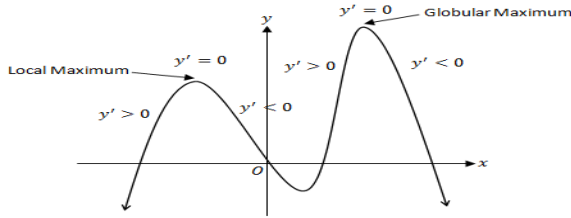


## Goals

The second derivative and applications of differentiation:

- use the increments formula:  $\delta y \cong \frac{dy}{dx} \times \delta x$  to estimate the change in the dependent variable  $y$  resulting from changes in the independent variable  $x$
- understand the concept of the second derivative as the rate of change of the first derivative function
- recognise acceleration as the second derivative of position with respect to time
- understand the concepts of concavity and points of inflection and their relationship with the second derivative
- understand and use the second derivative test for finding local maxima and minima
- sketch the graph of a function using first and second derivatives to locate stationary points and points of inflection
- solve optimisation problems from a wide variety of fields using first and second derivatives.



## Theoretical Components

Resources:

**Maths Quest Year 12 Chapter 5**

**Mathspace** – read and make notes

<https://mathspace.co/textbooks/syllabuses/Syllabus-844/topics/Topic-18525/subtopics/Subtopic-251345/?activeTab=theory>

<https://mathspace.co/textbooks/syllabuses/Syllabus-844/topics/Topic-18525/subtopics/Subtopic-251346/?activeTab=theory>

<https://mathspace.co/textbooks/syllabuses/Syllabus-844/topics/Topic-18525/subtopics/Subtopic-255316/?activeTab=theory>

### Second – Derivative Test

Let  $f'(c) = 0$  and let  $f''$  exist on an open interval containing  $c$ .

1. If  $f''(c) > 0$ , then  $f(c)$  is a relative minimum.
2. If  $f''(c) < 0$ , then  $f(c)$  is a relative maximum.
3. If  $f''(c) = 0$  then the test fails. Use the First Derivative Test.

## Practical Components

**Do the following questions.**

Organise your solutions neatly in your exercise book.

Ex 5B Second derivatives

- Q's 1 (1<sup>st</sup> col), 3 (c,d,e,k), 5, 6, 9, 11

Ex 5C Analysing the behaviour of functions using the second derivative

- Q's 1 – 2 (1<sup>st</sup> col), 3 – 5, 10 – 13

## Investigation

**No investigation this week.**

**Work on your assignment.**

**QFO**

Quiz/Forum/Other

Catch up on any Mathspace tasks you have missed.  
Work on your assignment (due week 6).

Remember to check-in with Jenny each lesson and get your name marked off.