Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

8545343212

MATHEMATICS **0580/22**

Paper 2 (Extended) **February/March 2017**

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.

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

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CAMBRIDGE International Examinations

1 Expand the brackets and simplify.

$$4(5w+3)-2(w-1)$$

..... [2]

2 The line AB is one side of an equilateral triangle ABC.

Using a straight edge and compasses only, construct triangle ABC.



[2]

3 **Without using your calculator** and by rounding each number correct to 1 significant figure, estimate the value of

$$\frac{10.3\times 19.5}{88.9-43.2}.$$

You must show all your working.

..... [2]

4 The population of the world grows exponentially at a rate of 1.1% per year.

Find the number of years it takes for the population to grow from 7 billion to 7.31 billion.
Give your answer correct to the nearest whole number.

.....years [2]

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5 $s = ut + 16t^2$

Find the value of s when $u = 2$ and $t = 3$.

$s =$ ..... [2]

6 Write the recurring decimal $0.1\dot{7}$ as a fraction.
Show all your working.

..... [2]

7 The length of a rectangle is 9.3 cm, correct to 1 decimal place.
Its width is 7.7 cm, correct to 1 decimal place.

Write down the lower bound and the upper bound for the area of the rectangle.

Lower bound = ... cm^2

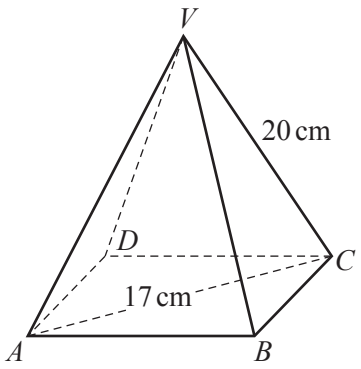
Upper bound = ... cm^2 [3]

8 **Without using your calculator**, work out $3\frac{1}{3} \div 2\frac{1}{2}$.

You must show all your working and give your answer as a mixed number in its simplest form.

..... [3]

9 The diagram shows a pyramid with a square base *ABCD*.
All the sloping edges of the pyramid are 20 cm long and $AC = 17$ cm.



NOT TO SCALE

Calculate the height of the pyramid.

..... cm [3]

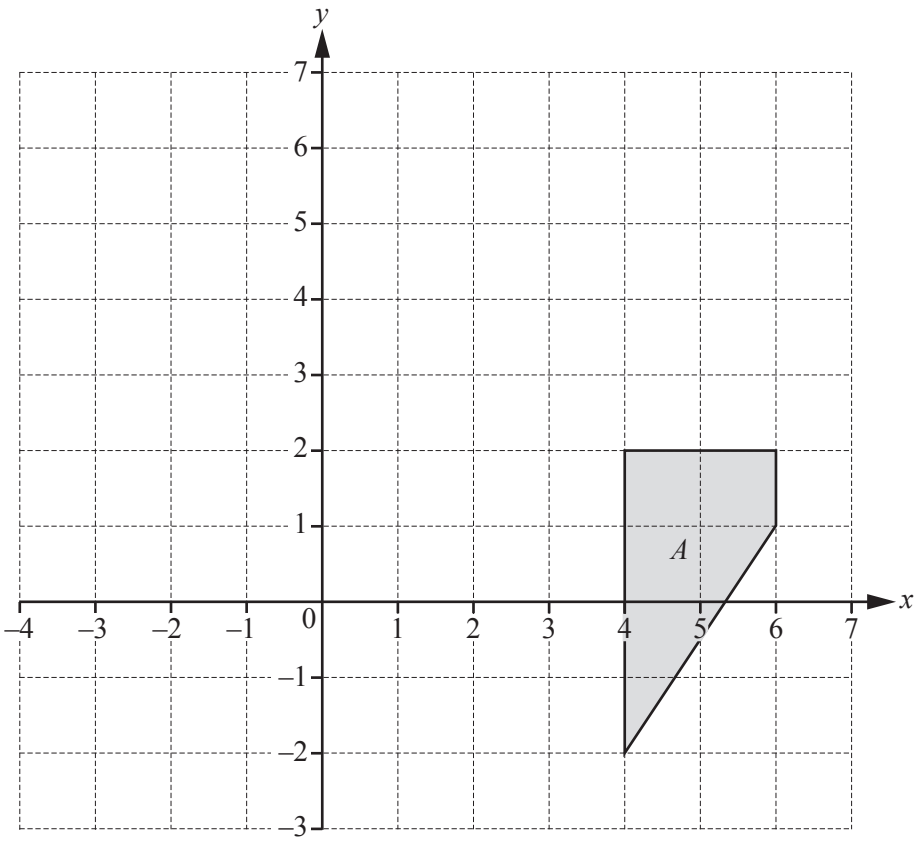
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10 Indira buys a television in a sale for \$924.
This was a reduction of 12% on the original price.

Calculate the original price of the television.

\$..... [3]

11



T(X) is the image of the shape X after translation by the vector $\begin{pmatrix} -1 \\ 3 \end{pmatrix}$.

M(Y) is the image of the shape Y after reflection in the line $x = 2$.

On the grid, draw MT(A), the image of shape A after the transformation MT. [3]

12 y is inversely proportional to x^2.
When $x = 5$, $y = 16$.

Find y when $x = 10$.

$y =$ ..... [3]

13 Factorise completely.

(a) $15c^2 - 5c$

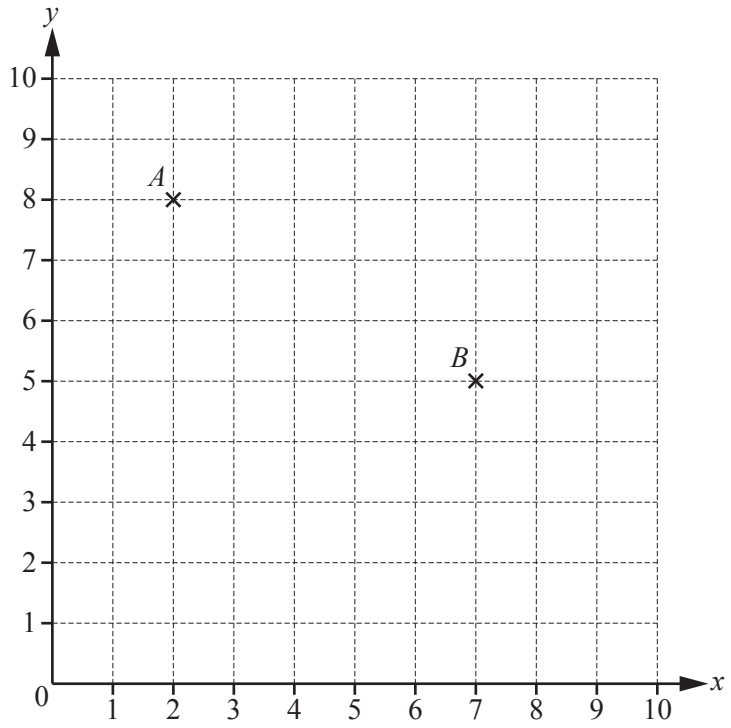
..... [2]

(b) $2kp - km + 6p - 3m$

..... [2]

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Points A and B are marked on the grid.

$\overrightarrow{BC} = \begin{pmatrix} -4 \\ 0 \end{pmatrix}$

(a) On the grid, plot the point C. [1]

(b) Write $\overrightarrow{AC}$ as a column vector.

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

(c) $\overrightarrow{DE}$ is a vector that is perpendicular to $\overrightarrow{BC}$.
The magnitude of $\overrightarrow{DE}$ is equal to the magnitude of $\overrightarrow{BC}$.

Write down a possible column vector for $\overrightarrow{DE}$.

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

15 Work out.

(a) $t^{24} \div t^4$

..... [1]

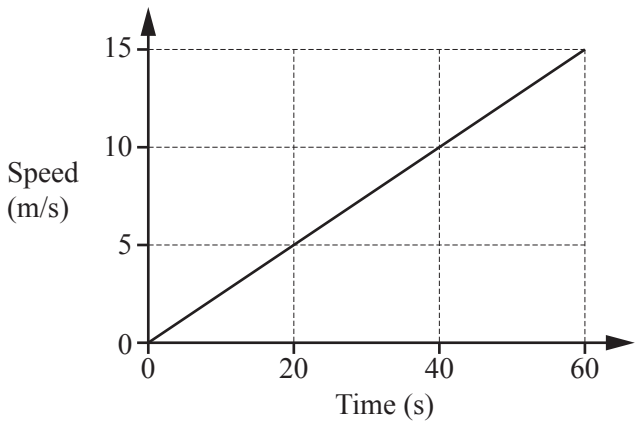
(b) $(x^5)^2$

..... [1]

(c) $(81m^8)^{\frac{3}{4}}$

..... [2]

16 The speed-time graph shows the first 60 seconds of a train journey.



(a) Find the acceleration of the train.

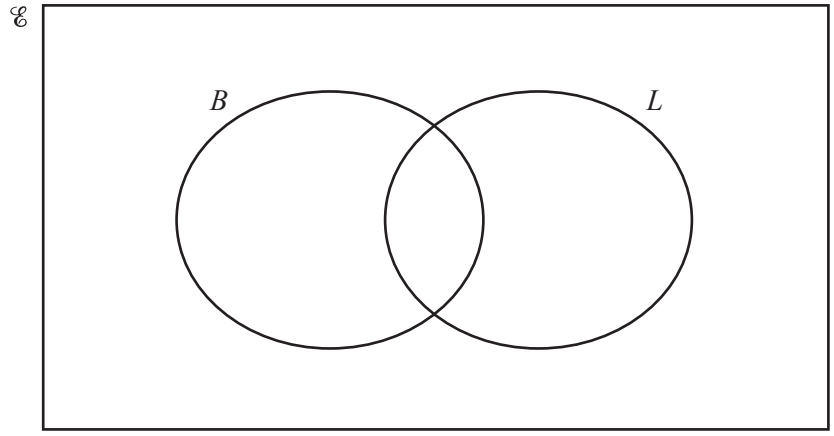
..... m/s^2 [1]

(b) Calculate the distance the train has travelled in this time.
Give your answer in kilometres.

..... km [3]

17 **(a)** A total of 20 trucks were tested at a checkpoint.

- 6 trucks failed the test for brakes (B)
- 7 trucks failed the test for lights (L)
- 9 trucks passed the tests for both brakes and lights.

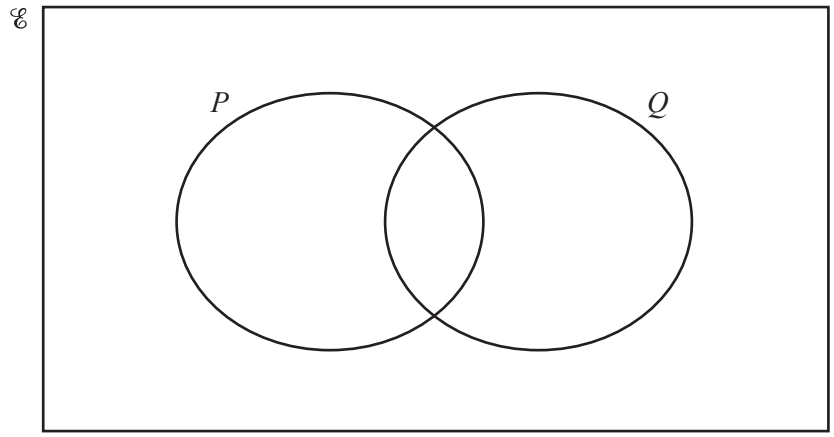


(i) Complete the Venn diagram. [2]

(ii) Find $\mathrm{n}(B' \cap L')$.

..... [1]

(b) In the Venn diagram below, shade the region $(P \cup Q) \cap Q'$.



[1]

18 $\mathbf{M} = \begin{pmatrix} 5 & 3 \\ 1 & -2 \end{pmatrix}$ $\mathbf{N} = \begin{pmatrix} 3 & -6 \\ 4 & 2 \end{pmatrix}$

Calculate

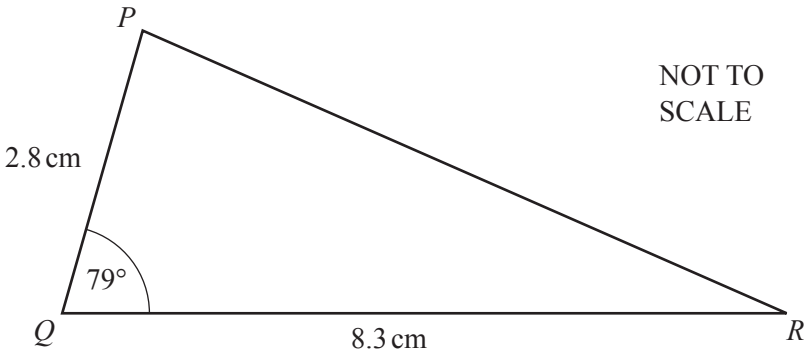
(a) **MN**,

( ) [2]

(b) $\mathbf{M}^{-1}$.

( ) [2]

19



(a) Calculate the area of triangle *PQR*.

.....cm^2 [2]

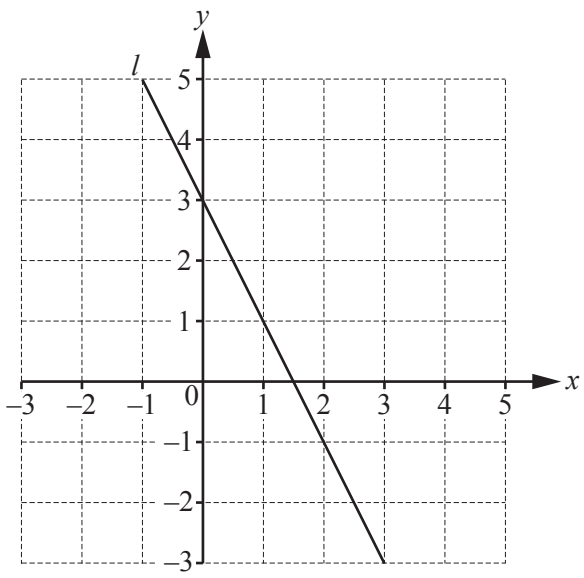
(b) Triangle *PQR* is enlarged by scale factor 4.5 .

Calculate the area of the enlarged triangle.

.....cm^2 [2]

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20



(a) Find the equation of the line l.
Give your answer in the form $y = mx + c$.

$y =$ ..... [3]

(b) A line perpendicular to the line l passes through the point $(3, -1)$.

Find the equation of this line.

..... [3]

Question 21 is printed on the next page.

21 $f(x) = \frac{x}{4} - 3$ $g(x) = 6x - 7$ $h(x) = 2^x$

(a) Work out the value of x when $f(x) = -0.5$.

$x =$ ..... [2]

(b) Find $g^{-1}(x)$.

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

(c) Work out the value of x when $h(x) = f(13)$.

$x =$ ..... [2]

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