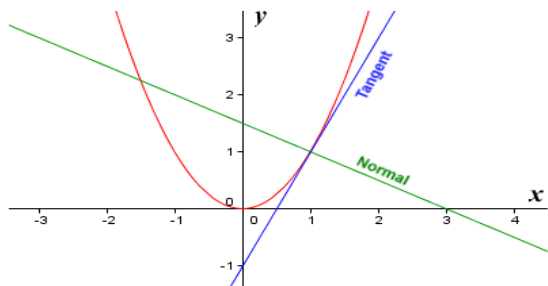


Goals



By the end of this fortnight, you will:

- Finding gradient function from first principle
- Differentiating using first principles
- Finding the gradient function (derivative) of polynomial functions using the power rule
- Differentiating using power rule
- Locating stationary points: $f'(x) = 0$
- Finding gradients and equations of tangents and normals at points on a curve

Theoretical Components

Knowledge Checklist:

- what is a gradient function?
- what is the x-intercept of a gradient function?
- power rule

Online Resources:

Derivative as slope of a tangent line:

- <https://www.youtube.com/watch?v=ANyVpMS3HL4>

The derivative of $f(x) = x^2$ for any x :

- https://www.youtube.com/watch?v=HEH_oKNLgUU

Example of finding gradient function from first principle for $f(x) = 5x + 1$:

- <https://www.youtube.com/watch?v=6rJ9hDUEeoQ>

Practical Components

Resources:

Make notes on the following chapters and websites:
Chapter 9 of Maths Quest 11 Mathematical Methods (pdf – Google Classroom)

- 9C - Differentiation using first principles
- 9D - Finding derivatives by rule
- 9E - Rates of change

Do the following questions:

Organise your solutions neatly in your exercise book.

Chapter 9 of Maths Quest 11 Mathematical Methods (pdf – Google Classroom)

- 9C: 1a, 1b, 3, 5a, 5c, 6
- 9D: all
- 9E: 2, 4-7, 11-17

Investigation

See next page

Other

In-Class task to be held during Week 13 in your double lesson.

Week 11 and 12 Investigation



The lower arch of the Sydney Harbour Bridge can be modelled using the equation:

$$y = -0.00188(x - 251.5)^2 + 118$$

Assuming Sydney Tower is 1 km from the far side of the bridge, **show** that Sydney Tower will first be visible from the arch at $x = 207.81$ m.

The point of Sydney Tower is 327 m above sea level.

Use the calculus techniques you have learnt to complete this task.

- *Remember not to round until the end of your calculations.*