Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

3232999774

MATHEMATICS **0580/43**

Paper 4 (Extended) **May/June 2018**

2 hours 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Geometrical instruments
Tracing paper (optional).

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.

This document consists of **19** printed pages and **1** blank page.

© UCLES 2018

CAMBRIDGE International Examinations

[Turn over

1 **(a)** Rowena buys and sells clothes.

(i) She buys a jacket for \$40 and sells it for \$45.40 .

Calculate the percentage profit.

..... % [3]

(ii) She sells a dress for \$42.60 after making a profit of 20% on the cost price.

Calculate the cost price.

\$ ..... [3]

(b) Sara invests \$500 for 15 years at a rate of 2% per year simple interest.

Calculate the total interest Sara receives.

\$ ..... [2]

© UCLES 2018

(c) Tomas has two cars.

(i) The value, today, of one car is \$21 000.
The value of this car **decreases** exponentially by 18% each year.

Calculate the value of this car after 5 years.
Give your answer correct to the nearest hundred dollars.

\$ ..... [3]

(ii) The value, today, of the other car is \$15 000.
The value of this car **increases** exponentially by x% each year.
After 12 years the value of the car will be \$42 190.

Calculate the value of x.

$x =$ ..... [3]

2 (a) (i) $y = 2^x$

Complete the table.

x	0	1	2	3	4
y		2	4	8	

[2]

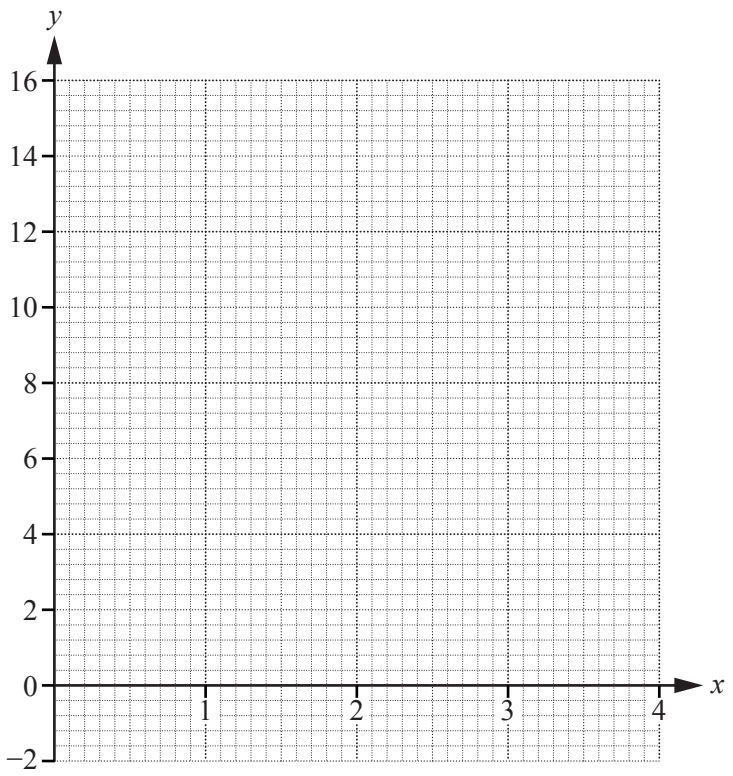
(ii) $y = 14 - x^2$

Complete the table.

x	0	1	2	3	4
y		13	10	5	

[2]

(b) On the grid, draw the graphs of $y = 2^x$ and $y = 14 - x^2$ for $0 \leqslant x \leqslant 4$.



[6]

© UCLES 2018

(c) Use your graphs to solve the equations.

(i) $2^x = 12$

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

(ii) $2^x = 14 - x^2$

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

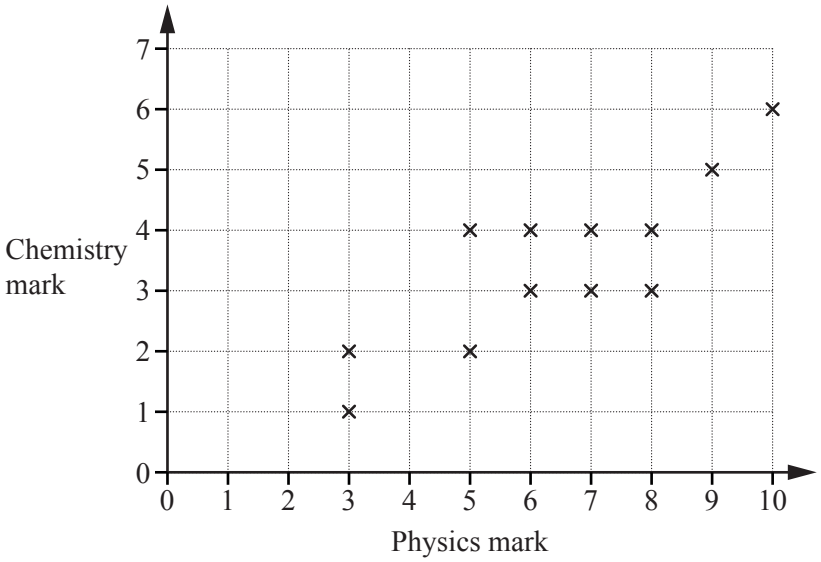
(d) **(i)** On the grid, draw the line from the point (4, 2) that has a gradient of -4. [1]

(ii) Complete the statement.

This straight line is a ..... to the graph of $y = 14 - x^2$

at the point (..... , ...). [2]

3 **(a)** The scatter diagram shows the physics mark and the chemistry mark for each of 12 students.



(i) What type of correlation is shown in the scatter diagram?

..... [1]

(ii) On the scatter diagram, draw a line of best fit. [1]

(iii) Find an estimate of the chemistry mark for another student who has a physics mark of 4.

..... [1]

(b) A teacher records the number of days each of the 24 students in her class are absent.
The frequency table shows the results.

Number of days	0	1	2	3	4	5
Frequency	10	8	3	2	0	1

Find the mode, the median and the mean.

Mode = ...

Median = ...

Mean = ... [5]

© UCLES 2018

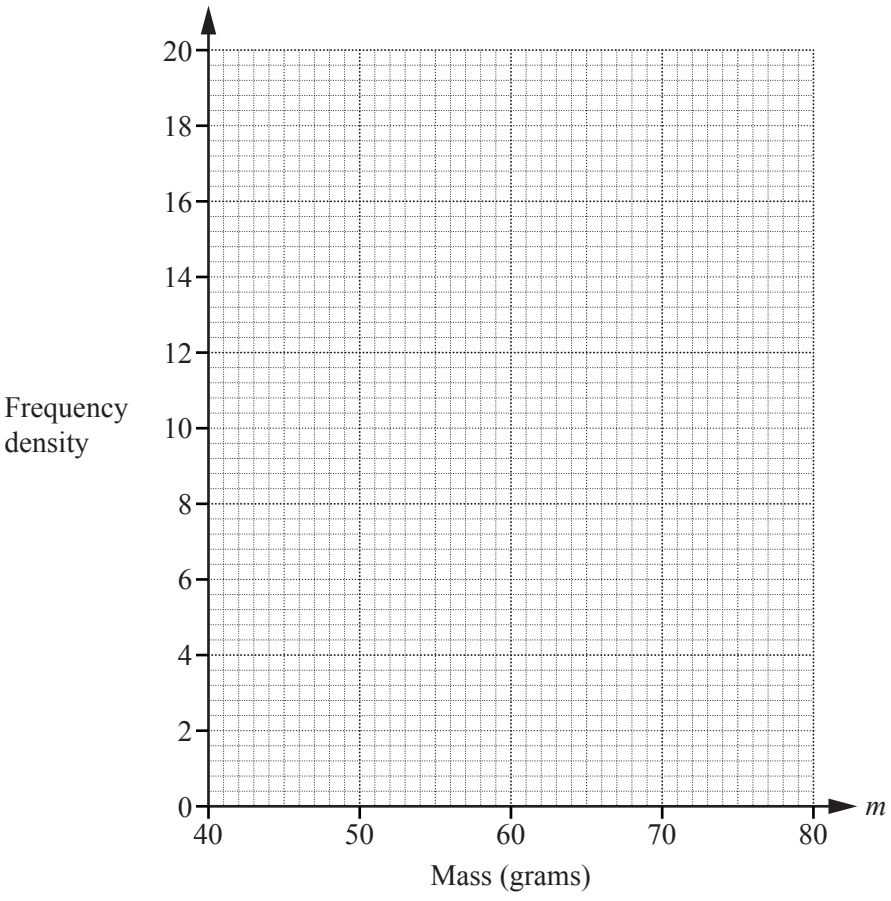
(c) Three sizes of eggs are sold in a shop.
The table shows the number of eggs of each size sold in one day.

Size	Small	Medium	Large
Mass (m grams)	$46 < m \leqslant 52$	$52 < m \leqslant 62$	$62 < m \leqslant 80$
Number of eggs sold	78	180	162

(i) Calculate an estimate of the mean mass.

..... g [4]

(ii) On the grid, draw a histogram to show the information in the table.



[4]

4 **(a)** The diagram shows two sets of cards.

Set *A*	1	1	2	2	2
Set *B*	0	1	1	1	2

(i) Jojo chooses two cards at random from Set *A* without replacement.

Find the probability that the two cards have the same number.

..... [3]

(ii) Jojo replaces the two cards.
Kylie then chooses one card at random from Set *A* and one card at random from Set *B*.

Find the probability that the two cards have the same number.

..... [3]

(iii) Who is the most likely to choose two cards that have the same number?
Show all your working.

..... [1]

© UCLES 2018

(b)

Set *C*	4	4	5	5	5

Lena chooses three cards at random from Set *C* without replacement.

Find the probability that the third card chosen is numbered 4.

..... [3]

5 **(a)** At a football match, the price of an adult ticket is $\$x$ and the price of a child ticket is $\$(x-2.50)$.
There are 18 500 adults and 2400 children attending the football match.
The total amount paid for the tickets is \$320 040.

Find the price of an adult ticket.

\$..... [4]

(b) **(i)** Factorise $y^2+5y-84$.

..... [2]

(ii)



NOT TO SCALE

The area of the rectangle is 84 cm^2.

Find the perimeter.

..... cm [3]

(c) In a shop, the price of a monthly magazine is \$$m$ and the price of a weekly magazine is \$$(m-0.75)$.
One day, the shop receives

- \$168 from selling monthly magazines
- \$207 from selling weekly magazines.

The total number of these magazines sold during this day is 100.

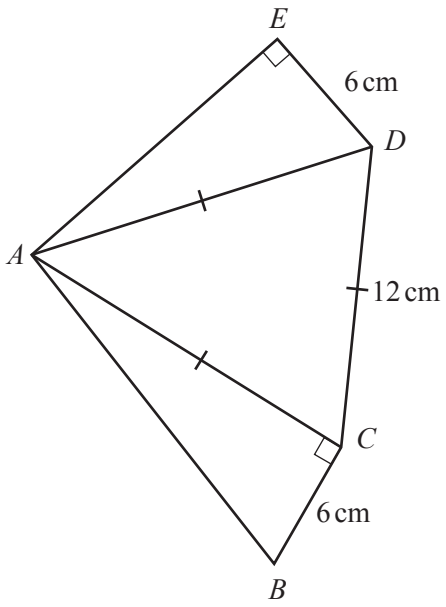
(i) Show that $50m^2 - 225m + 63 = 0$.

[3]

(ii) Find the price of a monthly magazine.
Show all your working.

\$ ..... [3]

6 (a)



NOT TO SCALE

In the pentagon $ABCDE$, angle ACB = angle AED = 90°.
Triangle ACD is equilateral with side length 12 cm.
$DE = BC = 6$ cm.

(i) Calculate angle BAE.

Angle BAE = ... [4]

(ii) Calculate AB.

AB = ... cm [2]

(iii) Calculate AE.

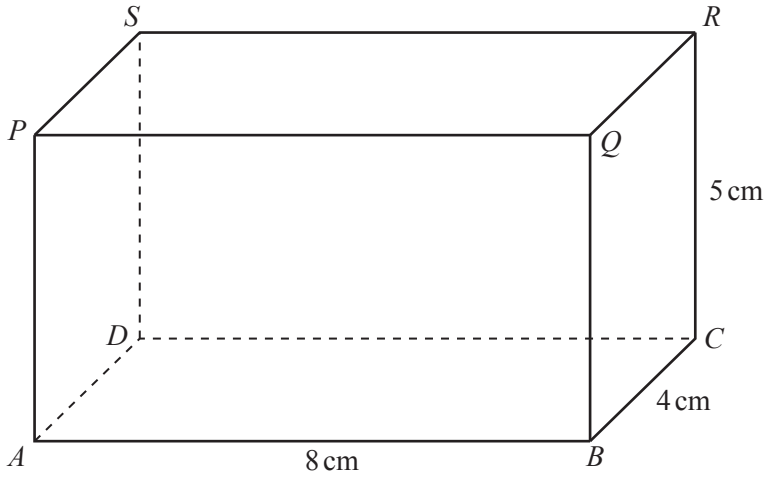
AE = ... cm [3]

© UCLES 2018

(iv) Calculate the area of the pentagon.

..... cm^2 [4]

(b)



NOT TO SCALE

The diagram shows a cuboid.
$AB = 8$ cm, $BC = 4$ cm and $CR = 5$ cm.

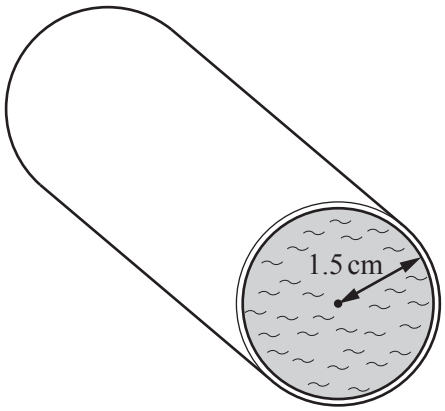
(i) Write down the number of planes of symmetry of this cuboid.

..... [1]

(ii) Calculate the angle between the diagonal AR and the plane $BCRQ$.

..... [4]

7 (a)



NOT TO SCALE

Water flows through a cylindrical pipe at a speed of 8 cm/s.
The radius of the circular cross-section is 1.5 cm and the pipe is always completely full of water.

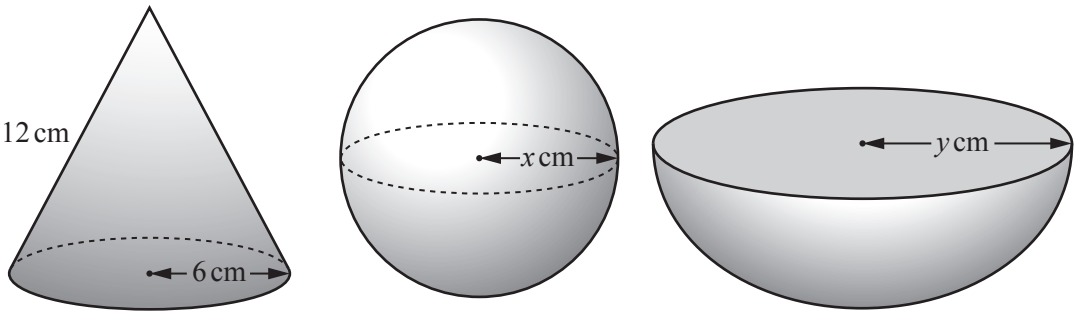
Calculate the amount of water that flows through the pipe in 1 hour.
Give your answer in litres.

..... litres [4]

© UCLES 2018

(b)

NOT TO SCALE



The diagram shows three solids.
The base radius of the cone is 6 cm and the slant height is 12 cm.
The radius of the sphere is x cm and the radius of the hemisphere is y cm.
The **total** surface area of each solid is the same.

(i) Show that the total surface area of the cone is $108\pi\,\text{cm}^2$.

[The curved surface area, A, of a cone with radius r and slant height l is $A = \pi rl$.]

[2]

(ii) Find the value of x and the value of y.

[The surface area, A, of a sphere with radius r is $A = 4\pi r^2$.]

x = ...

y = ... [4]

8 **(a)** $\mathbf{M} = \begin{pmatrix} 2 & 1 \\ 4 & 3 \end{pmatrix}$ $\mathbf{N} = \begin{pmatrix} 1 & 2 \end{pmatrix}$ $\mathbf{P} = \begin{pmatrix} 4 \\ 1 \end{pmatrix}$

(i) For the following calculations, put a tick (✓) if it is possible or put a cross (✗) if it is not possible. There is no need to carry out any of the calculations.

Calculation	✓ or ✗
$\mathbf{N} + \mathbf{P}$	
$\mathbf{NP}$	
$\mathbf{M}^2$	
$\mathbf{N}^2$	
$\mathbf{MN}$	
$\mathbf{NM}$	

[4]

(ii) Work out $\begin{pmatrix} 1 \\ 2 \end{pmatrix} + \mathbf{P}$.

..... [1]

(iii) Work out $\mathbf{PN}$.

..... [2]

(iv) Work out $\mathbf{M}^{-1}$.

..... [2]

(b) Describe fully the **single** transformation represented by the matrix $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$.

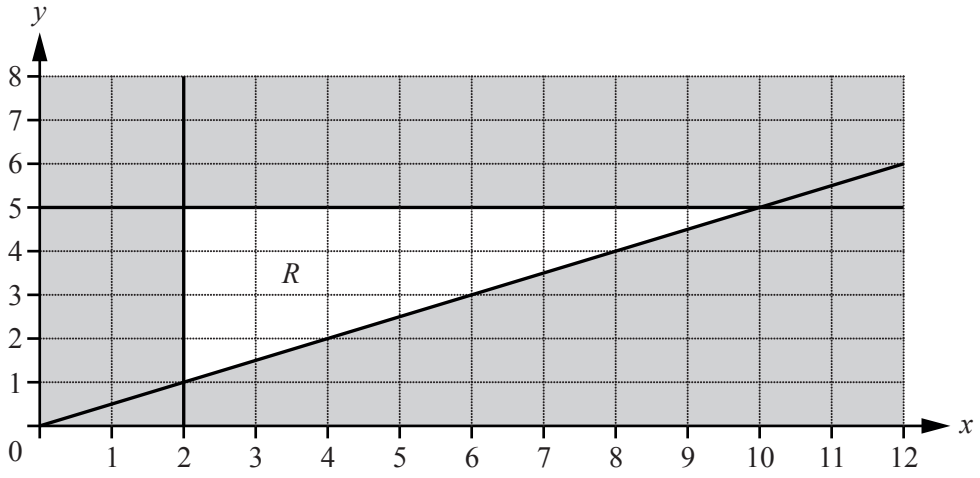
.....

..... [3]

9 **(a)** Find the equation of the straight line that is perpendicular to the line $y = \frac{1}{2}x + 1$ and passes through the point (1, 3).

..... [3]

(b)



(i) Find the three inequalities that define the region R.

.....

.....

..... [4]

(ii) Find the point (x, y), with integer co-ordinates, inside the region R such that $3x + 5y = 35$.

(..... , ...) [2]

10 (a) $f(x) = 2x - 3$ $g(x) = x^2 + 1$

(i) Find gg(2).

..... [2]

(ii) Find $g(x+2)$, giving your answer in its simplest form.

..... [2]

(iii) Find x when $f(x) = 7$.

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

(iv) Find $f^{-1}(x)$.

$f^{-1}(x) =$ ..... [2]

© UCLES 2018

(b) $h(x) = x^x$, $x > 0$

(i) Calculate h(0.3).
Give your answer correct to 2 decimal places.

..... [2]

(ii) Find x when $h(x) = 256$.

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

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.