Cambridge IGCSE

CANDIDATE NAME	

CENTRE NUMBER					

CANDIDATE NUMBER			

MATHEMATICS 0626/04

Paper 4 (Extended) May/June 2017

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Geometrical instruments
Tracing paper (optional)

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams and graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
CALCULATORS MAY NOT BE USED IN THIS PAPER.
If working is required for any question it must be shown below that question.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.

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 of the marks for this paper is 84.

This document consists of **15** printed pages and **1** blank page.

CAMBRIDGE
International Examinations

[Turn over

1 By rounding each number to 1 significant figure, estimate the value of

$$\frac{58.6 \times (0.45)^2}{\sqrt{8.97}}.$$

.... [2]

2 Find the reciprocal of $2\frac{1}{4}$.

.... [2]

3 **Using a straight edge and compasses only**, construct the perpendicular bisector of the line AB.
Leave in all your construction arcs.
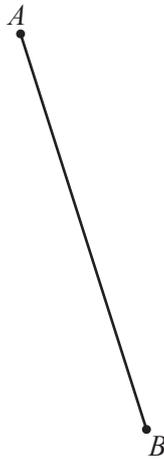
[2]

4 Evaluate.

(a) $\sqrt{10^6}$

.... [2]

(b) $5^{33} \times 5^{-34}$

.... [1]

(c) $\left(2^5 - 5\right)^{\frac{1}{3}}$

.... [2]

5 Find the equation of the straight line that passes through $(0, 5)$ and $(3, -1)$.
Give your answer in the form $y = mx + c$.

$y =$ .... [3]

4

6 **(a)** Work out.

$$4\begin{pmatrix} 3 \\ -1 \end{pmatrix} - \begin{pmatrix} -5 \\ 2 \end{pmatrix}$$

$$\begin{pmatrix} \\ \end{pmatrix}$$ [2]

(b) $$a\begin{pmatrix} 4 \\ 0 \end{pmatrix} + b\begin{pmatrix} -2 \\ 3 \end{pmatrix} = \begin{pmatrix} -6 \\ 12 \end{pmatrix}$$

Find the value of a and the value of b.

$a =$ ....

$b =$ .... [2]

7 Solve the simultaneous equations.

$$3x - 2y = 18$$
$$5x + 3y = 11$$

$x =$ ....

$y =$ .... [4]

8 The diagram shows points *A* and *B*.

•
A

•
B

(a) Construct the locus of points that are 3.5 cm from *A*. [1]

(b) Construct and shade the region which is

• less than 3.5 cm from *A*
and
• more than 7 cm from *B*. [2]

9 **(a)** Factorise completely.

$$5xy - 20y^2$$

.... [2]

(b) **(i)** Factorise.

$$w^2 - 1$$

.... [1]

(ii) Use your answer to **part (b)(i)** to work out $99^2 - 1$.

.... [2]

10 Solve the equation.

$$x^2 - 2x - 48 = 0$$

$x =$ .... or $x =$ .... [3]

11 Work out.

$$43\frac{3}{5} - 41\frac{5}{6}$$

Give your answer as a mixed number in its simplest form.

.... [3]

12 Make *x* the subject of this formula.

$$y = wx - z$$

.... [2]

13 Sketch the graph of $x^2 + y^2 = 4$.
Show the values where your graph crosses the axes.

[2]

14

Time (hours)
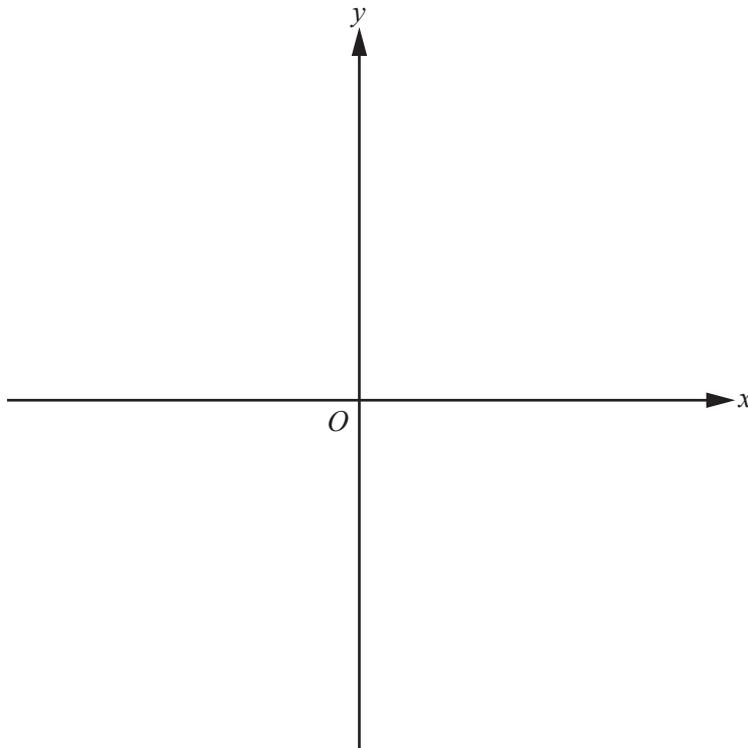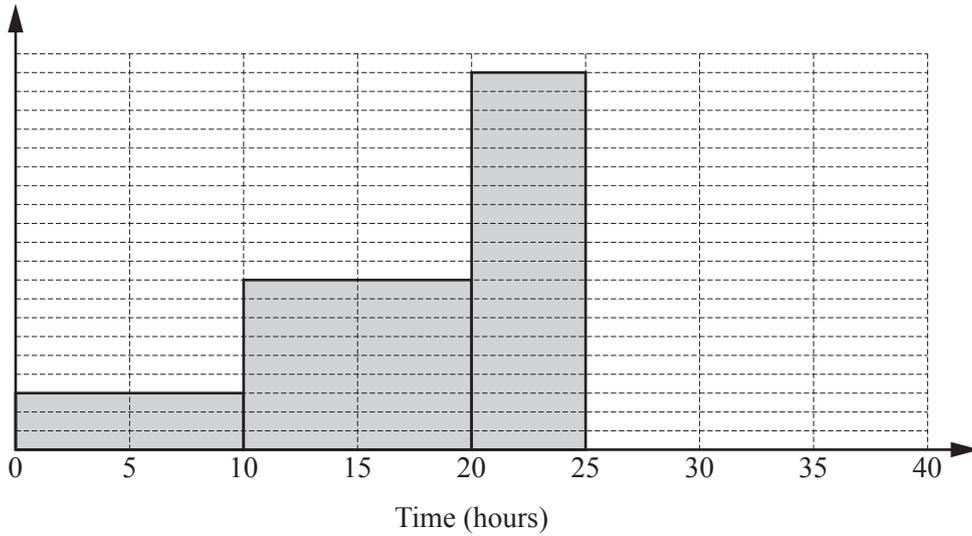
Mrs Jones asked the students in her class how long, in hours, they spent using their mobile phones last week. Some results are shown on the histogram.

9 students used their mobile phones for between 10 and 20 hours.
3 students used their mobile phones for between 25 and 40 hours.

(a) Use this information to complete the histogram.
Label the vertical axis.

[3]

(b) No pupil used their mobile phone for more than 40 hours.

**(i)** Work out the number of students in the class.

.... [1]

(ii) Estimate the percentage of students who used their mobile phone for between 10 and 24 hours each week.

.... % [2]

15 **(a)** Describe fully the **single** transformation represented by the matrix $\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$.

....

.... [2]

(b)
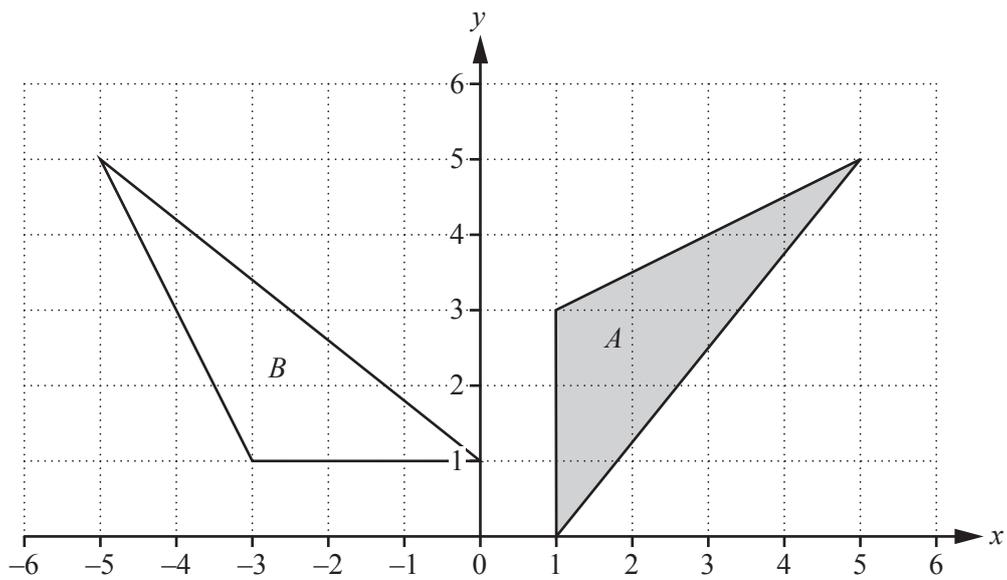
M is the matrix that maps triangle *A* onto triangle *B*.

Find **M**.

$$\mathbf{M} = \begin{pmatrix} & \\ & \end{pmatrix}$$ [2]

16 **(a)** Write $\sqrt{75}$ in the form $k\sqrt{3}$ where k is an integer.

.... [1]

(b) By rationalising the denominator, show that $\left(\dfrac{22}{4-\sqrt{5}}\right) = 8 + k\sqrt{5}$, where k is an integer.

[3]

17 **(a)** Work out the value of

$$\cos 30° \times \tan 30°.$$

.... [2]

(b) Solve the equation $\quad 2\sin x = \sqrt{2} \quad$ for $\ 0° \leqslant x \leqslant 360°$.

.... [4]

18 (a) Work out.

$$\begin{pmatrix} 3 & -2 \\ -4 & 1 \end{pmatrix}\begin{pmatrix} 4 & -3 \\ 0 & 5 \end{pmatrix}$$

$\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

(b) **C** is the matrix $\begin{pmatrix} 4 & 3 \\ -2 & 1 \end{pmatrix}$.

   (i) Find $\mathbf{C}^{-1}$.

$\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

   (ii) Simplify $(\mathbf{CC}^{-1})^n$, where n is a positive integer.

$\begin{pmatrix} & \\ & \end{pmatrix}$ [1]

19 In this question all the angles are in degrees.
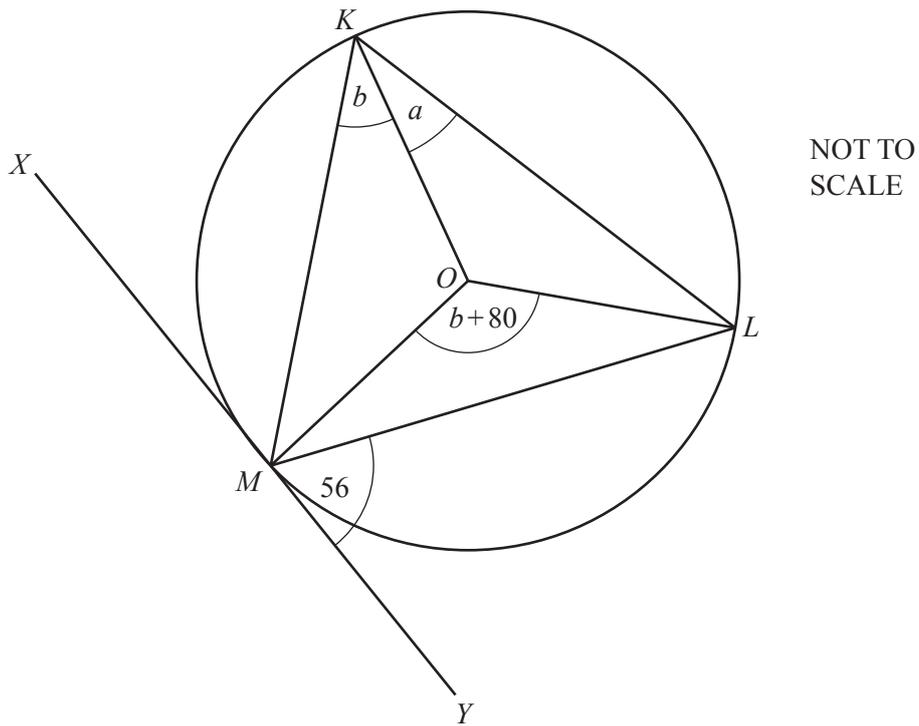
K, *L* and *M* are points on the circumference of the circle, centre *O*.
The line *XY* is a tangent to the circle at *M*.

Find the value of *a* and the value of *b*.

a = ...

b = ... [4]

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20 (a) 6 girls and 4 boys want to go up in a hot air balloon.
Three of them are chosen at random.

    (i) Work out the probability that three girls are chosen.

.... [2]

    (ii) Work out the probability that at least one boy is chosen.

.... [1]

(b) Linda throws an ordinary 6-sided fair dice.
If she does not throw a 6, she throws the dice again.
She keeps throwing the dice until she throws a 6.

    (i) Linda first throws a 6 on the second throw.

    Work out the probability of this event.

.... [2]

    (ii) Linda first throws a 6 on her nth throw.

    Find an expression, in terms of n, for the probability of this event.

.... [2]

21 Expand and simplify.

$$(x-3)(x+2)(x+3)$$

.... [3]

22 A curve has equation $y = ax^4 + bx$ where a and b are constants.

When $x = 0$, $\dfrac{dy}{dx} = 54$ and when $x = -1$, $\dfrac{dy}{dx} = 46$.

Find the value of a and the value of b.

$a =$ ....

$b =$ .... [5]

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