

REPASO 3

Nombre:

FECHA:

Topic 7 – Introductory differential calculus (15 h)

Aims

The aim of this section is to introduce the concept of gradient of the graph of a function, which is fundamental to the study of differential calculus, so that students can apply the concept of the derivative of a function to solving practical problems.

7.1 Content

Gradient of the line through two points, P and Q, that lie on the graph of a function.

Behaviour of the gradient of the line through two points, P and Q, on the graph of a function as Q approaches P.

Tangent to a curve.

Amplifications/exclusions

Not required: formal treatment of limits.

Included: solving problems involving a particular function for given values of h and x .

The derivative as the gradient function;

$$f'(x) = \lim_{h \rightarrow 0} \left(\frac{f(x+h) - f(x)}{h} \right); \quad f'(x) = \frac{dy}{dx}.$$

In examinations: questions on differentiation from first principles will not be set.

7.2 Content

The principle that

$$f(x) = ax^n \Rightarrow f'(x) = anx^{n-1} \\ \Rightarrow f''(x) = an(n-1)x^{n-2}$$

The derivative of functions of the form

$$f(x) = ax^n + bx^{n-1} + \dots, n \in \mathbb{Z}.$$

Amplifications/exclusions

Included: negative integer values for n .

7.3 Content

Gradients of curves for given values of x .

Values of x where $f'(x)$ is given.

Equation of the tangent at a given point.

Amplifications/exclusions

Not required: equation of the normal.

7.4 Content

Increasing and decreasing functions.

Graphical interpretation of $f'(x) > 0$, $f'(x) = 0$, $f'(x) < 0$.



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7.5 Content

Values of x where the gradient of a curve is 0 (zero): solution of $f'(x) = 0$.

Local maximum and minimum points.

Amplifications/exclusions

Included: the concept of a function changing from increasing to decreasing and vice versa as a test for local maxima and minima. —

Awareness of points of inflexion with zero gradient is to be encouraged, but will not be examined.

