

**WELSH JOINT EDUCATION COMMITTEE**

**CYD-BWYLLGOR ADDYSG CYMRU**

**General Certificate of Education**

**Tystysgrif Addysg Gyffredinol**

**Advanced Level/Advanced Subsidiary**

**Safon Uwch/Uwch Gyfrannol**

**MATHEMATICS C2**

**Pure Mathematics**

**Specimen Paper 2005/2006**

**(1  $\frac{1}{2}$  hours)**

**INSTRUCTIONS TO CANDIDATES**

Answer **all** questions.

**INFORMATION FOR CANDIDATES**

A calculator may be used for this paper.

A formula booklet is available and may be used.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

1. Use the Trapezium Rule with five ordinates to find the value of the integral

$$\int_1^2 \frac{1}{1+x^3} dx.$$

Show your working and give your answer correct to four decimal places. [4]

2. (a) Showing all your working, find all the values of  $\theta$  between  $0^\circ$  and  $360^\circ$  satisfying

$$6 \sin^2 \theta + \cos \theta - 5 = 0. \quad [6]$$

- (b) Find all the values of  $x$  in the interval  $0^\circ \leq x \leq 180^\circ$  satisfying the equation

$$\tan 3x = -1. \quad [4]$$

3. The triangle  $ABC$  is such that  $AB = 12\text{cm}$ ,  $BC = 10\text{cm}$  and  $\hat{C}AB = 45^\circ$

- (a) Find, to the nearest degree, the two possible values of  $\hat{BC}A$ . [3]

- (b) Find, correct to one decimal place, the possible values of the length  $AC$ . [5]

4. (a) A geometric series has first term  $a$  and common ratio  $r$ . Prove that the sum of the first  $n$  terms is given by

$$S_n = \frac{a(1-r^n)}{1-r}.$$

Given that  $|r| < 1$ , write down the sum to infinity of the series. [4]

- (b) The sum to infinity of a geometric series is four times the first term of the series. Find the common ratio. [4]

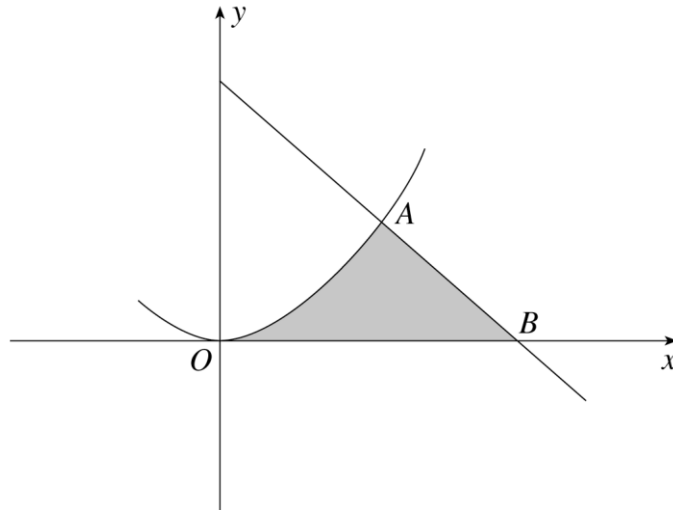
5. The fourth term of an arithmetic series is 11. The sixth term of the arithmetic series is 17.

- (a) Find the common difference and the first term. [4]

- (b) Find the sum of the first eight terms of the series. [1]

6. Integrate  $\sqrt{x} - \frac{2}{x^2}$  with respect to  $x$ . [4]

7.

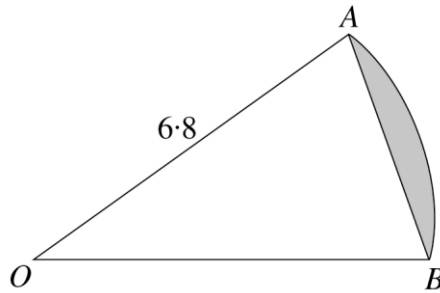


The diagram shows the curve  $y = 2x^2$  and the line  $y = 12 - 2x$  intersecting at the point  $A$ . The line  $y = 12 - 2x$  intersects the  $x$ -axis at  $B$ .

(a) Find the coordinates of  $A$  and  $B$ . [5]

(b) Evaluate the area of the shaded region [7]

8.



The diagram shows a sector of a circle of centre  $O$  and radius  $6.8\text{cm}$ . The perimeter of the sector is  $23.12\text{cm}$ . Calculate the area, in  $\text{cm}^2$ , of the shaded region, giving your answer correct to two decimal places. [6]

9. (a) Given that  $x = a^y$  where  $a > 0$ , write  $y$  in terms of  $x$ . Hence show that

$$\log_a x^n = n \log_a x. \quad [3]$$

(b) Solve the equation

$$2^{y+1} = 3,$$

giving your answer correct to three decimal places. [4]

**10.** A circle  $C$  has equation

$$(x - 5)^2 + (y - 7)^2 = 25.$$

- (a) Write down the radius of the circle and the coordinates of its centre. [2]
- (b) Find the equation of the tangent to the circle  $C$  at the point  $(2,3)$ . [4]
- (c) (i) Show that  $Q(13,13)$  lies outside the circle  $C$ . [2]
- (ii) Find the equation of a circle with centre at  $Q$  which touches the circle  $C$  externally. [3]