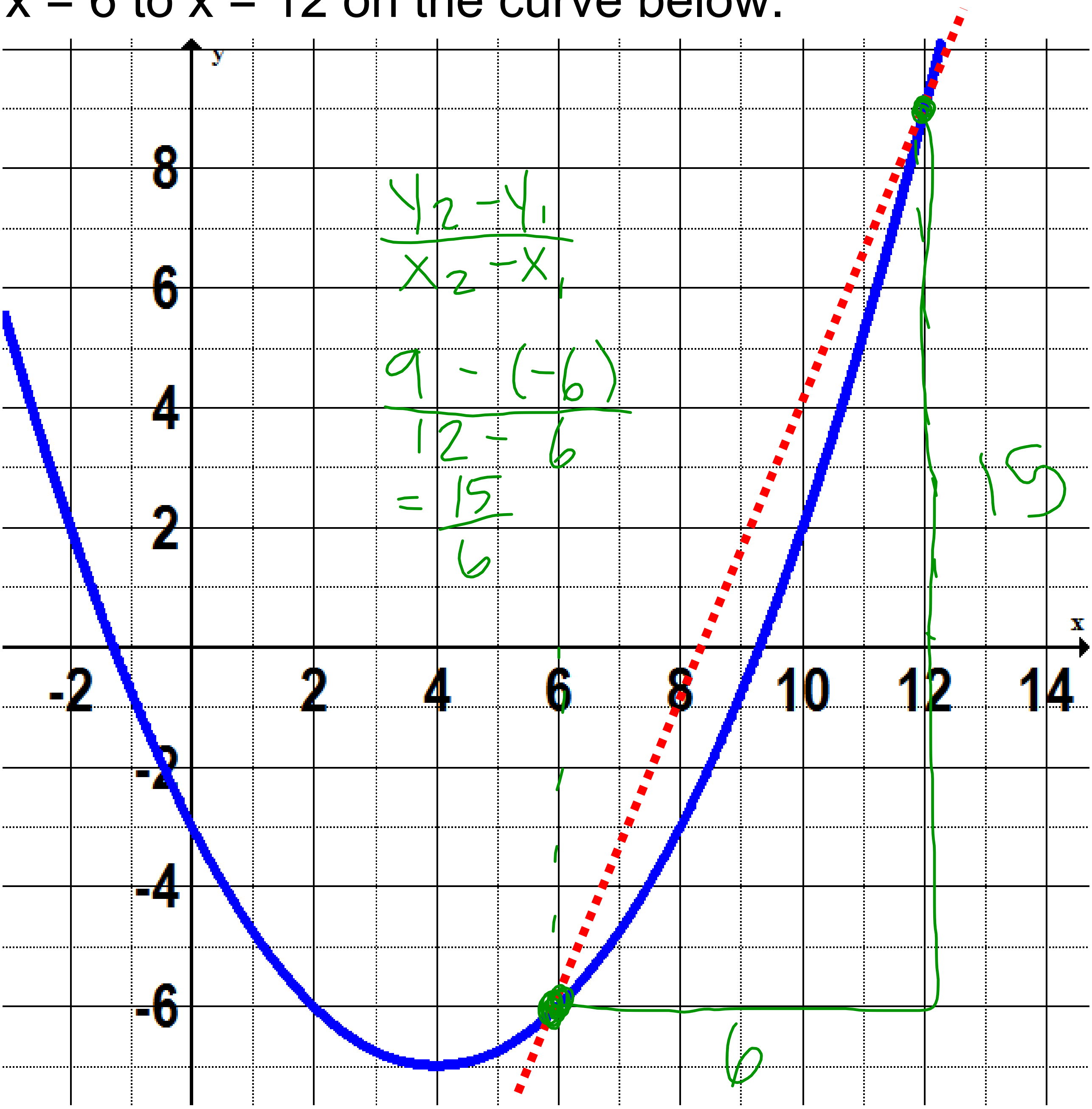
Recall from earlier in the course:

To determine the average rate of change over an interval, we find the slope of a **secant line** that passes through two points of a curve.

Minds on

Secant Lines and Tangent Lines

Determine the average rate of change from x = 6 to x = 12 on the curve below.



Action!

Determining Rate of Change

Average Rate of Change

To determine the average rate of change through two points x_1 and x_2, use the formula

$$\frac{\overbrace{f(x_2)}^{y_2} - \overbrace{f(x_1)}^{y_1}}{x_2 - x_1}$$

Action!

Determining Rate of Change

Average Rate of Change

Determine the average rate of change from
x = 2 to x = 5 on the function

$$f(x) = (x - 3)^3 - 1$$

$$\frac{f(5) - f(2)}{5-2}$$

$$= \frac{[(5-3)^3 - 1] - [(2-3)^3 - 1]}{5-2}$$

$$= \frac{7 - (-2)}{3}$$

$$= 3$$

Minds on

Secant Lines and Tangent Lines

Recall from earlier in the course:

To determine the instantaneous rate of change at a point, we find the slope of a **secant line** that passes through two **very close** points of a curve.

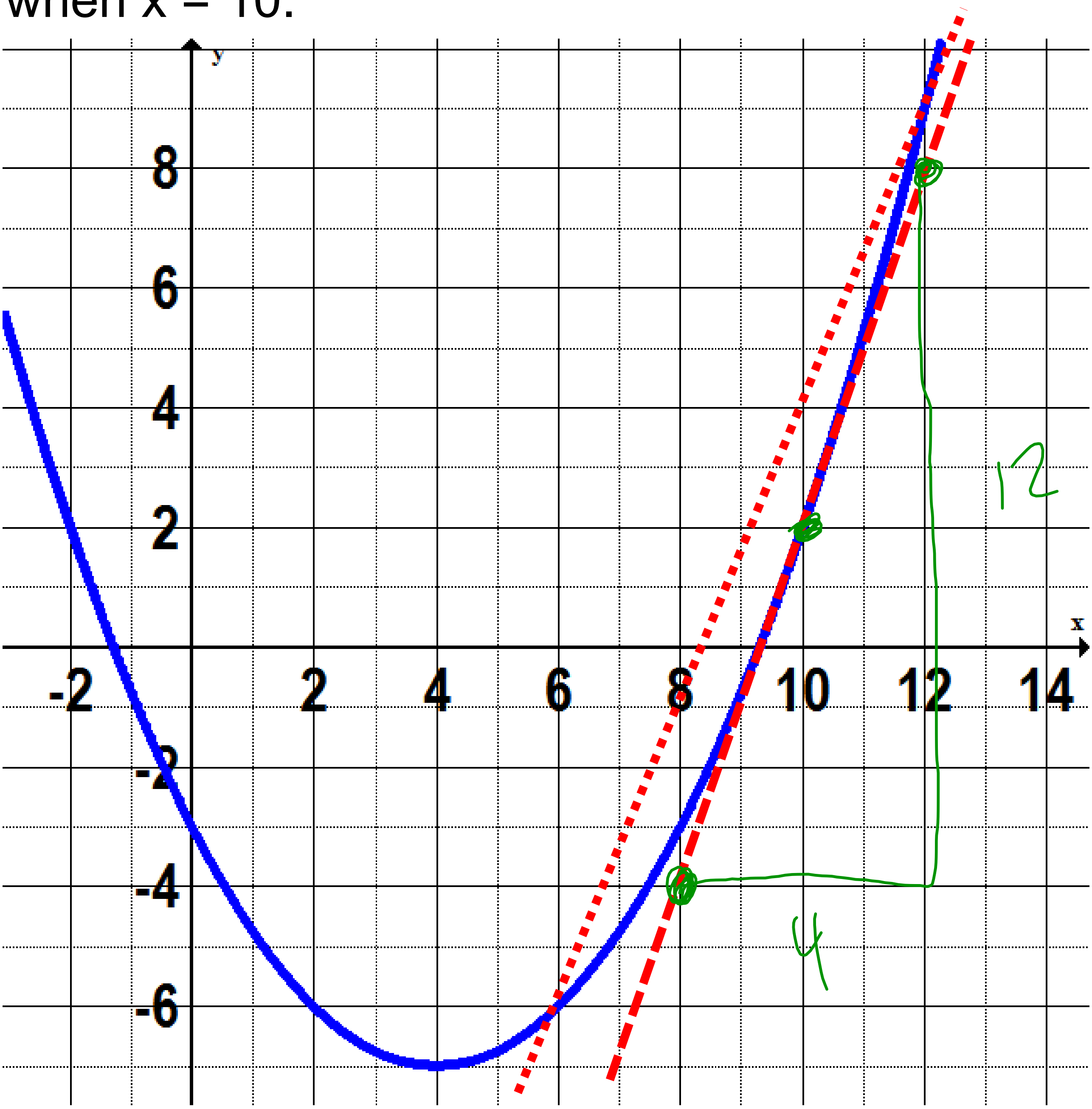
Ideally, this line would pass through our point and no other points on the curve.

This would be called a **tangent line.**

Minds on

Secant Lines and Tangent Lines

Determine the instantaneous rate of change when x = 10.



Action!

Determining Rate of Change

Instantaneous Rate of Change

To determine the instantaneous rate of change of a function when **x = a** use the difference quotient

$$\frac{f(a+h)-f(a)}{h}$$

where *h* is a very small number.

use $h=0.001$