

**6663**

**Edexcel GCE**  
**Core Mathematics C2**  
**Advanced Subsidiary**  
**Set B: Practice Question Paper 1**

Time: 1 hour 30 minutes

**Materials required for examination**  
Mathematical Formulae

**Items included with question papers**  
Nil

**Instructions to Candidates**

When a calculator is used, the answer should be given to an appropriate degree of accuracy.

**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 8 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.

1. A circle  $C$  has equation  $x^2 + y^2 - 10x + 6y - 15 = 0$ .
- (a) Find the coordinates of the centre of  $C$ . (2)
- (b) Find the radius of  $C$ . (2)

[P3 June 2001 Question 1]

2.  $f(x) \equiv ax^3 + bx^2 - 7x + 14$ , where  $a$  and  $b$  are constants.
- Given that when  $f(x)$  is divided by  $(x - 1)$  the remainder is 9,
- (a) write down an equation connecting  $a$  and  $b$ . (2)
- Given also that  $(x + 2)$  is a factor of  $f(x)$ ,
- (b) find the values of  $a$  and  $b$ . (4)

[P3 June 2001 Question 2]

3. Find all values of  $\theta$  in the interval  $0 \leq \theta < 360$  for which
- (a)  $\cos(\theta + 75)^\circ = 0$ . (3)
- (b)  $\sin 2\theta^\circ = 0.7$ , giving your answers to one decimal place. (5)

[P1 January 2001 Question 3]

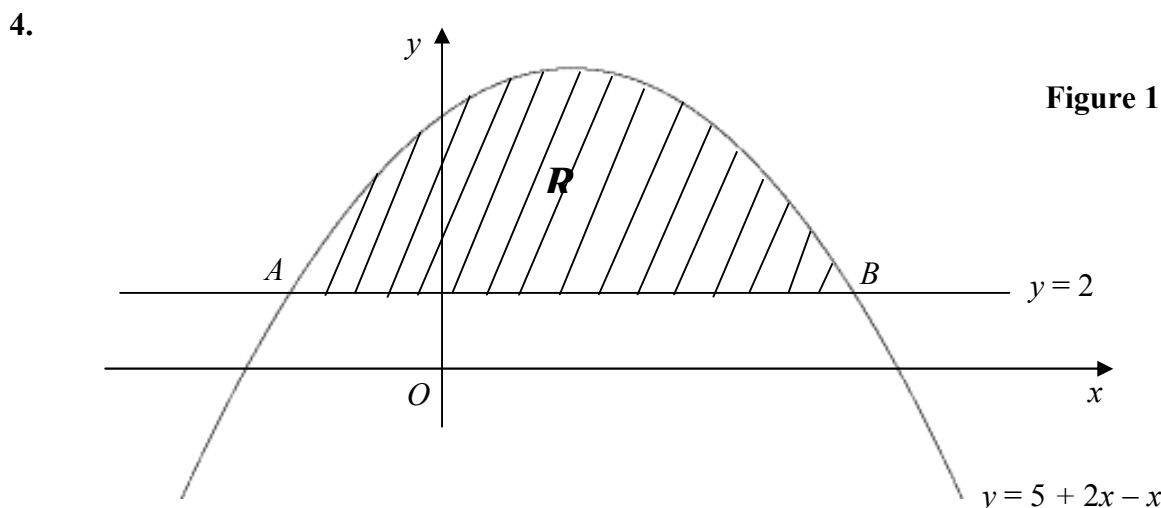


Fig. 1 shows the curve with equation  $y = 5 + 2x - x^2$  and the line with equation  $y = 2$ . The curve and the line intersect at the points  $A$  and  $B$ .

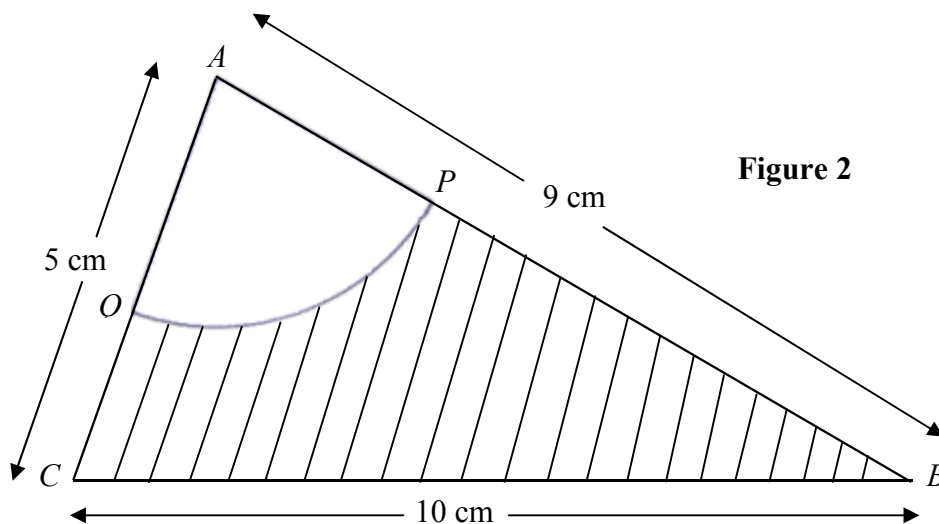
- (a) Find the  $x$ -coordinates of  $A$  and  $B$ . (3)
- The shaded region  $R$  is bounded by the curve and the line.
- (b) Find the area of  $R$ . (6)

[P1 January 2001 Question 4]

5. The third and fourth terms of a geometric series are 6.4 and 5.12 respectively. Find
- the common ratio of the series, (2)
  - the first term of the series, (2)
  - the sum to infinity of the series. (2)
  - Calculate the difference between the sum to infinity of the series and the sum of the first 25 terms of the series. (4)

[P1 January 2001 Question 5]

6.



Triangle  $ABC$  has  $AB = 9$  cm,  $BC = 10$  cm and  $CA = 5$  cm. A circle, centre  $A$  and radius 3 cm, intersects  $AB$  and  $AC$  at  $P$  and  $Q$  respectively, as shown in Fig. 2.

- Show that, to 3 decimal places,  $\angle BAC = 1.504$  radians. (3)
- Calculate,
- the area, in  $\text{cm}^2$ , of the sector  $APQ$ , (2)
  - the area, in  $\text{cm}^2$ , of the shaded region  $BPQC$ , (3)
  - the perimeter, in cm, of the shaded region  $BPQC$ . (4)

[P1 January 2001 Question 7]

7.

Figure 3

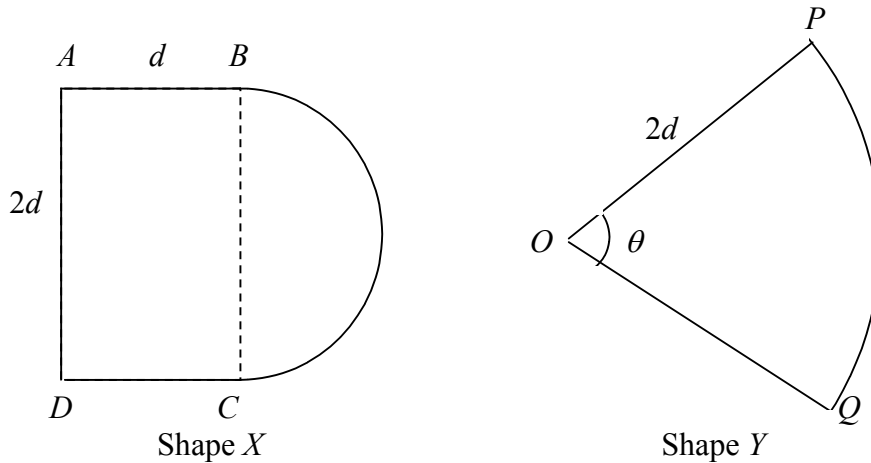


Fig. 3 shows the cross-sections of two drawer handles. Shape  $X$  is a rectangle  $ABCD$  joined to a semicircle with  $BC$  as diameter. The length  $AB = d$  cm and  $BC = 2d$  cm. Shape  $Y$  is a sector  $OPQ$  of a circle with centre  $O$  and radius  $2d$  cm. Angle  $POQ$  is  $\theta$  radians. Given that the areas of the shapes  $X$  and  $Y$  are equal,

(a) prove that  $\theta = 1 + \frac{1}{4}\pi$ . (5)

Using this value of  $\theta$ , and given that  $d = 3$ , find in terms of  $\pi$ ,

(b) the perimeter of shape  $X$ , (2)

(c) the perimeter of shape  $Y$ . (3)

(d) Hence find the difference, in mm, between the perimeters of shapes  $X$  and  $Y$ . (2)

[P1 June 2001 Question 6]

8.

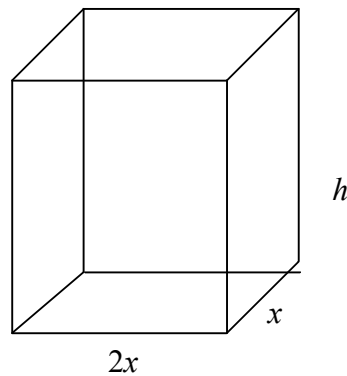


Figure 3

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. 3.

Given that the capacity of a carton has to be  $1030 \text{ cm}^3$ ,

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

(b) show that the surface area,  $A \text{ cm}^2$ , of a carton is given by  $A = 4x^2 + \frac{3090}{x}$ . (3)

The manufacturer needs to minimise the surface area of a carton.

(c) Use calculus to find the value of  $x$  for which  $A$  is a minimum. (5)

(d) Calculate the minimum value of  $A$ . (2)

(e) Prove that this value of  $A$  is a minimum. (2)

[P1 January 2001 Question 8]