

Bronze Level B3

Question paper

Level	A Level
Exam Board	Edexcel GCE
Subject	Mathematics
Module	Core 1
Difficulty Level	Bronze Level B3
Booklet	Question paper

Time Allowed: 90 minutes

Score: /75

Percentage: /100

Grade Boundaries:

A*	A	B	C	D	E
>72	64	55	47	39	<30

1. Find

$$\int \left(6x^2 + \frac{2}{x^2} + 5 \right) dx,$$

giving each term in its simplest form.

(4)

May 2012

2. Find

$$\int (8x^3 + 6x^{\frac{1}{2}} - 5) dx,$$

giving each term in its simplest form.

(4)

May 2010

3. Simplify

$$\frac{5 - \sqrt{3}}{2 + \sqrt{3}},$$

giving your answer in the form $a + b\sqrt{3}$, where a and b are integers.

(4)

January 2008

4. A girl saves money over a period of 200 weeks. She saves 5p in Week 1, 7p in Week 2, 9p in Week 3, and so on until Week 200. Her weekly savings form an arithmetic sequence.

(a) Find the amount she saves in Week 200.

(3)

(b) Calculate her total savings over the complete 200 week period.

(3)

May 2007

5. A sequence of positive numbers is defined by

$$a_{n+1} = \sqrt{(a_n^2 + 3)}, \quad n \geq 1,$$

$$a_1 = 2.$$

(a) Find a_2 and a_3 , leaving your answers in surd form.

(2)

(b) Show that $a_5 = 4$.

(2)

May 2010

6. The straight line L_1 passes through the points $(-1, 3)$ and $(11, 12)$.

(a) Find an equation for L_1 in the form $ax + by + c = 0$, where a , b and c are integers. (4)

The line L_2 has equation $3y + 4x - 30 = 0$.

(b) Find the coordinates of the point of intersection of L_1 and L_2 . (3)

May 2013

7. Sue is training for a marathon. Her training includes a run every Saturday starting with a run of 5 km on the first Saturday. Each Saturday she increases the length of her run from the previous Saturday by 2 km.

(a) Show that on the 4th Saturday of training she runs 11 km. (1)

(b) Find an expression, in terms of n , for the length of her training run on the n th Saturday. (2)

(c) Show that the total distance she runs on Saturdays in n weeks of training is $n(n + 4)$ km. (3)

On the n th Saturday Sue runs 43 km.

(d) Find the value of n . (2)

(e) Find the total distance, in km, Sue runs on Saturdays in n weeks of training. (2)

June 2008

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

$$a_1 = k,$$

$$a_{n+1} = 3a_n + 5, \quad n \geq 1,$$

where k is a positive integer.

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

(1)

- (b) Show that $a_3 = 9k + 20$.

(2)

- (c) (i) Find $\sum_{r=1}^4 a_r$ in terms of k .

- (ii) Show that $\sum_{r=1}^4 a_r$ is divisible by 10.

(4)

May 2007

9. The curve C with equation $y = f(x)$ passes through the point $(5, 65)$.

Given that $f'(x) = 6x^2 - 10x - 12$,

- (a) use integration to find $f(x)$.

(4)

- (b) Hence show that $f(x) = x(2x + 3)(x - 4)$.

(2)

- (c) Sketch C , showing the coordinates of the points where C crosses the x -axis.

(3)

May 2007

10. The curve C has equation

$$y = (x + 3)(x - 1)^2.$$

- (a) Sketch C , showing clearly the coordinates of the points where the curve meets the coordinate axes. (4)

- (b) Show that the equation of C can be written in the form

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

where k is a positive integer, and state the value of k . (2)

There are two points on C where the gradient of the tangent to C is equal to 3.

- (c) Find the x -coordinates of these two points. (6)

January 2008

11. The gradient of a curve C is given by $\frac{dy}{dx} = \frac{(x^2 + 3)^2}{x^2}$, $x \neq 0$.

- (a) Show that $\frac{dy}{dx} = x^2 + 6 + 9x^{-2}$. (2)

The point $(3, 20)$ lies on C .

- (b) Find an equation for the curve C in the form $y = f(x)$. (6)

June 2008

TOTAL FOR PAPER: 75 MARKS

END