Surname	
Other Names	
Candidate Signature	

Centre Number						Candidate Number				

Examiner Comments	

Total Marks

MATHEMATICS

AS PAPER 1

CM

Bronze Set B (Edexcel Version)

Time allowed: 2 hours

Instructions to candidates:

• In the boxes above, write your centre number, candidate number, your surname, other names and signature.

• Answer ALL of the questions.

• You must write your answer for each question in the spaces provided.

• You may use a calculator.

Information to candidates:

• Full marks may only be obtained for answers to ALL of the questions.

• The marks for individual questions and parts of the questions are shown in round brackets.

• There are 14 questions in this question paper. The total mark for this paper is 100.

Advice to candidates:

• You should ensure your answers to parts of the question are clearly labelled.

• You should show sufficient working to make your workings clear to the Examiner.

• Answers without working may not gain full credit.

1 0 3 3 1 2 1 2 8 0 0 0 4

1 In ascending powers of x, find the first four terms of the binomial expansion of

$$\left(3+\frac{x}{2}\right)^7$$

giving each term in its simplest form. **(5)**

Question 1 continued

TOTAL 5 MARKS

2 Solve, for $-360^{\circ} \leq \theta \leq 360^{\circ}$, the equation

$$2\cos(\theta) - 5\sin(\theta) = 0$$

Give your solutions to one decimal place. **(4)**

Question 2 continued

TOTAL 4 MARKS

3 On separate axes, sketch the curves with equation

(a) $y = 4^x$ **(2)**

(b) $y = 3 + 4^x$ **(2)**

(c) $y = -4^x$ **(2)**

On each sketch, show clearly the coordinates of any points where the curve crosses or meets the coordinate axes and state the equations of any asymptotes to the curve.

Question 3 continued

TOTAL 6 MARKS

4 The circle C is centred at the point $(2, -1)$ and passes through the point $(4, 2)$.

(a) Find the radius of the circle. **(2)**

(b) Write down the equation of the circle C in the form

$$(x - a)^2 + (y - b)^2 = k$$

where a, b and k are constants to be found. **(2)**

The circle C meets the y axis at the points A and B.

The point A has the coordinates $(0, 2)$.

(c) Find the coordinates of B. **(3)**

(d) Find the equation of the tangent to the circle C at B. **(3)**

Question 4 continued

TOTAL 10 MARKS

5 (a) Show that

$$\int_{-2}^{x} (2p+4)\,dp = ax^2 + bx + c$$

where a, b and c are integers to be found. **(4)**

(b) Hence, prove that $\int_{-2}^{x} (2p+4)\,dp \geq 0$ for all values of x. **(2)**

Question 5 continued

TOTAL 6 MARKS

6

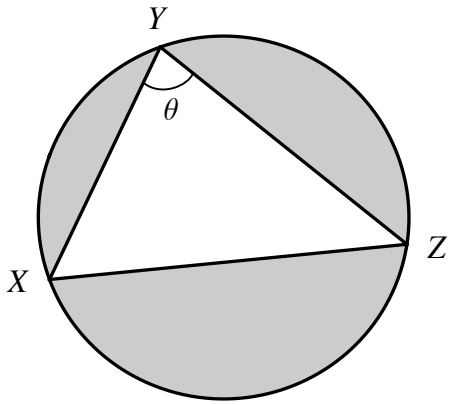

Figure 1

Figure 1 above shows a triangle XYZ that is inscribed in a circle C.

The triangle XYZ is such that $XY = 6$ cm, $YZ = 7$ cm and $XZ = 8$ cm.

The angle θ is the angle XYZ.

(a) Find $\cos\theta$. **(2)**

The radius R of the circle C satisfies

$$2R\sin\theta = |XZ|$$

(b) Find the value of R, giving your answer in the form $k\sqrt{15}$. **(3)**

(c) Hence, show that the area of the shaded region in Figure 1 can be given by

$$\frac{1}{60}\left(1024\pi - 315\sqrt{15}\right)$$

(4)

Question 6 continued

Question 6 continued

Question 6 continued

TOTAL 9 MARKS

7 (a) Using differentiation from first principles, find the derivative of $2x$. **(2)**

The function f is defined such that

$$f(x) = \frac{px - \sqrt{x}}{x^2}, \quad x > 0$$

where p is a constant.

(b) Find, in terms of p, a simplified expression for $f'(x)$. **(3)**

Given that the gradient of the normal to the curve $y = f(x)$ at $x = 1$ is $\frac{2}{5}$,

(c) find the value of p. **(3)**

Question 7 continued

TOTAL 8 MARKS

8 Find the range of values of x that satisfy

$$\frac{4+x}{x} > 3$$

(4)

Question 8 continued

TOTAL 4 MARKS

9 Here are four statements:

Statement **A** : the sum of any two rational numbers is rational

Statement **B** : the sum of any two irrational numbers is irrational

Statement **C** : the product of any two rational numbers is rational

Statement **D** : the product of any two irrational numbers is irrational

Two of these statements are false.

(i) Identify the two false statements. **(2)**

(ii) Provide a suitable counterexample to each of the false statements. **(2)**

Question 9 continued

TOTAL 4 MARKS

10 Each second, two particles P and Q move by the vectors $\mathbf{a}$ and $\mathbf{b}$ respectively, where

$$\mathbf{a} = 6\mathbf{i} + 4\mathbf{j}$$

$$\mathbf{b} = (\lambda + 2)\mathbf{i} + \mathbf{j}$$

and where λ is a scalar.

(a) Find a unit vector in the direction of the vector $\mathbf{a}$. **(2)**

Given that the paths followed by the particles are parallel,

(b) find the value of λ. **(2)**

The particle P starts at the origin and the particle Q starts at the point $2\mathbf{i} - 3\mathbf{j}$.

(c) (i) Show that the position of the particle P after two seconds is $12\mathbf{i} + 8\mathbf{j}$. **(1)**

(ii) Find the exact distance between the particles P and Q after two seconds. **(4)**

Question 10 continued

TOTAL 9 MARKS

11 (a) Find the solution to the equation

$$\ln(2x+5)-\ln(x)=4$$

(3)

(b) Hence, find the solution to the equation

$$\ln(2^{u+1}+5)-\ln(2^{u})=4$$

Give your answer to two decimal places. **(2)**

Question 11 continued

TOTAL 5 MARKS

12

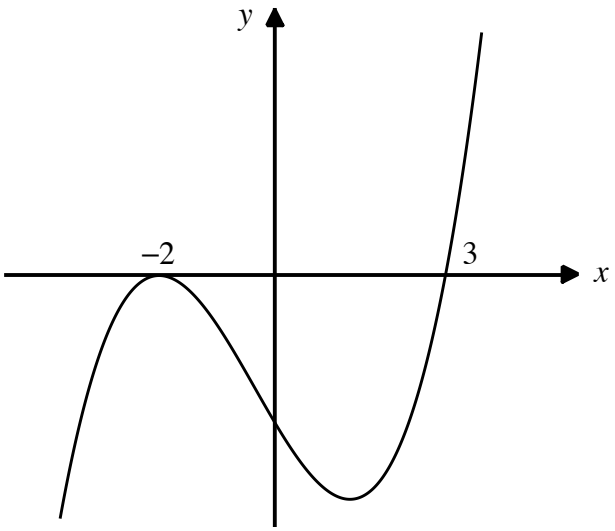

Figure 2

Figure 2 above shows the curve C with equation $y = (x - a)^2(x - b)$, where a and b are constants.

The curve C meets the x-axis at the points $(-2, 0)$ and $(3, 0)$, as shown in the diagram.

(a) Write down the values of a and b. **(1)**

(b) Write down the coordinates of the point where C intersects the y-axis. **(1)**

(c) (i) Find the coordinates of the minimum point on C. **(5)**

(ii) Use further calculus to verify that the point found in (c/i) is a minimum. **(3)**

The line L has the equation $y = k$, where k is a constant.

(d) Write down the set of values of k for which L intersects C once. **(2)**

Question 12 continued

Question 12 continued

Question 12 continued

TOTAL 12 MARKS

13 The line l_1 passes through the points $A(4, 10)$ and $B(-1, 0)$.

The line l_2 is perpendicular to the line l_1 and passes through the point $C(4, k)$, where k is a constant.

(a) Find, in terms of k, the equation of the line l_2. **(4)**

The line l_2 crosses the x-axis at the point D.

Given that the area of the triangle OAD is 10 units^2,

(b) show that $k = -1$. **(3)**

(c) Hence, find the coordinates of intersection between the lines l_1 and l_2. **(4)**

Question 13 continued

Question 13 continued

Question 13 continued

TOTAL 11 MARKS

14 The curve C has the equation $y = f(x)$, where

$$f'(x) = 2\sqrt{x}, \quad x > 0$$

The curve C passes through the point $(4, 1)$.

Find the equation of the tangent to C at the point where $x = 9$.

Give your answer in the form $ax + by + c = 0$, where a, b and c are integers to be found. **(7)**

Question 14 continued

END OF PAPER **TOTAL 7 MARKS**

TOTAL FOR PAPER IS 100 MARKS