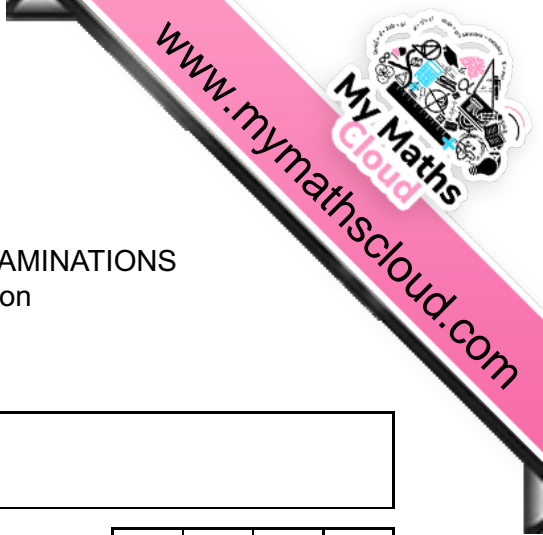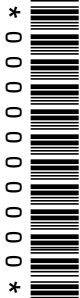UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTER NUMBER

CANDIDATE NUMBER

CAMBRIDGE IGCSE MATHEMATICS (US)   **0444/02**

Paper 2 (Extended)   **For examination from 2012**

SPECIMEN PAPER

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Geometrical Instruments

READ THESE INSTRUCTIONS FIRST

Write your Center number, candidate number, and name on all the work you hand in.
Write in dark blue or black pen.
You may use a pencil for any diagrams, or graphs.
Do not use staples, paper clips, highlighters, glue, or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
CALCULATORS MUST NOT BE USED IN THIS PAPER.
All answers should be given in their simplest form.
If work is needed for any question it must be shown in the space provided.

The number of points is given in parentheses [ ] at the end of each question or part question.
The total of the points for this paper is 70.

For Examiner's Use

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

UNIVERSITY *of* CAMBRIDGE
International Examinations

[Turn over

Formula List

For the equation $\qquad ax^2 + bx + c = 0 \qquad\qquad\qquad x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Lateral surface area, A, of cylinder of radius r, height h. $\qquad A = 2\pi rh$

Lateral surface area, A, of cone of radius r, sloping edge l. $\qquad A = \pi rl$

Surface area, A, of sphere of radius r. $\qquad A = 4\pi r^2$

Volume, V, of pyramid, base area A, height h. $\qquad V = \frac{1}{3}Ah$

Volume, V, of cone of radius r, height h. $\qquad V = \frac{1}{3}\pi r^2 h$

Volume, V, of sphere of radius r. $\qquad V = \frac{4}{3}\pi r^3$
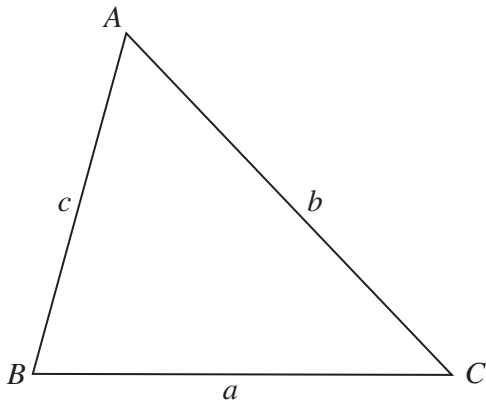
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc\cos A$$

$$\text{Area} = \tfrac{1}{2}bc\sin A$$

1 Write down

(a) an irrational number,

Answer (a) .... [1]

(b) a prime number between 60 and 70.

Answer (b) .... [1]

2 Sima drinks 2.5 liters of water each day.
A full glass holds 125 milliliters of water.
How many full glasses of water does Sima drink each day?

Answer .... [2]

3 (a) Write 3.55×10^4 in standard notation.

Answer (a) .... [1]

(b) Write 0.0069 in scientific notation.

Answer (b) .... [1]

(c) Work out $\left(4 \times 10^7\right)^2$.
Give your answer in scientific notation.

Answer (c) .... [2]

4 (a) Find the value of

(i) 3^0,

Answer (a)(i) .... [1]

(ii) $36^{\frac{1}{2}}$.

Answer (a)(ii) .... [1]

(b) $2^8 \div 2 = 2^x$

Find the value of x.

Answer (b) .... [1]

5 Two unbiased spinners are used in a game.
One spinner is numbered from 1 to 6 and the other is numbered from 1 to 3.
The scores on each spinner are **multiplied** together. The table below shows the possible outcomes.

First Spinner

		1	2	3	4	5	6
	1	1	2	3	4	5	6
Second Spinner	2	2	4	6	8	10	12
	3	3	6	9	12	15	18

(a) Find the probability that the outcome is even.

Answer (a) .... [1]

(b) When the outcome is even, find the probability that it is also greater than 11.

Answer (b) .... [2]

6 The table gives the average surface temperature (°C) on five planets.

Planet	Earth	Mercury	Neptune	Saturn	Uranus
Average temperature (°C)	15	350	–220	–180	–200

(a) Calculate the range of these temperatures.

Answer (a) .... °C [1]

(b) Which planet has a temperature 20°C lower than that of Uranus?

Answer (b) .... [1]

7 **(a)** Expand $(2x - 7)^2$.

Answer (a) .... [2]

(b) Factor completely $3x^2y - 12y^3$.

Answer (b) .... [2]

---

8 **(a)** Find the GCF (greatest common factor) of 36 and 108.

Answer (a) .... [2]

(b) Find the LCM (least common multiple) of 21 and 18.

Answer (b) .... [2]

---

9 **(a)** Solve

$$4x - 5 < 9.$$

Answer (a) .... [2]

(b) Represent your solution to part **(a)** on the number line below.

<div align="center">

–5   –4   –3   –2   –1   0   1   2   3   4   5
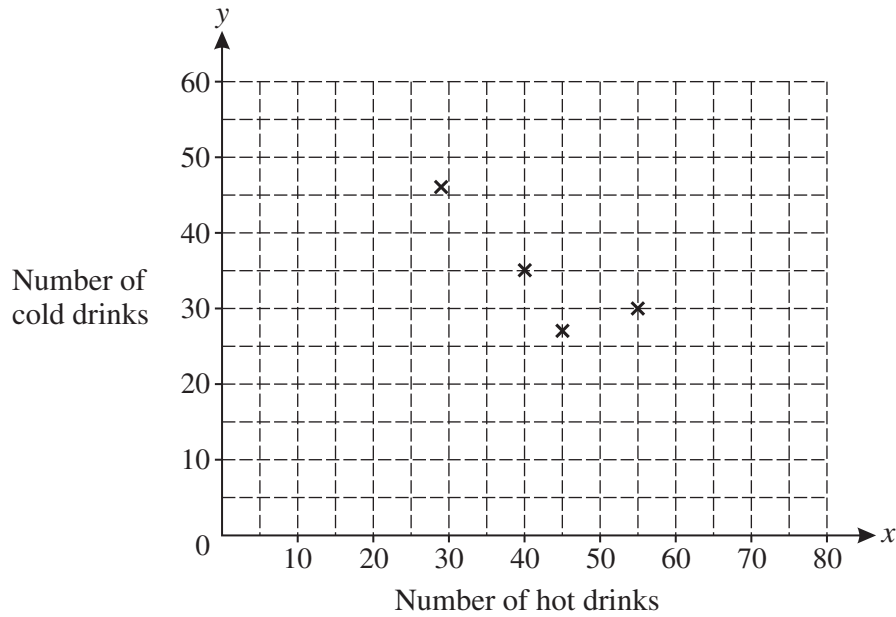
</div>
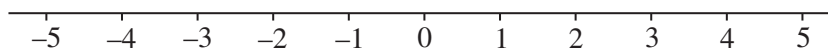
[1]

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10   During one week a café records the number of hot drinks (x) and cold drinks (y) it sel[...]
     day.

     The table shows the results.

Day	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Number of hot drinks (x)	55	29	40	45	65	80	60
Number of cold drinks (y)	30	46	35	27	20	15	25

(a)   Complete the scatter diagram by plotting the points for Friday, Saturday, and Sunday.
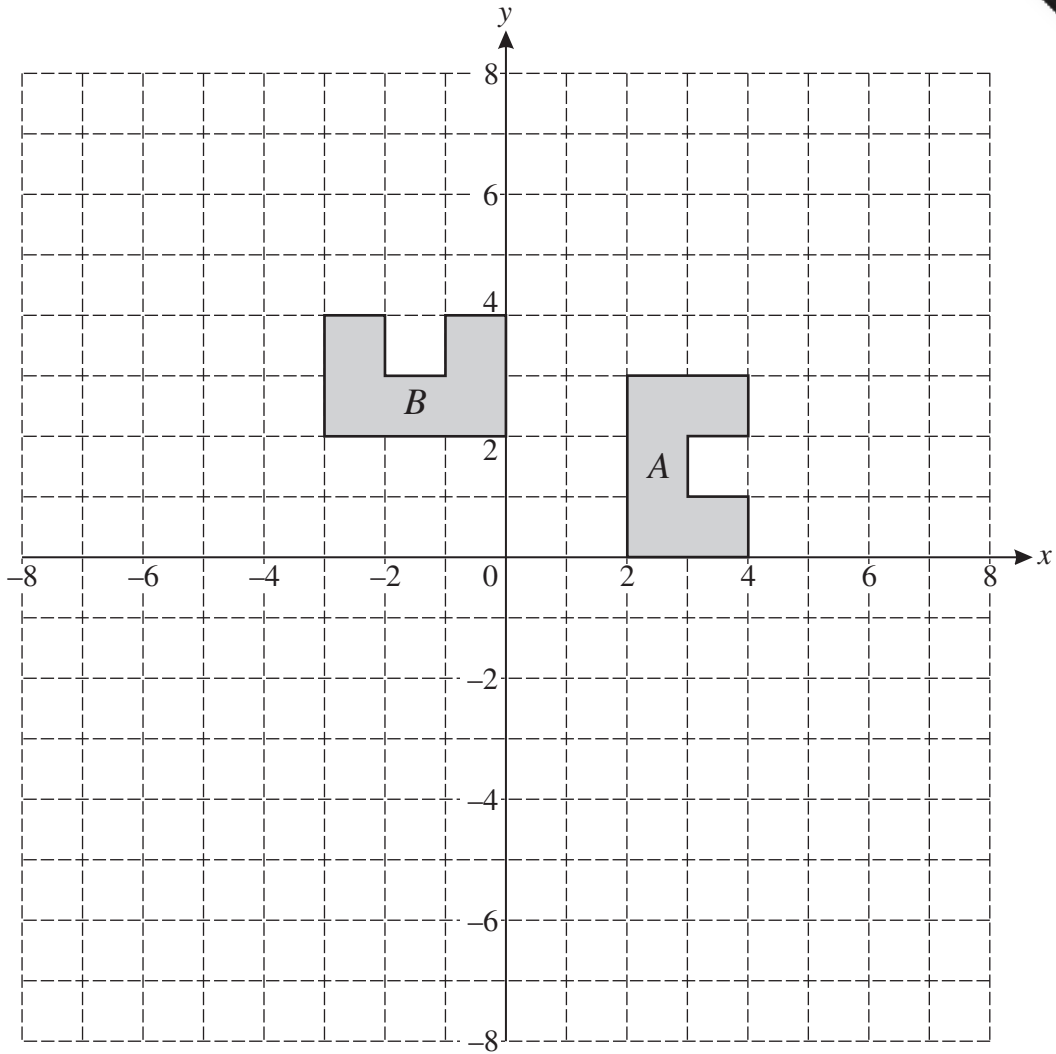   The first four points have been plotted for you.

[2]

(b)   Describe any correlation between x and y.

     .... [1]

(c)   50 hot drinks are sold on one day in the following week.

     How many cold drinks would you expect to be sold on this day?
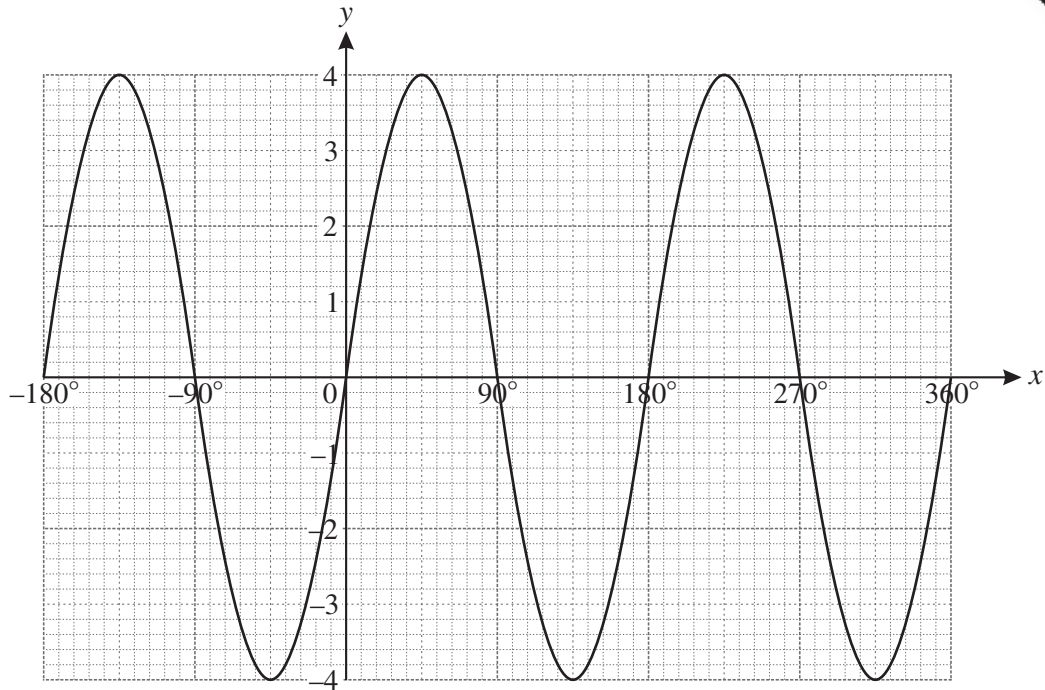
                                  Answer (c) .... [2]

11

(a) Describe fully the **single** transformation which maps shape *A* onto shape *B*.

....

.... [3]

(b) Draw the image of shape *A* after a stretch, with *y*-axis invariant and scale factor 2.

[2]

12

The diagram shows the graph of $y = \text{f}(x)$, where $\text{f}(x) = a\sin(bx)$.

Find the values of a and b.

Answer a = ... [1]

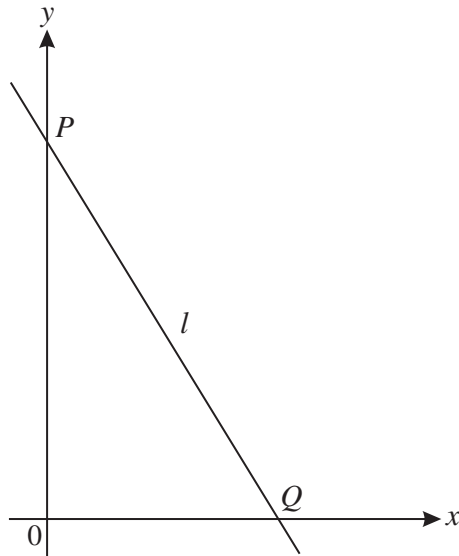*Answer b =* .... [1]

13 $\mathbf{p} = \begin{pmatrix} 5 \\ 1 \end{pmatrix}$ and $\mathbf{q} = \begin{pmatrix} -4 \\ 2 \end{pmatrix}$.

(a) Write $2\mathbf{p} - \frac{1}{2}\mathbf{q}$ as a column vector.

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

(b) Find $|\,\mathbf{q}\,|$ leaving your answer in radical form.

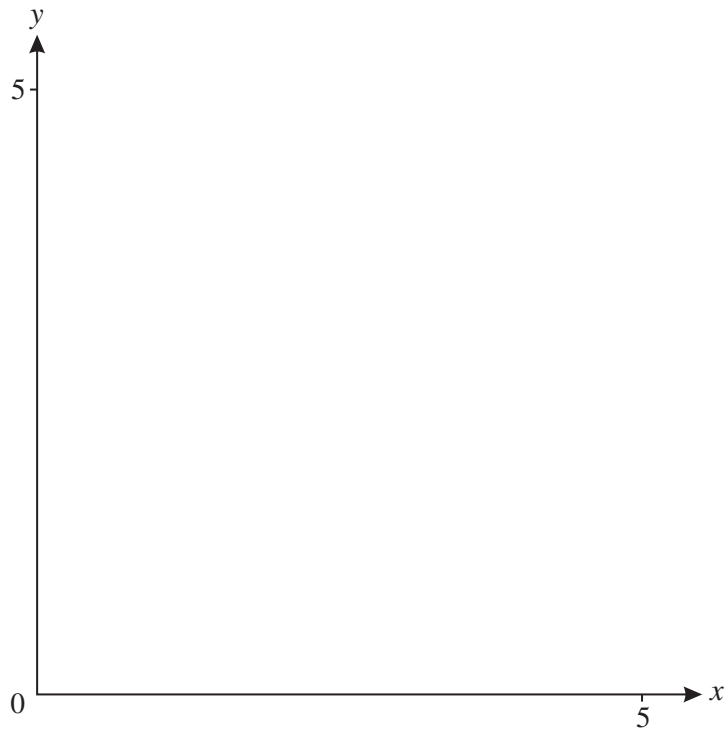*Answer (b)* .... [2]

14

NOT TO
SCALE

The diagram shows a line, *l*, which passes through the points *P* (0, 4) and *Q* (2, 0).

(a) Find the equation of the line *l*.

Answer (a) .... [2]

(b) Find the equation of the line which is perpendicular to *l* and passes through the midpoint of *PQ*.

Answer (b) .... [4]

15

(a) On the diagram above, **sketch** the lines

   (i) $x + y = 5$, [1]

   (ii) $y = 1$, [1]

  (iii) $y = 2x$. [1]

(b) Write R in the region where $x \geqslant 0$, $y \geqslant 1$, $y \geqslant 2x$ and $x + y \leqslant 5$. [1]

16 Simplify.

(a) $\dfrac{\sqrt{15}}{\sqrt{5}}$

Answer (a) .... [1]

(b) $\sqrt{300} + \sqrt{48}$

Answer (b) .... [2]

(c) $\left(\sqrt{5} + \sqrt{3}\right)^2$

Answer (c) .... [2]

17 Given that $x^2 + 6x + c = (x + d)^2 + 10$,

(a) find the values of c and d,

Answer (a) c = ...

d = ... [3]

(b) write down the minimum value of $x^2 + 6x + c$.

Answer (b) .... [1]

18 The wavelength, w, of a radio signal is inversely proportional to its frequency, f.
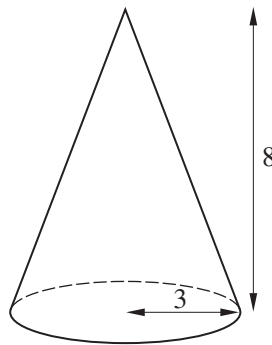When $f = 200$, $w = 1500$.

(a) Find an equation connecting f and w.

Answer (a) .... [2]

(b) Find the value of f when $w = 600$.

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

19 Cone A has base radius 3 cm and height 8 cm.

(a) Calculate the volume of cone A.
Give your answer in the form $k\pi$, where k is an integer.

Give the units of your answer.

Answer (a) .... [3]

(b) The total surface area of cone A is 109 cm^2, correct to 3 significant figures.
Cone B is mathematically similar to cone A and double the height.
Calculate the total surface area of cone B.

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