Edexcel GCE

Core Mathematics C2

Silver Level S2

(Question Paper)

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Silver Level S2

Time: 1 hour 30 minutes

Materials required for examination papers	**Items included with question**
Mathematical Formulae (Green)	Nil

Candidates may use any calculator allowed by the regulations of the Joint Council for Qualifications. Calculators must not have the facility for symbolic algebra manipulation, differentiation and integration, or have retrievable mathematical formulas stored in them.

Instructions to Candidates

Write the name of the examining body (Edexcel), your centre number, candidate number, the unit title (Core Mathematics C2), the paper reference (6664), your surname, initials and signature.

Information for Candidates

A booklet 'Mathematical Formulae and Statistical Tables' is provided.
Full marks may be obtained for answers to ALL questions.
There are 11 questions in this question paper. The total mark for this paper is 75.

Advice to Candidates

You must ensure that your answers to parts of questions are clearly labelled.
You must show sufficient working to make your methods clear to the Examiner. Answers without working may gain no credit.

Suggested grade boundaries for this paper:

A*	A	B	C	D	E
70	63	56	49	42	35

1. Find the first 3 terms, in ascending powers of x, of the binomial expansion of

$$(2 - 3x)^5,$$

giving each term in its simplest form.

(4)

May 2012

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2. $$f(x) = 3x^3 - 5x^2 - 58x + 40.$$

(*a*) Find the remainder when f (x) is divided by $(x - 3)$.

(2)

Given that $(x - 5)$ is a factor of f(x) ,

(*b*) find all the solutions of f(x) = 0 .

(5)

June 2010

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3. $$f(x) = 2x^3 - 5x^2 + ax + 18$$

where a is a constant.

Given that $(x - 3)$ is a factor of f(x),

(*a*) show that $a = -9$,

(2)

(*b*) factorise f(x) completely.

(4)

Given that

$$g(y) = 2(3^{3y}) - 5(3^{2y}) - 9(3^y) + 18,$$

(*c*) find the values of y that satisfy g(y) = 0, giving your answers to 2 decimal places where appropriate.

(3)

May 2013

2

4. (*a*) Show that the equation

$$3 \sin^2 \theta - 2 \cos^2 \theta = 1$$

can be written as

$$5 \sin^2 \theta = 3.$$

(2)

(*b*) Hence solve, for $0° \leq \theta < 360°$, the equation

$$3 \sin^2 \theta - 2 \cos^2 \theta = 1,$$

giving your answer to 1 decimal place.

(7)

January 2008

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5. The circle *C* has equation

$$x^2 + y^2 - 20x - 24y + 195 = 0.$$

The centre of *C* is at the point *M*.

(*a*) Find

    (i) the coordinates of the point *M*,

    (ii) the radius of the circle *C*.

(5)

N is the point with coordinates (25, 32).

(*b*) Find the length of the line *MN*.

(2)

The tangent to *C* at a point *P* on the circle passes through point *N*.

(*c*) Find the length of the line *NP*.

(2)

January 2013

6.
$$f(x) = x^4 + 5x^3 + ax + b,$$

where a and b are constants.

The remainder when f(x) is divided by $(x - 2)$ is equal to the remainder when f(x) is divided by $(x + 1)$.

(*a*) Find the value of *a*.

(5)

Given that $(x + 3)$ is a factor of f(*x*),
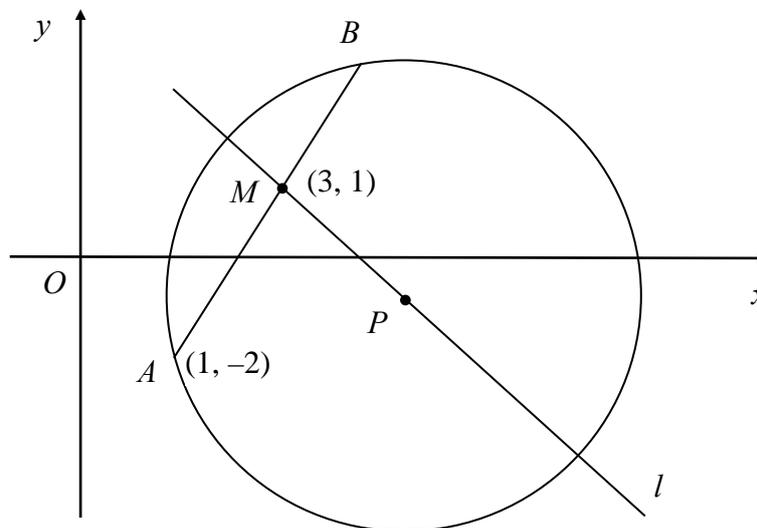
(*b*) find the value of *b*.

(3)

7.

Figure 3

The points *A* and *B* lie on a circle with centre *P*, as shown in Figure 3.
The point *A* has coordinates $(1, -2)$ and the mid-point *M* of *AB* has coordinates $(3, 1)$.
The line *l* passes through the points *M* and *P*.

(*a*) Find an equation for *l*.

(4)

Given that the *x*-coordinate of *P* is 6,

(*b*) use your answer to part (*a*) to show that the *y*-coordinate of *P* is -1,

(1)

(*c*) find an equation for the circle.

(4)

8. (*a*) Sketch the graph of $y = 7^x$, $x \in \mathbb{R}$, showing the coordinates of any points at which the graph crosses the axes.

(2)

(*b*) Solve the equation

$$7^{2x} - 4(7^x) + 3 = 0,$$

giving your answers to 2 decimal places where appropriate.
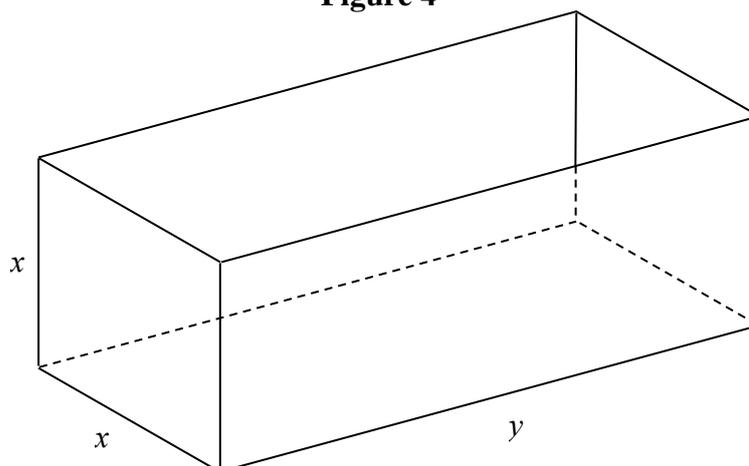
(6)

January 2011

9. **Figure 4**

Figure 4 shows an open-topped water tank, in the shape of a cuboid, which is made of sheet metal. The base of the tank is a rectangle x metres by y metres. The height of the tank is x metres.

The capacity of the tank is 100 m³.

(*a*) Show that the area A m² of the sheet metal used to make the tank is given by

$$A = \frac{300}{x} + 2x^2.$$

(4)

(*b*) Use calculus to find the value of x for which A is stationary.

(4)

(*c*) Prove that this value of x gives a minimum value of A.

(2)

(*d*) Calculate the minimum area of sheet metal needed to make the tank.

(2)

January 2008

TOTAL FOR PAPER: 75 MARKS

END