



## **Cambridge International Examinations**

Cambridge International Advanced Subsidiary Level

| CANDIDATE<br>NAME |            |               |             |   |                     |      |        |       |        |
|-------------------|------------|---------------|-------------|---|---------------------|------|--------|-------|--------|
| CENTRE<br>NUMBER  |            |               |             |   | CANDIDATE<br>NUMBER |      |        |       |        |
| MATHEMATICS       | <u> </u>   |               |             |   |                     |      |        | 97    | 09/22  |
| Paper 2 Pure M    | athematics | 2 <b>(P2)</b> |             |   |                     | Febi | ruary/ | March | ո 2017 |
|                   |            |               |             |   |                     | 1    | hour   | 15 mi | inutes |
| Candidates ansv   | wer on the | Question F    | ⊃aper.      |   |                     |      |        |       |        |
| Additional Mater  | ials: L    | st of Form    | nulae (MF9) | ) |                     |      |        |       |        |

## **READ THESE INSTRUCTIONS FIRST**

Write your Centre number, candidate number and name in the spaces at the top of this page.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, glue or correction fluid.

DO NOT WRITE IN ANY BARCODES.

## Answer all the questions.

Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place in the case of angles in degrees, unless a different level of accuracy is specified in the question.

The use of an electronic calculator is expected, where appropriate.

You are reminded of the need for clear presentation in your answers.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [] at the end of each question or part question.

The total number of marks for this paper is 50.



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| Given that $\tan 2\theta \cot \theta = 8$ , show that $\tan^2 \theta = \frac{3}{4}$ .            |        |
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| Hence solve the equation $\tan 2\theta \cot \theta = 8$ for $0^{\circ} < \theta < 180^{\circ}$ . |        |
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| (i)  | Solve the inequality $ 2x - 5  <  x + 3 $ .  | [4]    |
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| (ii) | Hence find the largest integer y satisfying the inequality $ 2 \ln y - 5  <  \ln y + 3 $ . | [2]    |
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|     | $x^2 \sin y + \cos 3y = 4$ |     |
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| at  |                            | [6  |
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| 5 | It is | given | that | a is | a | positive | constant | such | that |
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$$\int_0^a (1 + 2x + 3e^{3x}) \, \mathrm{d}x = 250.$$

| Show that $a = \frac{1}{3} \ln(251 - a - a^2)$ . | [5] |
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| 4 significant figur | es. Give the rest | iii oi each itera | uion to 6 signif | icant ngures. | [:     |
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| 6 | The polynomial p | $\mathbf{o}(x)$ | is | defined | by |
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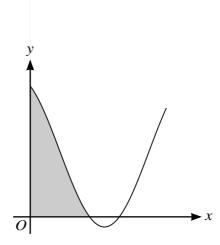
$$p(x) = ax^3 + bx^2 - 17x - a,$$

where a and b are constants. It is given that (x + 2) is a factor of p(x) and that the remainder is 28 when p(x) is divided by (x - 2).

| (i) | Find the values of $a$ and $b$ . | [5] |
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| 11) | Hence factorise $p(x)$ completely.   | [3] |
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| 11) | State the number of roots of the equation $p(2^y) = 0$ , justifying your answer. | [2] |
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The diagram shows part of the curve

$$y = 2\cos 2x\cos(2x + \frac{1}{6}\pi).$$

The shaded region is bounded by the curve and the two axes.

(i) Show that  $2\cos 2x\cos(2x+\frac{1}{6}\pi)$  can be expressed in the form

$$k_1(1 + \cos 4x) + k_2 \sin 4x,$$

| where the values of the constants $k_1$ and $k_2$ are to be determined. | [5]   |
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