

**Edexcel GCE**  
**Core Mathematics C2**  
**Practice Paper A3**  
**(Question Paper)**

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

Paper Reference(s)

**6663**

**Edexcel GCE**  
**Core Mathematics C2**  
**Advanced Subsidiary**  
**Set A: Practice Paper 3**

Time: 1 hour 30 minutes

Examiner's use only

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Team Leader's use only

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**Materials required for examination**

Mathematical Formulae

**Items included with question papers**

Nil

Candidates may use any calculator EXCEPT those with the facility for symbolic algebra, differentiation and/or integration. Thus candidates may NOT use calculators such as the Texas Instruments TI-89, TI-92, Casio *cfx* 9970G, Hewlett Packard HP 48G.

**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 seven 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.

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

Turn over

1.  $f(x) = x^3 + ax^2 + bx - 10$ , where  $a$  and  $b$  are constants.

When  $f(x)$  is divided by  $(x - 3)$ , the remainder is 14.

When  $f(x)$  is divided by  $(x + 1)$ , the remainder is  $-18$ .

- (a) Find the value of  $a$  and the value of  $b$ . **(5 marks)**
- (b) Show that  $(x - 2)$  is a factor of  $f(x)$ . **(2 marks)**
- 

2. (a) Write down the first four terms of the binomial expansion, in ascending powers of  $x$ , of  $(1 + ax)^n$ , where  $n > 2$ . **(2 marks)**

Given that, in this expansion, the coefficient of  $x$  is 8 and the coefficient of  $x^2$  is 30,

- (b) find the value of  $n$  and the value of  $a$ , **(4 marks)**
- (c) find the coefficient of  $x^3$ . **(2 marks)**
- 

3. A population of deer is introduced into a park. The population  $P$  at  $t$  years after the deer have been introduced is modelled by

$$P = \frac{2000a^t}{4 + a^t},$$

where  $a$  is a constant. Given that there are 800 deer in the park after 6 years,

- (a) calculate, to 4 decimal places, the value of  $a$ , **(4 marks)**
- (b) use the model to predict the number of years needed for the population of deer to increase from 800 to 1800. **(4 marks)**
- (c) With reference to this model, give a reason why the population of deer cannot exceed 2000. **(1 marks)**
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4. Given that  $f(x) = (2x^{\frac{3}{2}} - 3x^{-\frac{3}{2}})^2 + 5$ ,  $x > 0$ ,

- (a) find, to 3 significant figures, the value of  $x$  for which  $f(x) = 5$ . **(3 marks)**
- (b) Show that  $f(x)$  may be written in the form  $Ax^3 + \frac{B}{x^3} + C$ , where  $A$ ,  $B$  and  $C$  are constants to be found. **(3 marks)**

- (c) Hence evaluate  $\int_1^2 f(x) \, dx$ . **(5 marks)**
-

5.

Figure 1

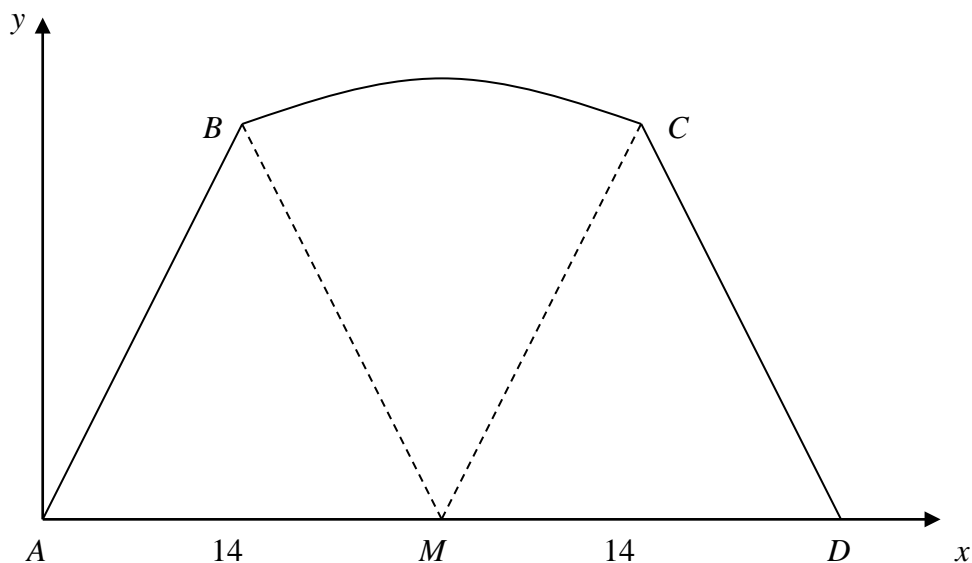


Figure 1 shows the cross-section  $ABCD$  of a chocolate bar, where  $AB$ ,  $CD$  and  $AD$  are straight lines and  $M$  is the mid-point of  $AD$ . The length  $AD$  is 28 mm, and  $BC$  is an arc of a circle with centre  $M$ .

Taking  $A$  as the origin,  $B$ ,  $C$  and  $D$  have coordinates  $(7, 24)$ ,  $(21, 24)$  and  $(28, 0)$  respectively.

- (a) Show that the length of  $BM$  is 25 mm. **(1 marks)**
- (b) Show that, to 3 significant figures,  $\angle BMC = 0.568$  radians. **(3 marks)**
- (c) Hence calculate, in  $\text{mm}^2$ , the area of the cross-section of the chocolate bar. **(5 marks)**

Given that this chocolate bar has length 85 mm,

- (d) calculate, to the nearest  $\text{cm}^3$ , the volume of the bar. **(2 marks)**

6.

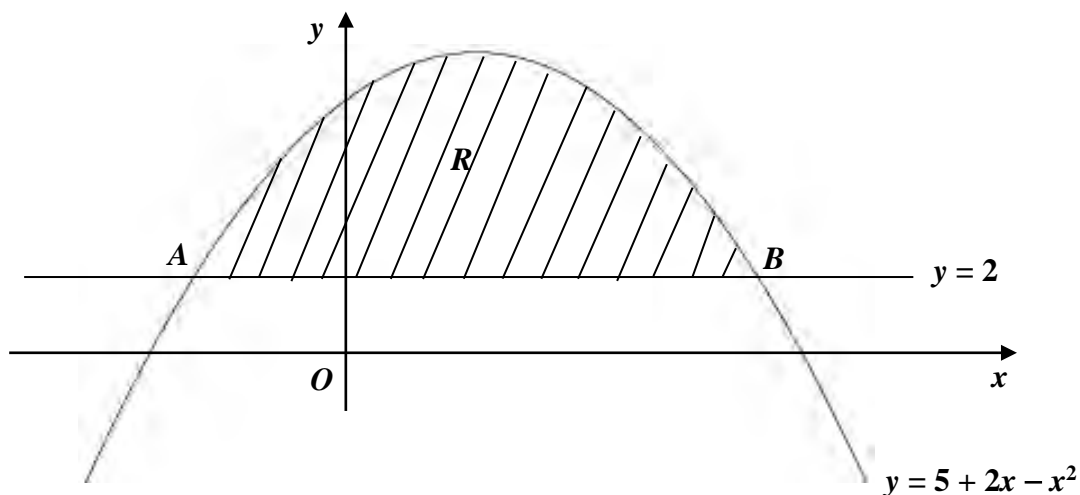


Fig. 1

Figure 1 shows the curve with equation  $y = 5 + 2x - x^2$  and the line with equation  $y = 2$ . The curve and the line intersect at the points  $A$  and  $B$ .

(a) Find the x-coordinates of  $A$  and  $B$ . (3 marks)

The shaded region  $R$  is bounded by the curve and the line.

(b) Find the area of  $R$ . (6 marks)

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7. Find all the values of  $\theta$  in the interval  $0 \leq \theta < 360^\circ$  for which

(a)  $\cos(\theta - 10^\circ) = \cos 15^\circ$ , (3 marks)

(b)  $\tan 2\theta = 0.4$ , (5 marks)

(c)  $2 \sin \theta \tan \theta = 3$ . (6 marks)

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END