



**MathsNET**

A joined up approach to  
teaching and learning  
mathematics

# The exponential function

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- Explain why we can write real numbers as  $\sum_{n=1}^{\infty} a_n(\delta t)^n$ ? When we use this representation when writing decimals what is the value of  $\delta t$
- Give the definition of the derivative as a limit
- Show from first principles (i.e. by solving the limit that you just wrote down) that the first derivative of  $x^4$  with respect to  $x$  is  $4x^3$ .
- Give the Taylor series expansion of a function

# The exponential function

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- Write down the Taylor series expansion for the exponential function  $e^x$ .
- Explain, by making reference to the properties of the Taylor series of this function, why the exponential function is so useful.