IYGB GCE

Core Mathematics C2

Advanced Subsidiary

Practice Paper F

Difficulty Rating: 3.1933/1.4252

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 10 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

$$f(x) \equiv x^3 - 2x^2 + kx + 6,$$

where k is a constant.

a) Given that $(x-3)$ is a factor of $f(x)$, show that $k = -5$. **(2)**

b) Factorize $f(x)$ into three linear factors. **(2)**

c) Find the remainder when $f(x)$ is divided by $(x+3)$. **(2)**

Question 2

a) Use the trapezium rule with five equally spaced ordinates (four strips) to find the value of

$$\int_0^4 \frac{2^x}{x+2}\, dx,$$

giving the answer correct to three significant figures. **(4)**

b) State how a better approximation to the value of the integral can be obtained using the trapezium rule. **(1)**

Question 3

a) Find the first four terms, in ascending powers of x, in the binomial expansion of $(1-2x)^{10}$. **(3)**

b) Use the answer of part (a) with a suitable value of x to find an approximate value for 0.98^{10}, giving the answer correct to three decimal places. **(3)**

Question 4

Miss Velibright started working as an accountant in a large law firm in the year 2001.

Her starting salary was £22,000 and her contract promised she will be receiving a pay rise of 5% every year thereafter. Miss Velibright plans to retire in 2030.

Find to the nearest £, …

a) …her salary in the year 2030. **(3)**

b) … her total earnings in employment for the years 2001 to 2030, inclusive. **(2)**

Question 5

The endpoints of a diameter of a circle are located at $A(-7,4)$ and $B(1,-2)$.

a) Find an equation for the circle. **(5)**

The straight line with equation

$$4y+3x=20$$

is a tangent to the circle at the point D.

b) Given that C represents the centre of the circle, determine an equation of the straight line CD. **(3)**

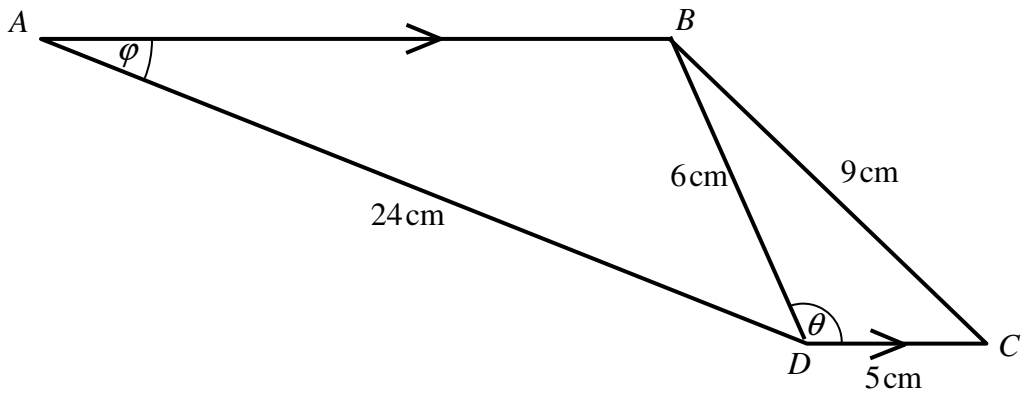
c) Determine the coordinates of D. **(3)**

Question 6

Solve the following logarithmic equation

$$2\log_3 x-\log_3(x-2)=2. \quad \textbf{(6)}$$

Question 7



The figure above shows a trapezium $ABCD$, where AB is parallel to DC.

The respective lengths of AD, BD, BC and DC are 24 cm, 6 cm, 9 cm and 5 cm.

The angle BDC is θ.

a) Show clearly that

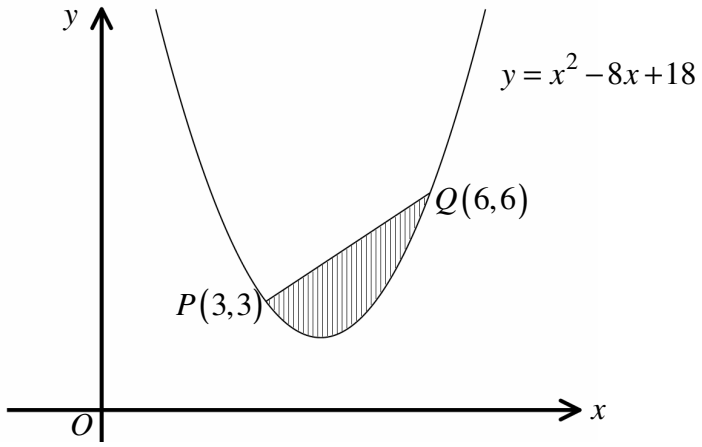
$$\cos\theta = -\frac{1}{3}. \qquad \textbf{(3)}$$

b) Hence show further that $\sin\theta = k\sqrt{2}$, where k is a fraction. **(2)**

The angle BAD is φ.

c) Find the exact value of $\sin\varphi$. **(2)**

Question 8



The figure above shows the parabola with equation

$$y = x^2 - 8x + 18, \ x \in \mathbb{R}.$$

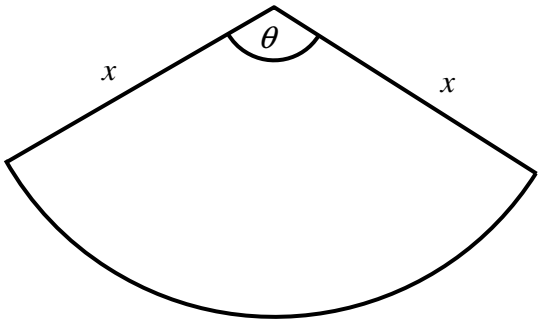
The points $P(3,3)$ and $Q(6,6)$ both lie on the parabola.

Find the exact area of the shaded region, bounded by the curve and the straight line segment between P and Q.

(7)

Question 9

A circular sector of radius x cm subtends an angle of θ radians at the centre.



The area of the sector is $36\ \text{cm}^2$ and its perimeter is P cm.

a) Show clearly that

$$P = 2x + \frac{72}{x}. \qquad (4)$$

b) Use differentiation to find the value of x for which P is stationary. (4)

c) Find the minimum value of P, fully justifying the fact that it is a minimum. (3)

d) Determine the value of θ when P is minimum. (2)

Question 10

Solve the following trigonometric equation in the range given.

$$3\tan\theta\sin\theta = \cos\theta + 1, \quad 0 \le \theta < 2\pi.$$

Give the answers in radians correct to two decimal places. (9)