Paper Reference (complete below)	Centre No.					Surname		Initial(s)
6663/01	Candidate No.					**Signature**		

Paper Reference(s)

6663
Edexcel GCE
Core Mathematics C1
Advanced Subsidiary
Set A: Practice Paper 5

Time: 1 hour 30 minutes

	Examiner's use only
	Team Leader's use only

Question Number	Leave Blank
1	
2	
3	
4	
5	
6	
7	
8	
Total	

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

Calculators may NOT be used in this examination.

Instructions to Candidates
In the boxes above, write your centre number, candidate number, your surname, initials and signature. You must write your answer for each question in the space following the question. If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates
A booklet 'Mathematical Formulae and Statistical Tables' is provided.
Full marks may be obtained for answers to ALL questions.
This paper has eight questions.

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.

Turn over

Edexcel
Success through qualifications

1. (*a*) Given that $8 = 2^k$, write down the value of k. **(1)**

   (*b*) Given that $4^x = 8^{2-x}$, find the value of x. **(4)**

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2. Given that $(2 + \sqrt{7})(4 - \sqrt{7}) = a + b\sqrt{7}$, where a and b are integers,

   (*a*) find the value of a and the value of b.

   (2)

   Given that $\dfrac{2 + \sqrt{7}}{4 + \sqrt{7}} = c + d\sqrt{7}$ where c and d are rational numbers,

   (*b*) find the value of c and the value of d.

   (3)

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3. $$y = 7 + 10x^{\frac{3}{2}}.$$

   (*a*) Find $\dfrac{dy}{dx}$.

   (2)

   (*b*) Find $\displaystyle\int y \ dx$.

   (3)

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4. (*a*) By completing the square, find in terms of k the roots of the equation

   $$x^2 + 2kx - 7 = 0.$$ **(4)**

   (*b*) Prove that, for all values of k, the roots of $x^2 + 2kx - 7 = 0$ are real and different.

   (2)

   (*c*) Given that $k = \sqrt{2}$, find the exact roots of the equation.

   (2)

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5. The straight line l_1 has equation $4y + x = 0$.

The straight line l_2 has equation $y = 2x - 3$.

(*a*) On the same axes, sketch the graphs of l_1 and l_2 . Show clearly the coordinates of all points at which the graphs meet the coordinate axes.

(3)

The lines l_1 and l_2 intersect at the point *A*.

(*b*) Calculate, as exact fractions, the coordinates of *A*.

(3)

(*c*) Find an equation of the line through *A* which is perpendicular to l_1. Give your answer in the form $ax + by + c = 0$, where *a*, *b* and *c* are integers.

(3)

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6. Each year, for 40 years, Anne will pay money into a savings scheme. In the first year she pays £500. Her payments then increase by £50 each year, so that she pays £550 in the second year, £600 in the third year, and so on.

(*a*) Find the amount that Anne will pay in the 40th year.

(2)

(*b*) Find the total amount that Anne will pay in over the 40 years.

(2)

Over the same 40 years, Brian will also pay money into the savings scheme. In the first year he pays in £890 and his payments then increase by £*d* each year.

Given that Brian and Anne will pay in exactly the same amount over the 40 years,

(*c*) find the value of *d*.

(4)

7.

Figure 1
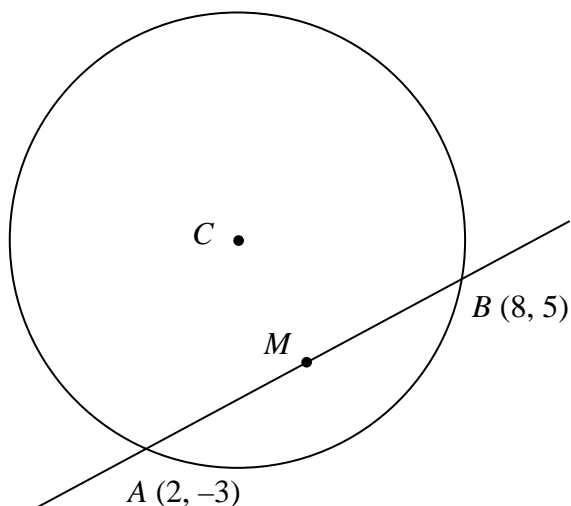
The points *A* and *B* have coordinates (2, –3) and (8, 5) respectively, and *AB* is a chord of a circle with centre *C*, as shown in Fig. 1.

(*a*) Find the gradient of *AB*.

(2)

The point *M* is the mid-point of *AB*.

(*b*) Find an equation for the line through *C* and *M*.

(5)

Given that the *x*-coordinate of *C* is 4,

(*c*) find the *y*-coordinate of *C*,

(2)

(*d*) show that the radius of the circle is $\dfrac{5\sqrt{17}}{4}$.

(4)

8.
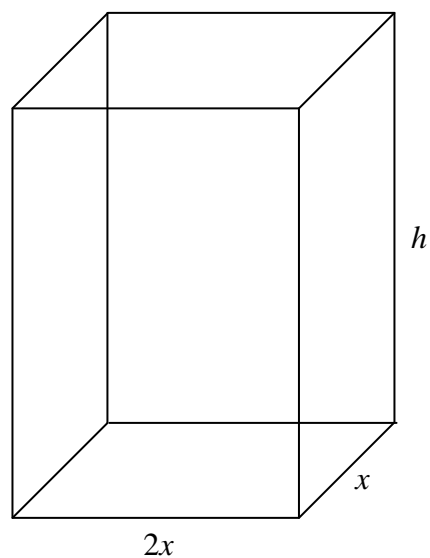

Fig. 4

A manufacturer produces cartons for fruit juice. Each carton is in the shape of a closed cuboid with base dimensions 2x cm by x cm and height h cm, as shown in Fig. 4.

Given that the capacity of a carton has to be 1030 cm^3,

(*a*) express h in terms of x, **(2)**

(*b*) show that the surface area, A cm^2, of a carton is given by

$$A = 4x^2 + \frac{3090}{x}.$$ **(3)**

END