Rates of change and tangent gradients

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A sample from this topic. The complete topic collection contains three different resources and worked solutions.

Read the worked example, then show each step in the practice questions. Show the mathematical steps. A calculator, graphing tool or CAS may be used to check results where useful.

What you will practise

• Average and instantaneous rates of change

Useful starting skills: Year 10 algebra, factorisation, functions, indices, geometry and elementary probability.

Average rate of change over [a, b] is [f(b)-f(a)]/(b-a). Geometrically it is a secant gradient.

An instantaneous rate is approached as the interval narrows around a point. A positive tangent gradient means the graph is locally increasing; a flat tangent does not automatically identify a maximum.

Worked example

For $f(t)=t^2$, find average rate from t=2 to 5.

[25-4]/[5-2]=21/3=7.

Answer: 7.

Try it yourself

Name: _____ Date: _____

1. For $f(x)=3x+1$, find average rate over $[2, 6]$.

2. For $s(t)=t^2+2t$, find average velocity on $[1, 3]$.

Answers and explanations

Check the method as well as the final answer. An alternative correct method is also valid.

1. 3.

The line has constant gradient 3.

2. 6 distance-units/time-unit.

s(3)=15, s(1)=3; 12/2=6.

Curriculum reference: Mathematical Methods Units 1–2 — Average and instantaneous rates of change

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