

## Task 1: Gradient of cubics, quartics, ...

Let  $f(x) = x^3$ . Start by entering this function into geogebra.

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### Part A

What is the gradient function,  $f'(x)$ ?

Find the gradient of  $f(x)$  for various values of  $x$ . Make a list of the values of  $x$  that you tried. Check that they make sense by looking at the graph in geogebra.

What can you say about the gradient of  $f(x) = x^3$ ?

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### Part B

Now let's look at functions of the form  $f(x) + k$ , for some number  $k$ .

Start by entering this into geogebra (you should get a slider for  $k$ ).

What can you say about the gradient function and the gradient at any point of  $f(x) + k$ ?

### *Part C*

Investigate the gradient of a few different cubics.

What can you say about the gradient of cubics?

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### *Part D*

Explore the gradient of a few different *quadratics*.

What can you say about the gradient function of *any* quadratic?

What can you say about the gradient of *any* quadratic?

### *Part E*

Investigate *quartics* (functions with an  $x^4$  term in them) and their gradients.

How about *quintics*? (functions with an  $x^5$  term...)

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### *Part F*

Summarise what you have found out about the gradients of quadratics, cubics, quartics, etc.