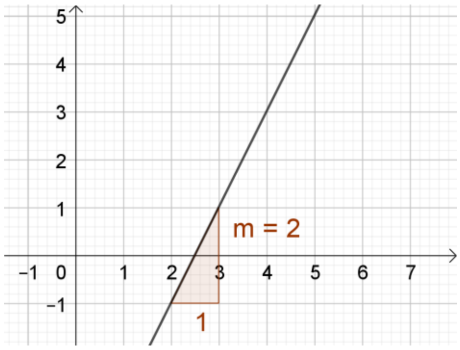
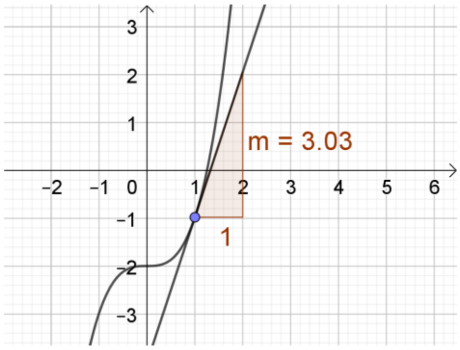
Introducing Derivatives

Differentiation and finding derivatives is all about finding rates of change.





The gradient of a **straight line** is constant.
It does **not change**.

The gradient of a **curve** changes.We use differentiation to find the gradient function.

Some functions and their derivatives:

Function	Gradient
$\boldsymbol{y = ax^n}$	$\boldsymbol{\frac{dy}{dx} = anx^{n-1}}$
$y = 3$	$\frac{dy}{dx} = 0$
$y = 4x$	$\frac{dy}{dx} = 4$
$y = 3x^2$	$\frac{dy}{dx} = 6x$
$y = \frac{2}{x^2}$ $y = 2x^{-2}$	$\frac{dy}{dx} = -4x^{-3}$ $\frac{dy}{dx} = \frac{-4}{x^3}$
$y = 2\sqrt{x} - \frac{3}{\sqrt[3]{x^2}}$ $y = 2x^{\frac{1}{2}} - 3x^{-\frac{2}{3}}$	$\frac{dy}{dx} = x^{-\frac{1}{2}} + 2x^{-\frac{5}{3}}$ $\frac{dy}{dx} = \frac{1}{\sqrt{x}} + \frac{2}{\sqrt[3]{x^5}}$

There are 3 different types of notation that you need to be able to recognise and use

$\boldsymbol{y = ax^n \Rightarrow \frac{dy}{dx} = anx^{n-1}}$	$\boldsymbol{f(x) = ax^n \Rightarrow f'(x) = anx^{n-1}}$	$\boldsymbol{\frac{d}{dx}(ax^n) = anx^{n-1}}$

INTHINKING