Write your name here

Surname	Other names

Pearson Edexcel International GCSE

Centre Number	Candidate Number

Mathematics A

Paper 4H

Higher Tier

Tuesday 17 January 2017 – Morning
Time: 2 hours

Paper Reference
4MA0/4H

You must have:
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
  – there may be more space than you need.
- **Calculators may be used.**
- You must **NOT** write anything on the formulae page.
  Anything you write on the formulae page will gain NO credit.

Information

- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets
  – use this as a guide as to how much time to spend on each question.

Advice

- Read each question carefully before you start to answer it.
- Check your answers if you have time at the end.

Turn over ▶

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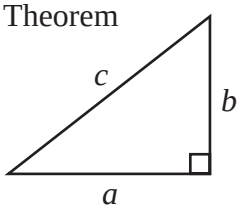
International GCSE MATHEMATICS
FORMULAE SHEET – HIGHER TIER

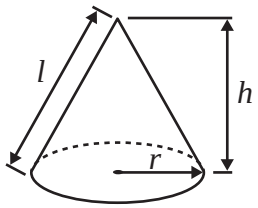
Pythagoras' Theorem



$a^2 + b^2 = c^2$

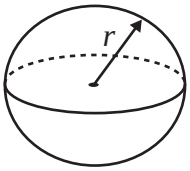
Volume of cone = $\frac{1}{3}\pi r^2 h$

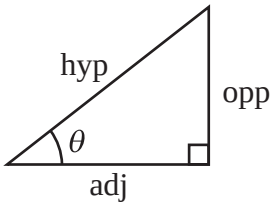
Curved surface area of cone = $\pi r l$



Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$





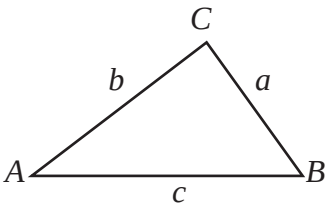
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

or $\sin\theta = \frac{\text{opp}}{\text{hyp}}$

$\cos\theta = \frac{\text{adj}}{\text{hyp}}$

$\tan\theta = \frac{\text{opp}}{\text{adj}}$

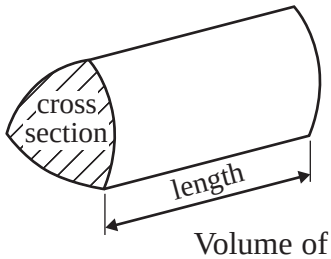
In any triangle *ABC*



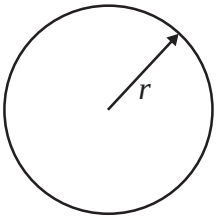
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

Area of triangle = $\frac{1}{2}ab\sin C$



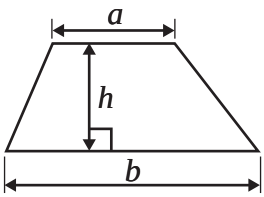
Volume of prism = area of cross section × length

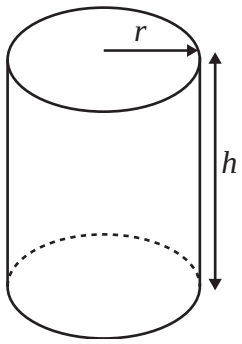


Circumference of circle = $2\pi r$

Area of circle = πr^2

Area of a trapezium = $\frac{1}{2}(a + b)h$





Volume of cylinder = $\pi r^2 h$

Curved surface area of cylinder = $2\pi rh$

The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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Answer ALL TWENTY ONE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 The table below shows information about the number of goals scored by a football club in each of its last 45 games.

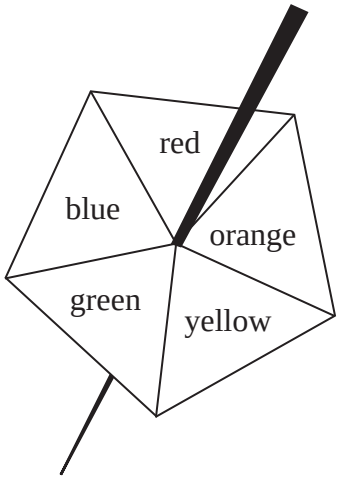
Number of goals	Number of games
0	7
1	14
2	8
3	10
4	5
5	0
6	1

Find the median number of goals.
Show your working clearly.

.....

(Total for Question 1 is 2 marks)

2 Here is a biased five-sided spinner.



When the spinner is spun, it can land on red, orange, yellow, green or blue.
The probabilities that it lands on red, orange and yellow are given in the table.

Colour	red	orange	yellow	green	blue
Probability	0.4	0.2	0.1		

The probability that the spinner lands on green is the same as the probability that the spinner lands on blue.

Michael spins the spinner once.

(a) Work out the probability that the spinner lands on green.

.....

(3)

Jenny spins the spinner 200 times.

(b) Work out an estimate for the number of times the spinner lands on red.

.....

(2)

(Total for Question 2 is 5 marks)

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3 The weekly rent for a holiday apartment is £530, which is the same as 715.5 euros.
The weekly rent for a holiday cottage is £750

Using the same rate of currency exchange, work out the weekly rent for the cottage in euros.

..... euros

(Total for Question 3 is 3 marks)

4 (a) (i) Use your calculator to work out the value of

$$\frac{16^2}{3 \times 12 - \pi}$$

Write down all the figures on your calculator display.

.....

(ii) Write your answer to (a)(i) correct to 3 significant figures.

.....

(3)

(b) Work out $\dfrac{4.2 \times 10^4}{700\,000}$

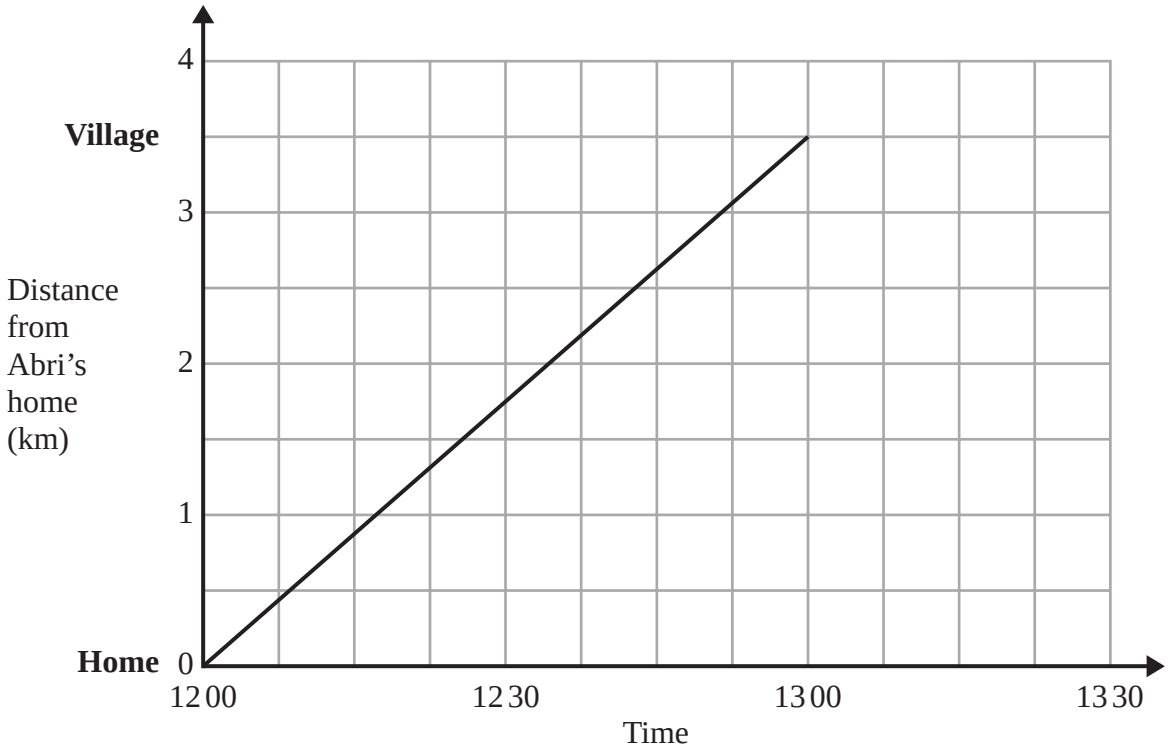
Give your answer in standard form.

.....

(2)

(Total for Question 4 is 5 marks)

5 Abri walks along a path from her home to a local village.
Here is the distance-time graph for her journey from her home to the village.



Benito leaves the village at 12 30 and walks at a constant speed along the same path to Abri's home.
He arrives at Abri's home at 13 15

(a) Show the information about Benito's journey on the grid.

(2)

(b) How far from the village were Abri and Benito when they passed each other?

..... km

(1)

(Total for Question 5 is 3 marks)

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6 A has coordinates $(11, 3e)$
B has coordinates $(1, 7e)$
The midpoint of AB has coordinates (x, y)

(a) Find the value of x.

$x =$ .....

(1)

(b) Find an expression for y in terms of e.
Simplify your answer.

$y =$ .....

(2)

(Total for Question 6 is 3 marks)

7 $P \cup Q = \{a, b, c, d, e, f\}$
$P \cap Q = \{e\}$
$a \in P, \quad c \in Q, \quad f \notin P, \quad \{b, d\} \cap Q = \varnothing$

(a) List the members of the set P.

.....

(2)

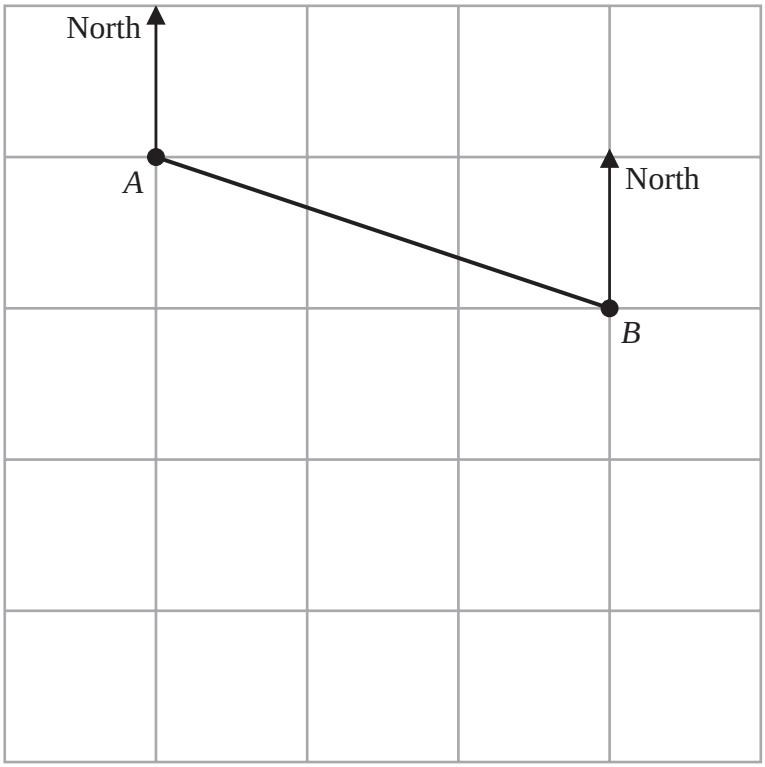
(b) List the members of the set Q.

.....

(1)

(Total for Question 7 is 3 marks)

8



The diagram shows point *A* and point *B* on a map.
The point *C* is due south of *A*
The bearing of *C* from *B* is 235°

(a) Mark the point *C* on the map.

(2)

The bearing of a point *D* from *B* is 168°

(b) Find the bearing of *B* from *D*

..... °

(2)

Gordon measures a length on the map as 6.3 cm correct to 1 decimal place.

(c) Write down the lower bound for this length.

..... cm

(1)

(Total for Question 8 is 5 marks)

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9 The diagram shows a ladder, *EF*, leaning against a vertical wall.
The foot, *E*, of the ladder is on horizontal ground.

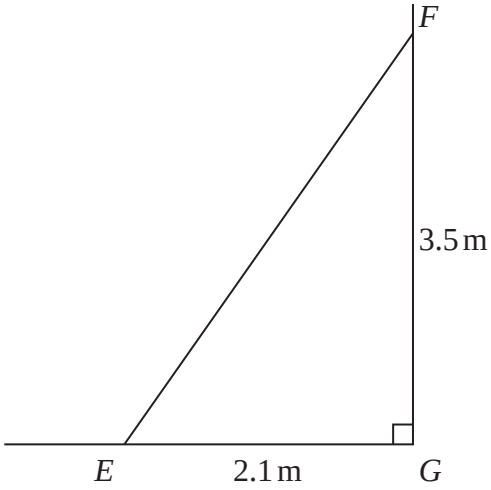

Diagram **NOT** accurately drawn

EG = 2.1 m *FG* = 3.5 m angle *EGF* = 90°

(a) Work out the length of the ladder.
Give your answer correct to 1 decimal place.

..... m

(3)

(b) Work out the size of angle *EFG*.
Give your answer correct to the nearest degree.

..... °

(3)

(Total for Question 9 is 6 marks)

10 Solve the simultaneous equations

$$5x - 2y = 33$$

$$5x + 8y = 18$$

Show clear algebraic working.

$x =$ .....

$y =$ .....

(Total for Question 10 is 3 marks)

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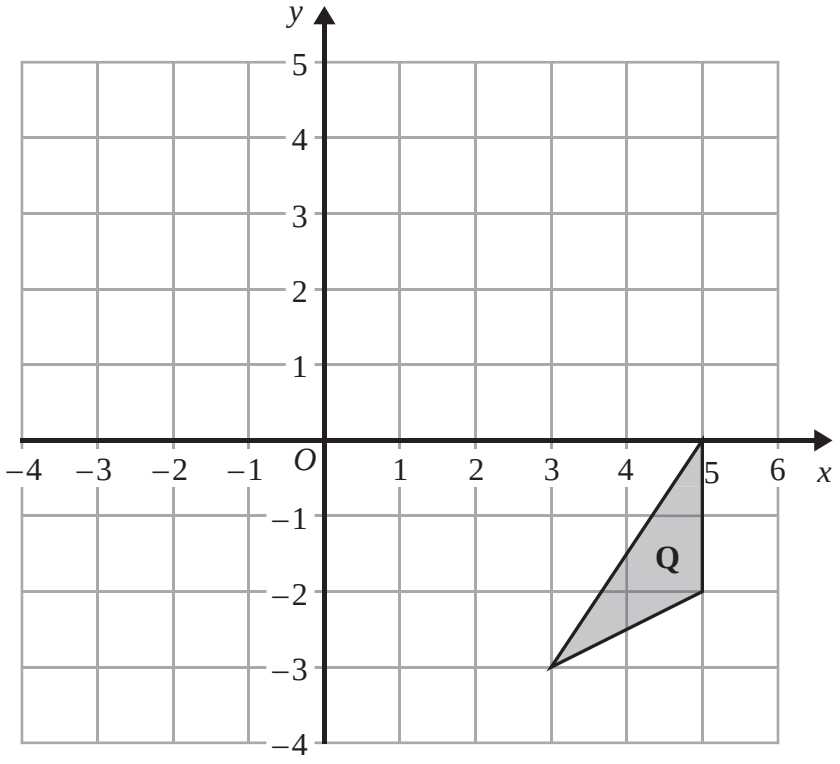
11



(a) On the grid, reflect triangle **Q** in the line $x = 1$
Label the new triangle **R**.

(2)

Triangle **R** is mapped onto triangle **S** by a reflection in the line $y = 0$

(b) Describe fully the single transformation that maps triangle **Q** onto triangle **S**.

.....

.....

(3)

(Total for Question 11 is 5 marks)

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12 The straight line **L** has equation $3x - 2y = 15$

(a) Find the gradient of **L**.

.....

(3)

(b) Find the coordinates of the point where **L** crosses the y-axis.

(..... , ...)

(1)

(c) Find an equation of the line that is parallel to **L** and crosses the x-axis at $(-2, 0)$

.....

(2)

(Total for Question 12 is 6 marks)

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13

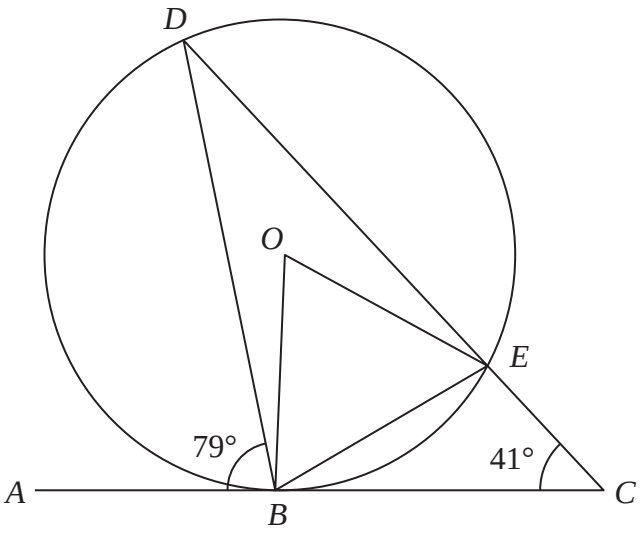

Diagram **NOT** accurately drawn

B, *D* and *E* are points on a circle, centre *O*.
ABC is a tangent to the circle.
DEC is a straight line.
Angle *ABD* = 79° and angle *ECB* = 41°

(a) Write down the size of angle *BED*.

.....°

(1)

(b) Work out the size of angle *BOE*.

.....°

(2)

(Total for Question 13 is 3 marks)

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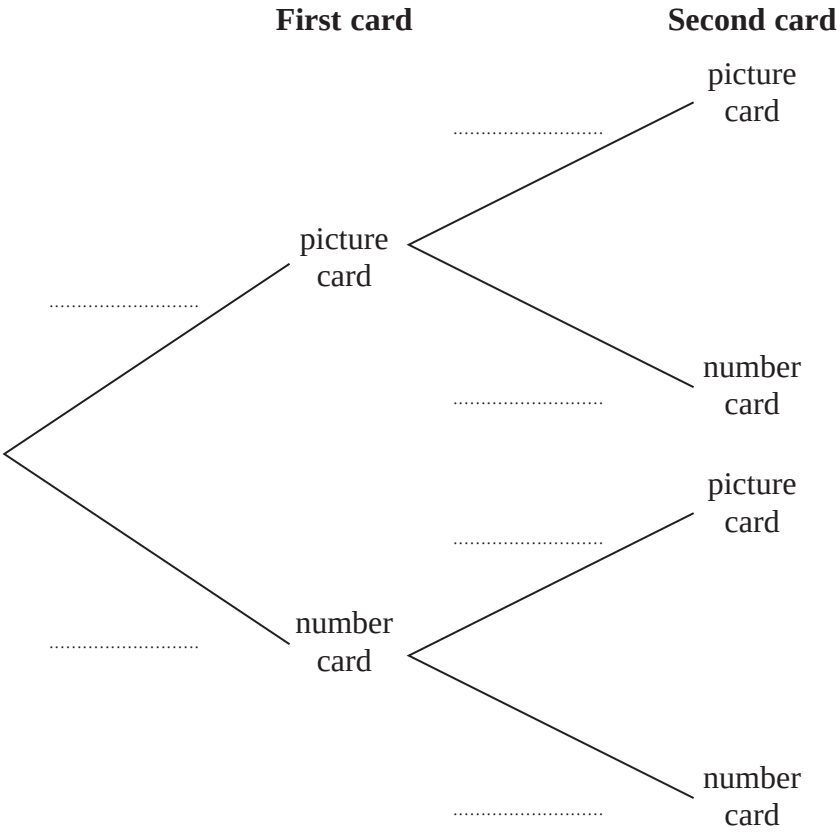
14 There are 52 cards in a pack.
12 cards are picture cards.
40 cards are number cards.

Melina takes at random a card from the pack.
She keeps the card and then takes at random a second card from the remainder of the pack.

(a) Complete the probability tree diagram.



(3)

(b) Work out the probability that the two cards Melina takes are both picture cards or both number cards.

.....

(3)

(Total for Question 14 is 6 marks)

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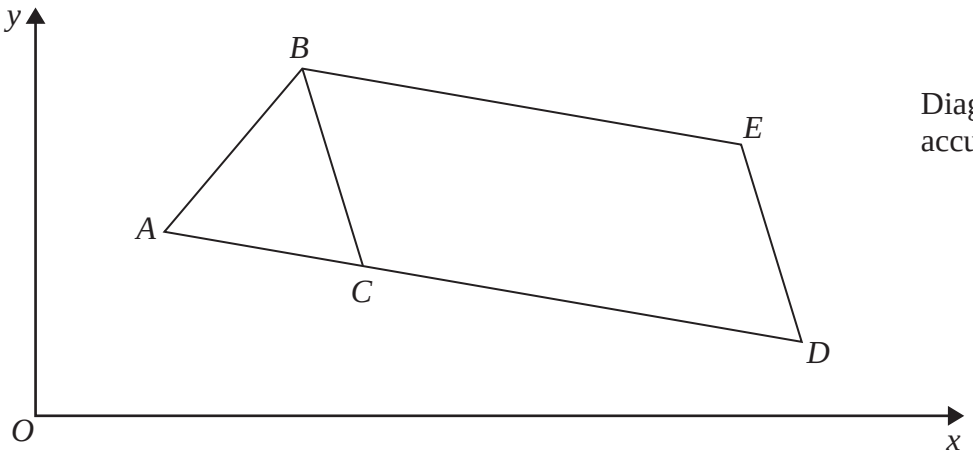

Diagram **NOT** accurately drawn

$\overrightarrow{AB} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$ and $\overrightarrow{AC} = \begin{pmatrix} 4 \\ -1 \end{pmatrix}$

(a) Find, as a column vector, $\overrightarrow{BC}$

.....

(2)

BCDE is a parallelogram.

$\overrightarrow{CD} = 2\overrightarrow{AC}$

(b) Find the length of *CE*.
Give your answer correct to 2 decimal places.

.....

(3)

(Total for Question 15 is 5 marks)

16 $g = 2^3 \times 3 \times 7^2$ $h = 2 \times 3 \times 7^3$

(a) Express gh as a product of powers of its prime factors.
Simplify your answer.

.....

(2)

$$\frac{g}{h} = 2^a \times 3^b \times 7^c$$

(b) Find the value of a, the value of b and the value of c.

$a =$ .....

$b =$ .....

$c =$ .....

(2)

(c) Show that $\left(7 - 2\sqrt{5}\right)\left(7 + 2\sqrt{5}\right) = 29$
Show your working clearly.

(2)

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$$\frac{1}{\sqrt[3]{9^4}} = 3^n$$

(d) Work out the exact value of n.

.....

(3)

(Total for Question 16 is 9 marks)

17 A particle moves along a straight line.
The fixed point O lies on this line.
The displacement of the particle from O at time t seconds is s metres where

$$s = 4t^2 - \frac{9}{t}$$

Find the velocity of the particle at time 5 seconds.

..... m/s

(Total for Question 17 is 3 marks)

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18 The function f is such that $f(x) = \dfrac{2x}{3x + 5}$

(a) Find $f(-2)$

.....

(1)

The function g is such that $g(x) = \dfrac{3}{x + 4}$

(b) Find $g^{-1}(6)$

.....

(2)

(c) Find $fg(-5)$

.....

(2)

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(d) Solve the equation $f(x) = g(x)$
Show clear algebraic working.

.....

(4)

(Total for Question 18 is 9 marks)

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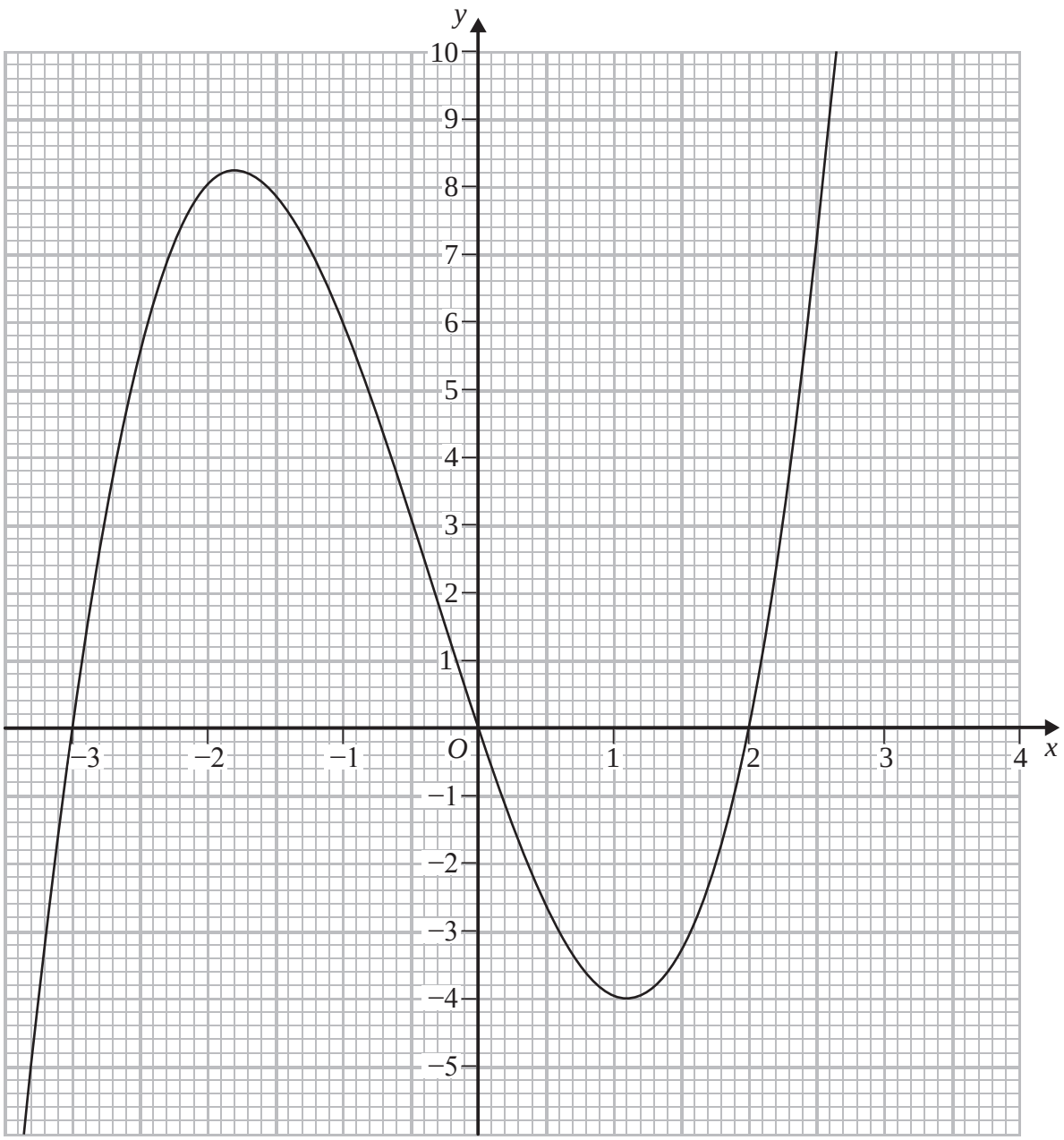
19 Here is the graph of $y = \mathrm{h}(x)$



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(a) Use the graph to find an estimate for the gradient of the curve $y = \mathrm{h}(x)$ at $(-1, 6)$

.....

(3)

(b) By drawing a suitable straight line on the grid, find an estimate for the solution of the equation $\mathrm{h}(x) = 7 - 2x$
Give your answer correct to 1 decimal place.

.....

(2)

The equation $\mathrm{h}(x) = k$ has 3 different solutions for $a < k < b$

(c) Use the graph to find an estimate for the value of a and the value of b.

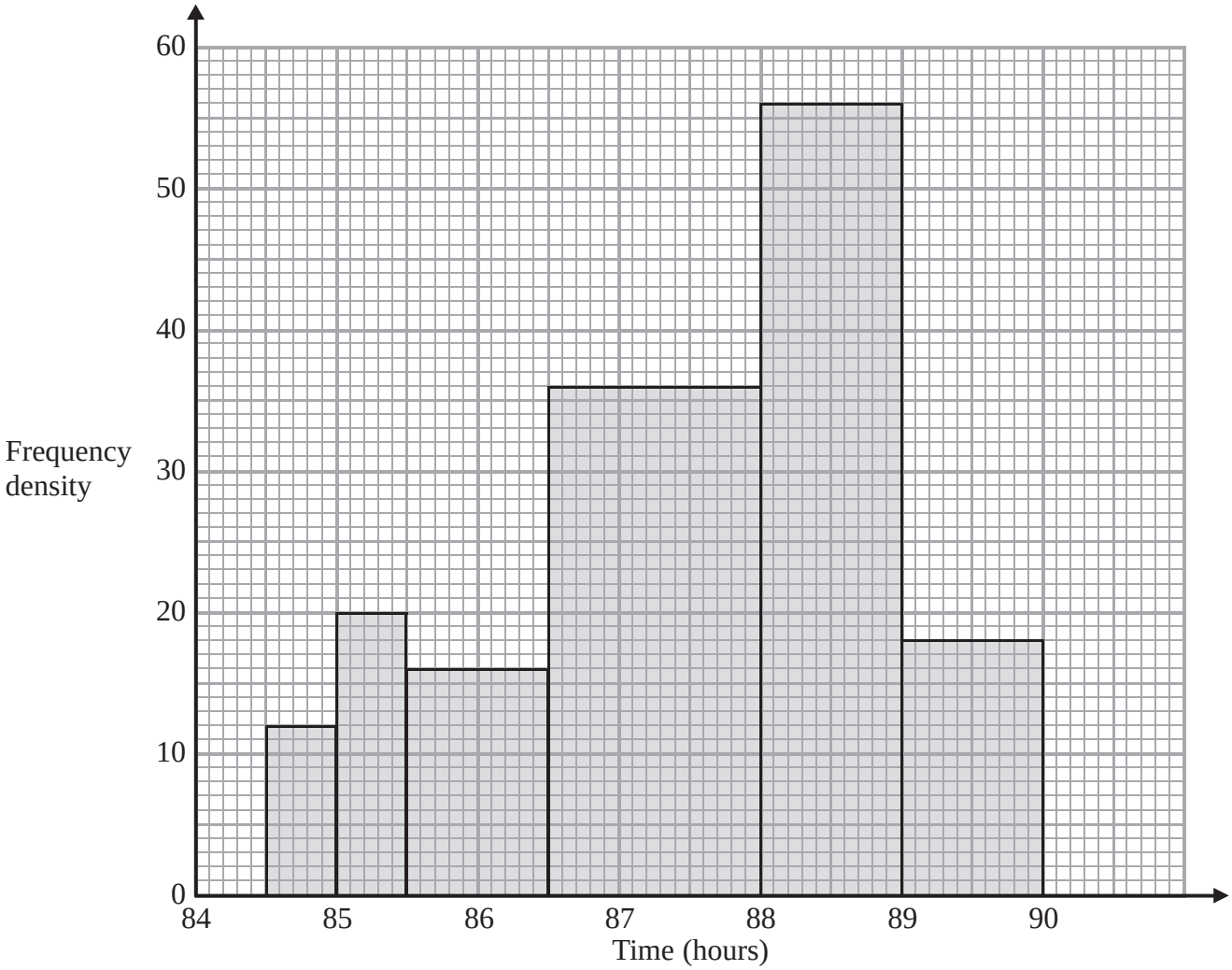
$a =$ .....

$b =$ .....

(2)

(Total for Question 19 is 7 marks)

20 The histogram shows information about the times taken by 160 cyclists to complete the Tour de France cycle race.



6 cyclists took less than 85 hours.

(a) Work out an estimate for the number of the 160 cyclists who took less than 86 hours.

.....

(2)

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(b) For these 160 cyclists, work out an estimate for the time taken by the cyclist who finished in 50th position.

..... hours

(2)

(Total for Question 20 is 4 marks)

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21 The diagram shows a cuboid *ABCDEFGH*.

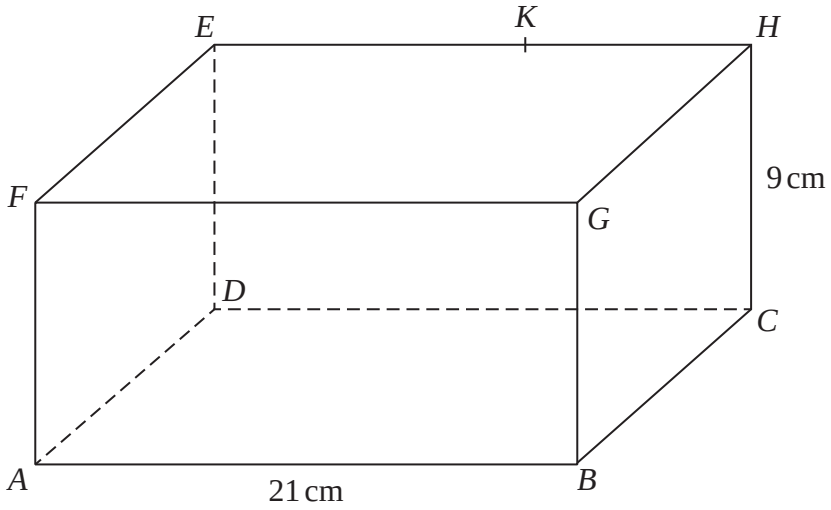

Diagram **NOT** accurately drawn

AB = 21 cm and *CH* = 9 cm.
K is the point on *EH* such that angle *AKB* = 68° and *BK* = 16.5 cm.

(a) Calculate the size of angle *BAK*.
Give your answer correct to 1 decimal place.

.....°

(3)

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(b) Calculate the size of the angle between the line *BK* and the plane *ABCD*.
Give your answer correct to 1 decimal place.

.....°

(2)

(Total for Question 21 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS

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