

A-Level Starter Activity



Topic: Cubic Graphs

Chapter Reference: Pure 1, Chapter 4

8
minutes

1. Solve the equations $x^3 + 4x^2 + 3x = 0$

(3)

2. Sketch the following graph, $f(x) = (x + 2)(x - 1)(x - 3)$

(3)

3. Sketch the following graph, $f(x) = (3x - 1)(x + 2)(1 - x)$

(3)

4. Sketch the following graph, $f(x) = (x + 1)(x - k)^2$

(3)

Solutions

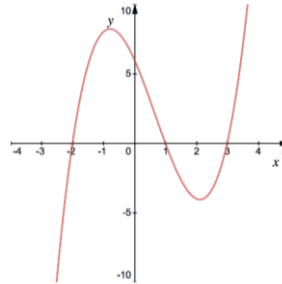
1.

$x(x^2 + 4x + 3) = x(x + 3)(x + 1)$	M1
$x = 0$	M1
$x = -3$ $x = -1$	M1

2.

$f(x) = (x + 2)(x - 1)(x - 3)$ $x = -2$ $x = 1$ $x = 3$	M1
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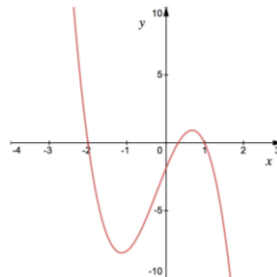
Shape **M1**
Roots marked **M1**



3.

$f(x) = (3x - 1)(x + 2)(1 - x)$ $x = \frac{1}{3}$ $x = -2$ $x = 1$	M1
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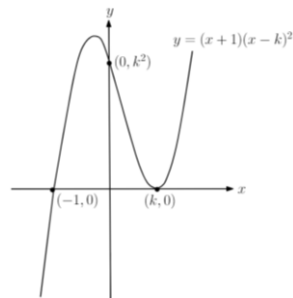
Shape **M1**
Roots marked **M1**



4.

$f(x) = (x + 1)(x - k)^2$ $x = -1$ $x = k$	M1
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Shape **M1**
Roots marked **M1**





1. The figure below shows a sketch of the curve with equation $f(x)$. The curve has a maximum point A at $(-2, 3)$ and a minimum point B at $(3, -5)$.

On separate diagrams sketch the curve with equation,

a. $y = f(x + 3)$

(3)

b. $y = 2f(x)$

(3)

On each diagram clearly show the coordinates of the maximum and minimum points.

The graph of $y = f(x) + a$ has a minimum at $(3, 0)$ where a is a constant.

c. Write down the value of a .

(1)

a.

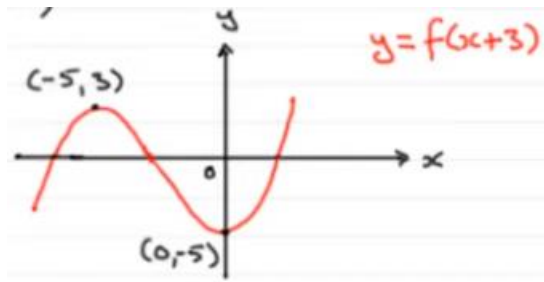
b.

c.

Solutions

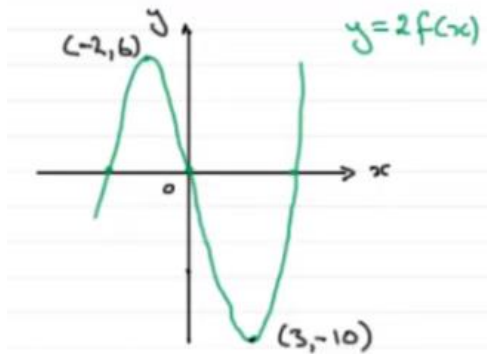
1a.

Shape **M1**
(-5, 3) **M1**
(0, -5) **M1**



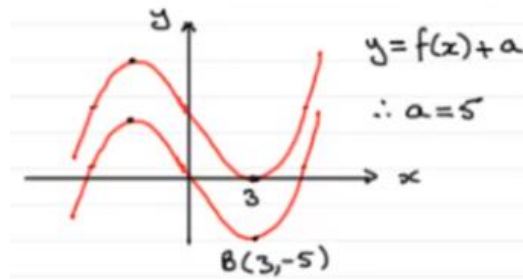
1b.

Shape **M1**
(-2, 6) **M1**
(3, -10) **M1**



1c.

Graphical representation **M1**
Transformation **M1**



$a = 5$

M1

A-Level Starter Activity



Topic: Quartic Graphs

Chapter Reference: Pure 1, Chapter 4

8
minutes

1. Sketch the graph of $f(x) = (x + 7)(x + 5)(x + 2)(2x - 3)$, and state the coordinates of the intersection with the x -axis. **(3)**

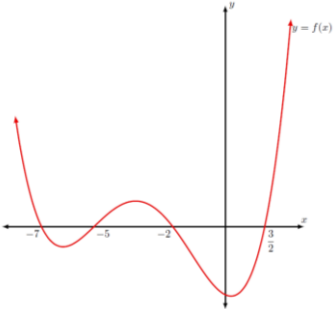
2. Sketch the graph of $f(x) = x(3x + 19)(3 - 2x)(2x + 9)$, and state the coordinates of the intersection with the x -axis. **(3)**

3. Sketch the graph of $f(x) = (3x - 2)^4$, and state the coordinates of the intersections with the x -axis. **(3)**

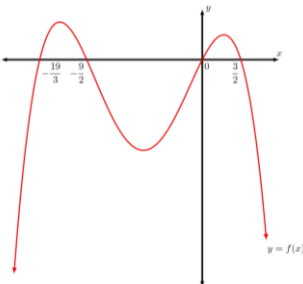
4. Sketch the graph of $16x^4 - 96x^3 + 120x^2 + 200x - 275$ **(4)**

Solutions

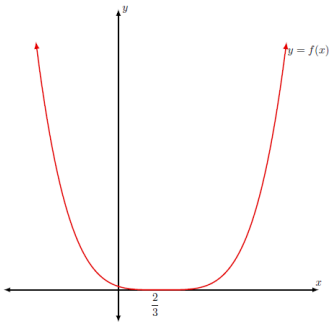
1.

$f(x) = (x + 7)(x + 5)(x + 2)(2x - 3)$ $x = -7, x = -5, x = -2, x = \frac{3}{2}$	M1
<div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <p>Shape M1 Roots marked M1</p> </div> <div style="width: 40%; text-align: center;">  </div> </div>	

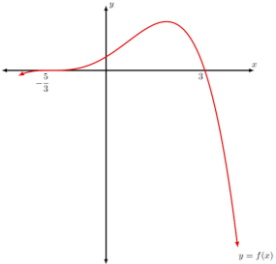
2.

$f(x) = x(3x + 19)(3 - 2x)(2x + 9)$ $x = 0, x = \frac{19}{3}, x = \frac{3}{2}, x = -\frac{9}{2}$	M1
<div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <p>Shape M1 Roots marked M1</p> </div> <div style="width: 40%; text-align: center;">  </div> </div>	

3.

$f(x) = (3x - 2)^4$ $x = \frac{2}{3}$	M1
<div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <p>Shape M1 Roots marked M1</p> </div> <div style="width: 40%; text-align: center;">  </div> </div>	

4.

$16x^4 - 96x^3 + 120x^2 + 200x - 275$ $= (3x + 5)^3 (3 - x)$	M1
$x = -\frac{5}{3}, x = 3$	M1
<div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <p>Shape M1 Roots marked M1</p> </div> <div style="width: 40%; text-align: center;">  </div> </div>	