Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

MATHEMATICS **0580/43**

Paper 4 (Extended) **May/June 2016**

2 hours 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 130.

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **15** printed pages and **1** blank page.

© UCLES 2016

CAMBRIDGE International Examinations

1 A football club sells tickets at different prices dependent on age group.

View solution

(a) (i) At one game, the club sold tickets in the ratio

under 18 : 18 to 60 : over 60 = 2 : 7 : 3.

There were 6100 tickets sold for people aged under 18.

Calculate the **total** number of tickets sold for the game.

..... [3]

(ii) Calculate the percentage of tickets sold for people aged under 18.

View solution

.....% [1]

(b) The table shows the football ticket prices for the different age groups.

View solution

Age	Price
Under 18	\$15
18 to 60	\$35
Over 60	\$18

At a **different** game there were 42 600 tickets sold.

- 14% were sold to people aged under 18
- $\frac{2}{3}$ of the tickets were sold to people aged 18 to 60
- The remainder were sold to people aged over 60

Calculate the total amount the football club receives from ticket sales for this game.

\$ ..... [5]

© UCLES 2016

(c) In a sale, the football club shop reduced the price of the football shirts to \$23.80 .
An error was made when working out this sale price.
The price was reduced by 30% instead of 20%.

Calculate the correct sale price for the football shirt.

View solution

\$..... [5]

2 **(a)** Solve the inequality.

$$5x - 3 > 9$$

View solution

..... [2]

(b) Factorise completely.

(i) $xy - 18 + 3y - 6x$

View solution

..... [2]

(ii) $8x^2 - 72y^2$

View solution

..... [3]

(c) Make r the subject of the formula.

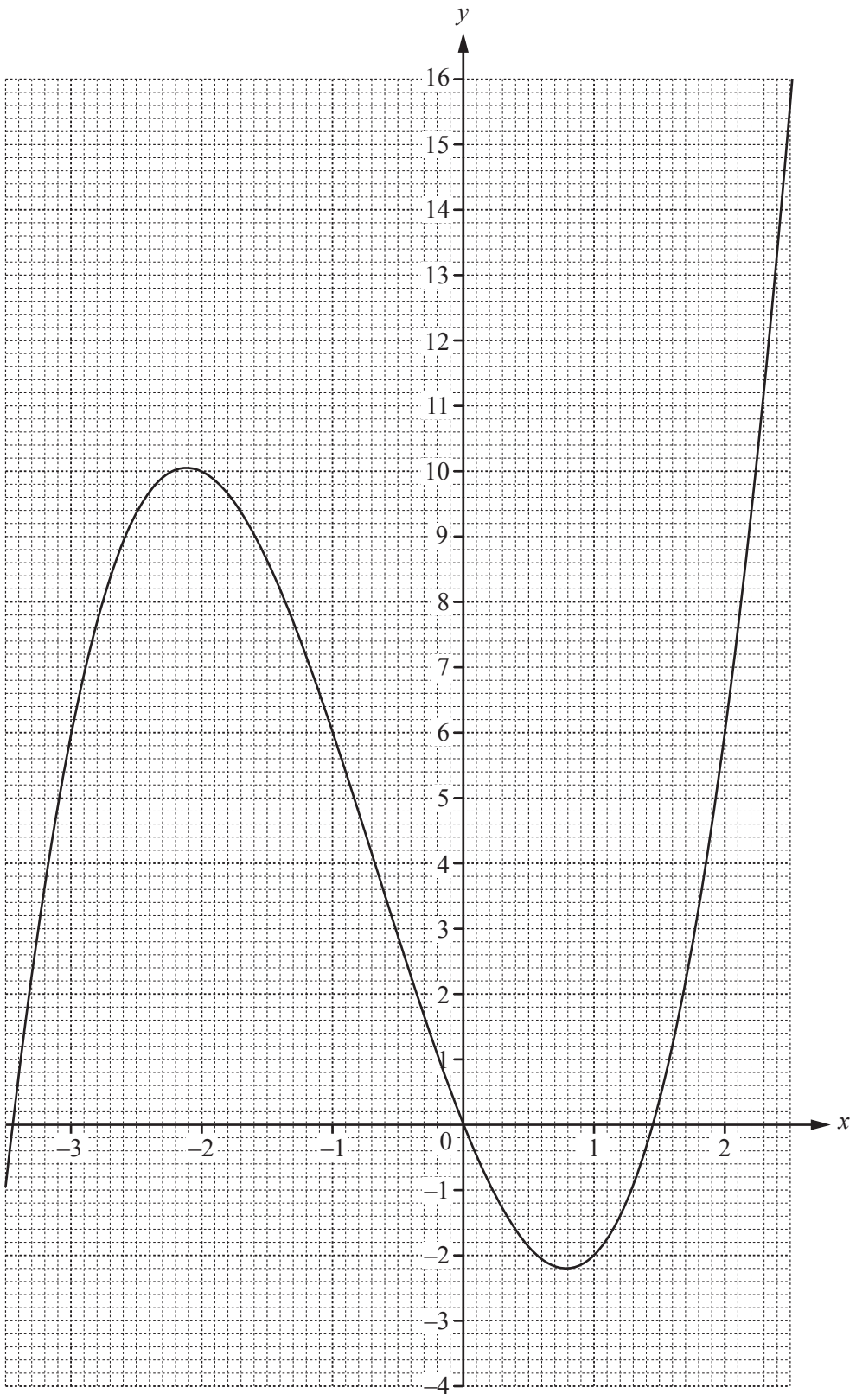
$$p + 5 = \frac{1 - 2r}{r}$$

View solution

$r =$ ..... [4]

© UCLES 2016

3 The diagram shows the graph of $y = f(x)$ for $-3.5 \leqslant x \leqslant 2.5$.



View solution

© UCLES 2016

(a) (i) Find f(– 2).

..... [1]

(ii) Solve the equation f(x) = 2.

View solution

x = ... or x = ... or x = ...[3]

(iii) Two tangents, each with gradient 0, can be drawn to the graph of y = f(x).

View solution

Write down the equation of each tangent.

.....

..... [2]

(b) (i) Complete the table for $g(x) = \frac{2}{x} + 3$ for $-3.5 \leqslant x \leqslant -0.5$ and $0.5 \leqslant x \leqslant 2.5$.

View solution

x	–3.5	–3	–2	–1	–0.5		0.5	1	2	2.5
g(x)	2.4	2.3		1			7	5		3.8

[3]

(ii) On the grid opposite, draw the graph of y = g(x). [4]

(iii) Use your graph to solve the equation f(x) = g(x).

x = ... or x = ...[2]

(c) Find gf(–2).

View solution

..... [2]

(d) Find $g^{-1}(5)$.

View solution

..... [1]

© UCLES 2016

4 Coins are put into a machine to pay for parking cars.
The probability that the machine rejects a coin is 0.05 .

(a) Adhira puts 2 coins into the machine.

View solution

(i) Calculate the probability that the machine rejects **both** coins.

..... [2]

(ii) Calculate the probability that the machine accepts at **least one** coin.

View solution

..... [1]

(b) Raj puts 4 coins into the machine.

View solution

Calculate the probability that the machine rejects **exactly one** coin.

..... [3]

(c) The table shows the amount of money, $\$a$, received for parking each day for 200 days.

Amount ($\$a$)	$200 < a \leqslant 250$	$250 < a \leqslant 300$	$300 < a \leqslant 350$	$350 < a \leqslant 400$	$400 < a \leqslant 450$	$450 < a \leqslant 500$
Frequency	13	19	27	56	62	23

Calculate an estimate of the mean amount of money received each day.

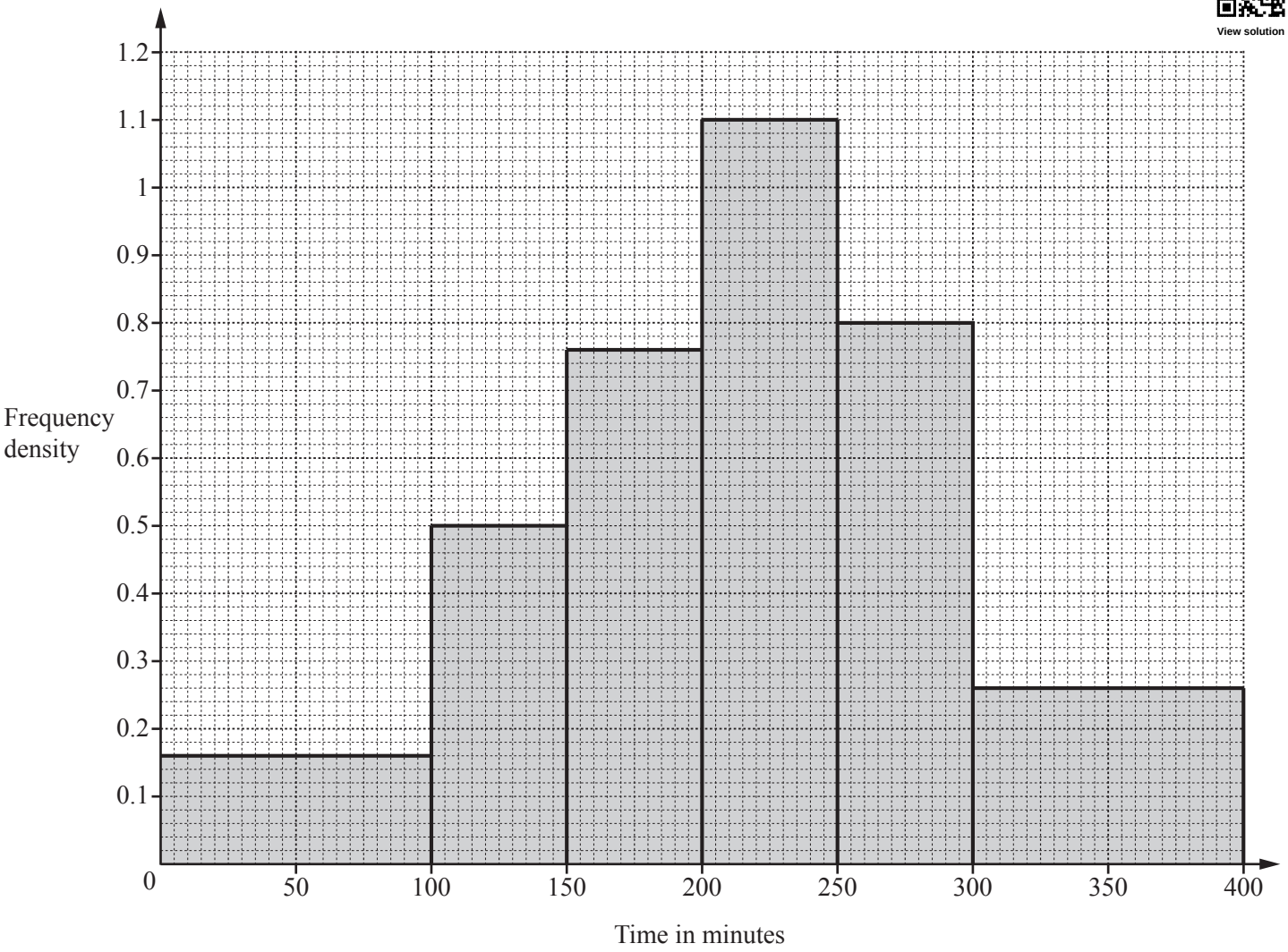
View solution

$..... [4]

© UCLES 2016

(d) The histogram shows the length of time that 200 cars were parked.

View solution



(i) Calculate the number of cars that were parked for 100 minutes or less.

..... [1]

(ii) Calculate the percentage of cars that were parked for more than 250 minutes.

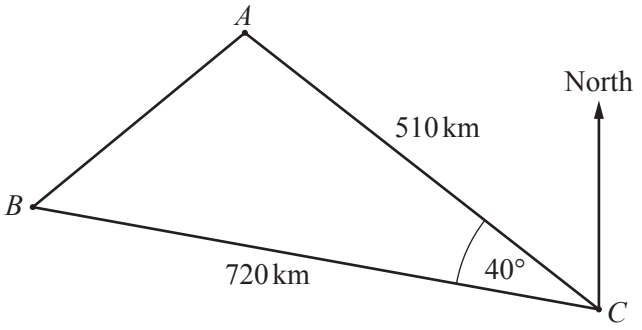
View solution

.....% [2]

© UCLES 2016

5

NOT TO SCALE



A plane flies from A to C and then from C to B.
$AC = 510$ km and $CB = 720$ km.
The bearing of C from A is 135° and angle $ACB = 40°$.

(a) Find the bearing of

(i) B from C,

..... [2]

(ii) C from B.

..... [2]

(b) Calculate AB and show that it rounds to 464.7 km, correct to 1 decimal place.

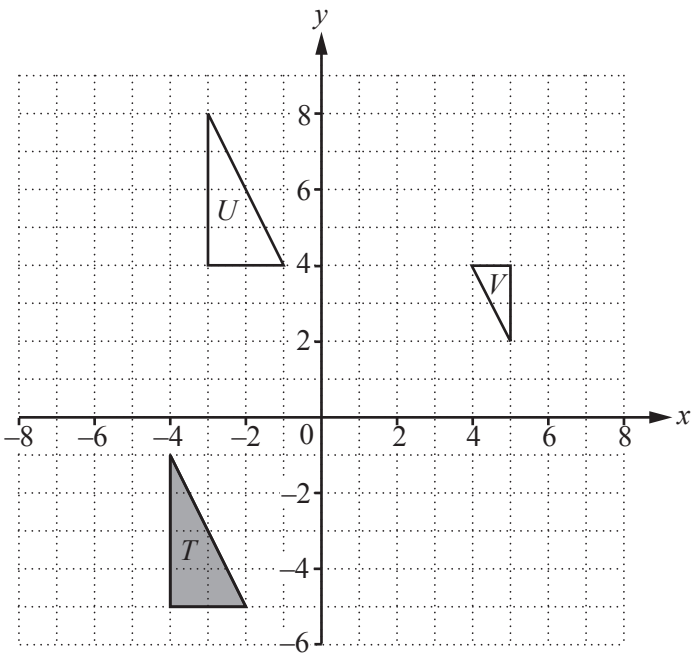
[4]

(c) Calculate angle ABC.

Angle ABC = ... [3]

© UCLES 2016

6



(a) (i) Draw the image of triangle T after a reflection in the line $x = 0$. [2]

(ii) Draw the image of triangle T after a rotation through 90° clockwise about (–2, –1). [2]

(iii) Describe fully the **single** transformation that maps triangle T onto triangle U.

View solution

.....

..... [2]

(iv) Describe fully the **single** transformation that maps triangle T onto triangle V.

.....

..... [3]

(b) (i) Find the matrix that represents the transformation in **part (a)(i)**.

View solution

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

(ii) Describe fully the **single** transformation represented by the inverse of the matrix in **part (b)(i)**.

.....

..... [2]

View solution

© UCLES 2016

7 Alfonso runs 10 km at an average speed of x km/h.
The next day he runs 12 km at an average speed of $(x - 1)$ km/h.

The time taken for the 10 km run is 30 minutes less than the time taken for the 12 km run.

(a) (i) Write down an equation in x and show that it simplifies to $x^2 - 5x - 20 = 0$.

View solution

[4]

(ii) Use the quadratic formula to solve the equation $x^2 - 5x - 20 = 0$.
Show your working and give your answers correct to 2 decimal places.

View solution

$x =$ ..... or $x =$ ..... [4]

(iii) Find the time that Alfonso takes to complete the 12 km run.
Give your answer in hours and minutes correct to the nearest minute.

View solution

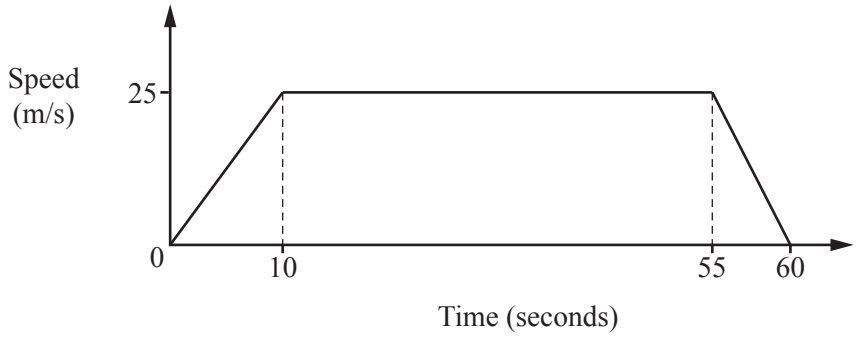
..... hours ..... minutes [2]

© UCLES 2016

(b) A cheetah runs for 60 seconds.
The diagram shows the speed-time graph.

View solution

NOT TO SCALE



(i) Work out the acceleration of the cheetah during the first 10 seconds.

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

(ii) Calculate the distance travelled by the cheetah.

View solution

..... m [3]

© UCLES 2016

8 $\mathbf{A} = \begin{pmatrix} 2 & 0 \\ -1 & 5 \\ 3 & -4 \end{pmatrix}$ $\mathbf{B} = \begin{pmatrix} 1 & 3 \\ -1 & 5 \end{pmatrix}$ $\mathbf{C} = \begin{pmatrix} 7 \\ -4 \end{pmatrix}$ $\mathbf{D} = \begin{pmatrix} 2 & 5 \end{pmatrix}$

View solution

(a) Work out each of the following if the answer is possible.
If a calculation is not possible, write "not possible" in the answer space.

(i) **BA**

[1]

View solution

(ii) 2**A**

[1]

View solution

(iii) **CD**

[2]

View solution

(iv) **DC**

[2]

View solution

(v) $\mathbf{B}^2$

[2]

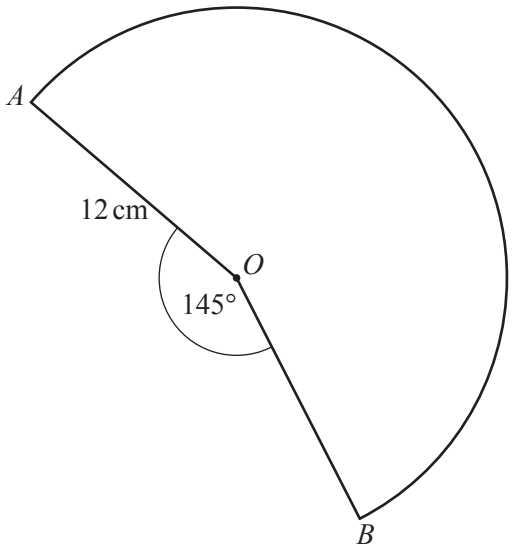
View solution

(b) Find $\mathbf{B}^{-1}$, the inverse of **B**.

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

© UCLES 2016

9



NOT TO SCALE

The diagram shows a sector, centre O, and radius 12 cm.

(a) Calculate the area of the sector.

View solution

..... cm^2 [3]

(b) The sector is made into a cone by joining OA to OB.

View solution

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

..... cm^3 [6]

10

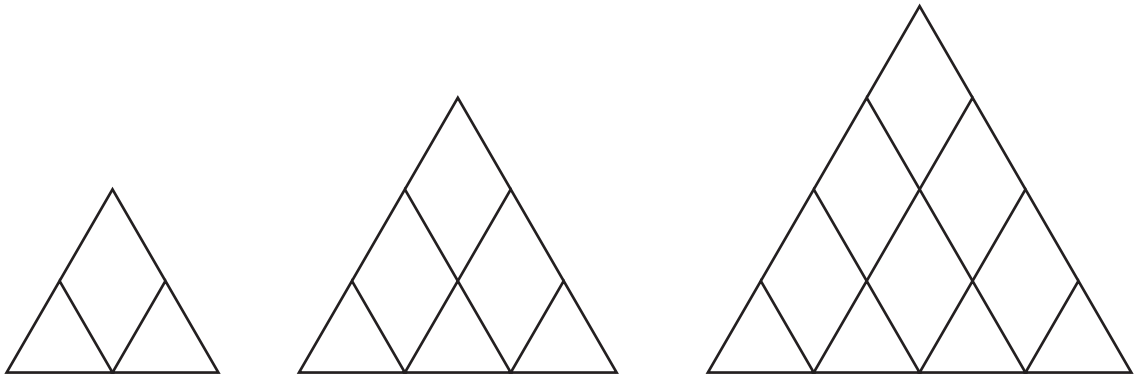


Diagram 1 Diagram 2 Diagram 3

Each diagram is made from tiles in the shape of equilateral triangles and rhombuses.
The length of a side of each tile is 1 unit.

(a) Complete the table below for this sequence of diagrams.

View solution

Diagram	1	2	3	4	5
Number of equilateral triangle shaped tiles	2	3	4	5	6
Number of rhombus shaped tiles	1	3	6		
Total number of tiles	3	6	10		
Number of 1 unit lengths	8	15	24		

[6]

(b) **(i)** The number of 1 unit lengths in Diagram n is $n^2 + 4n + p$.

View solution

Find the value of p.

$p =$ ..... [2]

(ii) Calculate the number of 1 unit lengths in Diagram 10.

View solution

..... [1]

© UCLES 2016

(c) The total number of tiles in Diagram n is $an^2 + bn + 1$.

Find the value of a and the value of b.

View solution

$a =$ .....

$b =$ ..... [5]

(d) Part of the Louvre museum in Paris is in the shape of a square-based pyramid made from glass tiles. Each of the triangular faces of the pyramid is represented by Diagram 17 in the sequence.

View solution

(i) Calculate the total number of glass tiles on one triangular face of this pyramid.

..... [2]

View solution

(ii) 11 tiles are removed from one of the triangular faces to create an entrance into the pyramid.

Calculate the total number of glass tiles used to construct this pyramid.

..... [1]

© UCLES 2016

BLANK PAGE

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.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge International Examinations Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cie.org.uk after the live examination series.

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.