

Silver Level S1

Question paper

Level	A Level
Exam Board	Edexcel GCE
Subject	Mathematics
Module	Core 1
Difficulty Level	Silver Level S1
Booklet	Question paper

Time Allowed: 90 minutes

Score: /75

Percentage: /100

Grade Boundaries:

A*	A	B	C	D	E
>71	62	54	46	38	<30

1. Simplify

$$\frac{7 + \sqrt{5}}{\sqrt{5} - 1},$$

giving your answer in the form $a + b\sqrt{5}$, where a and b are integers.

(4)

May 2013

2. Given that $y = 2x^5 + 7 + \frac{1}{x^3}$, $x \neq 0$, find, in their simplest form,

(a) $\frac{dy}{dx}$,

(3)

(b) $\int y \, dx$.

(4)

May 2011

3. (a) Find the value of $8^{\frac{5}{3}}$.

(2)

(b) Simplify fully $\frac{(2x^{\frac{1}{2}})^3}{4x^2}$.

(3)

May 2013

4. A sequence a_1, a_2, a_3, \dots is defined by

$$a_1 = 4,$$

$$a_{n+1} = k(a_n + 2), \quad \text{for } n \geq 1$$

where k is a constant.

- (a) Find an expression for a_2 in terms of k .

(1)

Given that $\sum_{i=1}^3 a_i = 2$,

- (b) find the two possible values of k .

(6)

May 2013

5.

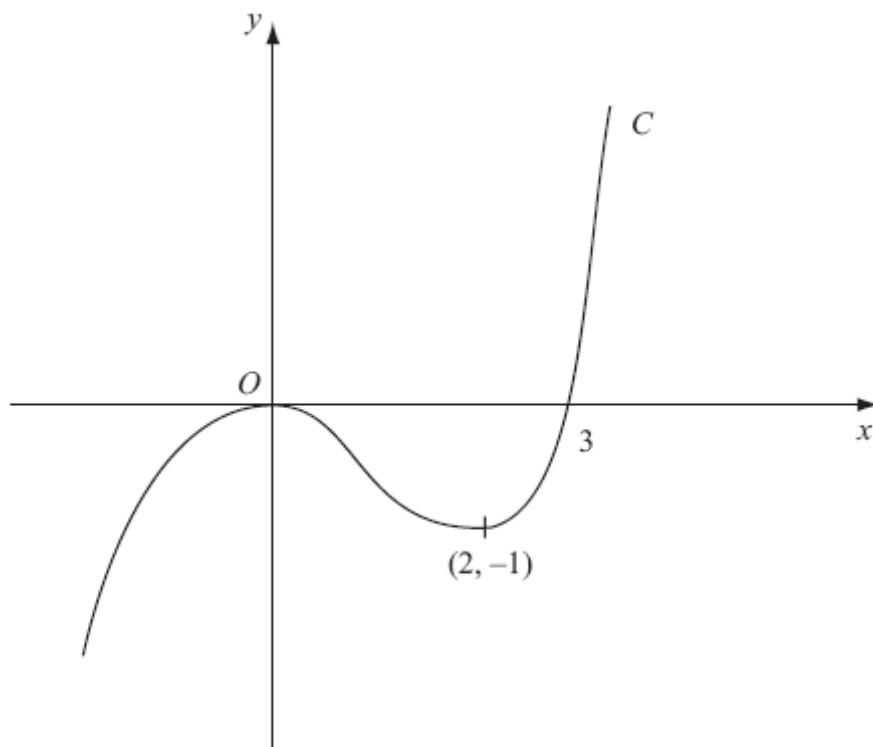
**Figure 1**

Figure 1 shows a sketch of the curve C with equation $y = f(x)$. There is a maximum at $(0, 0)$, a minimum at $(2, -1)$ and C passes through $(3, 0)$.

On separate diagrams, sketch the curve with equation

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

(3)

(b) $y = f(-x)$.

(3)

On each diagram show clearly the coordinates of the maximum point, the minimum point and any points of intersection with the x -axis.

January 2009

6. An arithmetic sequence has first term a and common difference d . The sum of the first 10 terms of the sequence is 162.
- (a) Show that $10a + 45d = 162$. (2)
- Given also that the sixth term of the sequence is 17,
- (b) write down a second equation in a and d , (1)
- (c) find the value of a and the value of d . (4)

January 2011

7. Lewis played a game of space invaders. He scored points for each spaceship that he captured.
- Lewis scored 140 points for capturing his first spaceship.
- He scored 160 points for capturing his second spaceship, 180 points for capturing his third spaceship, and so on.
- The number of points scored for capturing each successive spaceship formed an arithmetic sequence.
- (a) Find the number of points that Lewis scored for capturing his 20th spaceship. (2)
- (b) Find the total number of points Lewis scored for capturing his first 20 spaceships. (3)

Sian played an adventure game. She scored points for each dragon that she captured. The number of points that Sian scored for capturing each successive dragon formed an arithmetic sequence.

Sian captured n dragons and the total number of points that she scored for capturing all n dragons was 8500.

Given that Sian scored 300 points for capturing her first dragon and then 700 points for capturing her n th dragon,

- (c) find the value of n . (3)

January 2013

8.

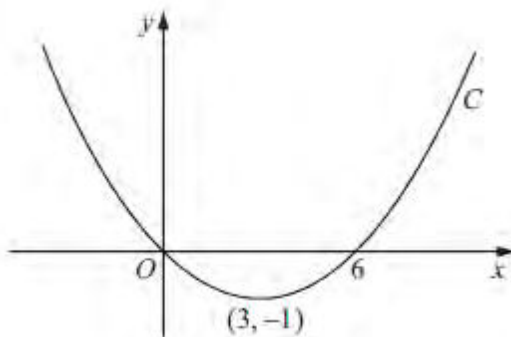
**Figure 2**

Figure 2 shows a sketch of the curve C with equation $y = f(x)$.
The curve C passes through the origin and through $(6, 0)$.
The curve C has a minimum at the point $(3, -1)$.

On separate diagrams, sketch the curve with equation

(a) $y = f(2x)$, (3)

(b) $y = -f(x)$, (3)

(c) $y = f(x + p)$, where p is a constant and $0 < p < 3$. (4)

On each diagram show the coordinates of any points where the curve intersects the x -axis and of any minimum or maximum points.

May 2011

9. A farmer has a pay scheme to keep fruit pickers working throughout the 30 day season. He pays £ a for their first day, £ $(a + d)$ for their second day, £ $(a + 2d)$ for their third day, and so on, thus increasing the daily payment by £ d for each extra day they work.

A picker who works for all 30 days will earn £40.75 on the final day.

- (a) Use this information to form an equation in a and d .

(2)

A picker who works for all 30 days will earn a total of £1005.

- (b) Show that $15(a + 40.75) = 1005$.

(2)

- (c) Hence find the value of a and the value of d .

(4)

May 2010

10. The curve C has equation $y = x^2(x - 6) + \frac{4}{x}$, $x > 0$.

The points P and Q lie on C and have x -coordinates 1 and 2 respectively.

- (a) Show that the length of PQ is $\sqrt{170}$.

(4)

- (b) Show that the tangents to C at P and Q are parallel.

(5)

- (c) Find an equation for the normal to C at P , giving your answer in the form $ax + by + c = 0$, where a , b and c are integers.

(4)

May 2007

TOTAL FOR PAPER: 75 MARKS

END