Cambridge Assessment International Education

Cambridge IGCSE™

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MATHEMATICS (US) **0444/02**

Paper 2 (Extended) **For examination from 2020**

SPECIMEN PAPER **1 hour 30 minutes**

You must answer on the question paper.

You will need: Geometrical instruments

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, center number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- Calculators must **not** be used in this paper.
- You may use tracing paper.
- You must show all necessary work clearly.

INFORMATION

- The total mark for this paper is 70.
- The number of marks for each question or part question is shown in parentheses [ ].

This document has **14** pages. Blank pages are indicated.

Formula List

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

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

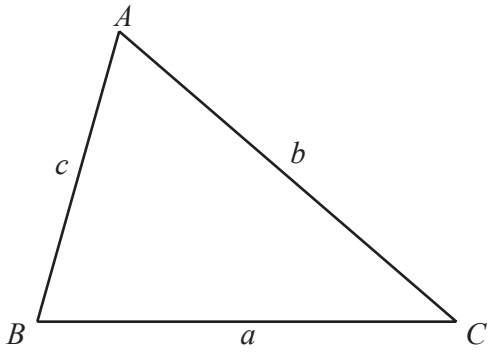
Lateral surface area, A, of cone of radius r, sloping edge l. $\quad A = \pi rl$

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

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

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

Volume, V, of sphere of radius r. $\quad V = \frac{4}{3}\pi r^3$



$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

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

1 Write down

(a) an irrational number,

..... [1]

(b) a prime number between 60 and 70.

..... [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?

..... [2]

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

..... [1]

(b) Write 0.0069 in scientific notation.

..... [1]

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

..... [2]

4 **(a)** Find the value of

(i) 3^0,

..... [1]

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

..... [1]

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

Find the value of x.

$x =$ ..... [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
Second Spinner	1	1	2	3	4	5	6
	2	2	4	6	8	10	12
	3	3	6	9	12	15	18

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

..... [1]

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

..... [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.

..... °C [1]

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

..... [1]

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

..... [2]

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

..... [2]

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

..... [2]

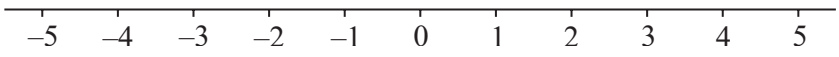
(b) Find the LCM (least common multiple) of 21 and 18.

..... [2]

9 **(a)** Solve $4x - 5 < 9$.

..... [2]

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



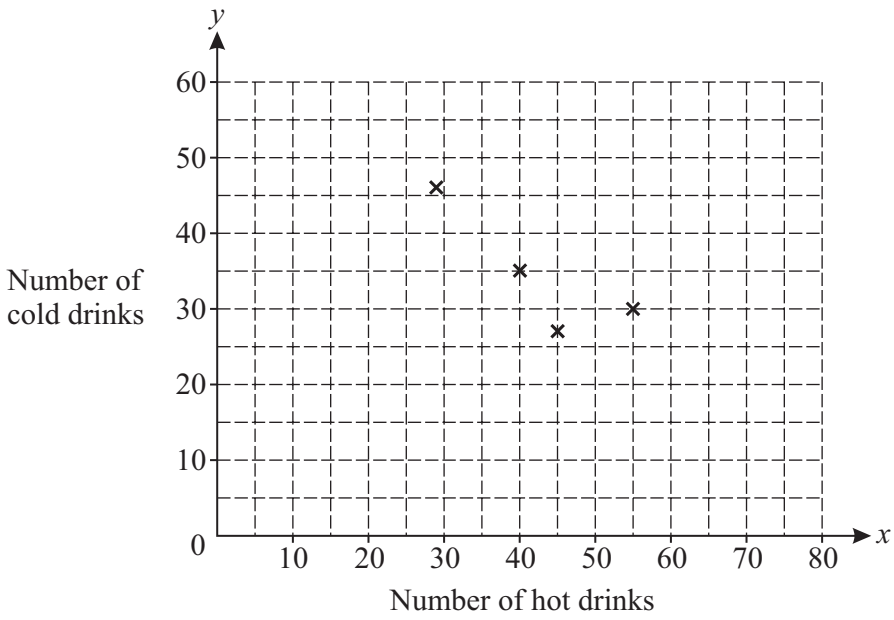
[1]

10 During one week a café records the number of hot drinks (x) and cold drinks (y) it sells each 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) What type of correlation is shown in the scatter diagram?

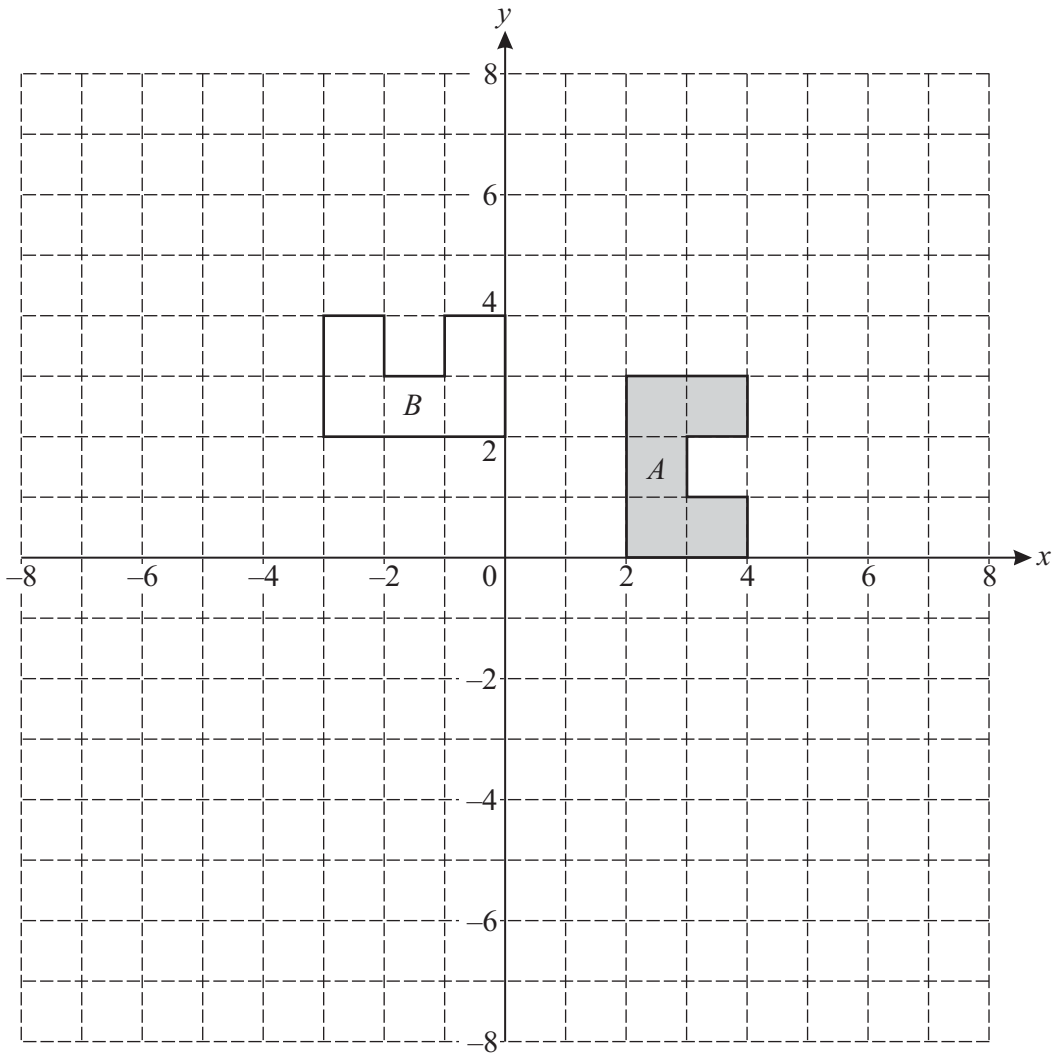
..... [1]

(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?

..... [2]

11



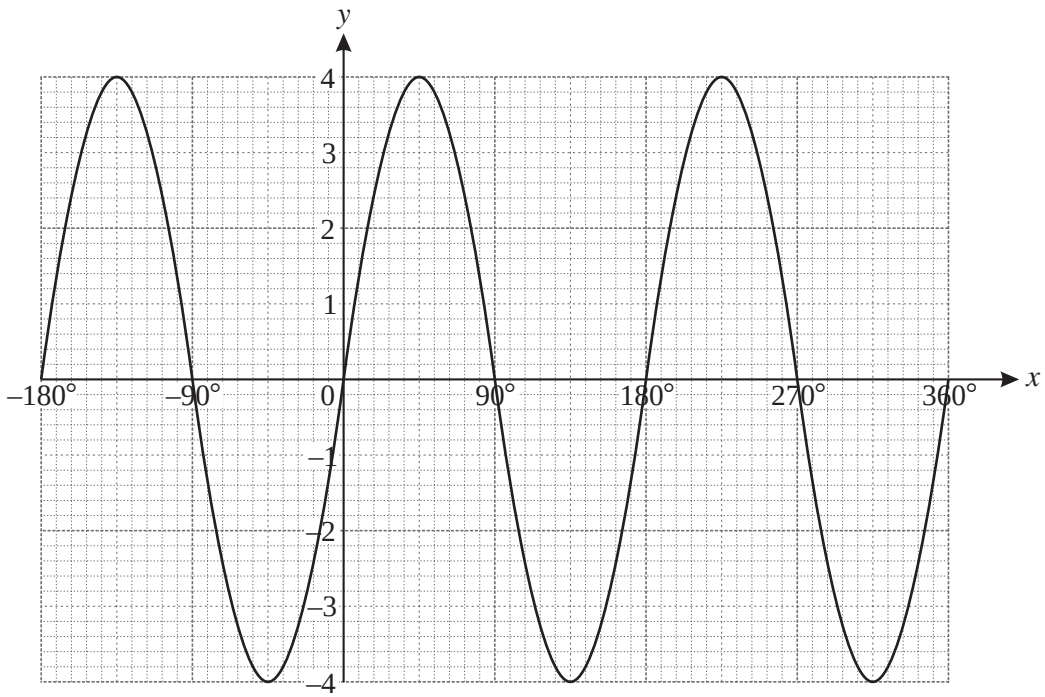
(a) Describe fully the **single** transformation that maps shape *A* onto shape *B*.

.....

..... [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 $y = f(x)$, where $f(x) = a\sin(bx)$.

Find the value of a and the value of b.

$a =$ .....

$b =$ ..... [2]

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

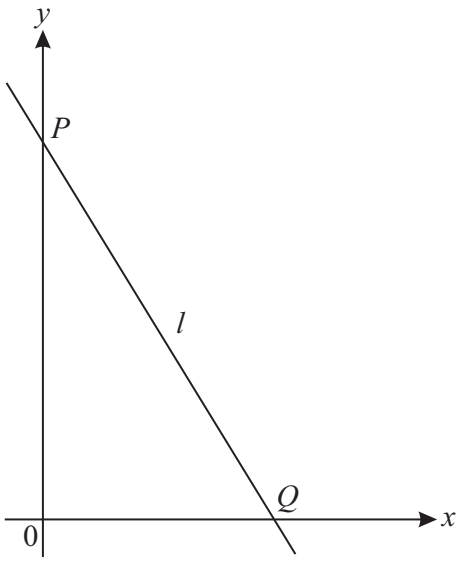
(a) Write $2\mathbf{p} - \frac{1}{2}\mathbf{q}$ as a column vector.

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

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

..... [2]

14



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

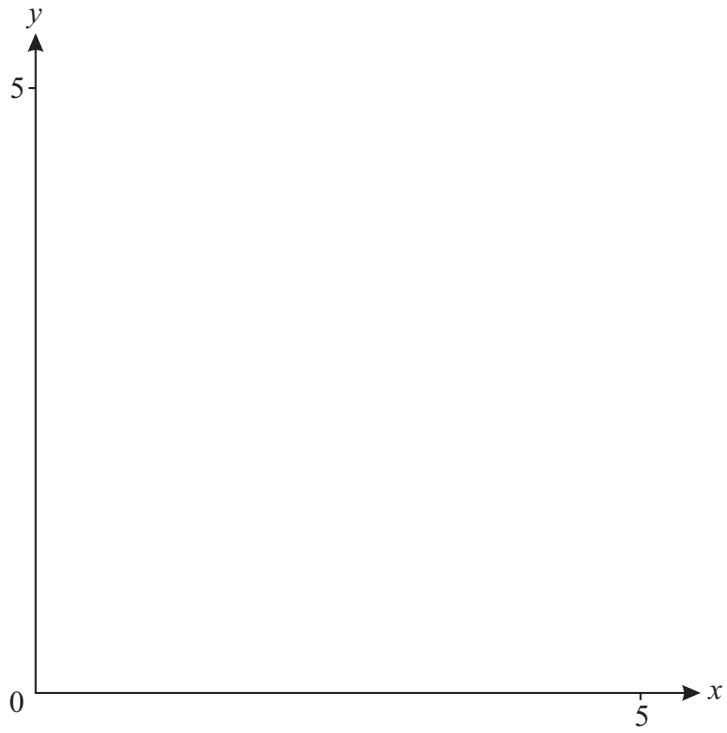
(a) Find the equation of the line l.

..... [2]

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

..... [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) $\dfrac{\sqrt{15}}{\sqrt{5}}$

..... [1]

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

..... [2]

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

..... [2]

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

(a) find the value of c and the value of d,

$c =$ .....

$d =$ ..... [3]

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

..... [1]

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

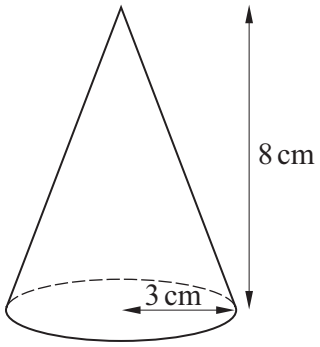
(a) Find an equation connecting f and w.

..... [2]

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

$f =$ ..... [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.

.... [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.

..... cm^2 [2]

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