

- 1 (a) (i) In a camera magazine, 63 pages are used for adverts.
The ratio number of pages of adverts : number of pages of reviews = 7:5 .

Calculate the number of pages used for reviews.

Answer(a)(i) [2]

- (ii) In another copy of the magazine, 56 pages are used for reviews and for photographs.
The ratio number of pages of reviews : number of pages of photographs = 9:5 .

Calculate the number of pages used for photographs.

Answer(a)(ii) [2]

- (iii) One copy of the magazine costs \$4.90 .
An annual subscription costs \$48.80 for 13 copies.

Calculate the percentage discount by having an annual subscription.

Answer(a)(iii) % [3]

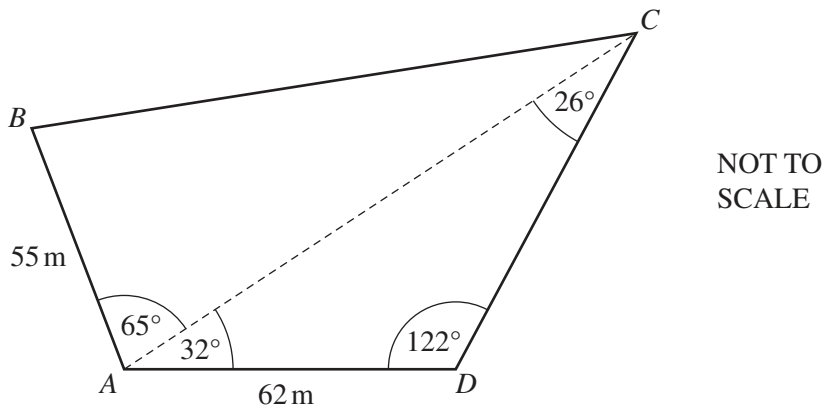
- (b) In a car magazine, 25% of the pages are used for selling second-hand cars, $62\frac{1}{2}\%$ of the **remaining** pages are used for features, and the other 36 pages are used for reviews.

*For
Examiner's
Use*

Work out the total number of pages in the magazine.

Answer(b) [4]

- 2 A field, $ABCD$, is in the shape of a quadrilateral.
A footpath crosses the field from A to C .



- (a) Use the sine rule to calculate the distance AC and show that it rounds to 119.9 m, correct to 1 decimal place.

Answer(a)

[3]

- (b) Calculate the length of BC .

Answer(b) $BC = \dots\dots\dots$ m [4]

(c) Calculate the area of triangle ACD .

*For
Examiner's
Use*

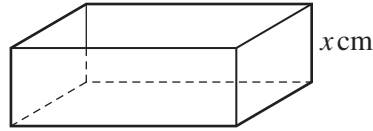
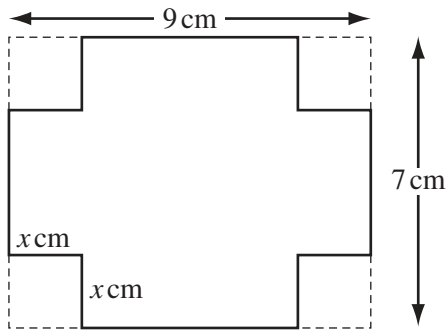
Answer(c) m^2 [2]

(d) The field is for sale at \$4.50 per square metre.

Calculate the cost of the field.

Answer(d) \$ [3]

- 3 A rectangular metal sheet measures 9 cm by 7 cm.
A square, of side x cm, is cut from each corner.
The metal is then folded to make an open box of height x cm.

NOT TO
SCALE

- (a) Write down, in terms of x , the length and width of the box.

Answer(a) Length =

Width = [2]

- (b) Show that the volume, V , of the box is $4x^3 - 32x^2 + 63x$.

Answer(b)

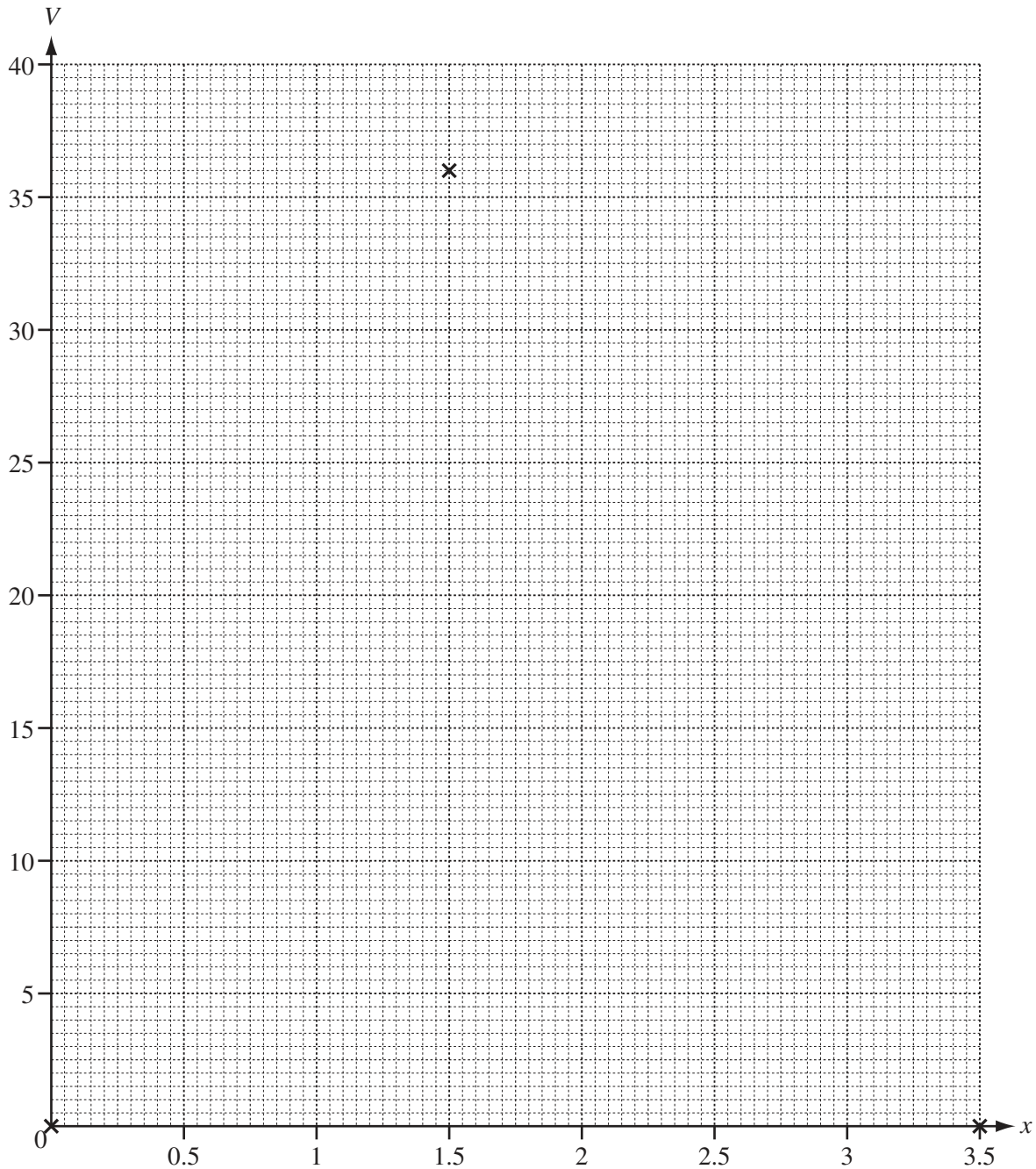
[2]

- (c) Complete this table of values for $V = 4x^3 - 32x^2 + 63x$.

x	0	0.5	1	1.5	2	2.5	3	3.5
V	0		35	36	30		9	0

[2]

- (d) On the grid opposite, draw the graph of $V = 4x^3 - 32x^2 + 63x$ for $0 \leq x \leq 3.5$.
Three of the points have been plotted for you.



[3]

- (e) The volume of the box is at least 30 cm^3 .
Write down, as an inequality, the possible values of x .

Answer(e) [2]

- (f) (i) Write down the maximum volume of the box.

Answer(f)(i) cm^3 [1]

- (ii) Write down the value of x which gives the maximum volume.

Answer(f)(ii) [1]

- 4 (a) One angle of an isosceles triangle is 48° .

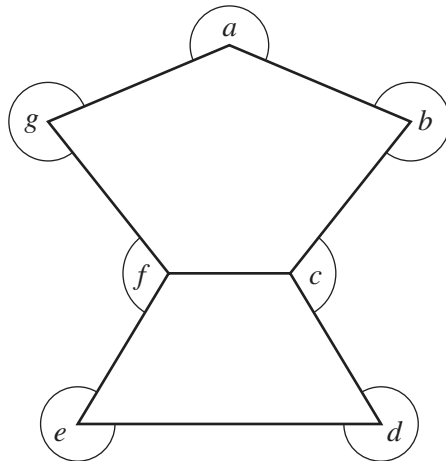
Write down the possible pairs of values for the remaining two angles.

Answer(a) and
..... and [2]

- (b) Calculate the sum of the interior angles of a pentagon.

Answer(b) [2]

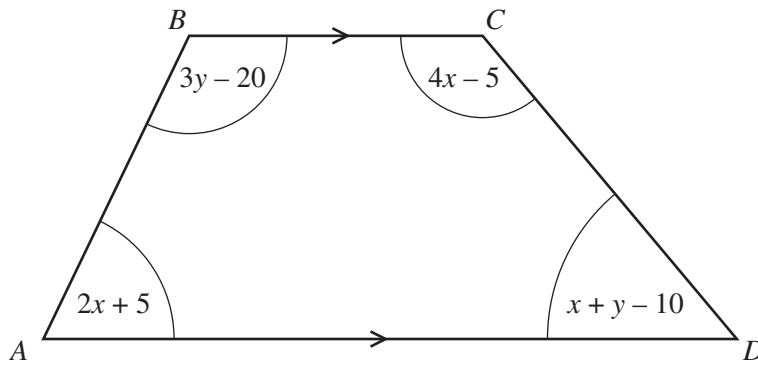
- (c) Calculate the sum of the angles a, b, c, d, e, f and g shown in this diagram.



NOT TO
SCALE

Answer(c) [2]

- (d) The trapezium, $ABCD$, has four angles as shown.
All the angles are in degrees.



NOT TO
SCALE

- (i) Show that $7x + 4y = 390$.

Answer(d)(i)

[1]

- (ii) Show that $2x + 3y = 195$.

Answer(d)(ii)

[1]

- (iii) Solve these simultaneous equations.

Answer(d)(iii) $x = \dots\dots\dots$

$y = \dots\dots\dots$ [4]

- (iv) Use your answer to **part (d)(iii)** to find the sizes of all four angles of the trapezium.

Answer(d)(iv) $\dots\dots\dots$, $\dots\dots\dots$, $\dots\dots\dots$, $\dots\dots\dots$ [1]

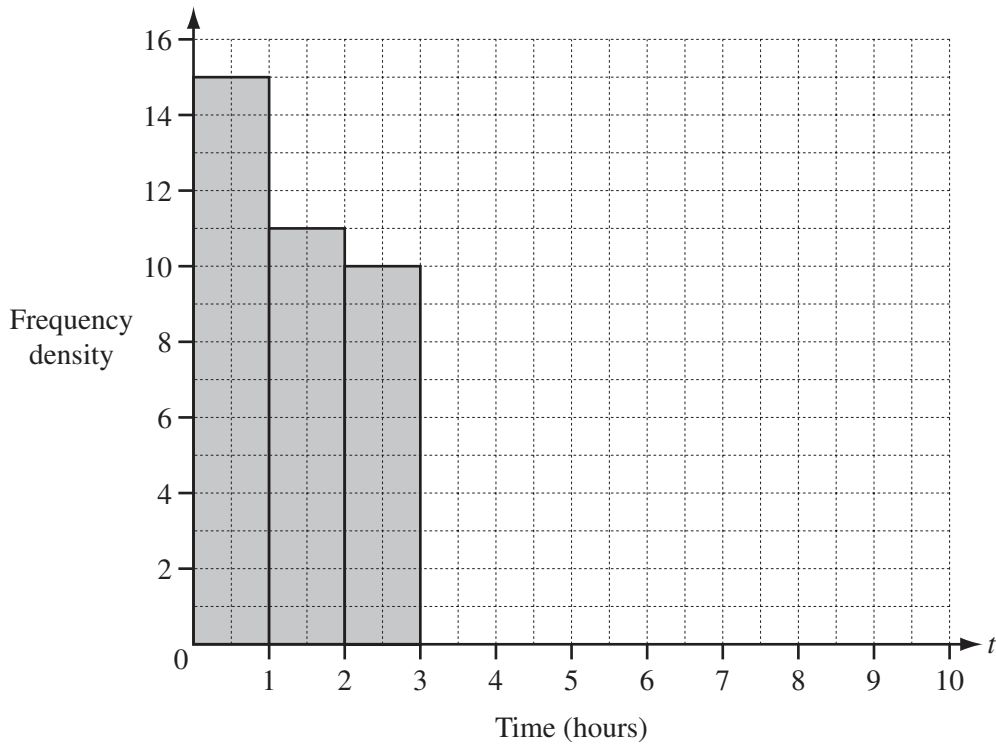
- 5 (a) 80 students were asked how much time they spent on the internet in one day.
This table shows the results.

Time (t hours)	$0 < t \leq 1$	$1 < t \leq 2$	$2 < t \leq 3$	$3 < t \leq 5$	$5 < t \leq 7$	$7 < t \leq 10$
Number of students	15	11	10	19	13	12

- (i) Calculate an estimate of the mean time spent on the internet by the 80 students.

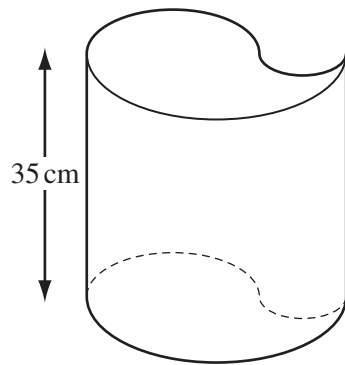
Answer(a)(i) hours [4]

- (ii) On the grid, complete the histogram to show this information.



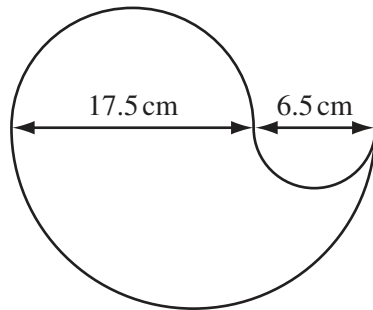
[4]

- 6 Sandra has designed this open container.
The height of the container is 35 cm.



NOT TO
SCALE

The cross section of the container is designed from three semi-circles with diameters 17.5 cm, 6.5 cm and 24 cm.



NOT TO
SCALE

- (a) Calculate the area of the cross section of the container.

Answer(a) cm² [3]

- (b) Calculate the external surface area of the container, including the base.

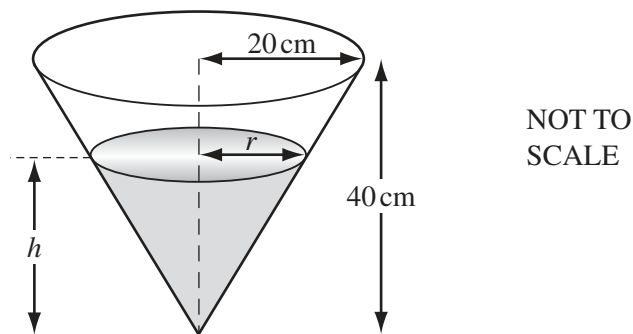
Answer(b) cm² [4]

- (c) The container has a height of 35 cm.

Calculate the capacity of the container.
Give your answer in litres.

Answer(c) litres [3]

- (d) Sandra's container is completely filled with water.
All the water is then poured into another container in the shape of a cone.
The cone has radius 20 cm and height 40 cm.



- (i) The diagram shows the water in the cone.

Show that $r = \frac{h}{2}$.

Answer(d)(i)

[1]

- (ii) Find the height, h , of the water in the cone.

[The volume, V , of a cone with radius r and height h is $V = \frac{1}{3}\pi r^2 h$.]

Answer(d)(ii) $h =$ cm [3]

7 (a) The co-ordinates of P are $(-4, -4)$ and the co-ordinates of Q are $(8, 14)$.

(i) Find the gradient of the line PQ .

Answer(a)(i) [2]

(ii) Find the equation of the line PQ .

Answer(a)(ii) [2]

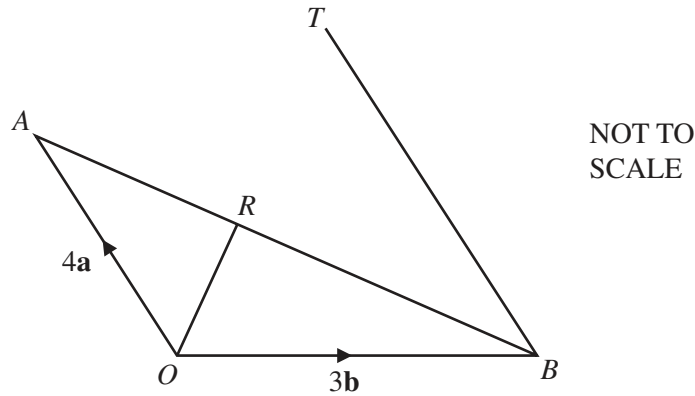
(iii) Write \vec{PQ} as a column vector.

Answer(a)(iii) $\vec{PQ} = \begin{pmatrix} \\ \end{pmatrix}$ [1]

(iv) Find the magnitude of \vec{PQ} .

Answer(a)(iv) [2]

(b)



In the diagram, $\vec{OA} = 4\mathbf{a}$ and $\vec{OB} = 3\mathbf{b}$.

R lies on AB such that $\vec{OR} = \frac{1}{5}(12\mathbf{a} + 6\mathbf{b})$.

T is the point such that $\vec{BT} = \frac{3}{2}\vec{OA}$.

(i) Find the following in terms of \mathbf{a} and \mathbf{b} , giving each answer in its simplest form.

(a) \vec{AB}

Answer(b)(i)(a) $\vec{AB} = \dots\dots\dots$ [1]

(b) \vec{AR}

Answer(b)(i)(b) $\vec{AR} = \dots\dots\dots$ [2]

(c) \vec{OT}

Answer(b)(i)(c) $\vec{OT} = \dots\dots\dots$ [1]

(ii) Complete the following statement.

The points O , R and T are in a straight line because $\dots\dots\dots$
 $\dots\dots\dots$ [1]

(iii) Triangle OAR and triangle TBR are similar.

Find the value of $\frac{\text{area of triangle } TBR}{\text{area of triangle } OAR}$.

Answer(b)(iii) $\dots\dots\dots$ [2]

- 8 (a) Rearrange $s = ut + \frac{1}{2}at^2$ to make a the subject.

Answer(a) $a = \dots\dots\dots$ [3]

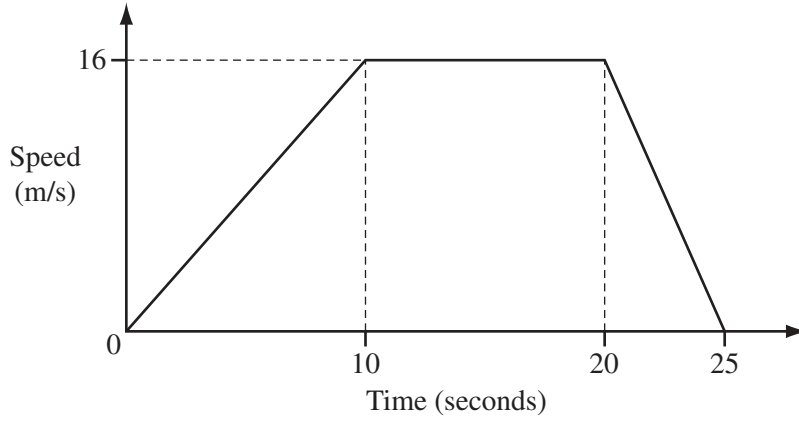
- (b) The formula $v = u + at$ can be used to calculate the speed, v , of a car.

$u = 15$, $a = 2$ and $t = 8$, each correct to the nearest integer.

Calculate the upper bound of the speed v .

Answer(b) $\dots\dots\dots$ [3]

(c) The diagram shows the speed-time graph for a car travelling between two sets of traffic lights.



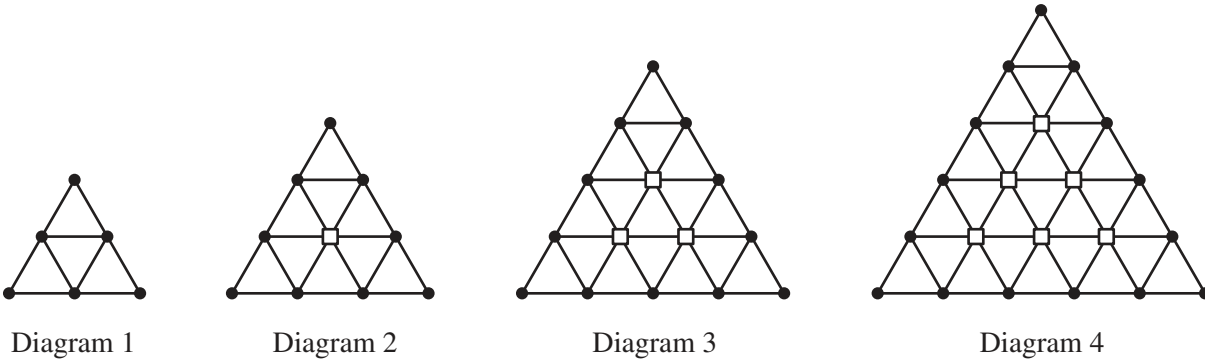
(i) Calculate the deceleration of the car for the last 5 seconds of the journey.

Answer(c)(i) m/s^2 [1]

(ii) Calculate the average speed of the car between the two sets of traffic lights.

Answer(c)(ii) m/s [4]

9 The first four diagrams in a sequence are shown below.



The diagrams are made from dots (●) and squares (□) joined by lines.

(a) Complete the table.

Diagram	1	2	3	4	5		n
Number of dots	6	9	12				
Number of squares	0	1	3				$\frac{1}{2}n(n - 1)$
Number of triangles	4	9	16				
Number of lines	9	18	30	45	63		$\frac{3}{2}(n + 1)(n + 2)$

[9]

(b) Which diagram has 360 lines?

Answer(b) [2]

(c) The **total** number of lines in the first n diagrams is

$$\frac{1}{2}n^3 + pn^2 + qn.$$

(i) When $n = 1$, show that $p + q = 8\frac{1}{2}$.

Answer(c)(i)

[1]

(ii) By choosing another value of n and using the equation in **part (c)(i)**, find the values of p and q .

Answer(c)(ii) $p = \dots\dots\dots$

$q = \dots\dots\dots$ [5]

Question 10 is printed on the next page.

10 (a) Simplify.

$$\frac{x^2 - 3x}{x^2 - 9}$$

Answer(a) [3]

(b) Solve.

$$\frac{15}{x} - \frac{20}{x+1} = 2$$

Answer(b) $x = \dots\dots\dots$ or $x = \dots\dots\dots$ [7]

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included the publisher will be pleased to make amends at the earliest possible opportunity.

University of Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.