

2 The derivative as a slope – Part 1

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)
derivative	导数	_____
tangent	切线	_____

Recall

You already know about the gradient (slope) of a line:

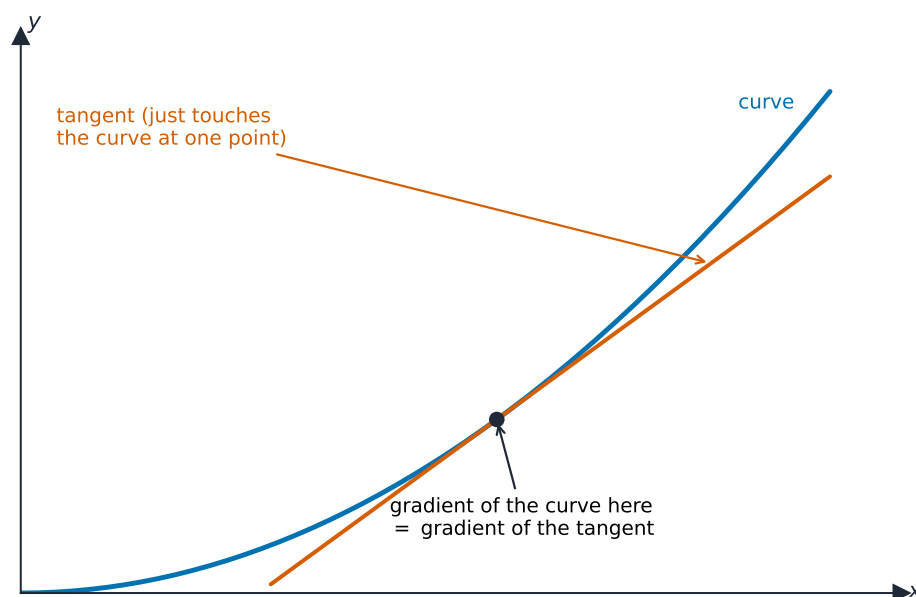
- A steep line has a big gradient; a flat one has zero.
- Gradient = rise over run.
- But a curve's steepness keeps changing along it.

This sheet introduces the **derivative** – the slope of a curve. Each idea has a worked example.

New ideas

■ 1 The slope of a curve

The **derivative** 导数 of a function at a point is the **slope of the curve** there – how steep it is at that exact spot.



■ 2 From secant to tangent

Take two points on the curve and join them – the **secant line**. Its slope is the **average** rate of change. As the two points move closer together, the secant becomes the **tangent** 切线 line, whose slope is the derivative.

■ 3 Notation

The derivative of f is written $f'(x)$ or $\frac{dy}{dx}$.

■ 4 A rate of change

The derivative is a **rate of change**: how fast the output changes as the input changes. For position over time, that rate is the velocity.

Watch out: the derivative is the slope of the **tangent** (at a single point), not the secant (between two points). The secant gives the **average** rate of change; the derivative gives the rate at one instant.

Practice

Try these in order. The methods are all above.

2.1 State what the derivative of a function tells you about its graph. [2]

2.2 State the difference between a secant line and a tangent line. [2]

2.3 State the two common notations for the derivative. [2]

2.4 A line has gradient 3. State the derivative of that line at every point. [1]

2.5 For an object's position over time, state what its derivative represents. [1]
