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0580/22

May/June 2016

1 hour 30 minutes

Additional Materials: Electronic calculator
Tracing paper (optional)

Geometrical instruments

READ THESE INSTRUCTIONS FIRST

DO **NOT** WRITE IN ANY BARCODES.

For π , use either your calculator value or 3.142.

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 **11** printed pages and **1** blank page.

- 1 Write 0.000 057 4 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 symmetry.

Write down the mathematical name of this quadrilateral.

..... [1]

- 5 8 9 10 11 12 13 14 15 16

From the list of numbers, write down

- (a) the square numbers,

..... [1]

- (b) a prime factor of 99.

..... [1]

- 6 Simplify.

$$\left(\frac{1}{2}x^{\frac{2}{3}}\right)^3$$

..... [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^2 .

Calculate the actual area of the forest in square kilometres.

..... km^2 [2]

- 8 Solve the inequality $\frac{x}{3} + 5 > 2$.

..... [2]

- 9 A regular polygon has an interior angle of 172° .
Find the number of sides of this polygon.

..... [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 $0.3\dot{6}$ as a fraction.
Give your answer in its simplest form.
[$0.3\dot{6}$ means $0.3666\dots$]

..... [3]

- 13 The base of a triangle is 9 cm correct to the nearest cm.
The area of this triangle is 40 cm^2 correct to the nearest 5 cm^2 .

Calculate the upper bound for the perpendicular height of this triangle.

..... cm [3]

- 14 **Without using a calculator**, work out $2\frac{5}{8} \times \frac{3}{7}$.

Show all your working and give your answer as a mixed number in its 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 .

$a =$

$b =$ [3]

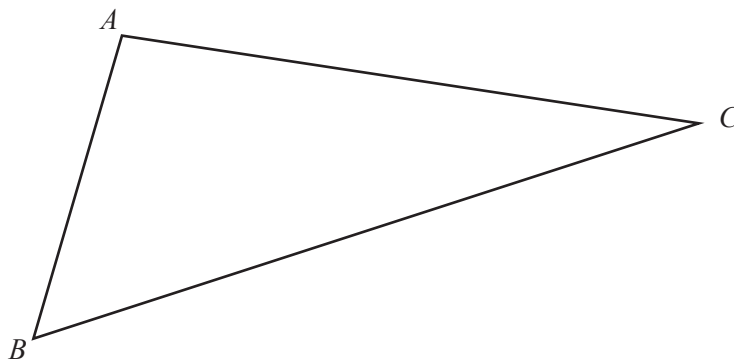
- 16 Solve the simultaneous equations.
Show all your working.

$$\begin{aligned} 3x + 4y &= 14 \\ 5x + 2y &= 21 \end{aligned}$$

$$x = \dots\dots\dots$$

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

- 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]

18 Find the n th term of each of these sequences.

(a) 16, 19, 22, 25, 28, ...

..... [2]

(b) 1, 3, 9, 27, 81, ...

..... [2]

19 It is estimated that the world's population is growing at a rate of 1.14% per year.
On January 1st 2014 the population was 7.23 billion.

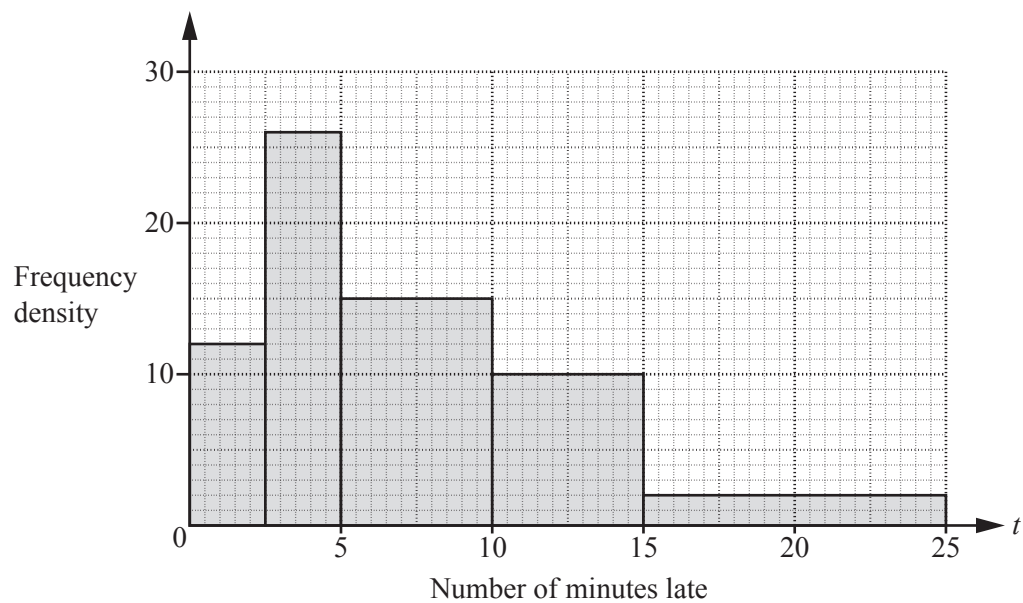
(a) Find the expected population on January 1st 2020.

.....billion [2]

(b) Find the year when the population is expected to reach 10 billion.

..... [2]

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

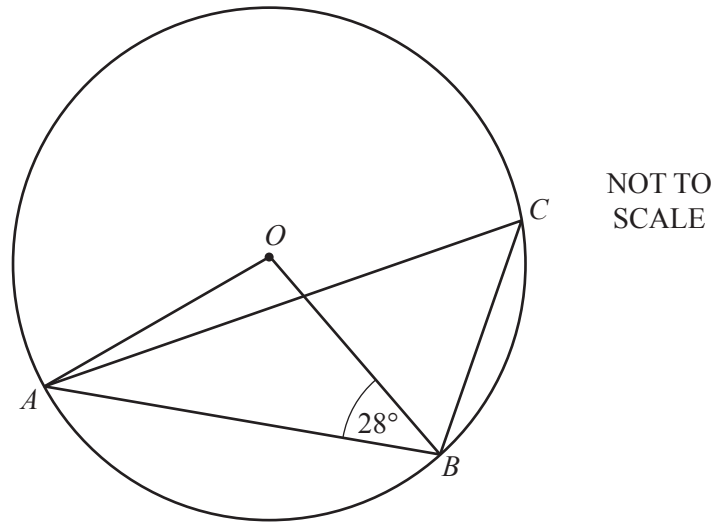


- (a) Find the number of trains that Deborah recorded.

..... [2]

- (b) Calculate the percentage of the trains recorded that arrived more than 10 minutes late.

.....% [2]



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.

Angle $ACB = \dots\dots\dots$ [4]

22 $\mathbf{M} = \begin{pmatrix} 5 & 1 \\ -3 & -2 \end{pmatrix}$

(a) Work out $4\mathbf{M}$.

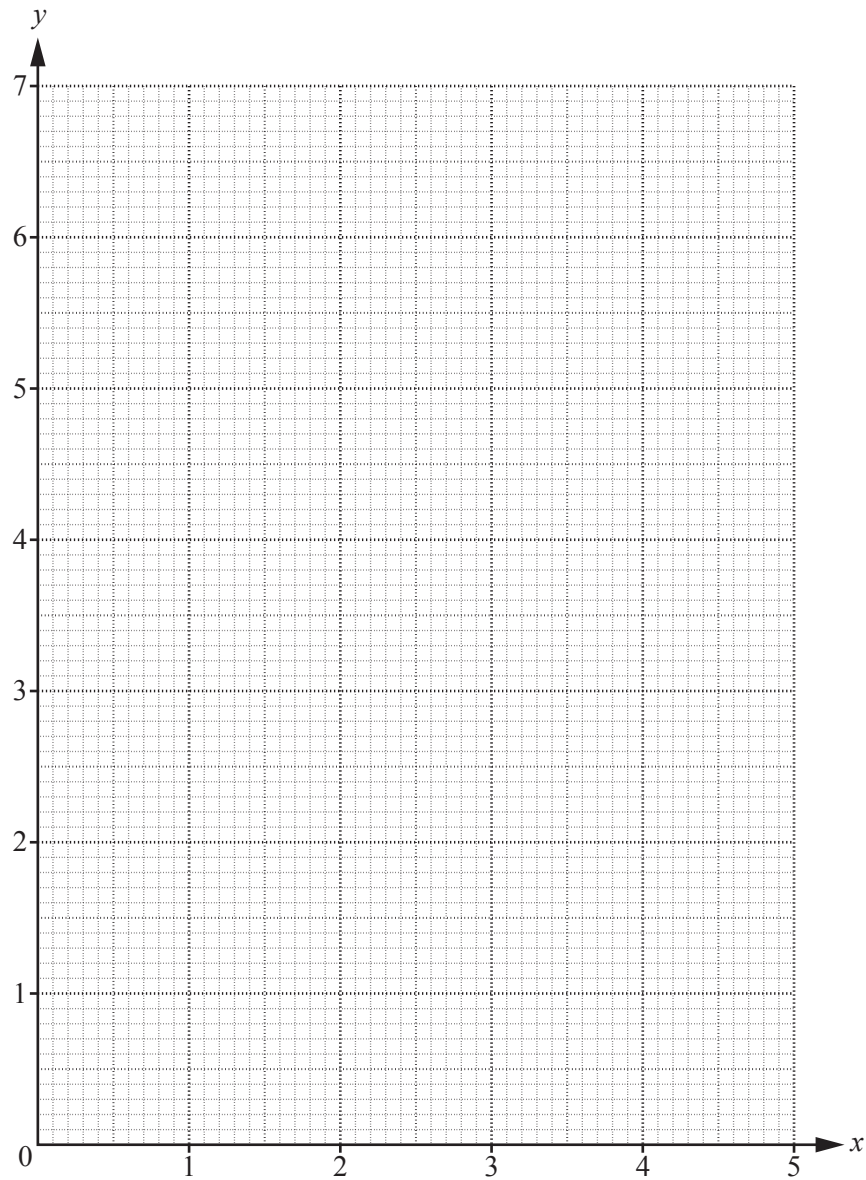
$$\begin{pmatrix} & \\ & \end{pmatrix} \quad [1]$$

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

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

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

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



The region R satisfies these inequalities.

$$y \leq 2x$$

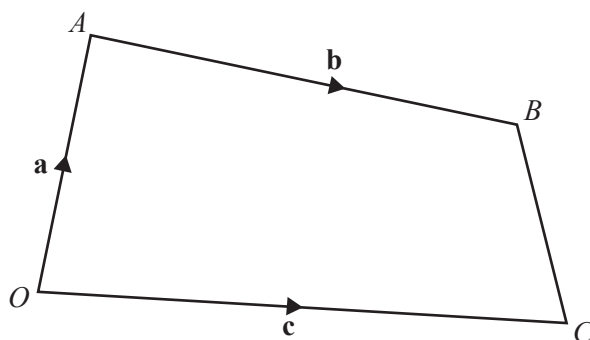
$$3x + 4y \geq 12$$

$$x \leq 3$$

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

[5]

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NOT TO
SCALE

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 \mathbf{a} , \mathbf{b} and \mathbf{c} , in its simplest form

(a) \overrightarrow{CB} ,

$$\overrightarrow{CB} = \dots\dots\dots [1]$$

(b) the position vector of Q ,

$$\dots\dots\dots [2]$$

(c) \overrightarrow{PQ} .

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

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