IYGB GCE

Core Mathematics C2

Advanced Subsidiary

Practice Paper P

Difficulty Rating: 3.5400/1.6260

Time: 1 hour 30 minutes

Candidates may use any calculator allowed by the Regulations of the Joint Council for Qualifications.

Information for Candidates

This practice paper follows the Edexcel Syllabus.
The standard booklet "Mathematical Formulae and Statistical Tables" may be used.
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 9 questions in this question paper.
The total mark for this paper is 75.

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 not gain full credit.
Non exact answers should be given to an appropriate degree of accuracy.
The examiner may refuse to mark any parts of questions if deemed not to be legible.

Question 1

a) Find the first **five** terms, in ascending powers of x, in the binomial expansion of $(1+2x)^{12}$. **(4)**

b) Use the answer of part (a) with a suitable value of x to find an approximate value for 1.02^{12}. **(3)**

c) Determine the error in this approximation. **(1)**

Question 2

$$f(x) \equiv x^2 - 4x + 12 .$$

The remainder when $f(x)$ is divided by $(x+k)$ is three times as large as when $f(x)$ is divided by $(x-k)$.

Determine the possible values of k. **(5)**

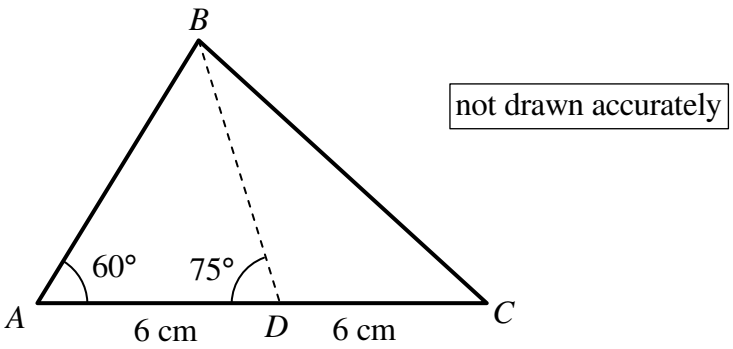
Question 3

Solve each of the following equations, giving the final answers correct to three significant figures, where appropriate.

a) $2 \times 3^x = 900$. **(4)**

b) $\log_2(7y-1) = 3 + \log_2(y-1)$. **(5)**

Question 4



The figure above shows a triangle ABC.

The straight line BD is such so that $AD = DC = 6$ cm.

The angles BAD and BDA are $60°$ and $75°$, respectively.

Find in appropriate degree of accuracy …

a) … the length of BD. **(2)**

b) … the area of the triangle of ABD. **(2)**

c) … the shortest distance from the vertex B to the straight line AC. **(2)**

d) … the length of BC. **(2)**

Question 5

A circle has its centre at the point $C(2,5)$ and its radius is $\sqrt{10}$.

a) Show that an equation for the circle is

$$x^2 + y^2 - 4x - 10y + 19 = 0 \qquad (\mathbf{3})$$

The straight line with equation

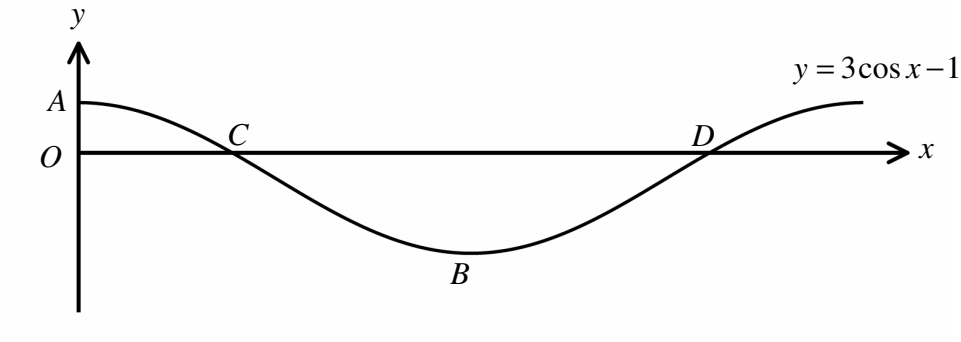
$$y = x + 5$$

meets the circle at the points P and Q.

b) Determine the coordinates of P and the coordinates of Q. $(\mathbf{4})$

c) Show that the distance of the chord PQ from C is $\sqrt{2}$ units. $(\mathbf{4})$

Question 6



The figure above shows the graph of the curve with equation

$$y = 3\cos x - 1, \quad 0 \le x \le 2\pi .$$

The graph meets the y axis at point A and the x axis at points C and D.

The point B is the first minimum of the graph for which $x > 0$.

a) State the coordinates of A and B. **(2)**

b) Determine the coordinates of C and D, correct to three significant figures. **(4)**

Question 7

Liquid is kept in containers, which due to evaporation and ongoing chemical reactions, at the end of each month the volume of the liquid in these containers reduces by 10% compared with the volume at the start of the same month.

One such container is filled up with 250 litres of liquid.

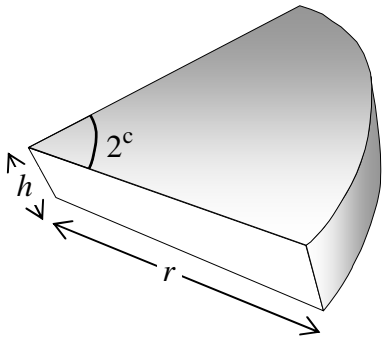
a) Show that the volume of the liquid in the container at the end of the second month is 202.5 litres. **(1)**

b) Find the volume of the liquid in the container at the end of the twelfth month. **(2)**

At the start of each month a new container is filled up with 250 litres of liquid, so that at the end of twelve months there are 12 containers with liquid.

c) Use an algebraic method to calculate the total amount of liquid in the 12 containers at the end of 12 months. **(5)**

Question 8



The figure above shows solid right prism of height h cm.

The cross section of the prism is a circular sector of radius r cm, subtending an angle of 2 radians at the centre.

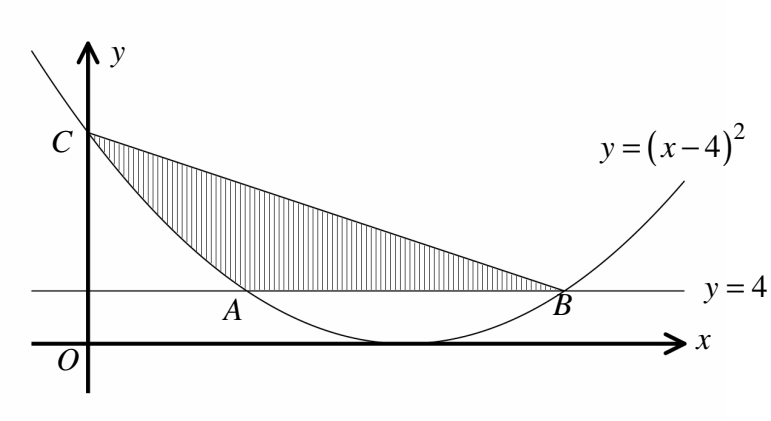
a) Given that the volume of the prism is 1000 cm^3, show clearly that

$$S = 2r^2 + \frac{4000}{r},$$

where S cm^2 is the total surface area of the prism. **(5)**

b) Hence determine the value of r and the value of h which make S **least**, fully justifying your answer. **(7)**

Question 9



The diagram above shows the curve with equation

$$y=(x-4)^2,\ x\in\mathbb{R},$$

intersected by the straight line with equation $y=4$, at the points A and B.

The curve meets the y axis at the point C.

Calculate the exact area of the shaded region, bounded by the curve and the straight line segments AB and BC. **(8)**
