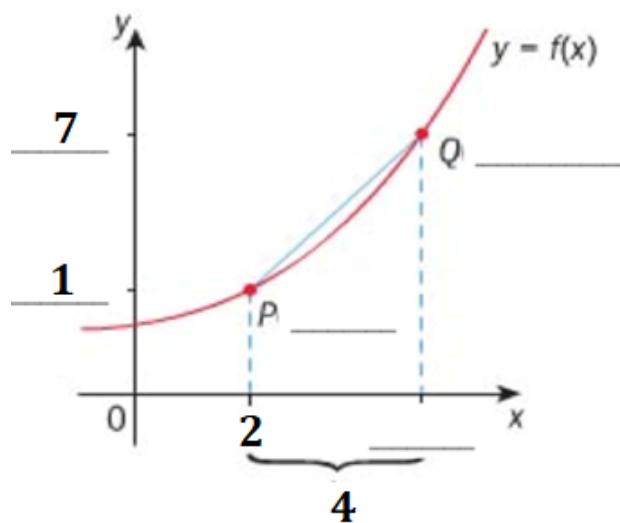
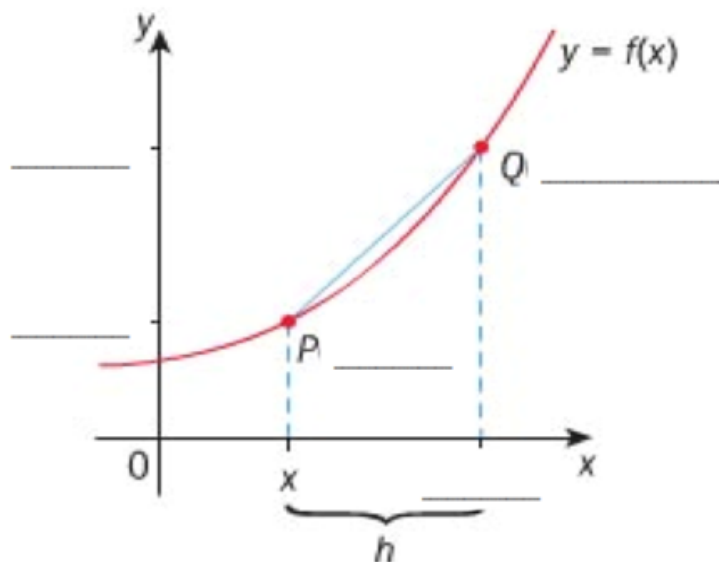


Finding the Slope of a Curve at a Single Point (at an instant!)

Find the slope of PQ, using the given values.



Find the slope of PQ, using x and h .



If you are to find the slope of the curve precisely at point P, then what needs to happen?

Can you express this as a limit?

Write the full slope (including the limit) for the line when Q is very close to P (use h !)

Definition of the Derivative

The function defined by

is known as the **derivative** of f . The derivative is defined by:

$$f'(x) = \quad \quad \quad \text{or} \quad \frac{dy}{dx} =$$

* The derivative is used _____ at a _____ along a curve.

Use the definition of a derivative to find the derivative function of $f(x) = x^2$

Use the definition of a derivative to
find the derivative function of $f(x) = x^3$

Important Derivative Rules

Look at the derivatives for $f(x) = x^2$ and $g(x) = x^3$

$f'(x) =$ $g'(x) =$

Do you notice a pattern?

Functions	I Think the Derivative is...	The Derivative is Actually...	Rule
x^4 x^5 x^{28}			

Find the derivative of each function.

a $f(x) = x^{11}$
b $f(x) = \frac{1}{x^4}$
c $f(x) = \sqrt{x}$

Functions	I Think the Derivative is...	The Derivative is Actually...	Rule
8 -7 π			
$5x^6$ $-3x^{15}$			
$x^{10} + x^7$ $2x^5 - 9x^7 + 10$			

Find the derivative of each function.

a $f(x) = \frac{3}{x^{12}}$
b $y = 5 + 3x^2$

c $s = (t + 1)(t - 2)$
d $f(x) = \frac{2x^4 - 3x^3 + 1}{x^2}, x \neq 0$

Find $f'(x)$ for $f(x)$ equal to:

a $5x^3 + 6x^2 - 3x + 2$ **b** $7x - \frac{4}{x} + \frac{3}{x^3}$

Find the gradient function for each of the following:

a $f(x) = 3\sqrt{x} + \frac{2}{x}$

b $g(x) = x^2 - \frac{4}{\sqrt{x}}$

Find the gradient function of $y = x^2 - \frac{4}{x}$ and hence find the gradient of the tangent to the function at the point where $x = 2$.