

Exercise walk-through

Interpreting the Meaning of the Derivative in Context ■ 4.1

eXercise

You must be able to

- give the **units** 单位 of a derivative
- interpret its sign and value in a real context

Method — The derivative in context

A derivative is a **rate of change** with units: if $V(t)$ is a volume in cm^3 at time t (s), then $V'(t)$ is in cm^3/s .

- $f'(t) > 0$: the quantity is increasing;
- $f'(t) < 0$: it is decreasing.

Practice 2.1 ■ 1 mark

State the units of $f'(t)$ if f is in metres and t in seconds.

Solution 2.1

Worked steps

metres per second (m/s) **B1**.

Practice 2.2 ■ 1 mark

State what a positive derivative means.

Solution 2.2

Worked steps

the quantity is increasing **B1**.

Practice 2.3 ■ 2 marks

If $P(t)$ is a population and $P'(5) = 200$, interpret this.

Solution 2.3

Worked steps

at $t = 5$, the population is growing at 200 per unit time **B1** **B1**.

Exam-style 3.1 ■ 1 mark

If $h(t)$ is a height in m and t in s, then $h'(t)$ has units

A m

B m/s

C s/m

D m · s

Solution 3.1

A m

B m/s



C s/m

D m · s

Worked steps

B.

Exam-style 3.2 ■ 1 mark

A positive $f'(t)$ means the quantity is

A decreasing

B increasing

C constant

D zero

Solution 3.2

A decreasing

B increasing 

C constant

D zero

Worked steps

B.

Exam-style 3.3 ■ 1 mark

$W(t)$ is water in litres at time t (min), and $W'(3) = -4$.

- (a) State the units.
- (b) State what the sign means.
- (c) Interpret $W'(3) = -4$.

Solution 3.3

Worked steps

(a) litres per minute (L/min) **B1**. (b) the amount is decreasing **B1**. (c) at $t = 3$ min, the water is falling at 4 L/min **B1**.