

# THE GC SCHOOL OF CAREERS

## DEPARTMENT OF MATHEMATICS

### REVISION GUIDE

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#### CORE MATHEMATICS 4

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#### DIFFERENTIATION

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#### Key Points

##### 1. Parametric equations

When a curve is described by parametric equations:

Step 1: Find  $\frac{dy}{dt}$  and  $\frac{dx}{dt}$

Step 2: Use the chain rule to find  $\frac{dy}{dx} = \frac{dy}{dt} \cdot \frac{dt}{dx}$

##### 2. Implicit Differentiation

- When  $f(y)$  is differentiated with respect to  $x$  it becomes  $f'(y) \frac{dy}{dx}$ .
- A product term such as  $f(x)g(y)$  is differentiated by the product rule and becomes  $f(x)g'(y) \frac{dy}{dx} + g(y)f'(x)$ .

##### 3. Differentiate

If  $y = a^x$ , where  $a$  is a constant then  $\frac{dy}{dx} = a^x \ln a$       **[LEARN PROOF]**

##### 4. Verbal Problems

You can set up simple differential equations from information given in context. This may involve using connected rates of change, or ideas of proportion.