Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/43**

Paper 4 (Extended) **May/June 2017**

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.

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. $\quad A = \pi rl$

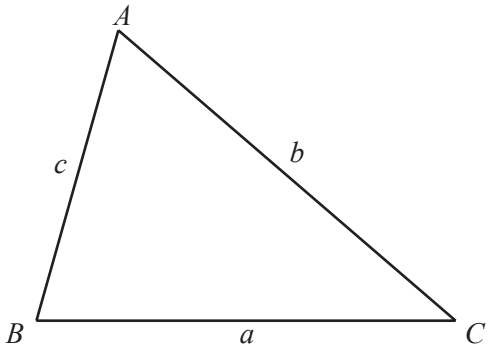
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

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



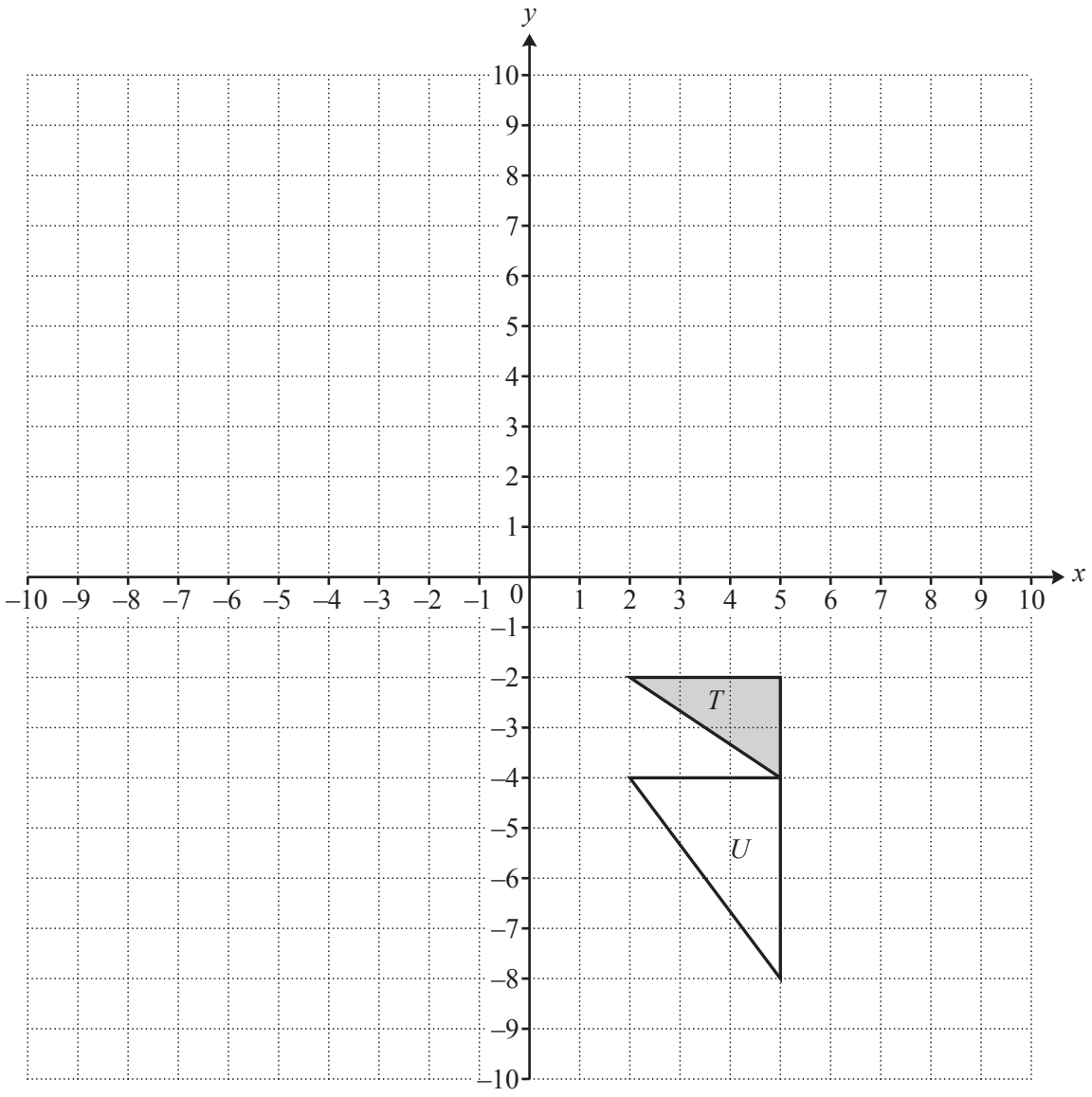
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

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

Answer **all** the questions.

1



(a) Translate triangle T by the vector $\begin{pmatrix} -2 \\ 7 \end{pmatrix}$. [2]

(b) **(i)** Reflect triangle T in the x-axis. Label the image P. [1]

(ii) Reflect triangle T in the line $x = -1$. Label the image Q. [1]

(iii) Describe fully the **single** transformation that maps triangle P onto triangle Q.

.....

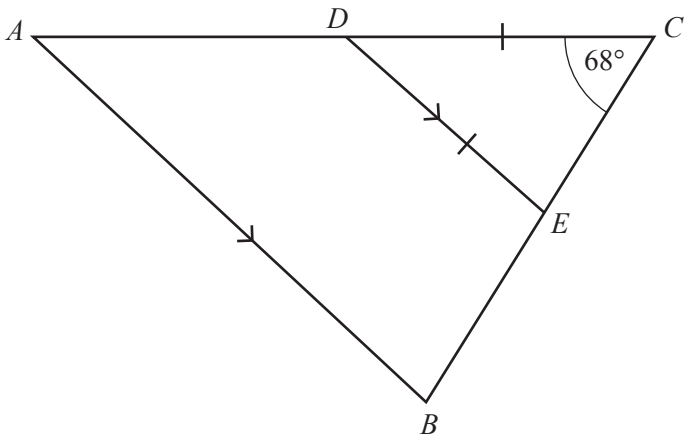
..... [3]

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

.....

..... [3]

2 (a)



NOT TO SCALE

In the diagram, ABC is a triangle and AB is parallel to DE.
Angle $BCA = 68^\circ$ and $DE = DC$.

(i) Find angle BAC.

Angle $BAC =$ ..... [2]

(ii) scalene equilateral isosceles right-angled

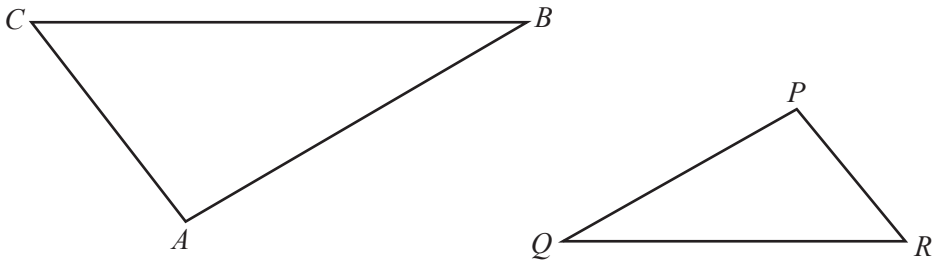
Choose one word from the list to complete the statement.

Triangle ABC is ..... [1]

(b) Calculate the interior angle of a regular 20 sided polygon.

..... [3]

(c)



NOT TO SCALE

In the diagram, angle A = angle P and angle B = angle Q.

(i) Explain why angle C = angle R.

..... [1]

(ii) $AB = 8$ cm, $AC = 5$ cm, $BC = 9$ cm and $PR = 3$ cm.

(a) Complete the statement.

Triangle ABC is ..... to triangle PQR [1]

(b) Calculate QR.

$QR =$ ..... cm [2]

3 **(a)** 12 students take part in a quiz.
The table shows the number of correct answers given by each student.

Student	A	B	C	D	E	F	G	H	I	J	K	L
Number of correct answers	7	6	9	5	6	4	7	8	4	10	9	3

Find

(i) the median,

..... [1]

(ii) the lower quartile,

..... [1]

(iii) the number of students with a smaller number of correct answers than the lower quartile.

..... [1]

(b) The table shows the average monthly temperature and the average monthly rainfall in Maseru, Lesotho.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temperature (t °C)	21	21	19	15	11	8	8	11	15	17	19	21
Rainfall (r mm)	113	102	99	59	28	12	12	14	27	62	83	88

(i) What type of correlation is there between the monthly temperature and the monthly rainfall?

..... [1]

(ii) Find the range of these temperatures.

..... °C [1]

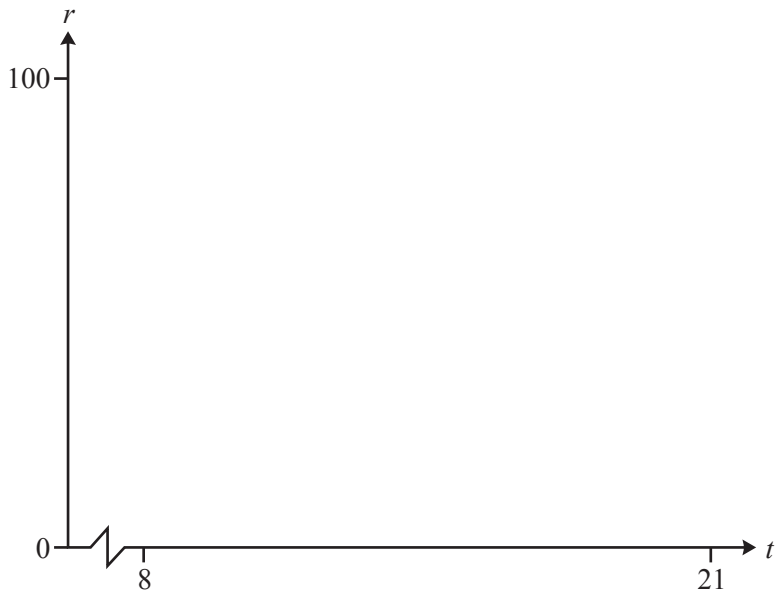
(iii) Find the mean of these temperatures.

..... °C [1]

(iv) Find the equation of the line of regression, giving r in terms of t.

$r =$ ..... [2]

(v) On the diagram, sketch the graph of the regression line for $8 \leqslant t \leqslant 21$.



[2]

4 **(a)** Marie has \$260.50 and Luk has \$208.40 .

(i) Find, in its simplest form, the ratio Marie's money : Luk's money.

Marie's money : Luk's money = ... : ..... [2]

(ii) Marie spends 16% of her money to buy a new coat.

Calculate the cost of the coat.

\$ ..... [2]

(iii) In a sale, the prices of all books are reduced by 10%.
Luk buys a book for \$11.25 .

Calculate the original price of the book.

\$ ..... [3]

(iv) Marie invests \$200 at a rate of 2% per year **simple** interest.

Calculate the total value of this investment at the end of 25 years.

\$ ..... [3]

(v) Luk invests \$190 at a rate of 2% per year **compound** interest.

Calculate the value of this investment at the end of 25 years.

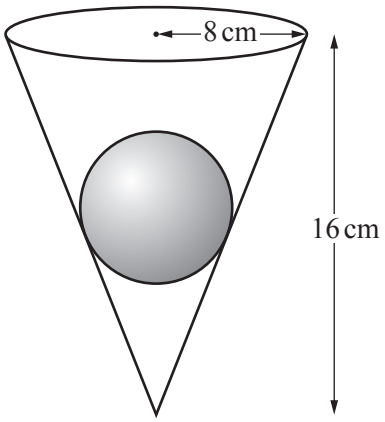
\$ ..... [3]

(b) Fredrik invests \$120 at a rate of 5.7% per year **compound** interest.

Calculate the number of complete years it will take until the value of this investment is first greater than \$300.

..... [3]

5



NOT TO SCALE

The diagram shows a solid sphere of radius 4 cm inside a hollow cone of radius 8 cm and height 16 cm. The sphere touches the interior of the cone.

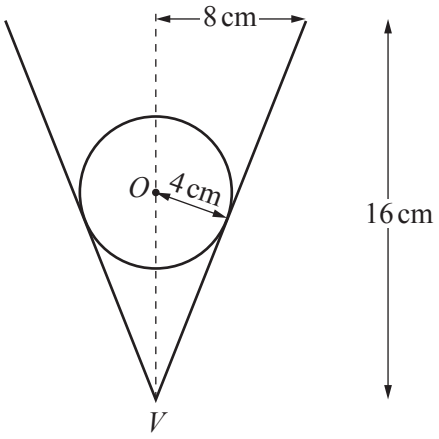
(a) Calculate the volume of the cone that is **not** occupied by the sphere.

..... cm^3 [3]

(b) Calculate the curved surface area of the cone.

..... cm^2 [3]

(c)



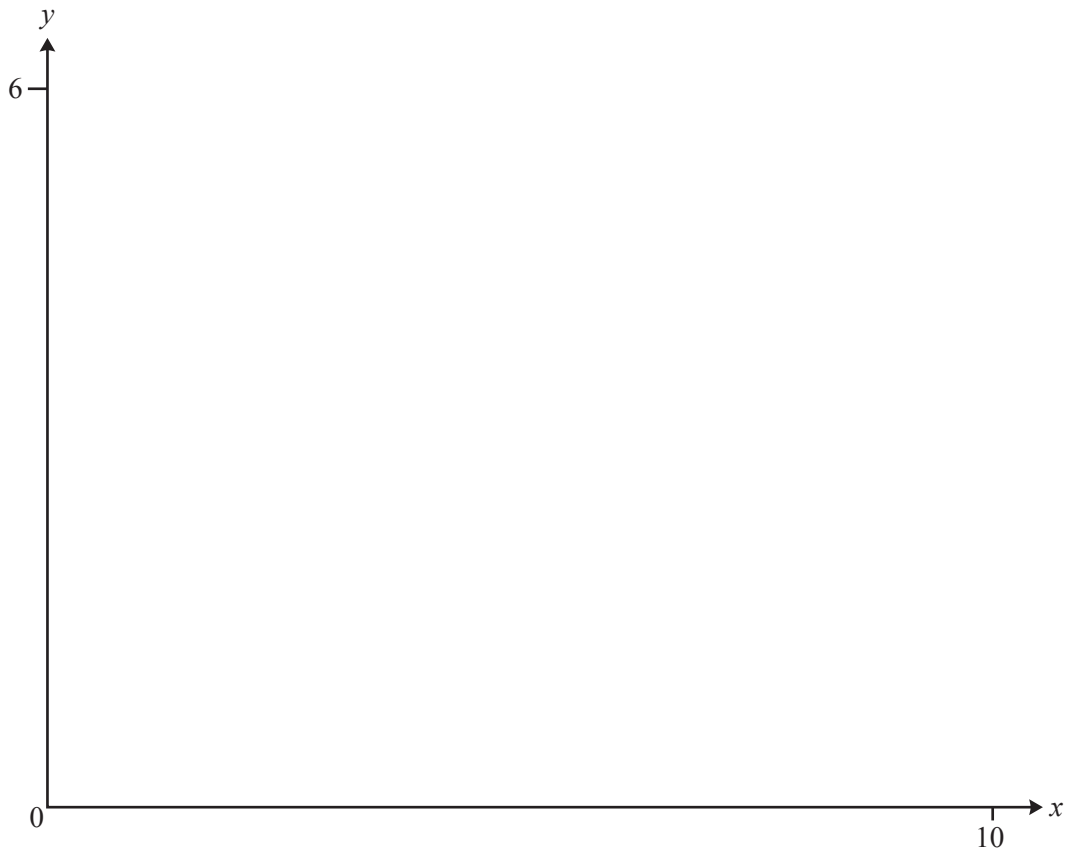
NOT TO SCALE

The centre, O, of the sphere is directly above the vertex, V, of the cone.

Calculate the length OV.

$OV =$ ..... cm [4]

6



$f(x) = x - 5\log x$

(a) On the diagram, sketch the graph of $y = f(x)$ for $0 < x \leqslant 10$. [2]

(b) Find the co-ordinates of the local minimum point.

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

(c) Find the range of $f(x)$ for the domain $1 \leqslant x \leqslant 5$.

..... [2]

(d) Solve the equation $f(x) = 2$.

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

(e) Solve the inequality $f(x) < 2$.

..... [1]

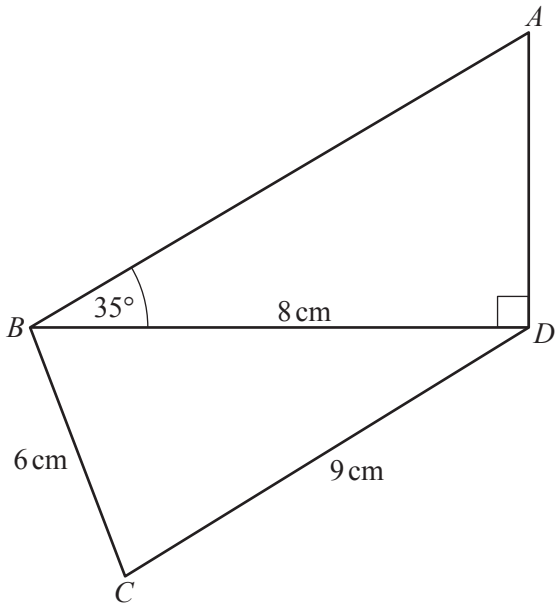
(f) **(i)** Find f(0.001), f(0.000 01) and f(0.000 000 1).

f(0.001) = ... , f(0.000 01) = ..., f(0.000 000 1) = ... [1]

(ii) Complete the statement.

The y-axis is ..... to the graph of $y = f(x)$. [1]

7



NOT TO SCALE

(a) Calculate AB.

$AB =$ ..... cm [3]

(b) Calculate angle BCD.

Angle $BCD =$ ..... [3]

8 $f(x) = x^2 + 1$ $g(x) = 3 + 2x$ $h(x) = \frac{1}{x+1}, x \neq -1$

(a) Find $f(-3)$.

..... [1]

(b) Find the value of g(h(1)).

..... [2]

(c) Simplify f(g(x)) + f(x).

..... [3]

(d) Find $h^{-1}(x)$.

$h^{-1}(x) =$ ..... [3]

(e) Solve.

(i) $g(x) = 1$

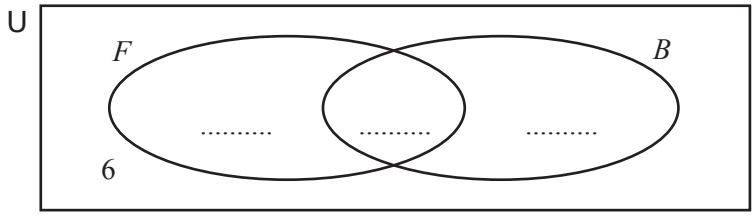
$x =$ ..... [2]

(ii) $g^{-1}(x) = 1$

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

9 In a survey, 40 students are asked if they like football, F, and if they like baseball, B.
22 like football, 19 like baseball and 6 do not like either football or baseball.

(a) Complete the Venn diagram to show this information.



[2]

(b) How many of these students

(i) like both football and baseball,

..... [1]

(ii) either like football or do not like baseball?

..... [1]

(c) Find $n(F \cap B')$.

..... [1]

(d) Two of these students are chosen at random.

Find the probability that they both like football.

..... [2]

(e) **(i)** One of the 19 students who like baseball is chosen at random.

Find the probability that this student also likes football.

..... [1]

(ii) Two of the 19 students who like baseball are chosen at random.

Find the probability that one likes football and one does not like football.

..... [3]

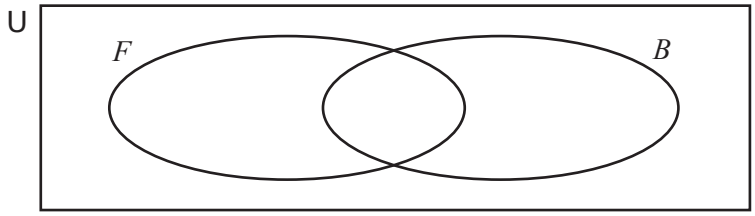
(f) Another n students take part in the survey.
They all like both baseball and football.
A student is then chosen at random from the $(40 + n)$ students.

The probability that a student likes both football and baseball is $\frac{5}{16}$.

Find the value of n.

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

(g)



On the Venn diagram, shade the region $F' \cup B'$. [1]

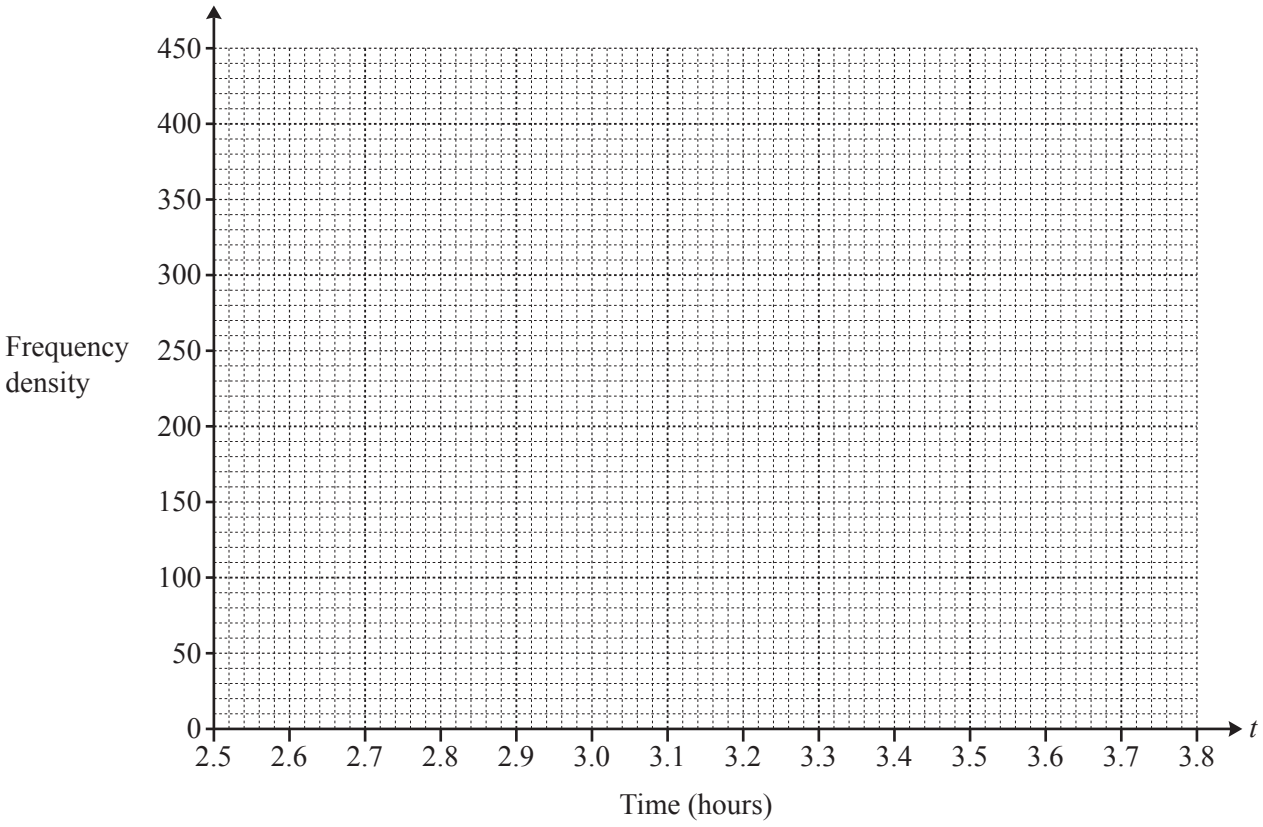
10 **(a)** The time, t hours, taken by each of 200 cars to complete a journey of 200 km is recorded. The results are shown in the table.

Time (t hours)	$2.5 < t \leqslant 3$	$3 < t \leqslant 3.25$	$3.25 < t \leqslant 3.75$
Frequency	60	100	40

(i) Calculate an estimate of the mean.

..... h [2]

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



[3]

(b) One car completes the 200 km journey at an average speed of x km/h.
Another car completes the 200 km journey at an average speed of $(x + 10)$ km/h.
The difference between the times taken by the two cars is 20 **minutes**.

(i) Show that $x^2 + 10x - 6000 = 0$.

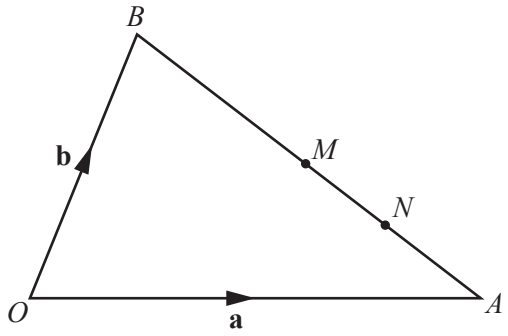
[4]

(ii) Find the time taken for the slower journey.
Give your answer in hours and minutes correct to the nearest minute.

..... h ..... min [4]

Question 11 is printed on the next page.

11



NOT TO SCALE

In the diagram, $\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$.
M is the midpoint of AB and N is the midpoint of AM.

(a) Find each of these vectors in terms of **a** and **b**.
Give each vector in its simplest form.

(i) $\overrightarrow{AB}$

$\overrightarrow{AB} =$ ..... [1]

(ii) $\overrightarrow{AN}$

$\overrightarrow{AN} =$ ..... [1]

(iii) $\overrightarrow{ON}$

$\overrightarrow{ON} =$ ..... [2]

(b) O is the point (0, 0).

$\overrightarrow{OA} = \begin{pmatrix} 8 \\ 0 \end{pmatrix}$ and $\overrightarrow{OB} = \begin{pmatrix} 2 \\ 6 \end{pmatrix}$.

Find the co-ordinates of N.

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