IYGB GCE

Mathematics MP1

Advanced Level

Practice Paper U

Difficulty Rating: 4.18/1.5385

Time: 2 hours 30 minutes

Candidates may use any calculator allowed by the regulations of this examination.

Information for Candidates

This practice paper follows closely the Pearson Edexcel Syllabus, suitable for first assessment Summer 2018.

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 12 questions in this question paper.
The total mark for this paper is 100.

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.

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Question 1

A curve C has equation

$$f(x)=-\frac{1}{x^2},\ x\in\mathbb{R},\ x\neq 0.$$

a) Sketch the graph of C. **(2)**

b) Sketch on separate set of axes the graph of ...

i. ... $f(x-1)$. **(2)**

ii. ... $f'(x)$. **(2)**

Mark clearly in each sketch the equations of any asymptotes to these curves and the coordinates of any intersections with the coordinate axes.

Question 2

$$f(x)=px^2+4x(p+3)+5p,$$

where p is a non zero constant.

The equation $f(x)=-19$ has two distinct real roots.

Find the range of the possible values of p. **(7)**

Question 3

Solve the following trigonometric equation

$$\frac{2+\cos 2x}{3+\sin^2 2x}=\frac{2}{5},\quad \text{for } 0^\circ\leq x<360^\circ. \qquad \textbf{(6)}$$

Question 4

$$f(x) = 2x^3 - 9x^2 + px + q$$

a) Find the values of each of the constants p and q, given that $(x-2)$ and $(2x+1)$ are factors of $f(x)$. **(3)**

b) Hence solve the equation

$$2\sqrt{y} + \frac{7}{\sqrt{y}} = 9 - \frac{6}{y}. \quad \textbf{(6)}$$

Question 5

The straight line with equation $y = 2x - 3$ is a tangent to a circle with centre at the point $C(2,-3)$.

Determine, in exact surd form, the radius of the circle. **(10)**

In this question you may **not** use …

… a standard formula which determines the shortest distance of a point from a straight line.

… any form of calculus.

Question 6

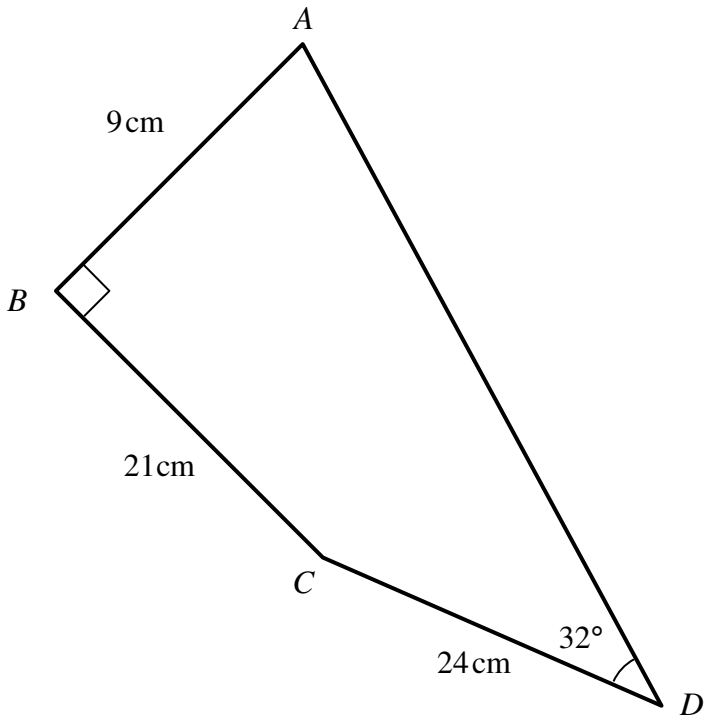
A curve C and a straight line L have respective equations

$$C: \ y = ax^{\frac{3}{2}} - bx^{\frac{1}{2}} \qquad \text{and} \qquad L: \ y = 8x - 32,$$

where a and b are non zero constants.

Given that L is a tangent to C at the point where $x = 4$ is, determine the value of a and the value of b. **(7)**

Question 7



The figure below shows the quadrilateral $ABCD$ where AB is 9 cm, BC is 21 cm and CD is 24 cm.

The angle ABC is $90°$ and the angle CDA is $32°$.

Find, to three significant figures, the area of the quadrilateral $ABCD$. **(6)**

Question 8

Solve the following logarithmic equation

$$\frac{\log_4 x^2}{5+\log_4 x^2}+\left(\log_4 x\right)^2=0. \qquad \textbf{(7)}$$

Question 9

The points $A(-1,4)$, $B(2,3)$ and $C(8,1)$ lie on the x-y plane, where O is the origin.

a) Show that A, B and C are collinear. **(2)**

The point D lies on BC so that $\overrightarrow{BD} : \overrightarrow{BC} = 2:3$.

b) Find the coordinates of D. **(2)**

The straight line OB is extended to the point P, so that $\overrightarrow{AP}$ is parallel to $\overrightarrow{OC}$.

c) Determine the coordinates of P. **(5)**

Question 10

a) Find the first four terms, in ascending powers of x, of the binomial expansion of $(6x-3)^8$, simplifying fully each coefficient. **(3)**

b) Hence find the coefficient of …

i. … y^3 in the binomial expansion of $\left[\frac{1}{3}(y+9)\right]^8$. **(4)**

ii. … z^6 in the binomial expansion of $\left(\sqrt{2}z-1\right)^8\left(\sqrt{2}z+1\right)^8$. **(5)**

Question 11

The point A has coordinates $(-2,1)$.

a) Find the coordinates of the point of reflection of A about the straight line with equation $3x+y=12$. **(6)**

The point P, whose coordinates are $(4,2)$, is rotated about A by 90° anticlockwise, onto the point Q.

b) Determine the coordinates of Q. **(8)**

Question 12

It is given that

$$\int_1^2 kx^2 + a \ dx = 11 \qquad \text{and} \qquad \int_1^k \frac{6}{x^2} \ dx = a,$$

where a and k are constants.

Determine the possible values of k.

(7)