

$$y = x^2 - 4x + 3$$

$$y = x^3 + x^2 - 6x - 4$$

$$y = x^3 - 3x^2 + 3x - 5$$

$$y = 6 + x - x^2$$

$$y = 5 + x - 2x^2 - x^3$$

$$y = 3 + 6x - x^3$$

$$y = 4 - x^2$$

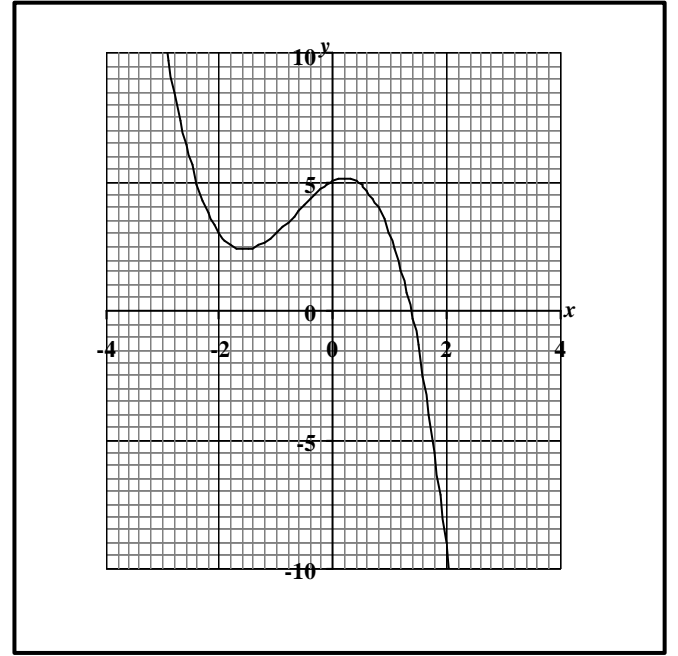
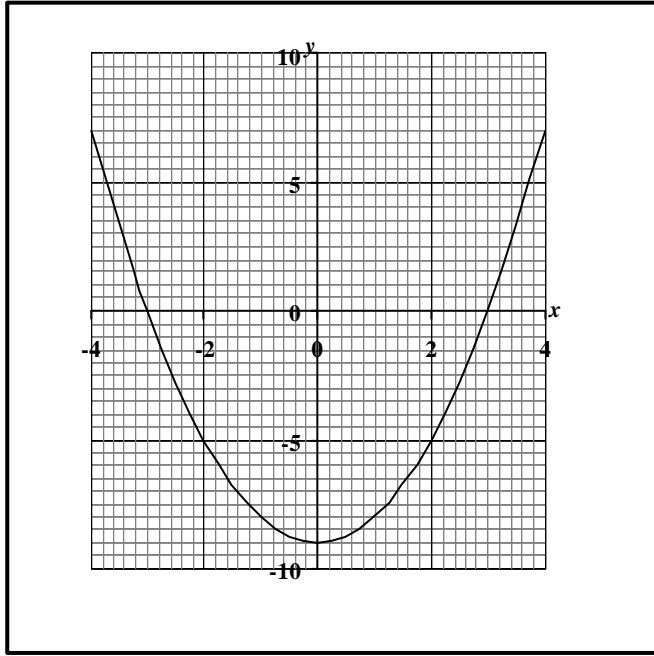
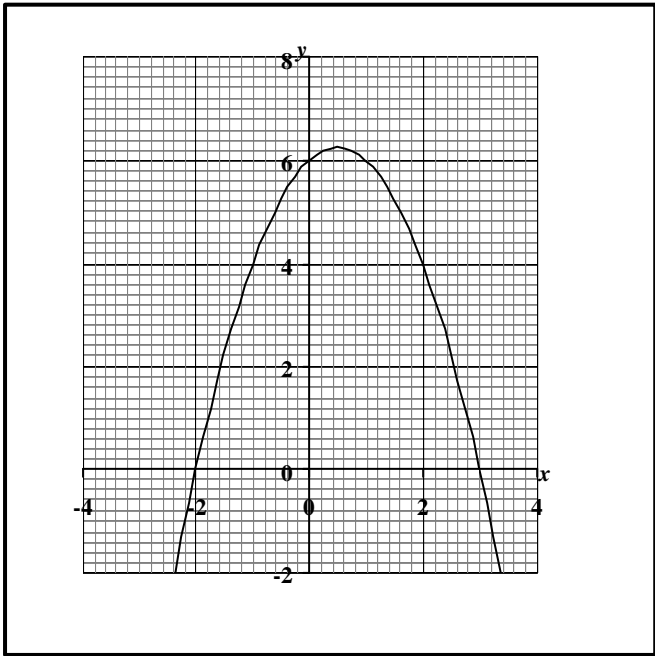
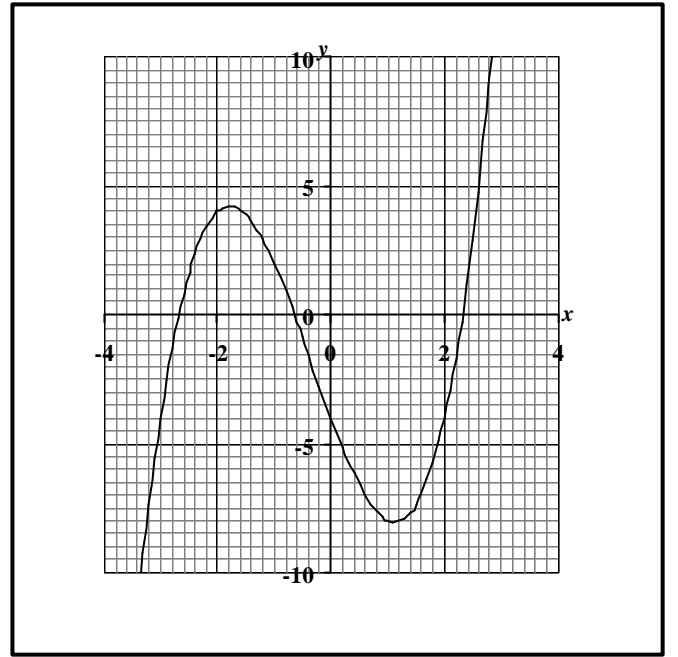
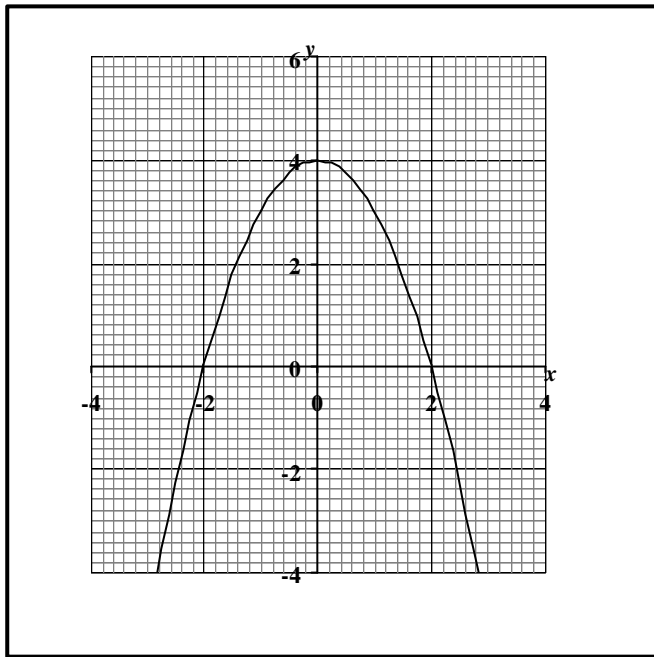
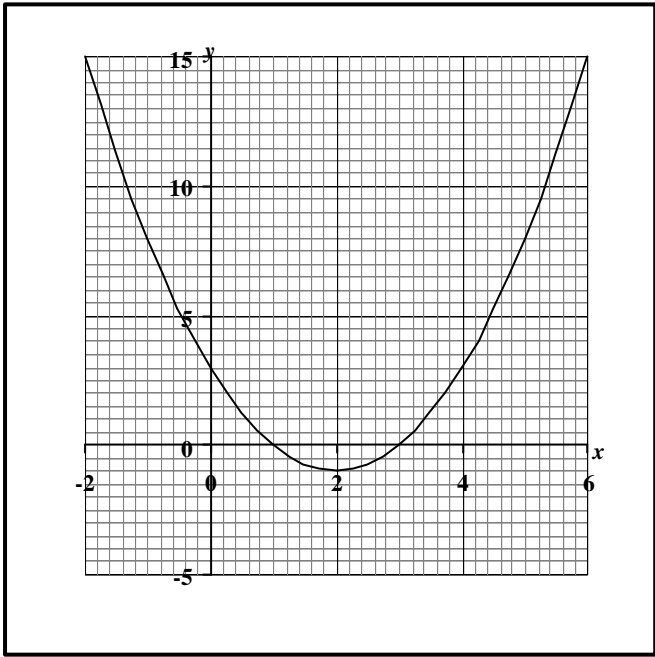
$$y = x^3 + 5$$

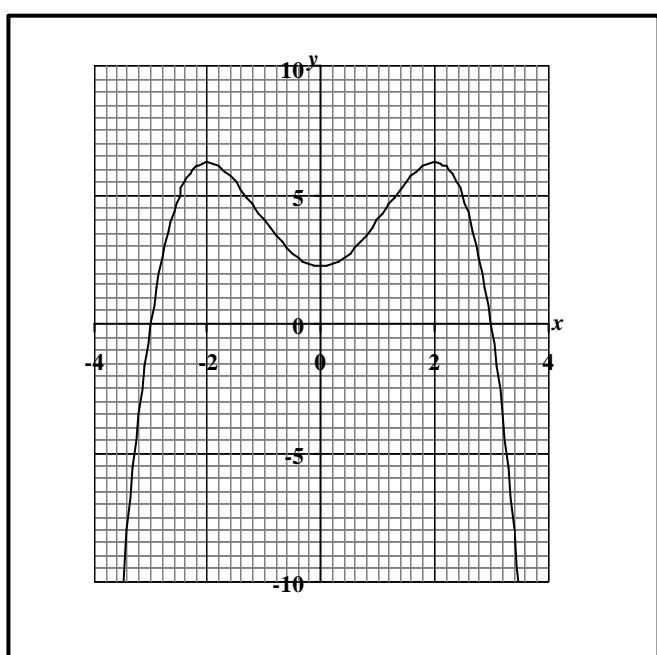
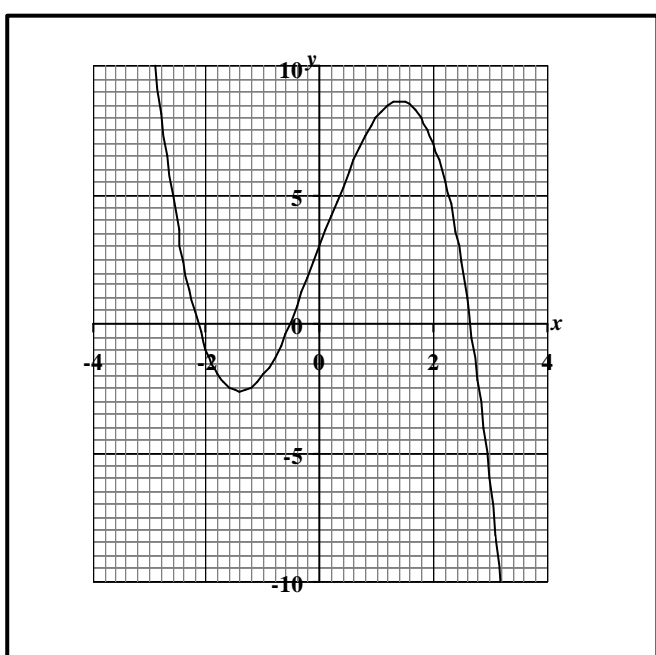
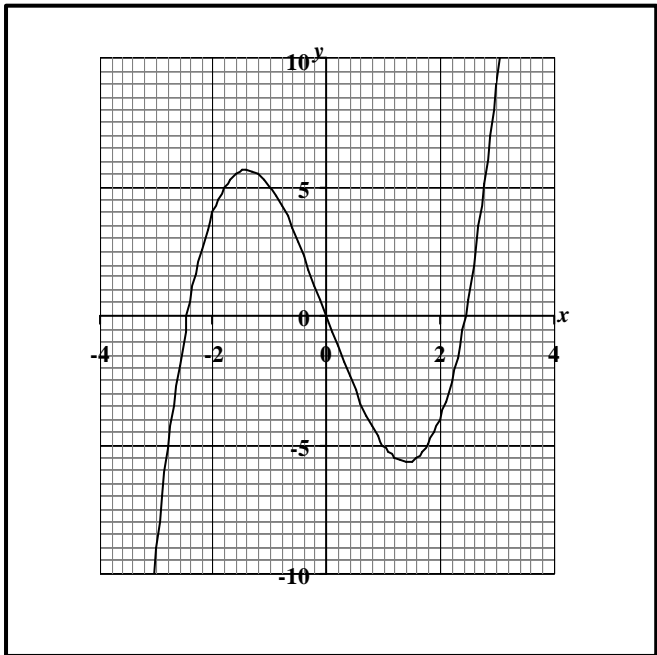
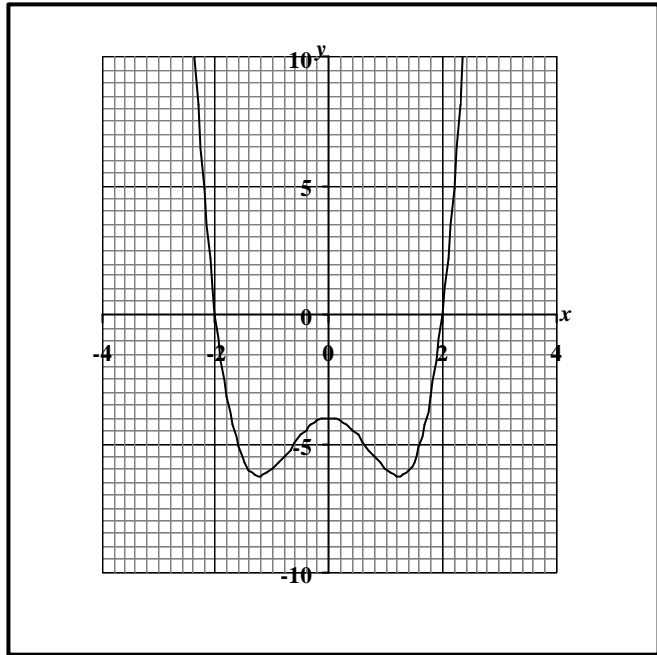
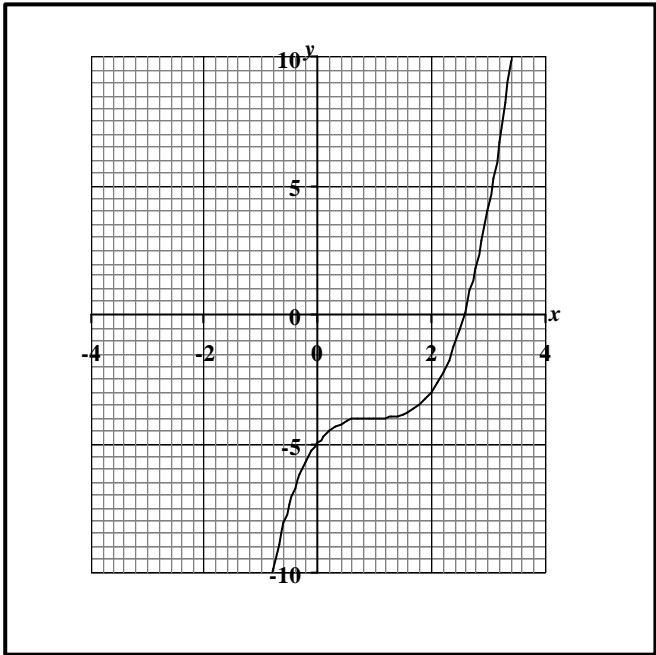
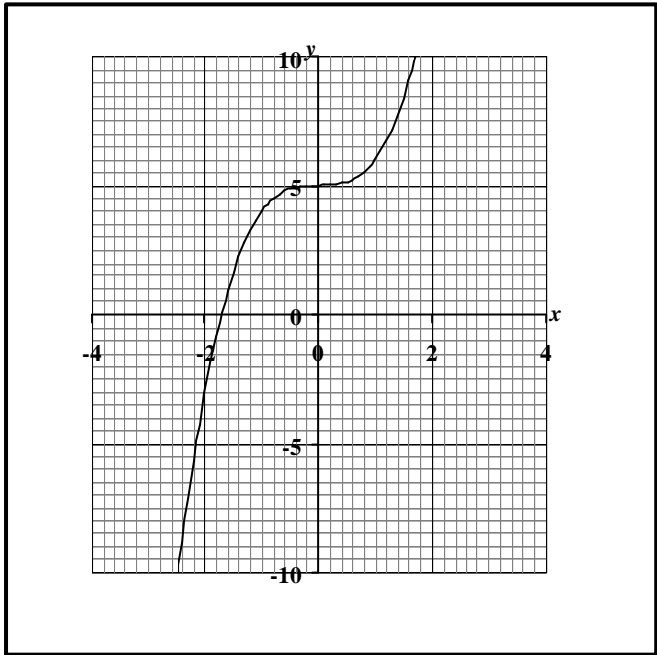
$$y = x^4 - 3x^2 - 4$$

$$y = x^2 - 9$$

$$y = x^3 - 6x$$

$$y = \frac{1}{4}(9 + 8x^2 - x^4)$$





$$y = 2x - 4$$

$$y = 3x^2 + 2x - 6$$

$$y = 3x^2 - 6x + 3$$

$$y = 1 - 2x$$

$$y = 1 - 4x - 3x^2$$

$$y = 6 - 3x^2$$

$$y = -2x$$

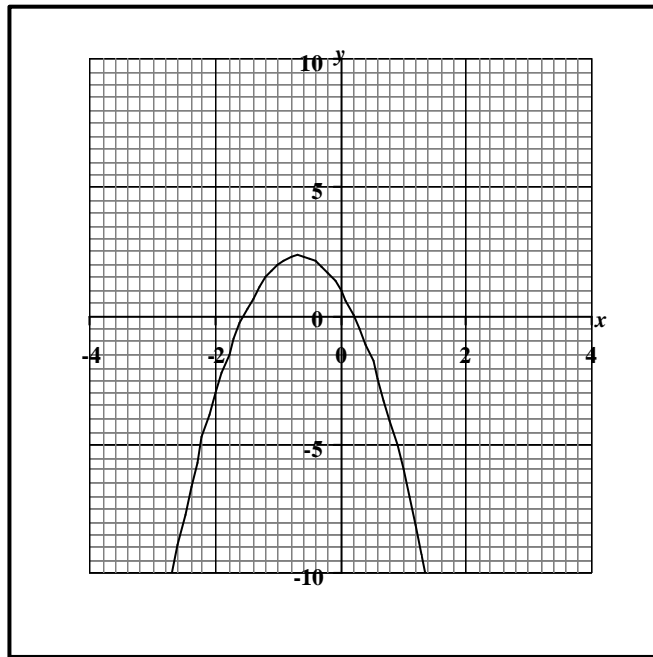
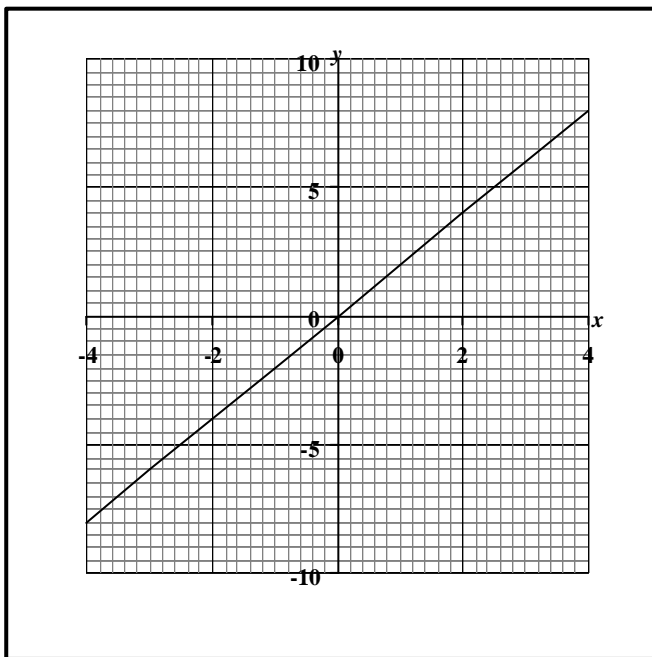
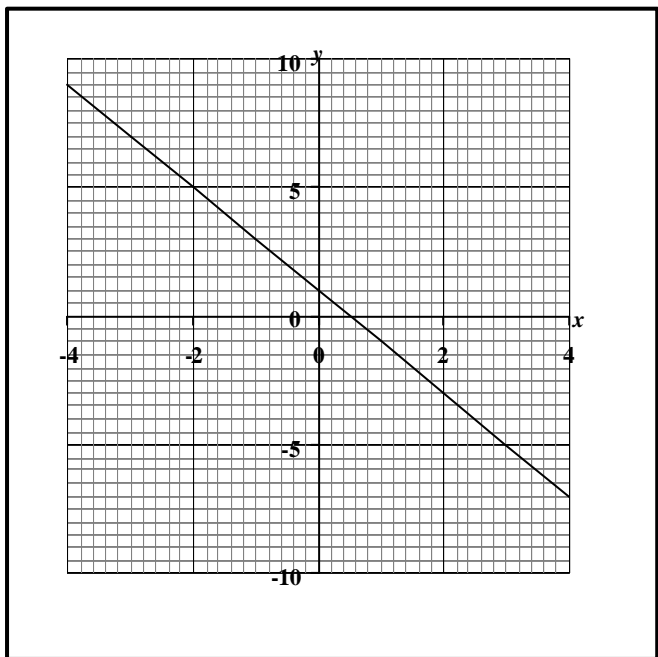
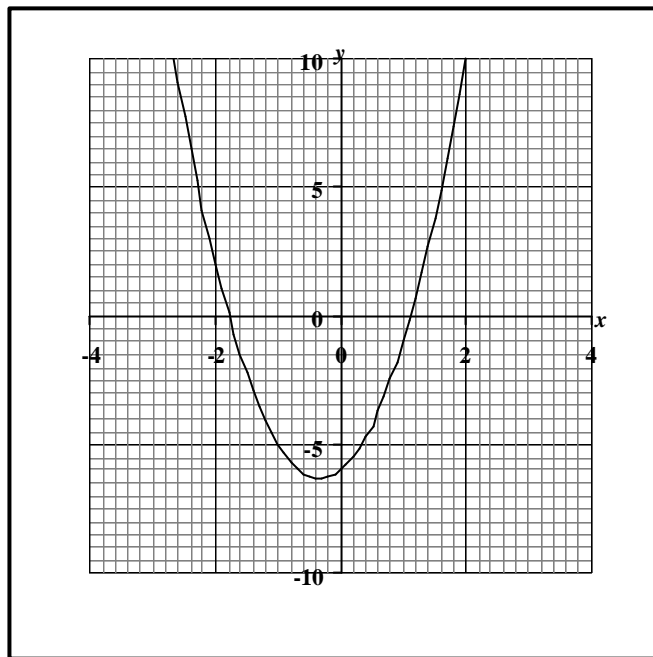
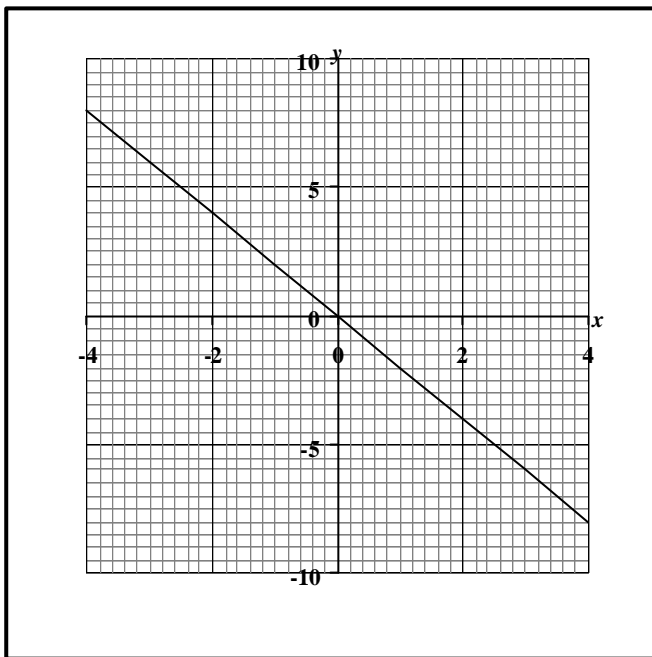
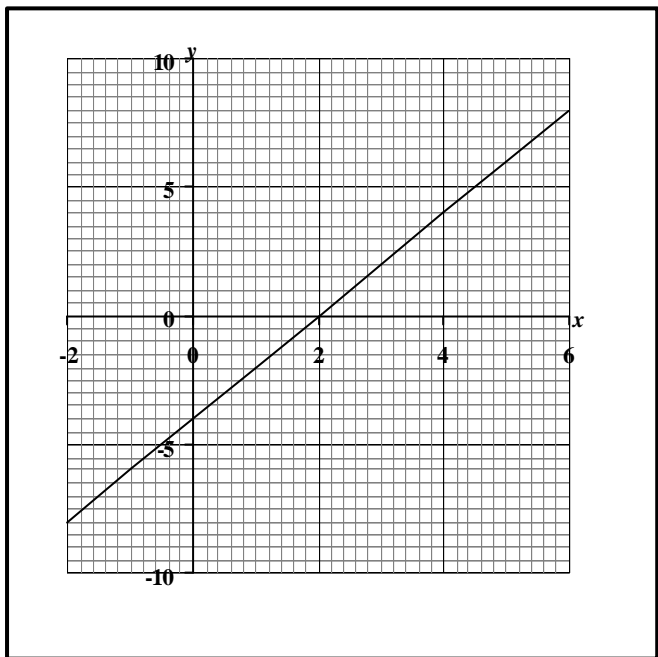
$$y = 3x^2$$

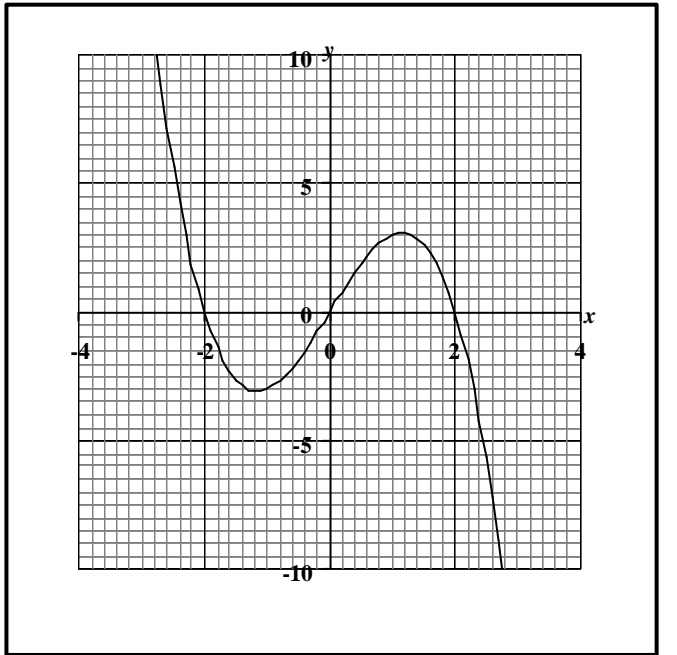
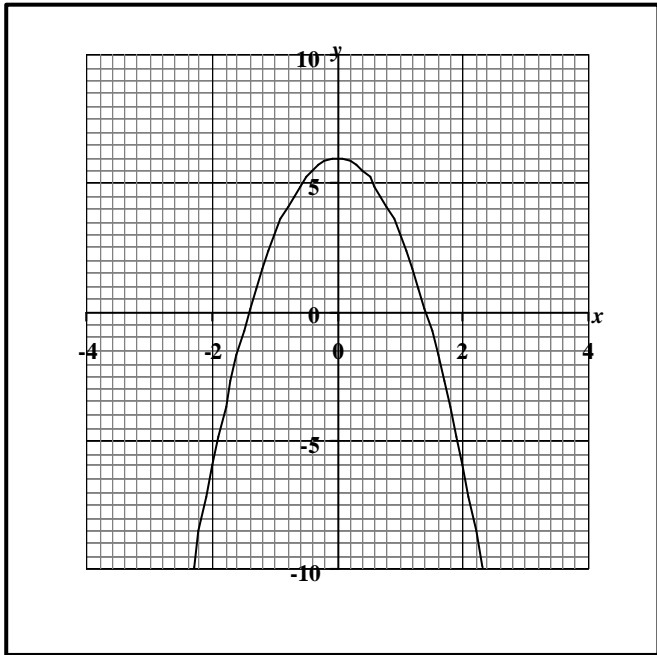
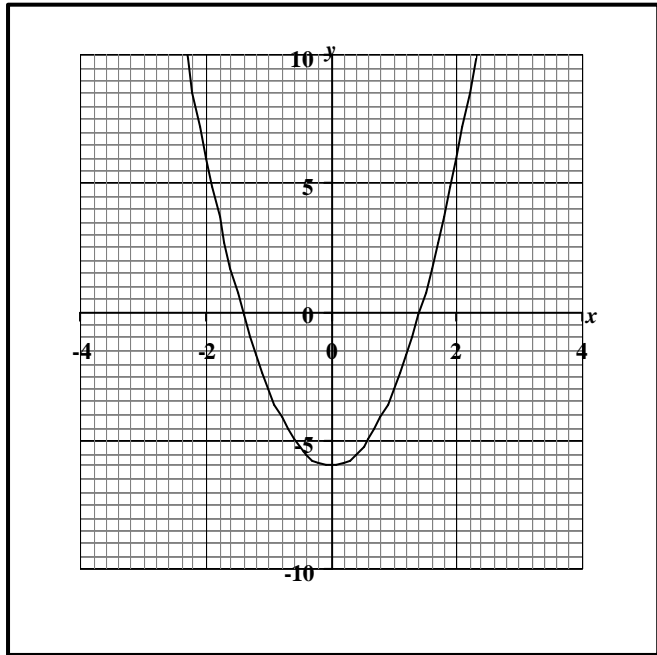
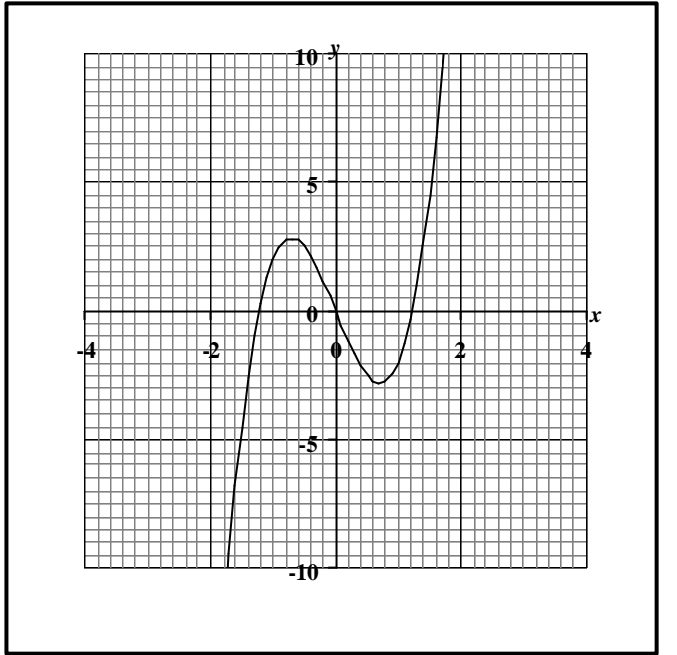
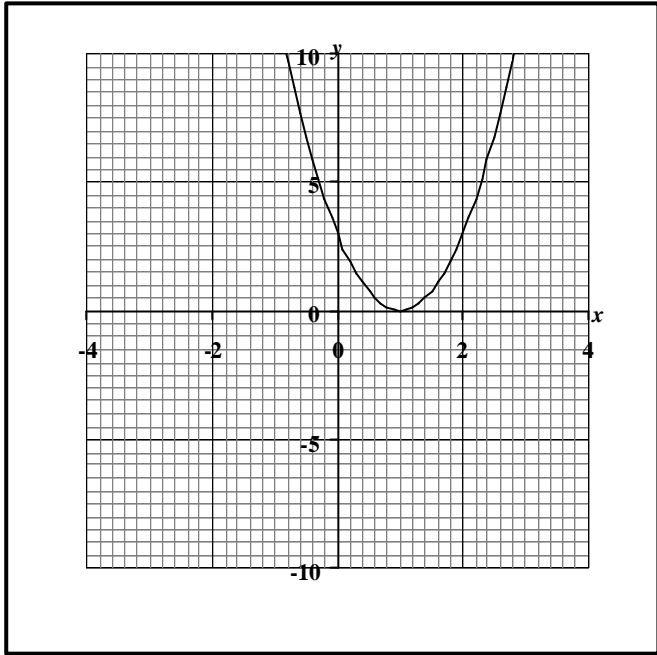
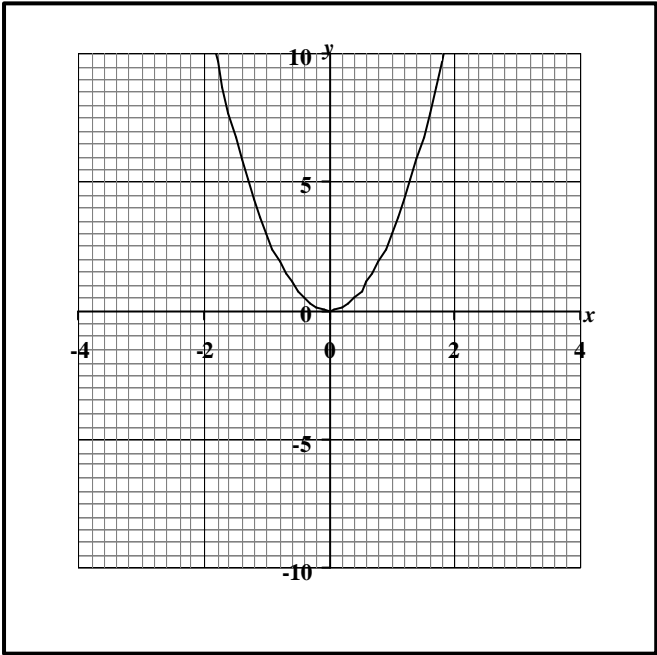
$$y = 4x^3 - 6x$$

$$y = 2x$$

$$y = 3x^2 - 6$$

$$y = 4x - x^3$$





Teacher Notes

Units Advanced Level, *Modelling with calculus*

Skills used in this activity:

- Find the derivatives of polynomial functions.
- Match graphs of polynomials with those of their gradient functions.

Notes

The previous pages give 12 sets of cards, each set containing a polynomial function, its graph, the corresponding gradient function and the graph of the gradient function.

The 12 polynomials are on page 1, their graphs (in the same order) on pages 2 and 3, the gradient functions on page 4 and the graphs of the gradient functions on pages 5 and 6.

These cards can be used in a variety of matching activities with students working individually or in pairs or groups. You will need to laminate and cut out copies of the cards for each student or group of students. Copying each type of card onto a different colour of paper will make the matching activities easier. Some suggestions are given below:

- 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 gradient function and the graph of the gradient function.
- Use just the algebraic function cards and their gradient functions (i.e. pages 1 and 4 only). Matching functions with their gradient functions provides a quick check of students' knowledge of the rules for differentiating polynomials.
- For a more difficult activity use just the graphs (i.e. the cards on pages 2, 3, 5 and 6 only). To match the graphs of polynomials and their gradient functions students will need to think carefully about the relationship between the features of the graph of a function and its gradient function.

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

