

Paper Reference(s)

**6664/01**

**Edexcel GCE**

**Core Mathematics C2**

**Advanced Subsidiary**

**Friday 9 January 2009 – Morning**

**Time: 1 hour 30 minutes**

**Materials required for examination**

Mathematical Formulae (Green)

**Items included with question papers**

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 or integration, or have retrievable mathematical formulae stored in them.**

**Instructions to Candidates**

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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**

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A booklet 'Mathematical Formulae and Statistical Tables' is provided.  
Full marks may be obtained for answers to ALL questions.  
The marks for the parts of questions are shown in round brackets, e.g. (2).  
There are 10 questions in this question paper. The total mark for this paper is 75.

**Advice to Candidates**

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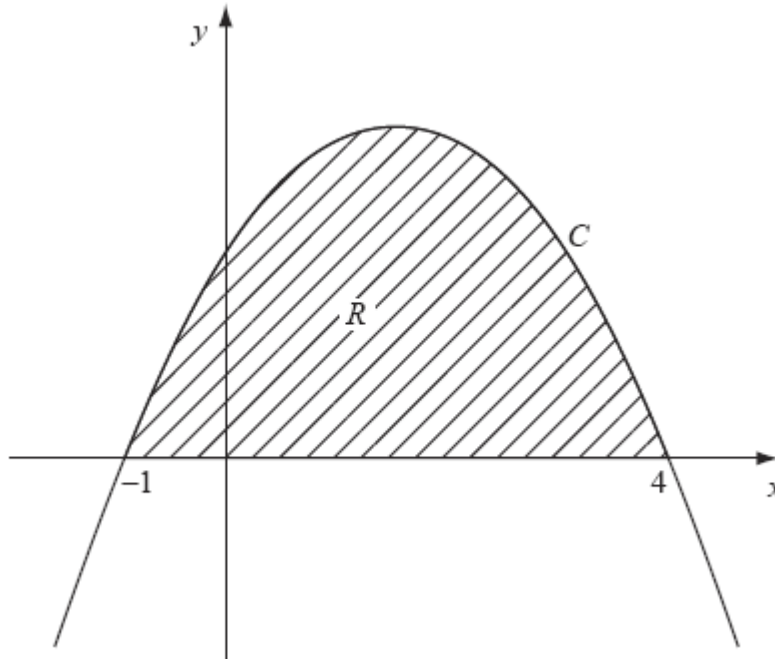
You must ensure that your answers to parts of questions are clearly labelled.  
You must show sufficient working to make your methods clear to the Examiner.  
Answers without working may not gain full credit.

1. Find the first 3 terms, in ascending powers of  $x$ , of the binomial expansion of  $(3 - 2x)^5$ , giving each term in its simplest form.

(4)

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2.



**Figure 1**

Figure 1 shows part of the curve  $C$  with equation  $y = (1 + x)(4 - x)$ .

The curve intersects the  $x$ -axis at  $x = -1$  and  $x = 4$ . The region  $R$ , shown shaded in Figure 1, is bounded by  $C$  and the  $x$ -axis.

Use calculus to find the exact area of  $R$ .

(5)

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3.

$$y = \sqrt{10x - x^2}.$$

(a) Copy and complete the table below, giving the values of  $y$  to 2 decimal places.

$x$	1	1.4	1.8	2.2	2.6	3
$y$	3	3.47			4.39	

(2)

(b) Use the trapezium rule, with all the values of  $y$  from your table, to find an approximation for

the value of  $\int_1^3 \sqrt{10x - x^2} \, dx$ .

(4)

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4. Given that  $0 < x < 4$  and

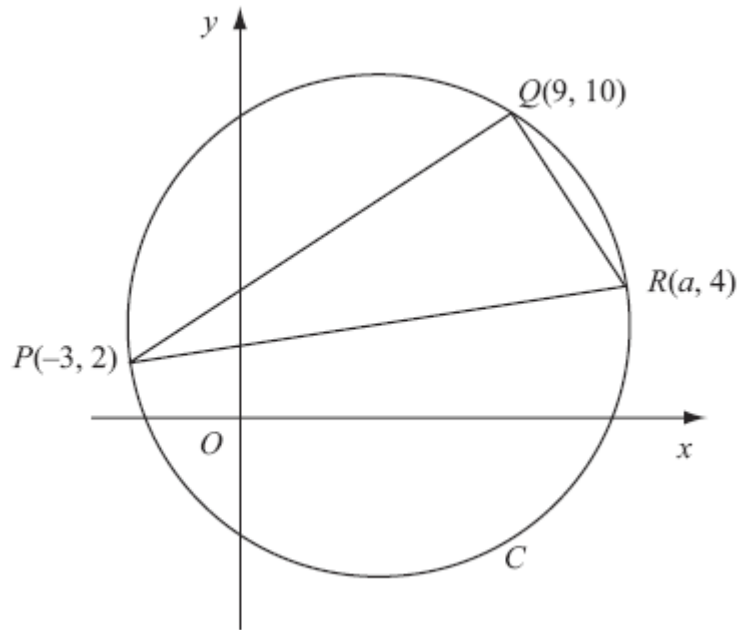
$$\log_5(4 - x) - 2 \log_5 x = 1,$$

find the value of  $x$ .

(6)

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5.



**Figure 2**

The points  $P(-3, 2)$ ,  $Q(9, 10)$  and  $R(a, 4)$  lie on the circle  $C$ , as shown in Figure 2.

Given that  $PR$  is a diameter of  $C$ ,

(a) show that  $a = 13$ ,

**(3)**

(b) find an equation for  $C$ .

**(5)**

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)**

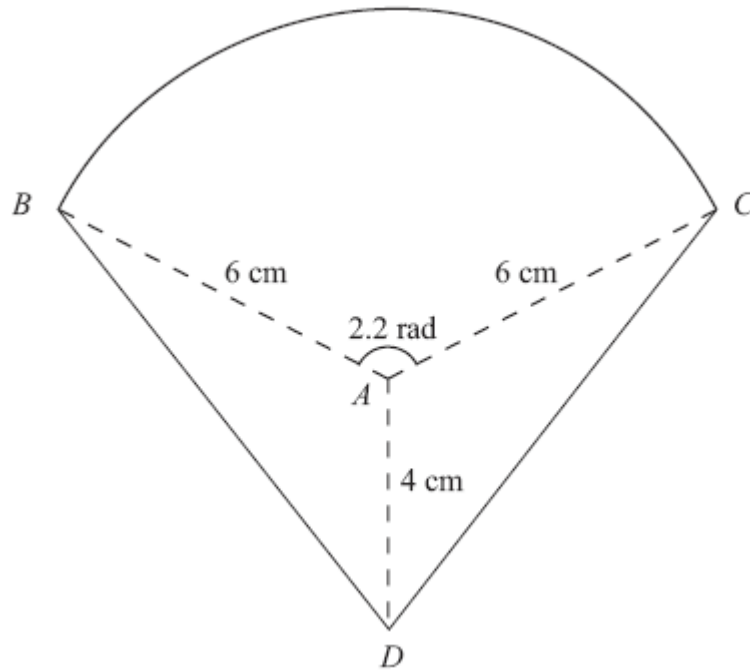
Given that  $(x + 3)$  is a factor of  $f(x)$ ,

(b) find the value of  $b$ .

(3)

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7.



**Figure 3**

The shape  $BCD$  shown in Figure 3 is a design for a logo.

The straight lines  $DB$  and  $DC$  are equal in length. The curve  $BC$  is an arc of a circle with centre  $A$  and radius 6 cm. The size of  $\angle BAC$  is 2.2 radians and  $AD = 4$  cm.

Find

(a) the area of the sector  $BAC$ , in  $\text{cm}^2$ , (2)

(b) the size of  $\angle DAC$ , in radians to 3 significant figures, (2)

(c) the complete area of the logo design, to the nearest  $\text{cm}^2$ . (4)

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8. (a) Show that the equation

$$4 \sin^2 x + 9 \cos x - 6 = 0$$

can be written as

$$4 \cos^2 x - 9 \cos x + 2 = 0. \quad (2)$$

- (b) Hence solve, for  $0 \leq x < 720^\circ$ ,

$$4 \sin^2 x + 9 \cos x - 6 = 0,$$

giving your answers to 1 decimal place.

(6)

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9. The first three terms of a geometric series are  $(k + 4)$ ,  $k$  and  $(2k - 15)$  respectively, where  $k$  is a positive constant.

(a) Show that  $k^2 - 7k - 60 = 0$ . (4)

(b) Hence show that  $k = 12$ . (2)

(c) Find the common ratio of this series. (2)

(d) Find the sum to infinity of this series. (2)

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10. A solid right circular cylinder has radius  $r$  cm and height  $h$  cm.

The total surface area of the cylinder is  $800 \text{ cm}^2$ .

- (a) Show that the volume,  $V \text{ cm}^3$ , of the cylinder is given by

$$V = 400r - \pi r^3. \quad (4)$$

Given that  $r$  varies,

(b) use calculus to find the maximum value of  $V$ , to the nearest  $\text{cm}^3$ . (6)

(c) Justify that the value of  $V$  you have found is a maximum. (2)

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**TOTAL FOR PAPER: 75 MARKS**

**END**