



Activity description

There are 12 sets of cards, each set containing a polynomial function, its graph, the corresponding derivative function and the graph of the derivative function.

The cards can be used in a variety of matching activities to check whether students can identify the derivatives of quadratic and cubic functions and their graphs.

This activity can be used to check learning after this topic has been covered or for revision at the end of a calculus course. The slideshow provides an introduction by considering a quadratic example and a cubic example.

Suitability

Level 3 (Advanced)

Time

10–45 minutes depending on whether the slideshow is shown and which of the cards are used.

Resources

Set of matching cards to be copied, cut out, and laminated for students or groups; copying each type of card onto a different colour of paper makes the matching activities easier

Optional: Slideshow

Equipment

Optional: graphic calculators, interactive whiteboard

Key mathematical language

Polynomial, quadratic, cubic, function, derivative, intercept, factors, turning points, maximum, minimum, gradient

Notes on the activity

The cards have the polynomials on the first page, their graphs (in the same order) on the second and third pages, the derivative functions on the fourth page, and the graphs of the derivative functions on the fifth and sixth pages.

Possible matching activities

- Use all four cards from each set (but perhaps not all the sets, depending on the time you have available). Shuffle each type of card, then ask students to match each function with its graph, the derivative function, and the graph of the derivative function.
- Use just the algebraic function cards and their derivative functions (the 1st and 4th pages only). Matching functions with their derivative functions

provides a quick check of students' knowledge of the rules for differentiating polynomials. This could be used as a starter or session plenary.

- For a more difficult activity use just the graphs (that is the cards on the 2nd, 3rd, 5th and 6th pages only). To match the graphs of polynomials and their derivatives, students will need to think carefully about the relationship between the features of the graph of a function and its derivative.

Note that the same set of cards can be used for matching algebraic and graphical representations of polynomial functions.

During the activity

Students can work individually to check individual knowledge or in pairs or small groups to encourage discussion.

Points for discussion

Connections between the graphs of functions and their derivatives. The examples and questions on the slides can be used to aid class discussion.

Extensions

Students use graphic calculators to explore whether the connections they have seen between functions and their derivatives and graphs also apply to other functions such as exponential and trigonometric functions.

Give students a list of polynomial and other functions. These may just consist of quadratic and cubic functions as in the matching activity, or include other functions such as exponential and trigonometric functions. Ask students to sketch the graphs of the functions and their derivatives and to describe the ways in which they are related (could be written in the form of notes to be used in revision later).