



Cambridge International AS & A Level

CANDIDATE
NAME

CENTRE
NUMBER

--	--	--	--	--

CANDIDATE
NUMBER

--	--	--	--

* 0 1 2 3 4 5 6 7 8 9 *

MATHEMATICS

9709/01

Paper 1 Pure Mathematics 1

For examination from 2020

SPECIMEN PAPER

1 hour 50 minutes

You must answer on the question paper.

You will need: List of formulae (MF19)

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- If additional space is needed, you should use the lined page at the end of this booklet; the question number or numbers must be clearly shown.
- You should use a calculator where appropriate.
- You must show all necessary working clearly; no marks will be given for unsupported answers from a calculator.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.

INFORMATION

- The total mark for this paper is 75.
- The number of marks for each question or part question is shown in brackets [].

This document has **22** pages. Blank pages are indicated.

BLANK PAGE

1 The following points

$A(0, 1)$, $B(1, 6)$, $C(5, 5)$, $D(9, 2)$ and $E(2, 2)$

lie on the curve $y = f(x)$. The table below shows the gradients of the chords AE and BE .

Chord	AE	BE	CE	DE
Gradient of chord	4	3		

(a) Complete the table to show the gradients of CE and DE . [2]

•	•
•	•
•	•
•	•
•	•
•	•
•	•
•	•
•	•
•	•
•	•

(b) State what the x-axis intercepts indicate about the value of $f'(2)$. [1]

•	•	•
•	•	•
•	•	•
•	•	•
•	•	•
•	•	•
•	•	•
•	•	•
•	•	•
•	•	•

5 (a) The curve $y = x^2 + 3x + 4$ is translated by $\begin{pmatrix} 2 \\ 0 \end{pmatrix}$.

Find and simplify the equation of the translated curve. [2]

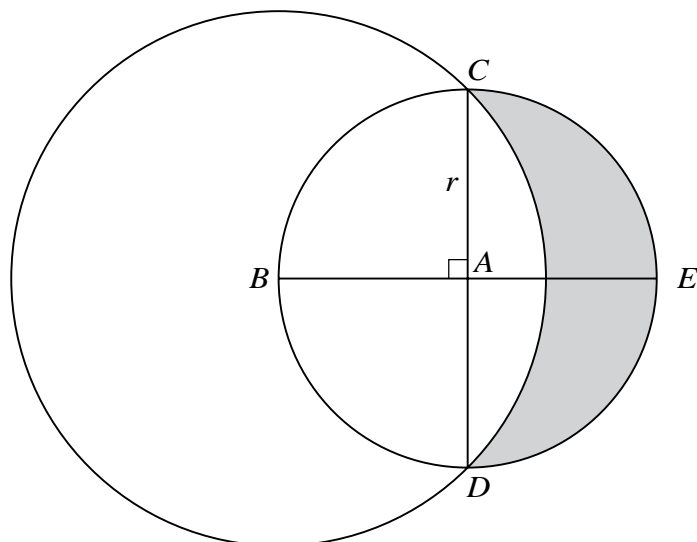
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.

(b) The graph $y = f(x)$ is transformed to the graph of $y = f(-x)$.

Describe fully the two single transformations which have been combined to give the resulting transformation. [3]

.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.

9



The diagram shows a circle with centre A and radius r . Diameters CAD and BAE are perpendicular to each other. A larger circle has centre B and passes through C and D .

(a) Show that the radius of the larger circle is $r\sqrt{2}$. [1]

.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.

(b) Find the area of the shaded region in terms of r . [6]

.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.

11 The function is defined for $x \in \mathbb{R}$, $f : x \mapsto x^2 + ax + b$, where a and b are constants.

(a) It is given that $a = 6$ and $b = 8$

Find the range of f .

[3]

.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.

(b) It is given instead that $a = 5$ and that the roots of the equation $f(x) = 0$ are k and $2k$, where k is a constant.

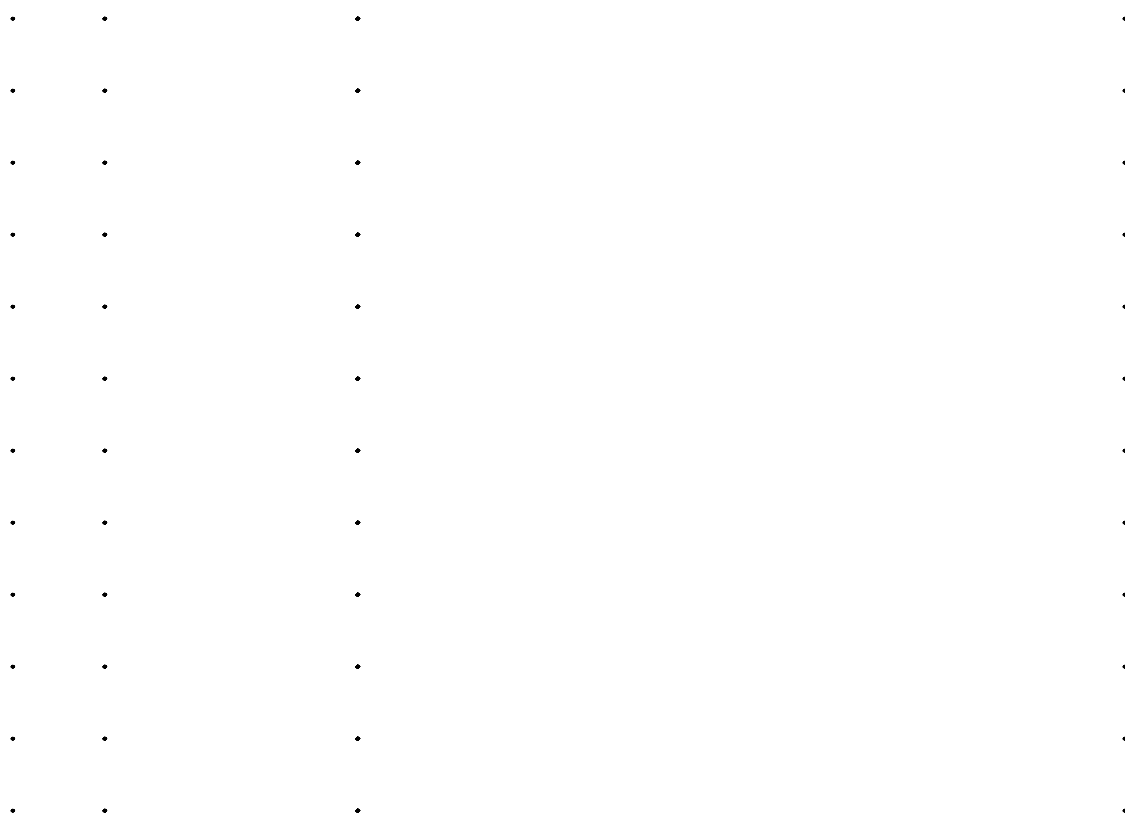
Find the values of b and k .

[3]

.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.

(c) Find the area of the shaded region

[4]



(d) The gradient, $\frac{dy}{dx}$, of the curve has a minimum value m .

Calculate the value of m .

[4]



