

## **Cambridge International Examinations**

Cambridge International General Certificate of Secondary Education

CANDIDATE NAME			
CENTRE NUMBER		CANDIDATE NUMBER	
MATHEMATICS			0580/22
Paper 2 (Extended)			May/June 2016
			1 hour 30 minutes
Candidates answer of	n 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  $\pi$ , use either your calculator value or 3.142.

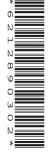
At the end of the examination, fasten all your work securely together.

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	Write 0.0000574 in standard form.	
		[1]
2	Calculate. $\frac{3.07 + 2^4}{5.03 - 1.79}$	
		[1]
3	Write 3.5897 correct to 4 significant figures.	
		[1]
4	A quadrilateral has rotational symmetry of order 2 and no lines of sym Write down the mathematical name of this quadrilateral.	mmetry.
		[1]
5	8 9 10 11 12 13 14	15 16
	From the list of numbers, write down  (a) the square numbers,	
		[1]
	<b>(b)</b> a prime factor of 99.	[1]
6	Simplify. $(1   2)^3$	
	$\left(\frac{1}{2}x^{\frac{2}{3}}\right)^3$	
		[2]

7	A map is drawn to a scale of 1 : 1 000 000. A forest on the map has an area of 4.6 cm <sup>2</sup> .	
	Calculate the actual area of the forest in square kilometres.	
		km <sup>2</sup> [2]
8	Solve the inequality $\frac{x}{3} + 5 > 2$ .	
		[2]
9	A regular polygon has an interior angle of 172°	
9	A regular polygon has an interior angle of 172°.  Find the number of sides of this polygon.	
	T. 100	
		[3]
10	Make $p$ the subject of the formula.	
	rp + 5 = 3p + 8r	
	p	=[3]
11	Shahruk plays four games of golf.	
	His four scores have a mean of 75, a mode of 78 and a median of 77.	
	Work out his four scores.	
		[3]

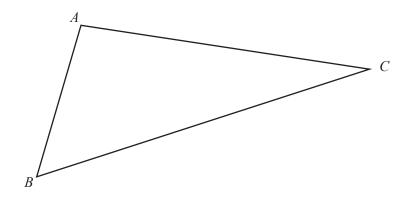
12	Write the recurring decimal 0.36 as a fraction. Give your answer in its simplest form. [0.36 means 0.3666]	
		[3]
13	The base of a triangle is $9  \text{cm}$ correct to the nearest cm. The area of this triangle is $40  \text{cm}^2$ correct to the nearest $5  \text{cm}^2$ .	
	Calculate the upper bound for the perpendicular height of this triangle	2.
		cm [3]
14	<b>Without using a calculator</b> , work out $2\frac{5}{8} \times \frac{3}{7}$ . Show all your working and give your answer as a mixed number in it	s lowest terms.
		[3]
15	$y = x^2 + 7x - 5$ can be written in the form $y = (x + a)^2 + b$ .	
	Find the value of a and the value of b.	
		<i>η</i> =
	L.	$b = \dots [3]$

16 Solve the simultaneous equations. Show all your working.

$$3x + 4y = 14$$
$$5x + 2y = 21$$

x =		
<i>y</i> =	[	3

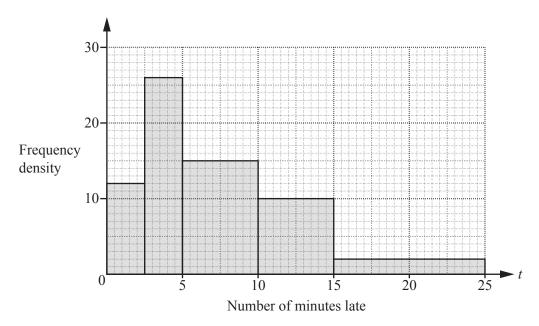
17 The diagram shows triangle ABC.



- (a) Using a straight edge and compasses only, construct the bisector of angle ABC. [2]
- **(b)** Draw the locus of points **inside** the triangle that are 3 cm from AC. [1]

Find the <i>n</i> th term of each of these sequences.							
(a)	16,	19,	22,	25,	28,		
(b)	1,	3,	9,	27,	81,		[2]
							[2]
							per year.
(a) Fin	d the exp	pected p	opulatio	n on Jan	uary 1st	2020.	
							billion [2]
<b>(b)</b> Fin	d the yea	ar when	the popu	ılation is	s expecte	ed to reach 10 billion.	
							[2]
	(a)  (b)  It is estir On Janua  (a) Fin	(a) 16,  (b) 1,  It is estimated th On January 1st 2  (a) Find the exp	(a) 16, 19,  (b) 1, 3,  It is estimated that the woon January 1st 2014 the  (a) Find the expected p	(a) 16, 19, 22,  (b) 1, 3, 9,  It is estimated that the world's po On January 1st 2014 the population  (a) Find the expected population	(a) 16, 19, 22, 25,  (b) 1, 3, 9, 27,  It is estimated that the world's population On January 1st 2014 the population was a second of the expected population on January 1st 2014 the population on January 1st 2st 2st 2st 2st 2st 2st 2st 2st 2st 2	(a) 16, 19, 22, 25, 28,  (b) 1, 3, 9, 27, 81,  It is estimated that the world's population is grow On January 1st 2014 the population was 7.23 billion.  (a) Find the expected population on January 1st	Find the <i>n</i> th term of each of these sequences.  (a) 16, 19, 22, 25, 28,  (b) 1, 3, 9, 27, 81,  It is estimated that the world's population is growing at a rate of 1.14% On January 1st 2014 the population was 7.23 billion.  (a) Find the expected population on January 1st 2020.

20 Deborah records the number of minutes late, t, for trains arriving at a station. The histogram shows this information.



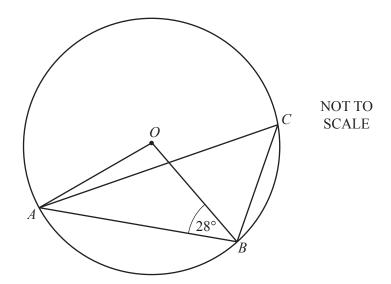
(a) Find the number of trains that Deborah recorded.

	[2]	
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**(b)** Calculate the percentage of the trains recorded that arrived more than 10 minutes late.

.....% [2]

21



In the diagram, A, B and C lie on the circumference of a circle, centre O.

Work out the size of angle *ACB*. Give a reason for each step of your working.

$$\mathbf{M} = \begin{pmatrix} 5 & 1 \\ -3 & -2 \end{pmatrix}$$

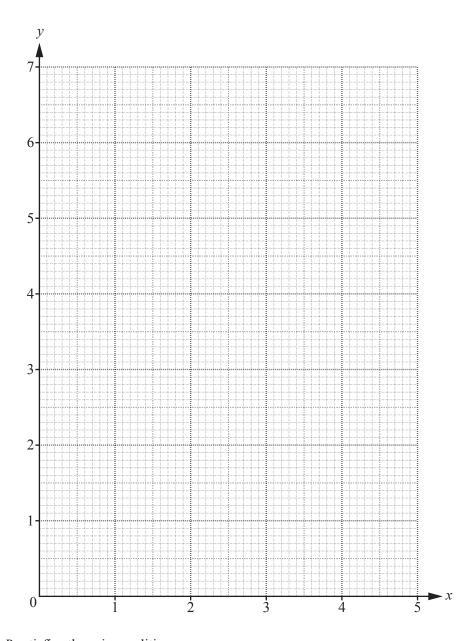
(a) Work out 4M.

**(b)** Work out  $\mathbf{M}^2$ .

(c) Find  $M^{-1}$ , the inverse of M.

$$\left(\begin{array}{c} \\ \end{array}\right) \quad [2]$$

23



The region R satisfies these inequalities.

$$y \le 2x$$

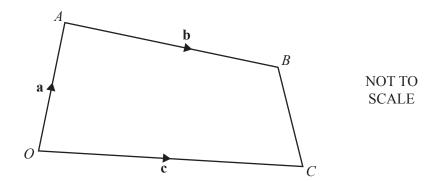
$$3x + 4y \geqslant 12$$

$$x \le 3$$

On the grid, draw and label the region R that satisfies these inequalities. Shade the **unwanted** regions.

[5]

24



In the diagram, O is the origin,  $\overrightarrow{OA} = \mathbf{a}$ ,  $\overrightarrow{OC} = \mathbf{c}$  and  $\overrightarrow{AB} = \mathbf{b}$ . P is on the line AB so that AP : PB = 2 : 1. Q is the midpoint of BC.

Find, in terms of a, b and c, in its simplest form

(a)  $\overrightarrow{CB}$ ,

$\overrightarrow{CB} =$	 [1]
	 L-1

**(b)** the position vector of Q,



(c)  $\overrightarrow{PQ}$ .

$$\overrightarrow{PQ} = \dots [2]$$

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