Gradient spotting

Teacher notes

Why use this resource?

This resource introduces students to the gradient functions (derivatives) of quadratics and cubics, and by extension to all polynomials. It offers students an opportunity to experiment with these polynomials, building a sense of how the gradients change as one moves along a variety of simple polynomials. They are asked to look for patterns and to predict the gradient functions of some small polynomials. This resource would work well after students have encountered the concept of the gradient of a curve (for example by using Zooming in) and the tangent to a curve (for example by using A tangent is …).

Preparation

Students will need access to a suitable device to explore the interactivity. They should have a basic concept of tangents to curves and the gradient of a curve prior to exploring this resource.

Possible approach

It is useful for the teacher to discuss the relationship between the different parts of the applet with the class before students work on the resource. For example, the teacher could ask the class about the gradient of $y = x^2$ (if they have already explored this in detail), and then use this function to show how the two graphs show the function and its gradients, while the spreadsheet shows just the gradients.

Students can then work in small groups on the quadratics activity, with the aim of reaching a rule with associated explanations. After this, they can move on to look at the cubics section, which shows gradient functions which themselves are non-linear.

Key questions

- If we know the gradients of two functions, what is the gradient of the sum of the functions?
- What pattern do you see emerging when considering the gradient functions of x, x^2 and x^3? Could you predict the gradient function of x^4?

Possible support

For the quadratics section, it might be helpful to ask the students what they recall about finding the equation of a straight line, or finding an "nth term rule" from a sequence of numbers.

It might also be useful to ask them to think of the simplest possible examples and to work with those first.

Possible extension

To prove the results found here, the resource Binomials are the answer offers a more formal approach using gradients of chords.