



## **Cambridge International Examinations**

Cambridge International General Certificate of Secondary Education

CANDIDATE NAME			
CENTRE NUMBER		CANDIDATE NUMBER	
MATHEMATICS			0580/23
Paper 2 (Extended)		Oct	ober/November 2014
			1 hour 30 minutes
Candidates answer o	n the Question Paper.		
Additional Materials:	Electronic calculator Tracing paper (optional)	Geometrical instrume	ents

## **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  $\pi$ , 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.



1	\$1 = 8.2  rand
	Change \$350 into rands.
	Answer rand [2]
2	Write the following in order of size, smallest first.
	$0.34 \qquad \sqrt{0.6} \qquad 0.6^2 \qquad 0.7^3$
	<i>Answer</i> <
	smallest [2]
3	Work out $4 \times 10^{-5} \times 6 \times 10^{12}$ . Give your answer in standard form.
	<i>Answer</i> [2]
4	The four sector angles in a pie chart are $2x^{\circ}$ , $3x^{\circ}$ , $4x^{\circ}$ and $90^{\circ}$ .
	Find the value of $x$ .
	$Answer x = \dots [2]$

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	2]
6			_
	$\frac{2x+5}{3}=8$		
	An.	$swer x = \dots \qquad [$	3]
7	7 Find the interior angle of a regular polygon with 18 sides.		_
		Answer	3]
			_

8	Make <i>x</i> the subject of the formula.	
	, and the second	$y = 2 + \sqrt{x - 8}$

$$Answer x =$$
 [3]

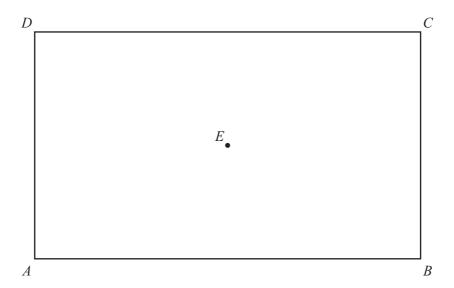
9 y varies inversely as (x + 5). y = 6 when x = 3.

Find y when x = 7.

$$Answer y = \dots [3]$$

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
			Answer \$	
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 <i>n</i> th term is given by $U_n = \frac{1}{4}n^2 (n+1)^2$ .		
		Work out the value of $U_{\rm 39}$ .		
			Answer(a) $U_{39} = \dots$	[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	<b>part (a)</b> , find a formula for the $n$ th term, $V_n$ .	
			Answer(b) $V_n = \dots$	[1

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*.

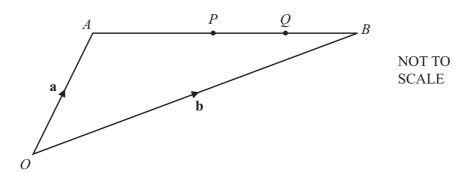
[1]

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

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

*Answer* ..... [4]

14



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. Q 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]

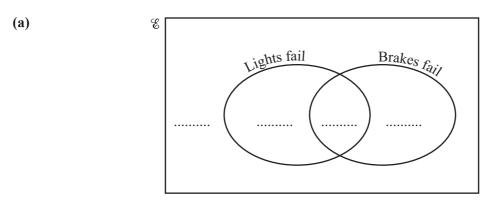
15 The lights and brakes of 30 bicycles are tested. The table shows the results.

	Lights	Brakes
Fail test	3	9
Pass test	27	21

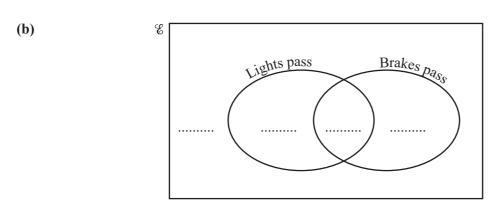
The lights and brakes both failed on one bicycle only.

 $\mathscr{E} = \{30 \text{ bicycles}\}\$ 

Complete the Venn diagrams.



[2]



[2]

16 
$$f(x) = (x-3)^2$$

$$g(x) = \frac{x-1}{4}$$

$$h(x) = x^3$$

Find

(a) 
$$hf(1)$$
,

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

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

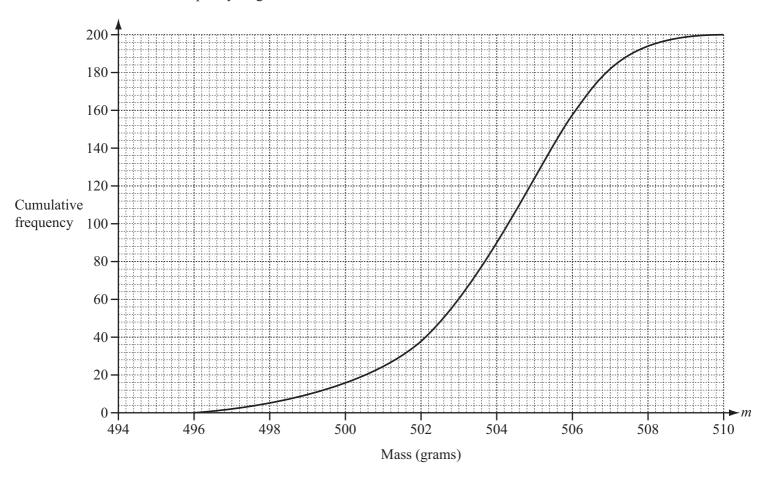
(c) 
$$gh(x)$$
,

$$Answer(c) gh(x) = \dots [1]$$

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

$$Answer(d) x = \dots [1]$$

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.

(c)

Mass ( <i>m</i> grams)	496 < m ≤ 500	$500 < m \le 504$	$504 < m \le 508$	$508 < m \le 510$
Frequency	16	74	104	6

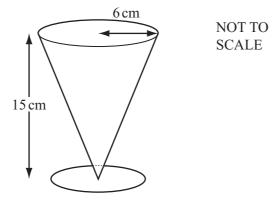
The data in this frequency table is to be shown in a histogram.

Complete the frequency density table below.

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

[2]

18



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  $V = \frac{1}{3}\pi r^2 h$ .]

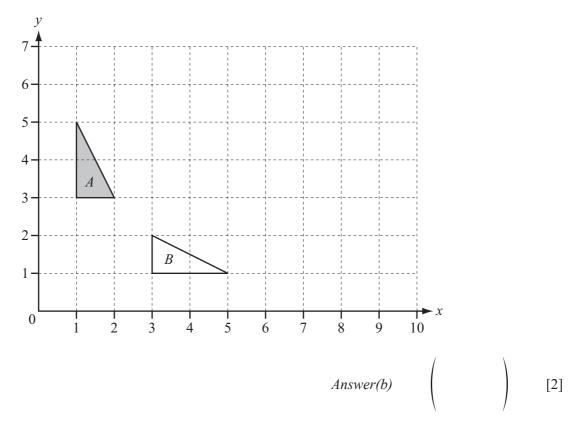
**(b)** Calculate the volume of milk left in the bottle. Give your answer in cm<sup>3</sup>.

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

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.



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

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included the publisher will be pleased to make amends at the earliest possible opportunity.

Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.