Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

9093700033

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/43**

Paper 4 (Extended) **October/November 2016**

2 hours 15 minutes

Candidates answer on the Question Paper.

Additional Materials: Geometrical Instruments
Graphics Calculator

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.
Do not use staples, paper clips, glue or correction fluid.
You may use an HB pencil for any diagrams or graphs.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** the questions.
Unless instructed otherwise, give your answers exactly or correct to three significant figures as appropriate.
Answers in degrees should be given to one decimal place.
For π, use your calculator value.
You must show all the relevant working to gain full marks and you will be given marks for correct methods, including sketches, even if your answer is incorrect.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for this paper is 120.

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

© UCLES 2016

CAMBRIDGE International Examinations

[Turn over

Formula List

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

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

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

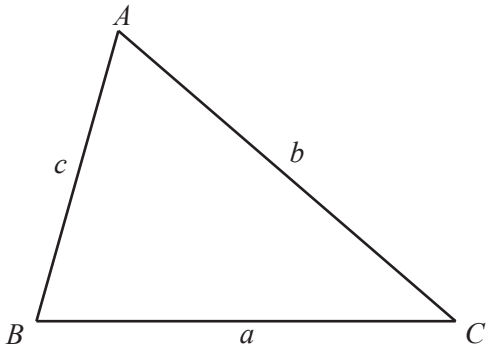
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

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

Volume, V, of cylinder of radius r, height h. $\quad V = \pi r^2 h$

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. $\quad V = \frac{4}{3}\pi r^3$



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

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

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

Answer **all** the questions.

1 **(a)** Work out.

(i) $\sqrt[3]{79\,507}$

..... [1]

(ii) $3.6^2 + \frac{1}{0.63}$

..... [1]

(b) $p = 5.62 \times 10^5$ $q = 6.83 \times 10^{-3}$

Work out, giving your answers in standard form.

(i) p^2

..... [2]

(ii) $\frac{p}{q}$

..... [2]

2 Gennaro has \$276 480 in his Pension Fund.

(a) Gennaro has two options.

Option A Receive 25% of the \$276 480 now
plus
5.5% of the remaining 75% each year.

Option B Receive 5.5% of the whole \$276 480 each year.

(i) Show that the total amount Gennaro will have received at the end of 10 years, if he chooses option A, is \$183 168.

[3]

(ii) After how many whole years will the total amount received using option B become more than the total amount received under option A?

..... [4]

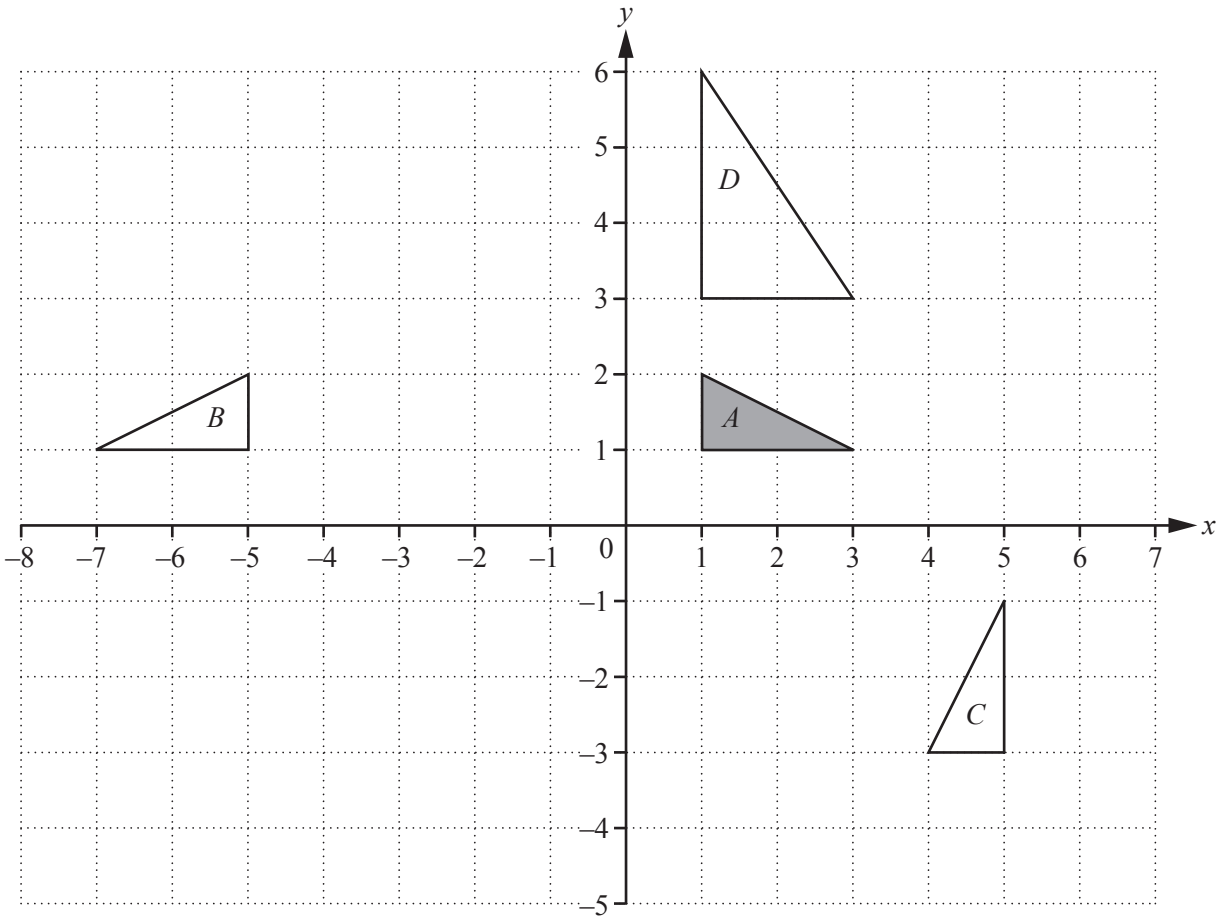
(b) The \$276 480 is 8% more than the amount the Pension Fund was worth one year ago.

Calculate how much it was worth one year ago.

\$ ..... [3]

© UCLES 2016

3



Describe fully the **single** transformation that maps

(a) triangle A onto triangle B,

.....

..... [2]

(b) triangle A onto triangle C,

.....

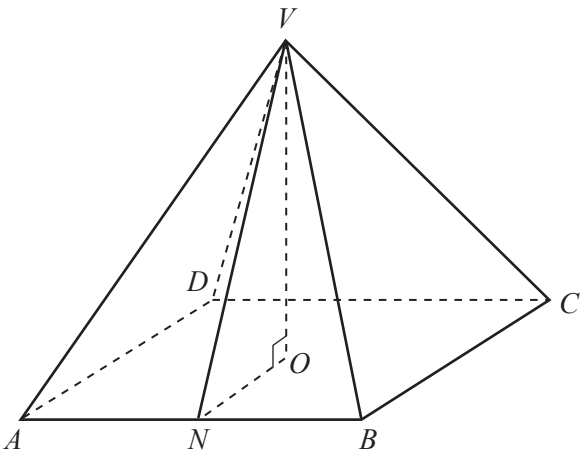
..... [3]

(c) triangle A onto triangle D.

.....

..... [3]

4



NOT TO SCALE

The diagram shows a solid, square-based pyramid $VABCD$.
O is the centre of the base $ABCD$ and VO is perpendicular to the base.
N is the midpoint of AB.
$AB = 6$ cm and $VO = 8$ cm.

(a) Calculate

(i) the volume of the pyramid,

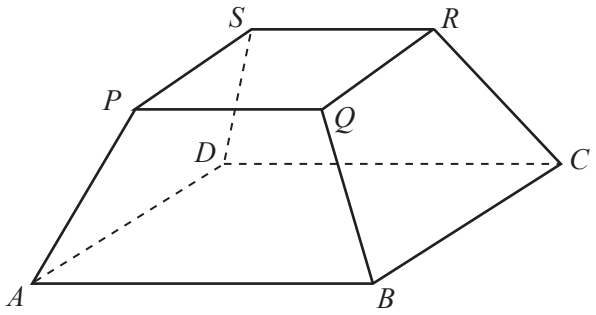
..... cm^3 [2]

(ii) the length of VN.

..... cm [2]

© UCLES 2016

(b) The similar pyramid *VPQRS* is removed from the original pyramid to leave the solid below.



NOT TO SCALE

The height of this solid is half the height of the pyramid *VABCD*.

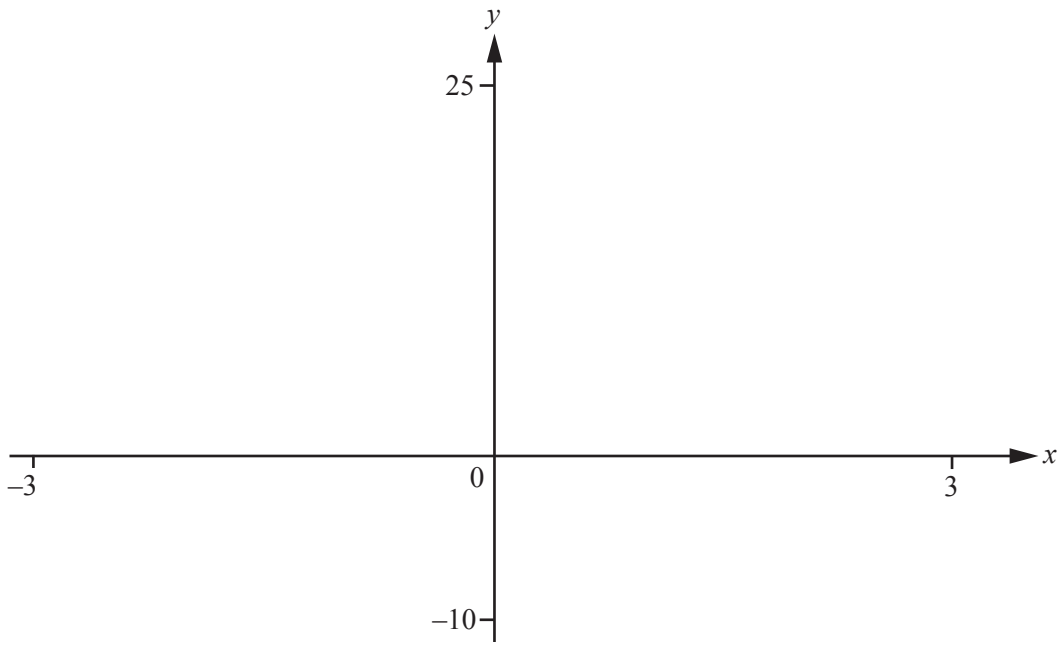
(i) Find the volume of this solid.

..... cm^3 [3]

(ii) Find the total surface area of this solid.

..... cm^2 [5]

5



$\mathrm{f}(x) = x^3 - 4x + 6$

(a) On the diagram, sketch the graph of $y = \mathrm{f}(x)$ for $-3 \leqslant x \leqslant 3$. [2]

(b) Solve the equation $\mathrm{f}(x) = 2x + 3$.

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

(c) **(i)** Find the co-ordinates of the local maximum point and the local minimum point.

Maximum (..... , ...)

Minimum (..... , ...) [3]

(ii) Find the range of values of k for which $\mathrm{f}(x) = k$ has only one solution.

..... [1]

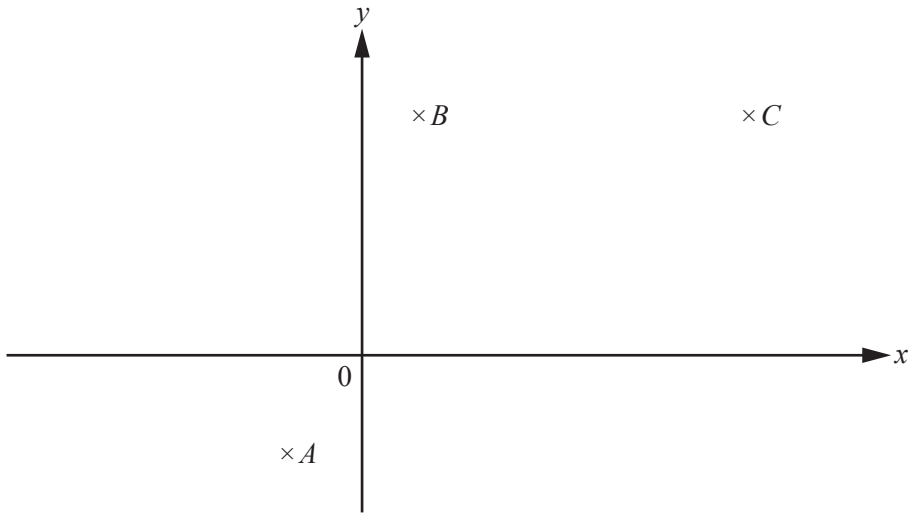
(d) Describe fully the symmetry of the graph of $y = \mathrm{f}(x)$.

.....

..... [3]

© UCLES 2016

6



The diagram shows the points A $(-1, -1)$, B $(1, 3)$ and C $(6, 3)$.

(a) The points A, B, C and D are the vertices of a parallelogram.

Write down the co-ordinates of the three possible positions of D.

(..... , ...)

(..... , ...)

(..... , ...) [3]

(b) E is a point such that C is the midpoint of the line AE.

Find the co-ordinates of the point E.

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

(c) The line L is perpendicular to the line AC and goes through A.

Find the equation of the line L.

..... [4]

© UCLES 2016

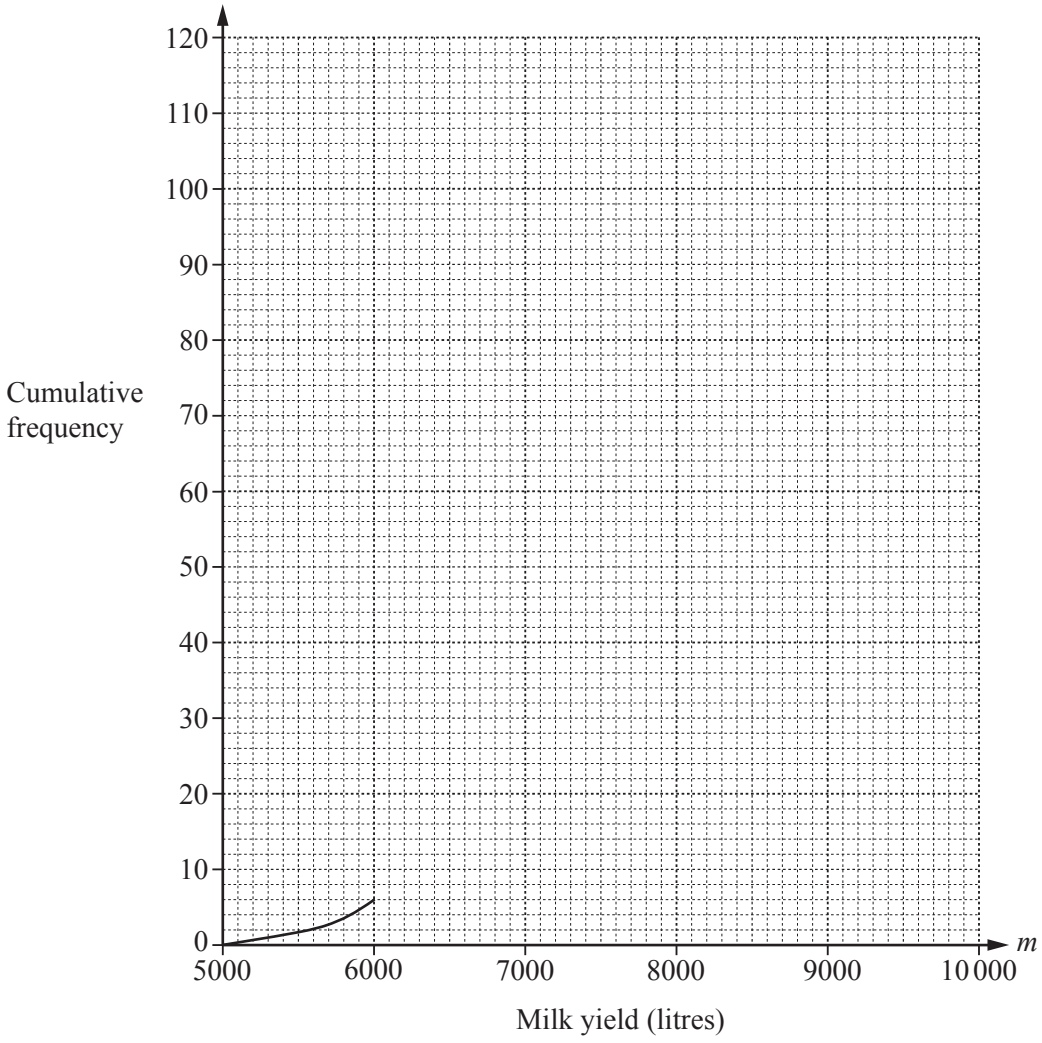
7 A farmer measured the milk yield of each of his 120 cows over a one-year period.
The results are shown in the frequency table.

Milk yield (m litres)	Frequency
$5000 < m \leqslant 6000$	6
$6000 < m \leqslant 6500$	12
$6500 < m \leqslant 7000$	22
$7000 < m \leqslant 7500$	37
$7500 < m \leqslant 8000$	20
$8000 < m \leqslant 9000$	17
$9000 < m \leqslant 10\,000$	6

Milk yield (m litres)	Cumulative frequency
$m \leqslant 6000$	6
$m \leqslant 6500$	
$m \leqslant 7000$	
$m \leqslant 7500$	
$m \leqslant 8000$	
$m \leqslant 9000$	
$m \leqslant 10\,000$	120

(a) (i) Complete the cumulative frequency table. [1]

(ii) Complete the cumulative frequency curve.



[3]

© UCLES 2016

(iii) Use your graph to estimate the median.

..... litres [1]

(iv) Use your graph to estimate the inter-quartile range.

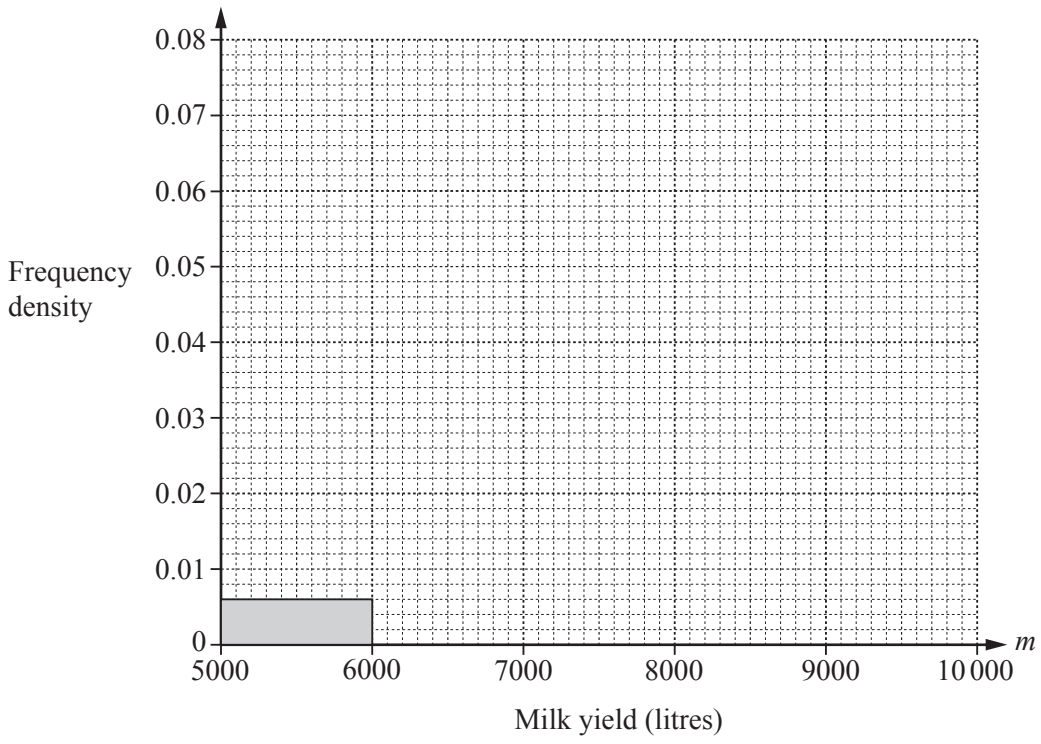
..... litres [2]

(v) The farmer sells the cows with a milk yield of less than 6200 litres.

Use your graph to estimate the number of cows he sells.

..... [1]

(b) On the grid below, complete the histogram to represent the data in the first table.

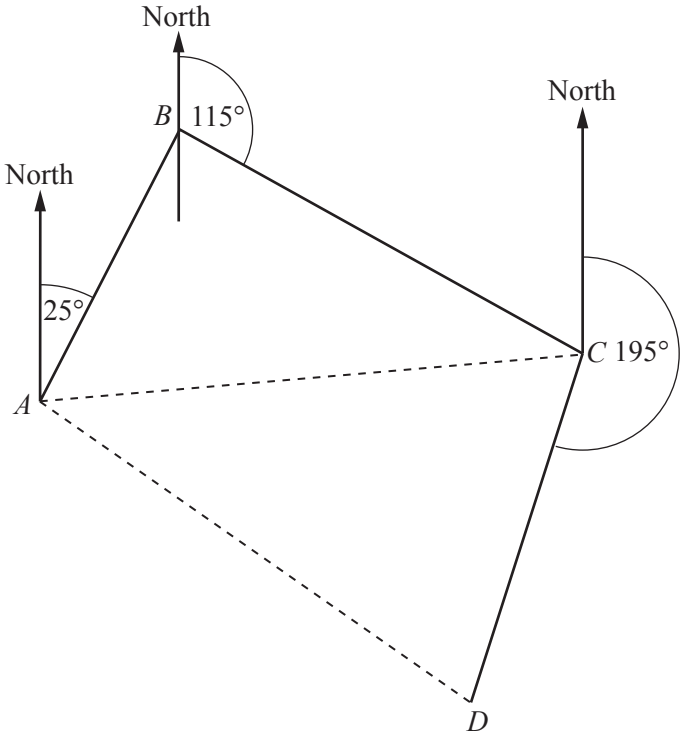


[4]

8 A ship sails on the following course.

- 60 km on a bearing of 025° from A to B
- 80 km on a bearing of 115° from B to C
- 75 km on a bearing of 195° from C to D

The diagram shows the course.



NOT TO SCALE

(a) Show that angle $ABC = 90°$.

[1]

(b) Calculate angle BCA.

Angle BCA = ... [2]

(c) Calculate the distance AC.

AC = ... km [2]

© UCLES 2016

(d) Calculate the distance AD.

$AD =$ ..... km [4]

(e) Calculate the bearing of D from A.

..... [4]

9 Justine travels 760 km in her car.

(a) Justine's average speed for the journey is 77 km/h.

Calculate the time Justine takes to complete the journey.
Give your answer in hours and minutes correct to the nearest minute.

..... h ..... min [3]

(b) Justine travels 270 km on main roads and 490 km on autoroutes.
On main roads her car travels x km on each litre of fuel.
On autoroutes her car travels $(x+4)$ km on each litre of fuel.

(i) Write down an expression, in terms of x, for the fuel that Justine's car uses on main roads on this journey.

..... litres [1]

(ii) Altogether Justine's car uses 62 litres of fuel for the whole journey.

Write down an equation in x and show that it simplifies to $31x^2 - 256x - 540 = 0$.

[3]

(iii) Solve the equation $31x^2 - 256x - 540 = 0$ to find the distance Justine's car travels on 1 litre of fuel on autoroutes.

..... km [4]

10 (a) (i) Factorise.

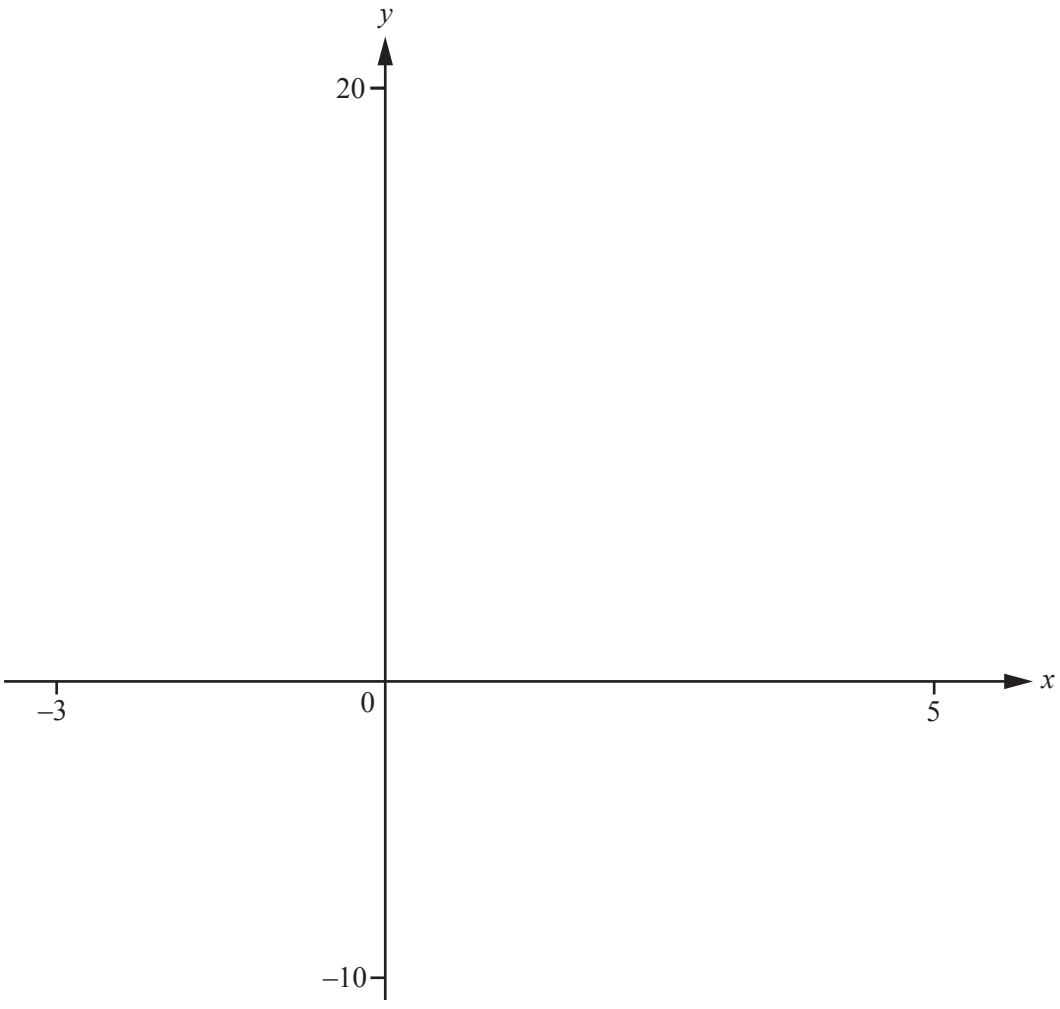
$$2x^2 - 3x + 1$$

..... [2]

(ii) Show that $2x + 1 + \frac{3}{x-2}$ can be written as $\frac{(2x-1)(x-1)}{(x-2)}$.

[3]

(b)



$$f(x) = \frac{(2x-1)(x-1)}{(x-2)}$$

(i) On the diagram, sketch the graph of $y = f(x)$ for values of x between -3 and 5. [2]

© UCLES 2016

(ii) On the same diagram, sketch the graph of $y = 2x + 1$. [2]

(iii) Write down the equations of the asymptotes to the graph of $y = \mathrm{f}(x)$.

.....

..... [2]

(iv) Solve $\mathrm{f}(x) = 0$.

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

11 The 50 members of an activities group either go walking or cycling.
The table shows the choices of the males and females.

	Walking	Cycling	Total
Male	16		29
Female			
Total		22	50

(a) Complete the table. [2]

(b) Two of the 50 members are chosen at random.

Calculate the probability that they both go cycling.

..... [2]

(c) Two of those who go walking are chosen at random.

Calculate the probability that one is a male and the other is a female.

..... [3]

© UCLES 2016

12 y is inversely proportional to the square root of x.
When $x = 25$, $y = 2$.

(a) Find y in terms of x.

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

(b) Find the value of x when $y = 3$.

..... [2]

(c) $z = ax^n$

z is proportional to the cube of y.
When $x = 4$, $z = 500$.

Find the value of a and the value of n.

$a =$ .....

$n =$ ..... [3]

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.