L2 CALCULUS
CHEAT SHEET

STUDY TIME

ABOUT THE STANDARD

◆ Not understanding the core concept of calculus is the basis of a lot of students not being passing the paper

◆ Calculus is about *rate of change* - just in a whole bunch of different contexts!

◆ You won't be able to get away with simply differentiating a function when you get stuck, put some time into understanding the purpose and ideas behind calculus first.

THE PURPOSE OF CALCULUS

◆ We can use a really simple example from junior science to understand why we use calculus.

◆ The rate of change of distance in regards to time is called velocity. To calculate velocity we need to find the slope (or gradient) of the line on a distance time graph.

◆ This is easy when we have a linear graph but we need calculus to do this when we have any other type of graph (i.e. a parabola).

◆ This is the reason why we differentiate a function; to find the gradient function!

GENERAL TIPS

◆ Being able to draw the gradient function on a graph is essential! Not only will this help you with the questions that ask you to do this directly but drawing or sketching any question will help with general understanding.

◆ If you are stuck on a question try drawing it to understand what it is asking.

TYPES OF QUESTIONS

◆ **Turning points**
  ◇ Three situations can occur when the gradient is zero:
  ◇
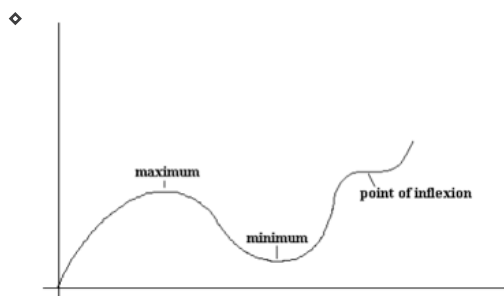
  ◇ We can determine the nature of the turning point by using the second derivative test. If the result is:
  ◇ Positive = local minimum,
  Negative = local maximum and
 Zero = point of inflection.

- ◆ **Equation of a tangent**
  - ◇ We can use the form y = mx + c to find the equation of a tangent.
  - ◇ M = the gradient of the tangent, this is the same gradient as the original curve at the specific given point where the tangent meets the curve
  - ◇ C can be found by using any point on the tangent line and substituting the x and y coordinates into the y = mx + c formula to generate c.
  - ◇ Then, simply rewrite the equation using the m and the c you have found.
- ◆ **Volume of a 3D shape**
  - ◇ The volume of a 3D shape is rate that the surface area of the base is increasing (height). Hence if we differentiate the volume equation we get an equation for the surface area of the base.
- ◆ **Kinematics**
  - ◇ Use this diagram to help with knowing how to jump between types of equations:
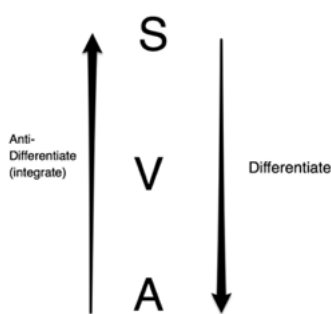
  - ◇ Additionally, always draw what is happening in the situation you are thinking about.
  - ◇ Answering the kinematics questions correctly is one of the easiest ways to get the top marks.

OVERALL

- ◆ This is a brief overview of some tips and types of questions the level 2 calculus can throw at you but watching this video will not be sufficient study for the exam! Make sure you do practice questions, past papers and check out our StudyTime walkthrough guides for extra help.