Cambridge Assessment International Education

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MATHEMATICS (US) **0444/03**

Paper 3 (Core) **For examination from 2020**

SPECIMEN PAPER **2 hours**

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.
- You should use a calculator where appropriate.
- You may use tracing paper.
- You must show all necessary work clearly.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- For π, use either your calculator value or 3.142.

INFORMATION

- The total mark for this paper is 104.
- The number of marks for each question or part question is shown in parentheses [ ].

This document has **16** pages. Blank pages are indicated.

Formula List

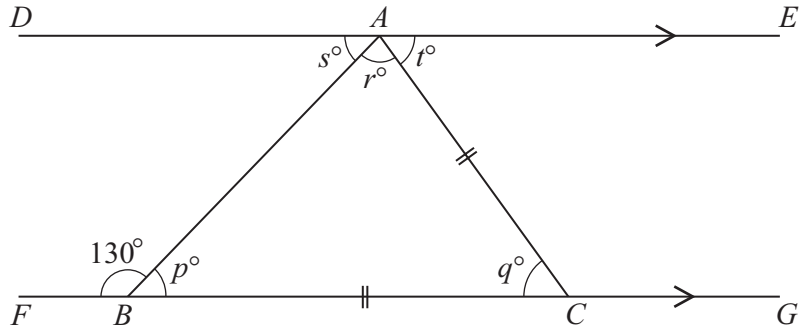
Area, A, of triangle, base b, height h.	$A = \frac{1}{2}bh$
Area, A, of circle, radius r.	$A = \pi r^2$
Circumference, C, of circle, radius r.	$C = 2\pi r$
Lateral surface area, A, of cylinder of radius r, height h.	$A = 2\pi rh$
Surface area, A, of sphere of radius r.	$A = 4\pi r^2$
Volume, V, of prism, cross-sectional area A, length l.	$V = Al$
Volume, V, of cylinder of radius r, height h.	$V = \pi r^2 h$
Volume, V, of sphere of radius r.	$V = \frac{4}{3}\pi r^3$

1 Tania sells her land for $12 000.
She invests the money for 3 years at 6% per year **compound** interest.

Calculate the total amount of money she will have at the end of the 3 years.
Give your answer correct to the nearest dollar.

$ ..... [4]

2



NOT TO SCALE

In the diagram, *DAE* and *FBCG* are parallel lines.
AC = *BC* and angle *FBA* = 130°.

(a) What is the special name given to triangle *ABC*?

..... [1]

(b) Work out the values of *p*, *q*, *r*, *s*, and *t*.

p = ... *q* = ... *r* = ...

s = ... *t* = ... [5]

3 A bag contains 24 discs.
10 discs are red, 9 discs are green, and 5 discs are yellow.

(a) The number of discs of each color can be shown by three sectors on a pie chart.
The sector angle for the red discs is 150°.

Work out the sector angle for

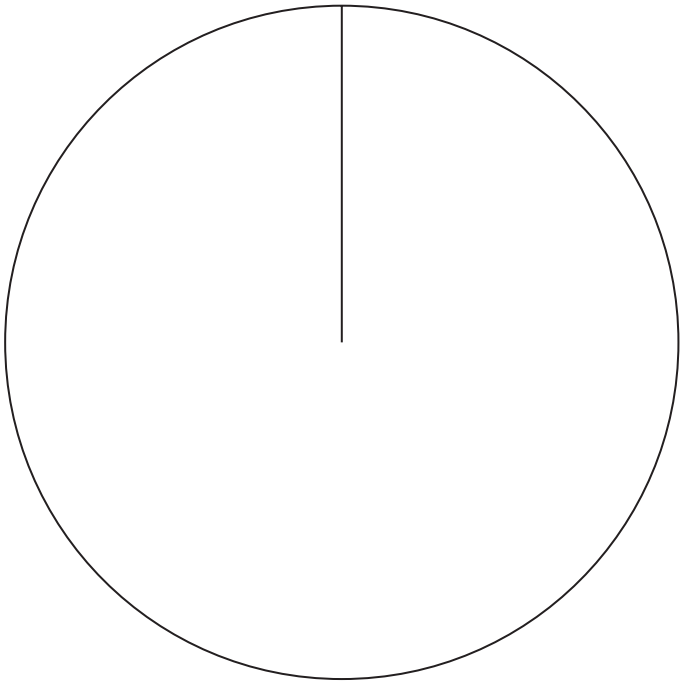
(i) the green discs,

..... [1]

(ii) the yellow discs.

..... [1]

(b) Complete the pie chart and label the sectors.



[2]

(c) A disc is chosen at random.

Find, **as a fraction**, the probability of each of the following events.

(i) Event A: the disc is red.

..... [1]

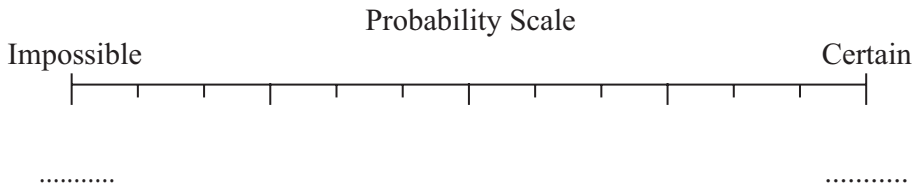
(ii) Event B: the disc is red or yellow.

..... [1]

(iii) Event C: the disc is **not** yellow.

..... [1]

(d)



The diagram shows a horizontal probability scale.

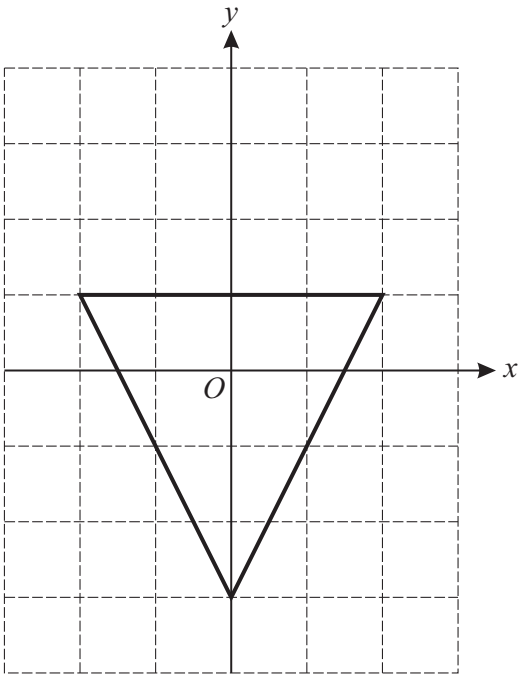
Write on the dotted lines in the diagram, the probability of

(i) an impossible event, [1]

(ii) a certain event. [1]

(e) Using the notation $\overset{\uparrow}{A}$, $\overset{\uparrow}{B}$, and $\overset{\uparrow}{C}$, mark the positions of your three answers in **part (c)** on the Probability Scale diagram in **part (d)**. [3]

4



The triangle in the diagram is isosceles.

(a) How many lines of symmetry does this triangle have?

..... [1]

(b) Write down the order of rotational symmetry of this triangle.

..... [1]

(c) On the grid, draw the rotation of this triangle about O through 180°. [2]

(d) Describe fully another **single** transformation that maps this triangle onto your answer for **part (c)**.

.....

..... [2]

5 Alphonse, his wife, and child fly from Madrid to Beijing.
The adult plane fare is 450 euros.
The child plane fare is 68% of the adult fare.

(a) Show that the total plane fare for the family is 1206 euros.
Show all your working clearly.

[3]

(b) The ratio of the money spent on plane fares : accommodation : tickets = 6 : 5 : 3.

Calculate the **total** cost.

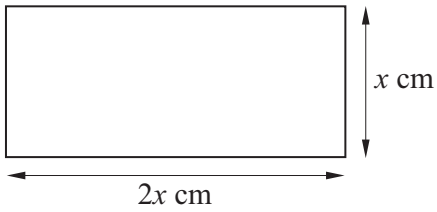
..... euros [3]

(c) Alphonse changes 500 euros into Chinese yuan at a rate of 1 euro = 9.91 Chinese yuan.

How many Chinese yuan does he receive?

..... yuan [2]

6 **(a)**



NOT TO SCALE

The perimeter of the rectangle in this diagram is 36 centimeters.

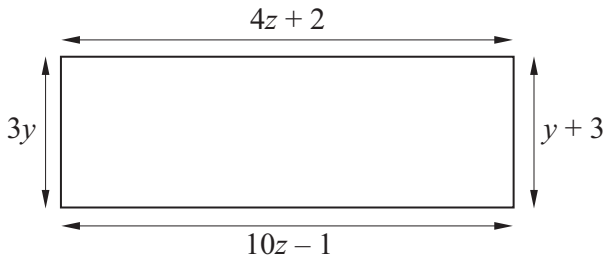
(i) Find the value of x.

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

(ii) Using this value of x, calculate the area of the rectangle.

..... cm^2 [2]

(b)



NOT TO SCALE

This diagram shows another rectangle.

(i) In this rectangle $3y = y + 3$.
Solve the equation to find y.

$y =$ ..... [2]

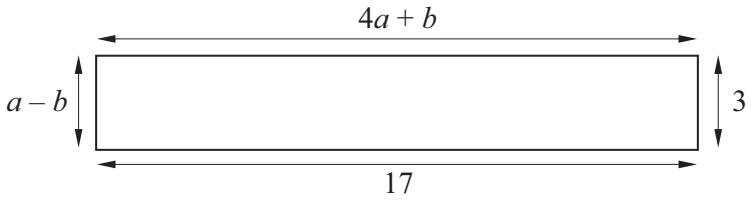
(ii) Write down an equation in z.

..... [1]

(iii) Solve the equation in **part (b)(ii)** to find z.

$z =$ ..... [3]

(c)



NOT TO SCALE

This diagram shows another rectangle.

(i) Write down two equations in a and b.

.....

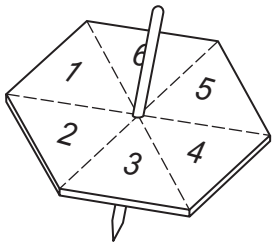
..... [2]

(ii) Solve these two equations simultaneously to find the value of a and the value of b.

$a =$ .....

$b =$ ..... [3]

7



Omar spins a six-sided spinner.
The results of 60 spins are shown below.

3	3	6	5	6	1	2	6	5	2
3	4	4	4	3	4	6	5	2	1
6	3	6	4	1	5	3	6	2	6
6	6	3	6	1	6	6	5	1	6
1	6	2	5	3	6	4	2	3	5
1	4	4	1	5	4	6	6	2	3

(a) Use these results to complete the frequency table.

Number	Frequency
1	
2	
3	
4	
5	
6	

[3]

(b) Write down the mode.

..... [1]

(c) Find the median.

..... [2]

(d) Calculate the mean.
Give your answer correct to 1 decimal place.

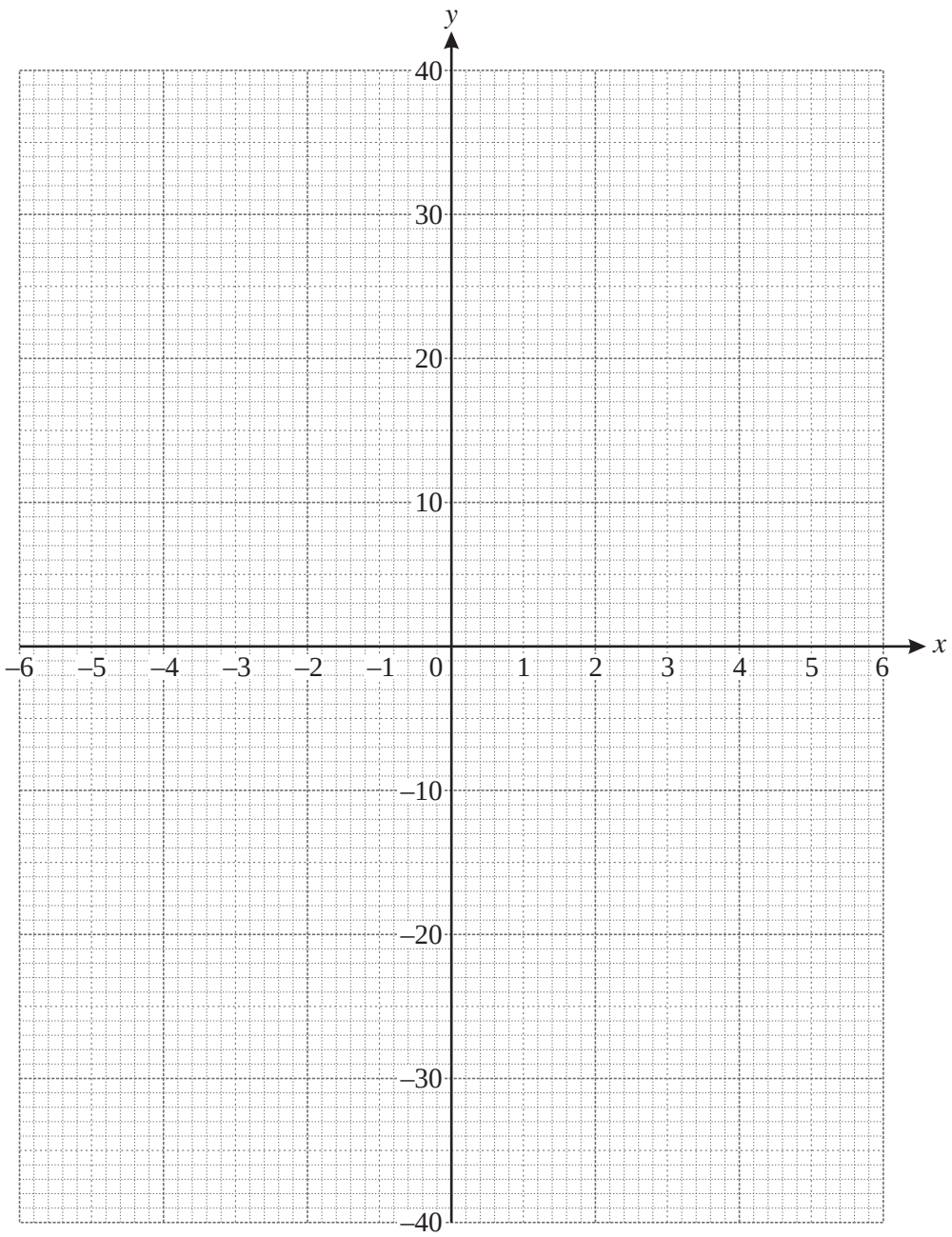
..... [3]

8 **(a)** Complete the table for the function $y = \frac{36}{x}$, $(x \neq 0)$.

x	−6	−5	−4	−3	−2	−1		1	2	3	4	5	6
y		−7.2	−9		−18				18		9	7.2	

[3]

(b) On the grid, draw the graph of $y = \frac{36}{x}$ for $-6 \leqslant x \leqslant -1$ and $1 \leqslant x \leqslant 6$.



[4]

(c) Use your graph to find x when $y = 21$.

$x =$ ..... [1]

(d) Complete the table for the function $y = x^2$.

x	−6	−5	−4	−3	−2	−1	0	1	2	3	4	5	6
y		25	16		4	1		1	4		16	25	

[2]

(e) On the same grid, draw the graph of $y = x^2$ for $-6 \leqslant x \leqslant 6$. [4]

(f) Write down the coordinates of the point of intersection of the graphs of $y = \frac{36}{x}$ and $y = x^2$.

(..... , ...) [1]

9 **(a)** **(i)** Calculate the area of a circle with radius 3.7 centimeters.

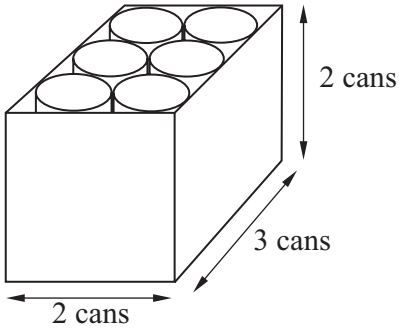
..... cm^2 [2]

(ii) A can of tomatoes is a cylinder with radius 3.7 centimeters and height h centimeters. The volume of the cylinder is $430\,cm^3$.

Calculate h.

h = ... [2]

(b)



NOT TO SCALE

Twelve of these cans fit exactly inside a box 3 cans long, 2 cans wide, and 2 cans high.

(i) Write down the length, width, and height of the box.

length = ... cm

width = ... cm

height = ... cm [3]

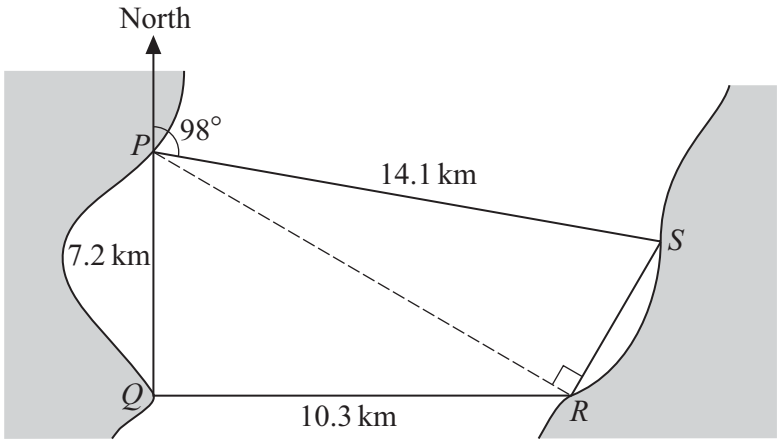
(ii) Calculate the volume of the box.

..... cm^3 [2]

(iii) Calculate the percentage of the volume of the box occupied by the cans.

..... % [3]

10



NOT TO SCALE

P, *Q*, *R*, and *S* are ferry ports on a wide river, as shown in the diagram.

A ferry sails from *P*, stopping at *Q*, *R*, and *S* before returning to *P*.

(a) Port *Q* is 7.2 kilometers due south of *P*. Port *R* is 10.3 kilometers due east of *Q*.

(i) Show by calculation that angle $QPR = 55°$.

[2]

(ii) Write down the bearing of *R* from *P*.

..... [1]

(b) The bearing of *S* from *P* is 098° and $SP = 14.1$ km.

(i) Explain why angle $RPS = 27°$.

..... [1]

(ii) Angle $PRS = 90°$. Calculate the distance *RS*.

RS = ... km [2]

(iii) Find the total distance the ferry sails.

..... km [1]

(c) The total sailing time for the ferry is 4 hours 30 minutes.

Calculate the average sailing speed, in kilometers per hour, for the whole journey.

..... km/h [2]

11

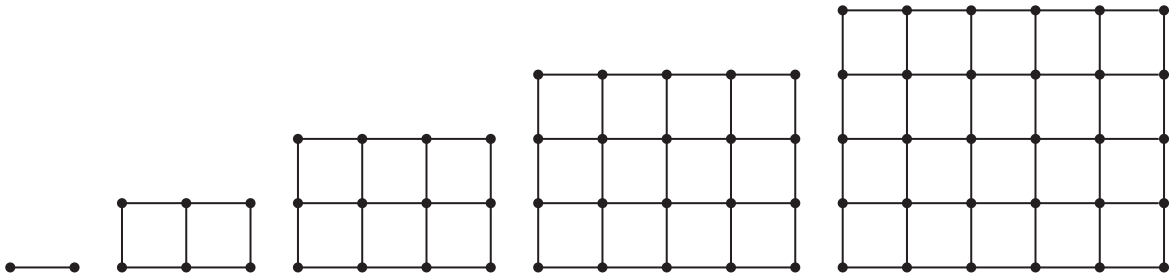


Diagram 1 Diagram 2 Diagram 3 Diagram 4 Diagram 5

Look at the sequence of five diagrams.
Diagram 1 has 2 dots and 1 line.
Diagram 2 has 6 dots and 7 lines.

The numbers of dots and lines in each of the diagrams are shown in the table.

Diagram number	1	2	3	4	5	6	7
Number of dots	2	6	12	20	30		
Number of lines	1	7	17	31	49		

(a) Complete the table for Diagrams 6 and 7. [4]

(b) How many dots are there in Diagram n?

..... [2]

(c) The number of lines in Diagram n is $2n^2 - 1$.

Which diagram has 287 lines?

..... [2]