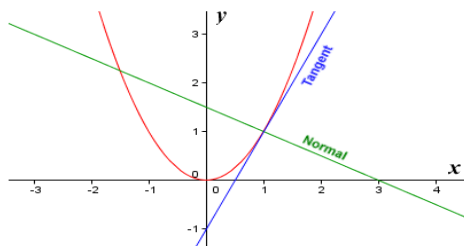**HAWKER** COLLEGE
Engage | Inspire | Achieve

Goals

This week we are:

- 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 rate?
- constant rates
- variable rates
- average rates of change
- instantaneous rates of change
- interpret graphs that illustrate rates of change
- equations of tangents
- what is a limit?
- evaluating limits
- what is a gradient function?
- what is the x-intercept of a gradient function?
- power rule
- finding gradient functions by sketching
- finding gradient functions by using the rule
- finding gradient functions using your CAS

Fortunately, the tedious process of finding derivatives from first principles need not be applied once rules are established.
For polynomial functions, the following rules apply.

- **Rule 1.** If $f(x) = x^n$, then $f'(x) = nx^{n-1}$.

- **Rule 2.** If $f(x) = ax^n$, then $f'(x) = nax^{n-1}$.

- **Rule 3.** If $f(x) = c$, then $f'(x) = 0$ (where c is constant).

- **Rule 4.** If $f(x) = g(x) + h(x)$, then $f'(x) = g'(x) + h'(x)$.

Practical Components

Resources:
- Maths Quest Year 11 Chapter 9 (see Google Classroom)

Ex 9D Finding derivatives by rule
- All questions

Ex 9E Rates of Change
- Qs 2, 4, 5, 6, 7, 11 – 17

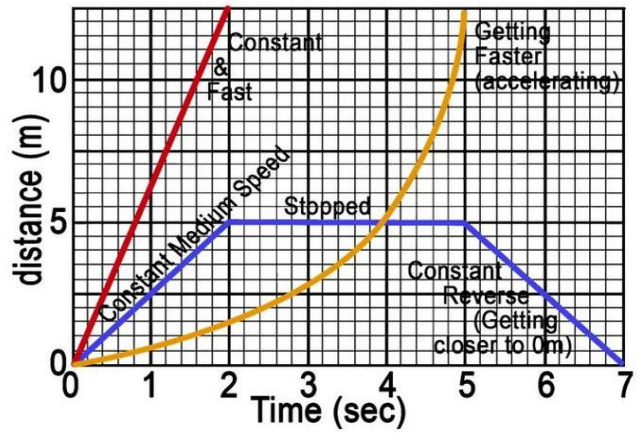# Investigation

See separate page
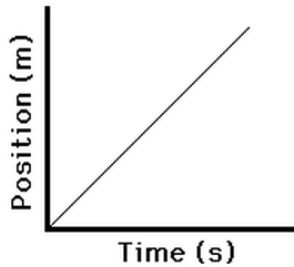
(20 marks – see rubric)

QFO
Quiz/Forum/Other

Your investigations for weeks 10-15 are assessable.
You will have an in-class test in week 14.

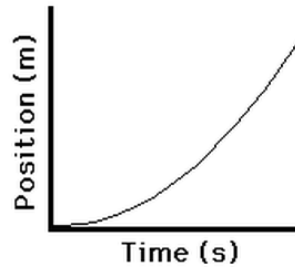**Remember to check-in with your teacher each lesson and get your name marked off.**

Constant & Fast
Getting Faster (accelerating)
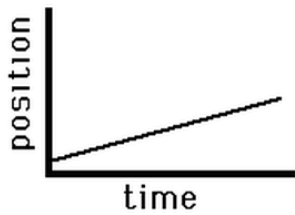Constant Medium Speed
Stopped
Constant Reverse (Getting closer to 0m)

Constant Velocity
Positive Velocity

Positive Velocity
Changing Velocity (acceleration)

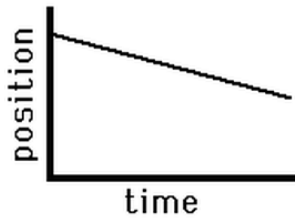**Slow, Rightward(+)**
Constant Velocity

Fast, Rightward(+)
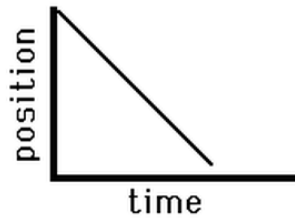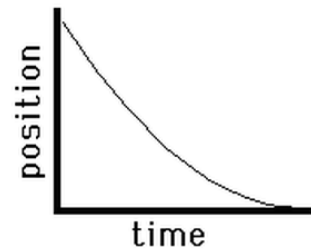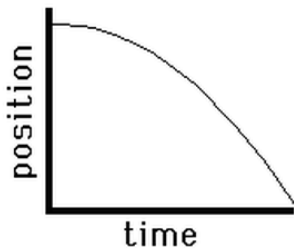**Constant Velocity**

Slow, Leftward(-)
Constant Velocity
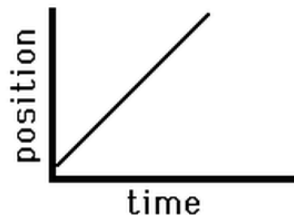
Fast, Leftward(-)
Constant Velocity

Negative (-) Velocity
Slow to Fast

Leftward (-) Velocity
Fast to Slow

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

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

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

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