Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

2853616420

MATHEMATICS **0580/23**

Paper 2 (Extended) **October/November 2014**

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

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 or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
If working is needed for any question it must be shown below that question.
Electronic calculators should be used.
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.
For π, use either your calculator value or 3.142.

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 70.

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **12** printed pages.

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1 $1 = 8.2 rand

Change $350 into rands.

Answer ..... rand [2]

---

2 Write the following in order of size, smallest first.

$0.34 \qquad \sqrt{0.6} \qquad 0.6^2 \qquad 0.7^3$

Answer ..... < ..... < ..... < ..... [2]
smallest

---

3 Work out $4 \times 10^{-5} \times 6 \times 10^{12}$.
Give your answer in standard form.

Answer ..... [2]

---

4 The four sector angles in a pie chart are $2x°$, $3x°$, $4x°$ and $90°$.

Find the value of x.

Answer x = ... [2]

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5 A train takes 65 minutes to travel 52 km.

Calculate the average speed of the train in kilometres per hour.

Answer ..... km/h [2]

---

6 Solve the equation.

$$\frac{2x + 5}{3} = 8$$

Answer x = ... [3]

---

7 Find the interior angle of a regular polygon with 18 sides.

Answer ..... [3]

---

8 Make x the subject of the formula.

$$y = 2 + \sqrt{x - 8}$$

Answer x = ... [3]

---

9 y varies inversely as $(x + 5)$.
$y = 6$ when $x = 3$.

Find y when $x = 7$.

Answer y = ... [3]

---

10 Maryah borrows \$12 000 to start a business.
The loan is for 3 years at a rate of 5% per year compound interest.
The loan has to be paid back at the end of the 3 years.

Calculate the total amount to be paid back.

Answer \$..... [3]

---

11 **(a)** Here are the first three terms of a sequence.

$U_1 = 1^3$ $U_2 = 1^3 + 2^3$ $U_3 = 1^3 + 2^3 + 3^3$

The nth term is given by $U_n = \frac{1}{4}n^2 (n + 1)^2$.

Work out the value of U_{39} .

Answer(a) U_{39} = ... [2]

(b) Here are the first three terms of another sequence.

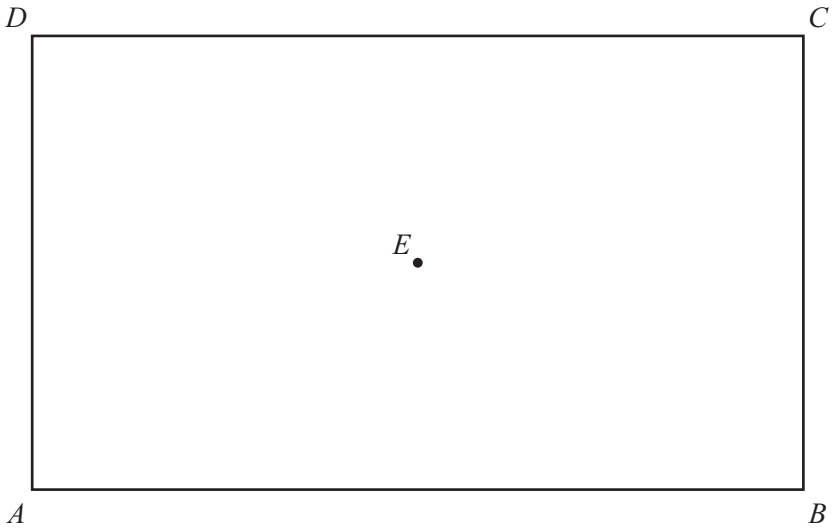
$V_1 = 2^3$ $V_2 = 2^3 + 4^3$ $V_3 = 2^3 + 4^3 + 6^3$

By comparing this sequence with the sequence in **part (a)**, find a formula for the nth term, V_n .

Answer(b) V_n = ... [1]

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12



(a) Draw the locus of the points which are 3 cm from E. [1]

(b) **Using a straight edge and compasses only**, construct the bisector of angle DCB. [2]

(c) Shade the region which is

- less than 3 cm from E

and

- nearer to CB than to CD. [1]

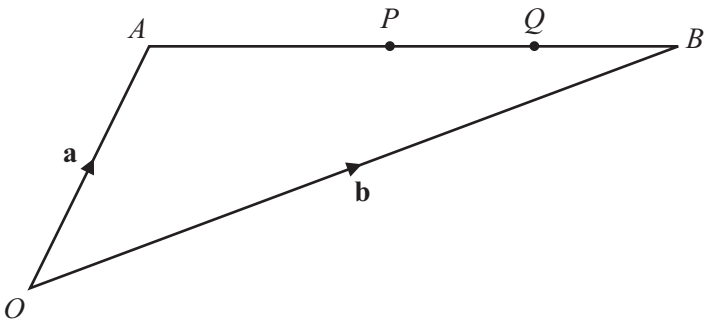
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13 Write as a single fraction, in its simplest form.

$$\frac{3}{2x} + \frac{2x}{3} + 3 + 2x$$

Answer ..... [4]

14



NOT TO SCALE

The diagram shows two points, P and Q, on a straight line AB.
P is the midpoint of AB and Q is the midpoint of PB.
O is the origin, $\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$.

Write down, in terms of **a** and **b**, in its simplest form

(a) $\overrightarrow{AP}$,

Answer(a) $\overrightarrow{AP}$ = ... [2]

(b) the position vector of Q.

Answer(b) ..... [2]

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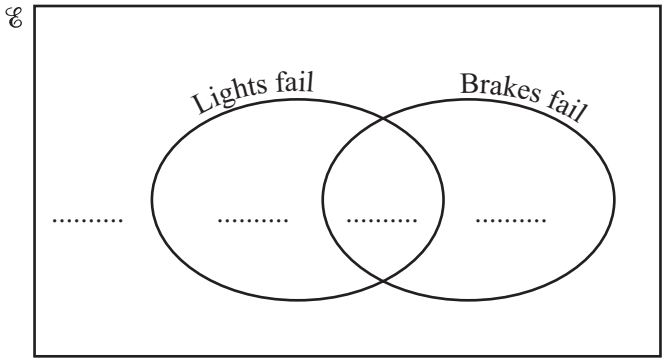
15 The lights and brakes of 30 bicycles are tested.
The table shows the results.

	Lights	Brakes
Fail test	3	9
Pass test	27	21

The lights and brakes both failed on one bicycle only.

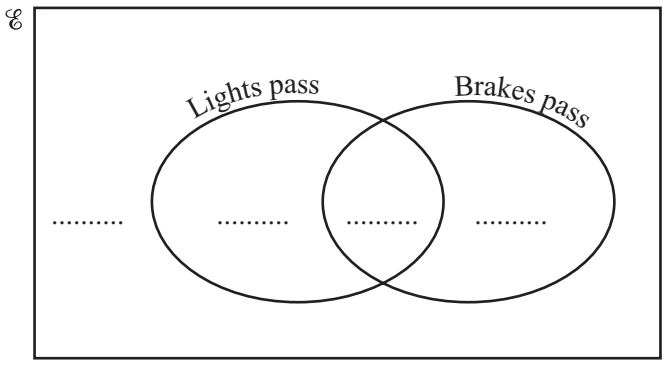
$\mathscr{E}$ = {30 bicycles}
Complete the Venn diagrams.

(a)



[2]

(b)



[2]

16 $f(x) = (x - 3)^2$ $g(x) = \frac{x-1}{4}$ $h(x) = x^3$

Find

(a) hf(1),

Answer(a) ..... [2]

(b) $g^{-1}(x)$,

Answer(b) $g^{-1}(x)$ = ... [2]

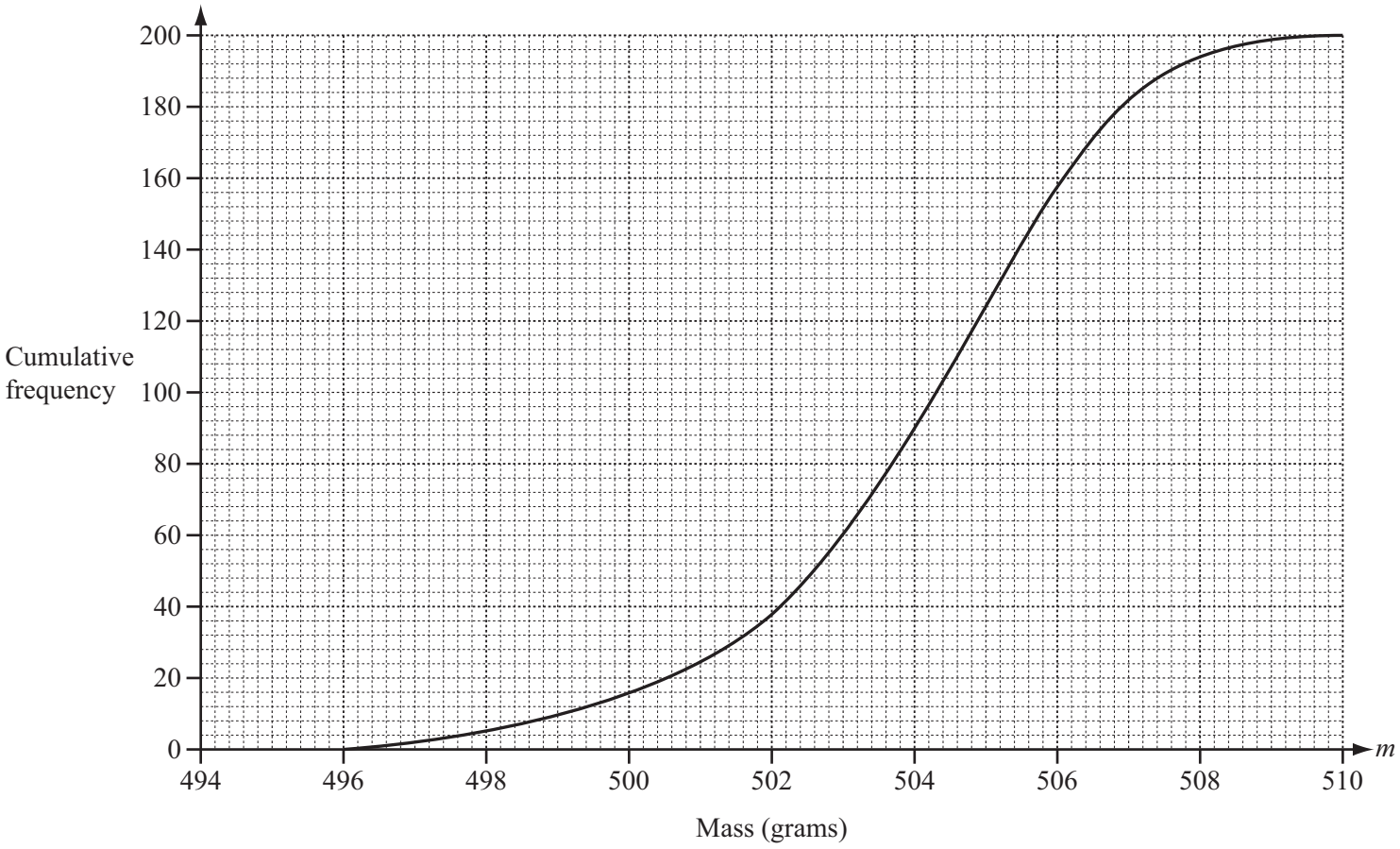
(c) gh(x),

Answer(c) gh(x) = ... [1]

(d) the solution to the equation $f(x) = 0$.

Answer(d) x = ... [1]

17 The mass, m grams, of cornflakes in each of 200 boxes is recorded.
The cumulative frequency diagram shows the results.



(a) Use the diagram to estimate the inter-quartile range.

Answer(a) ..... g [2]

(b) Find the probability that a box chosen at random has a mass of 500 grams or less.

Answer(b) ..... [2]

(c)

Mass (m grams)	$496 < m \leqslant 500$	$500 < m \leqslant 504$	$504 < m \leqslant 508$	$508 < m \leqslant 510$
Frequency	16	74	104	6

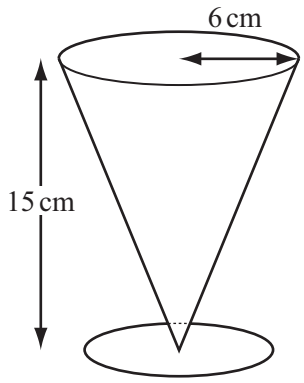
The data in this frequency table is to be shown in a histogram.

Complete the frequency density table below.

Mass (m grams)	$496 < m \leqslant 500$	$500 < m \leqslant 504$	$504 < m \leqslant 508$	$508 < m \leqslant 510$
Frequency density	4			

[2]

18



NOT TO SCALE

The diagram shows a glass, in the shape of a cone, for drinking milk.
The cone has a radius of 6 cm and height 15 cm.
A bottle of milk holds 2 litres.

(a) How many times can the glass be completely filled from the bottle?
[The volume, V, of a cone with radius r and height h is $V = \frac{1}{3}\pi r^2 h$.]

Answer(a) ..... [4]

(b) Calculate the volume of milk left in the bottle.
Give your answer in cm^3.

Answer(b) ..... cm^3 [3]

Question 19 is printed on the next page.

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[Turn over

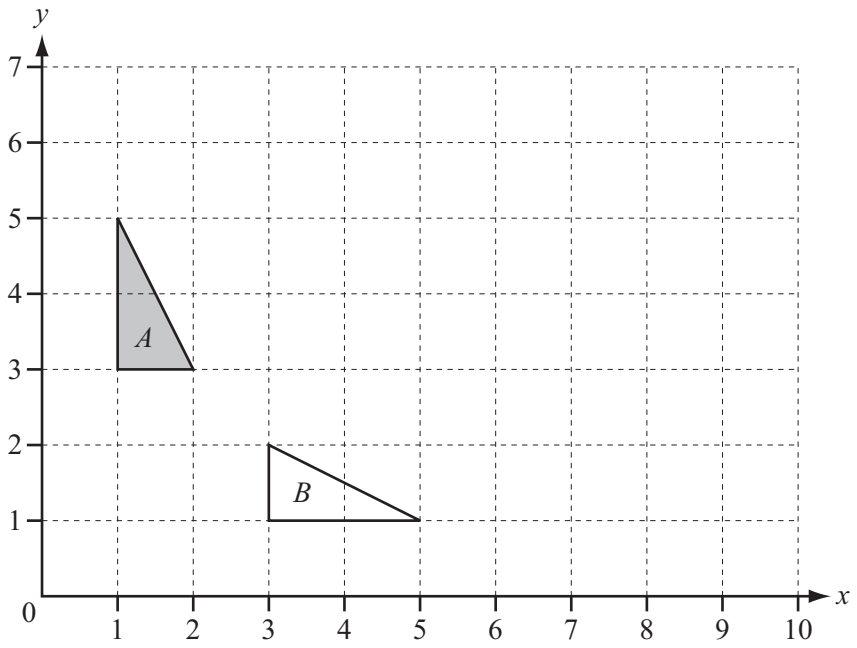
19 (a) $\mathbf{N} = \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$

Describe fully the **single** transformation represented by **N**.

Answer(a) .....

..... [3]

(b) Find the matrix which represents the **single** transformation that maps triangle *A* onto triangle *B*.



Answer(b) $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

(c) On the grid, draw the image of triangle *A* under a stretch, factor 3, with the *y*-axis invariant. [2]

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