YEAR 11 - MATHEMATICS

Preliminary Topic 18(1) - Gradients of Tangents (2)

MATHEMATICS ADVANCED

LEARNING PLAN			
Learning Intentions Student is able to:	**Learning Experiences** Implications, considerations and implementations:	**Success Criteria** I can:	**Resources**
Model, analyse and solve problems involving linear functions.	Review the linear equation $y = mx + c$ as previously studied in Stage 5.2 and Stage 5.3.	• Model a problem using the equation of a straight line in the form $y = mx + c$ • Solve problems modelled on the linear equation	A module of work on coordinate geometry: http://amsi.org.au/teacher_modules/Introduction_to_coordinate_geometry.html
Explain the geometrical significance of m and c in the equation $f(x) = mx + c$	Students investigate the significance of m and c using graphical technology and a constant controller. They explore the meaning of m and c when y and x represent specific quantities.	• Explain the significance of the gradient in relation to the problem being modelled	

		• Describe the significance of the constant, c, in the model	
Distinguish between continuous and discontinuous functions, identifying key elements which distinguish each type of function	Students sort a variety of different line graphs into groups that have a common feature in regard to their shape. The set of graphs provided could include: • those from newspapers and magazines, • graphs from practical situations such as parking station fees, • piecewise graphs, • graphs already met in this course and unfamiliar graphs sourced from later topics in this course or elsewhere.	• Describe a sorting strategy using terms such as broken, unbroken, jump, restricted, in pieces, finite and infinite. • Select appropriate language for describing graphs that have a break, using the terms 'continuous' and 'discontinuous'. • Sort graphs using the new categories and then further sort the discontinuous graphs into those that have an asymptote, a jump or a hole.	Limits and continuity activities: https://www.geogebra.org/m/jR5qtBfh https://teacher.desmos.com/activitybuilder/custom/574de5cdab71b5085a2aad42 https://www.math.brown.edu/utra/discontinuities.html http://www.themathpage.com/acalc/continuous-function.htm
Sketch graphs of functions that are continuous and compare them with graphs of functions that have discontinuities		• Sketch a variety of graphs which are continuous or discontinuous in nature	

		• Compare continuous and discontinuous graphs	
Describe continuity informally, and identify continuous functions from their graphs		• Identify continuous functions from their graphs • Describe what is meant by cont	A description of continuity and discontinuity can be found here: https://www.math.brown.edu/utra/discontinuities.html http://www.themathpage.com/acalc/continuous-function.htm A description of limits and continuity can be found here: https://www.geogebra.org/m/jR5qtBfh https://teacher.desmos.com/activitybuilder/custom/574de5cdab71b5085a2aad42

Describe the gradient of a secant drawn through two nearby points on the graph of a continuous function as an approximation of the gradient of the tangent to the graph at those points, which improves in accuracy as the distance between the two points decreases	Students use a variety of graphs representing practical situations (eg the price of a house over time) and describe what information the graph illustrates.	• Calculate the gradient of the secant joining two points on a graph • Describe the effect of moving the two points closer together • Deduce an approximate gradient for the tangent to a graph at a particular point	Exploring Gradient workbook: https://www.geogebra.org/m/anYSW7fG
Examine and use the relationship between the angle of inclination of a line or tangent, θ, with the positive x-axis, and the gradient, m, of that line or tangent, and establish that $tan\,\theta = m$	Review the concept of the gradient of an interval joining two points on the Cartesian plane as $m = \frac{rise}{run}$. Use graphing software to explore the gradient of a line and the effect of changing the gradient on the angle of inclination.	▪ distinguish between positive and negative gradient. ▪ link negative gradient to a negative angle of inclination. ▪ describe how the angle of inclination is related to the gradient. ▪ use the formula ▪ tan $tan\,\theta = m$ to find the angle of inclination of a line.	