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Calculus

Calculus – The tangent search continues

In this lesson we continue with the problem we started in our previous lesson, namely to determine the gradient of a tangent to a curve at a particular point, by choosing points closer to the point of interest.

Lesson Outcomes

By the end of this lesson, you should be able to:

- describe the process that is used to determine the gradient of the tangent to the graph at a particular point.

Curriculum Links

LO 2: Functions and Algebra

The learner is able to investigate, analyse, describe and represent a wide range of functions and solve related problems

12.2.7 (a) Investigate and use instantaneous rate of change of a variable when interpreting models of situations:

- demonstrating an intuitive understanding of the limit concept in the context of approximating the rate of change or gradient of a function at point; (Linked to task)

(c) Determine the equations of the tangents to graphs.

Lesson Notes

In this lesson we explore what happens to the gradient of the line as we move the second point closer to our desired point from the left. For completeness we must also see what happens if we place the second point on the right of the point in which we are interested.

A summary of the gradients calculated in this lesson are given in the following table:

Other x value (left)	gradient	Other x value (right)	gradient
0	1	2	3
$\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$2\frac{1}{2}$
$\frac{3}{4}$	$1\frac{3}{4}$	$1\frac{1}{4}$	$2\frac{1}{4}$

Task

Calculate the following gradients:

$$y = f(x) = x^2 \text{ and } x_1 = 2$$

Other x value (left)	gradient	Other x value (right)	gradient
$x_1 - 1$		$x_1 + 1$	
$x_1 - 12$		$x_1 + 12$	
$x_1 - 14$		$x_1 + 14$	
$x_1 - 18$		$x_1 + 18$	

$$y = f(x) = x^2 \text{ and } x_1 = 3$$

Other x value (left)	gradient	Other x value (right)	gradient
$x_1 - 1$		$x_1 + 1$	
$x_1 - 12$		$x_1 + 12$	
$x_1 - 14$		$x_1 + 14$	
$x_1 - 18$		$x_1 + 18$	

