IYGB GCE

Mathematics MP1

Advanced Level

Practice Paper G

Difficulty Rating: 3.41/1.0811

Time: 2 hours

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.

Question 1

A cubic graph is defined in terms of a constant k as

$$f(x) \equiv x^3 - 19x + k\,,\ x \in \mathbb{R}\,.$$

Find the value k, if the graph of $f(x)$ …

a) … passes through the origin. **(1)**

b) … meets the y axis at $y = 5$. **(1)**

c) … meets the x axis at $x = 2$. **(2)**

d) … passes through the point $(-1, -7)$. **(2)**

Question 2

Write each of the following surd expressions as simple as possible.

a) $\left(3 - \sqrt{8}\right)^2$. **(3)**

b) $\dfrac{\sqrt{63}}{3} + \dfrac{14}{\sqrt{7}}$. **(3)**

Detailed workings must be shown in this question

Question 3

Solve the following trigonometric equation in the range given.

$$\frac{5\sin\theta - 2\cos\theta}{\sin\theta} = 3\,, \quad 0° \le \theta < 360°\,.$$ **(5)**

Question 4

The straight line l_1 passes through the point $(10,-3)$ and has gradient $\frac{1}{3}$.

a) Find an equation for l_1, in the form $ax+by+c=0$, where a, b and c are integers. **(2)**

The straight line l_2 has gradient of -2 and y intercept of 3.

l_1 and l_2 intersect at the point P.

b) Determine the coordinates of P. **(4)**

l_1 meets the y axis at the point Q.

c) Calculate the exact area of the triangle OPQ, where O is the origin. **(3)**

Question 5

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

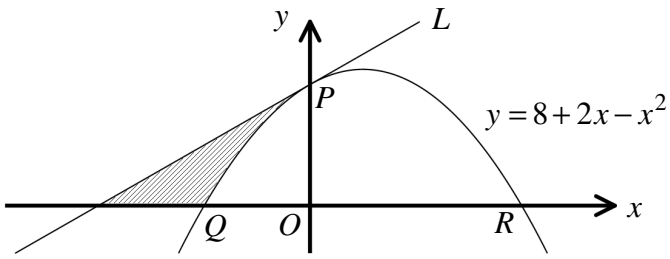
a) Express $f(x)$ in the form $(x+a)^2+b$, where a and b are constants. **(2)**

b) Find in exact form the solutions of the equation $f(x)=0$. **(2)**

c) Hence solve the inequality **(4)**

$$2(3x-4)-(x+6)(x-2)>0.$$

Question 6



The figure above shows the graph of a curve with equation

$$y = 8 + 2x - x^2 .$$

The curve meets the y axis at the point P, and the x axis at the points Q and R.

a) Determine the coordinates of P, Q and R. **(4)**

The straight line L is the tangent to the curve at P. **(4)**

b) Find an equation of L.

c) Show that the area of the finite region bounded by the curve, the tangent L and the x axis is $\frac{20}{3}$. **(7)**

Question 7

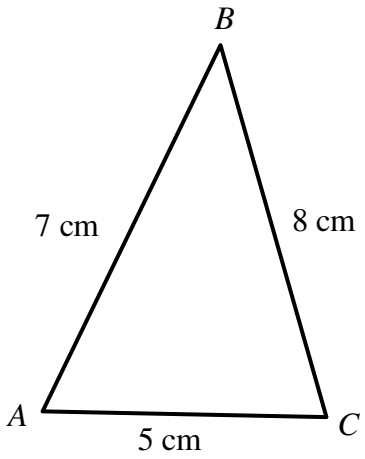
a) Find the first **five** terms, in ascending powers of x, in the binomial expansion of $(1-2x)^{11}$. **(4)**

b) Use the answer of part **(a)** with a suitable value of x to show that

$$\left(\frac{14}{15}\right)^{11} \approx \frac{1582}{3375}. \quad \textbf{(3)}$$

c) Determine the percentage error in the approximation of part **(b)**. **(2)**

Question 8



The figure above shows the triangle ABC where AB is 7 cm, AC is 5 cm and BC is 8 cm.

Show, by **detailed** workings, that the exact area of this triangle is $10\sqrt{3}$ cm^2. **(7)**

Question 9

A circle has centre at $C(4,4)$ and passes through the point $P(6,8)$.

The straight line l_1 is a tangent to the circle at P.

a) Show that an equation of l_1 is

$$x + 2y = 22 .$$ **(4)**

The straight line l_2 has equation $y = 2x - 14$ and meets l_1 at the point Q.

b) Find the coordinates of Q. **(3)**

c) Show that l_2 is also a tangent to this circle at the point R, and determine the coordinates of R. **(7)**

Question 10

$$f(x) = x^3 + 2,\ x \in \mathbb{R}.$$

a) State the value of $f(-1)$. **(1)**

b) Find a simplified expression for $f(-1+h)$. **(2)**

c) Use the formal definition of the derivative as a limit, to show that

$$f'(-1) = 3.$$ **(4)**

Question 11

Given that

$$a = x^{\frac{1}{2}} + x^{-\frac{1}{2}} \quad \text{and} \quad b = x^{\frac{1}{2}} - x^{-\frac{1}{2}},$$

show clearly that

$$a^2b^2 + 4 \equiv \left(x + \frac{1}{x}\right)^2.$$ **(6)**

Question 12

Solve the following simultaneous equations

$$\log_2 x + 2\log_4 y = 4$$

$$x + y = 10$$ **(8)**
