OCR
Oxford Cambridge and RSA

H

Wednesday 2 November 2016 – Morning

GCSE MATHEMATICS A

A501/02   Unit A (Higher Tier)

7234140248

Candidates answer on the Question Paper.

OCR supplied materials:
None

Other materials required:
* Scientific or graphical calculator
* Geometrical instruments
* Tracing paper (optional)

Duration: 1 hour

A50102
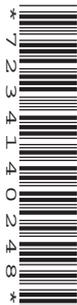
Candidate forename		Candidate surname	

| Centre number					Candidate number				

INSTRUCTIONS TO CANDIDATES

* Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
* Use black ink. HB pencil may be used for graphs and diagrams only.
* Answer **all** the questions.
* Read each question carefully. Make sure you know what you have to do before starting your answer.
* Your answers should be supported with appropriate working. Marks may be given for a correct method even if the answer is incorrect.
* Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
* Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

* 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 **60**.
* This document consists of **16** pages. Any blank pages are indicated.

> ☑ **You are permitted to use a calculator for this paper**

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Turn over

2
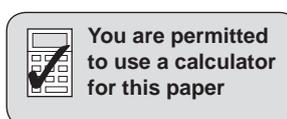
Formulae Sheet: Higher Tier

Area of trapezium $= \frac{1}{2}(a+b)h$
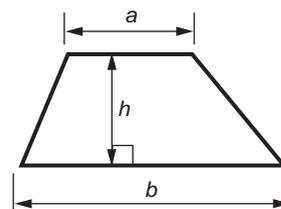
Volume of prism = (area of cross-section) × length
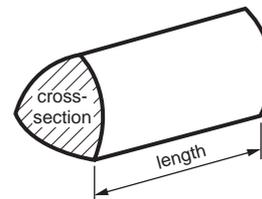
In any triangle *ABC*

**Sine rule** $\quad \dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

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

Area of triangle $= \frac{1}{2} ab \sin C$
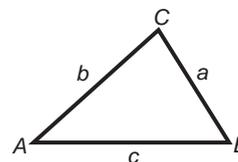
Volume of sphere $= \frac{4}{3}\pi r^3$

Surface area of sphere $= 4\pi r^2$
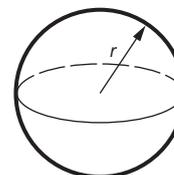
Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi rl$
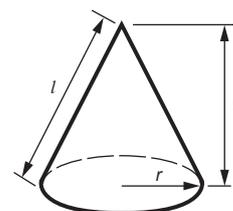
The Quadratic Equation

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

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

PLEASE DO NOT WRITE ON THIS PAGE

3
Answer **all** the questions.

1 Sarah and Abi share a flat.

(a) They pay the rent in the ratio Sarah : Abi = 250 : 300.

What **fraction** of the total rent does Sarah pay?
Give your answer in its simplest form.

(a) .... **[2]**

(b) Sarah and Abi share the heating bill in the ratio Sarah : Abi = 5 : 4.
Sarah pays £85.

Work out the total cost of the heating bill.

(b) £ .... **[3]**

Turn over

4

2 A website said that 600 billion pieces of *Lego* had been produced up to July 2015.
On average, this was 86 pieces for each person in the world.

Use this data to calculate how many people there were in the world in July 2015.
Give your answer in billions, correct to one decimal place.

.... billion **[2]**

3 **(a)** Express 84 as the product of its prime factors.

(a) .... **[2]**

(b) Find the least common multiple (LCM) of 84 and 30.

(b) .... **[3]**

6

4   **(a)** The area, *A*, of a trapezium is given by this formula.

$$A = \frac{1}{2}(a+b)h$$

Find *A* when $a = 3.2\,\text{cm}$, $b = 7.6\,\text{cm}$ and $h = 5.5\,\text{cm}$.

(a) .... cm² **[1]**

(b) Factorise completely.

$$12f + 16c - 4$$

(b) .... **[2]**

5 *In this question, use a ruler and a pair of compasses.*
Do not rub out your construction lines.

The scale drawing represents the positions of three towns, Angton (A), Balville (B) and Colhurst (C).

Pali wants to live

- nearer to B than A

- within 10 km of C.

On the scale drawing, construct and indicate clearly the region where Pali should look for a house.

Scale: 1 cm represents 2 km
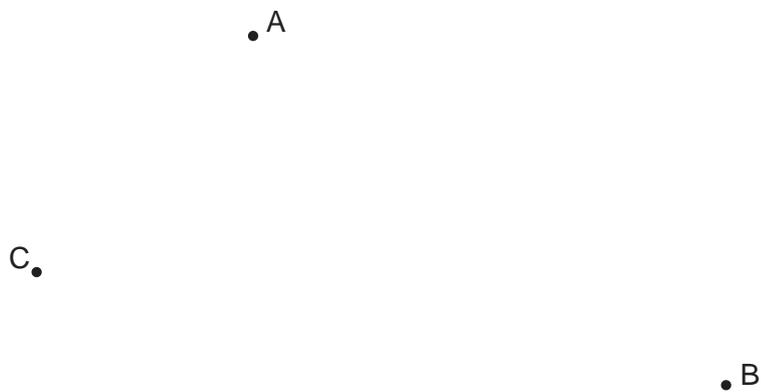
[4]

6 **(a)** Jean is at the Blackheath War Memorial.

Scale: 4 cm represents 1 km
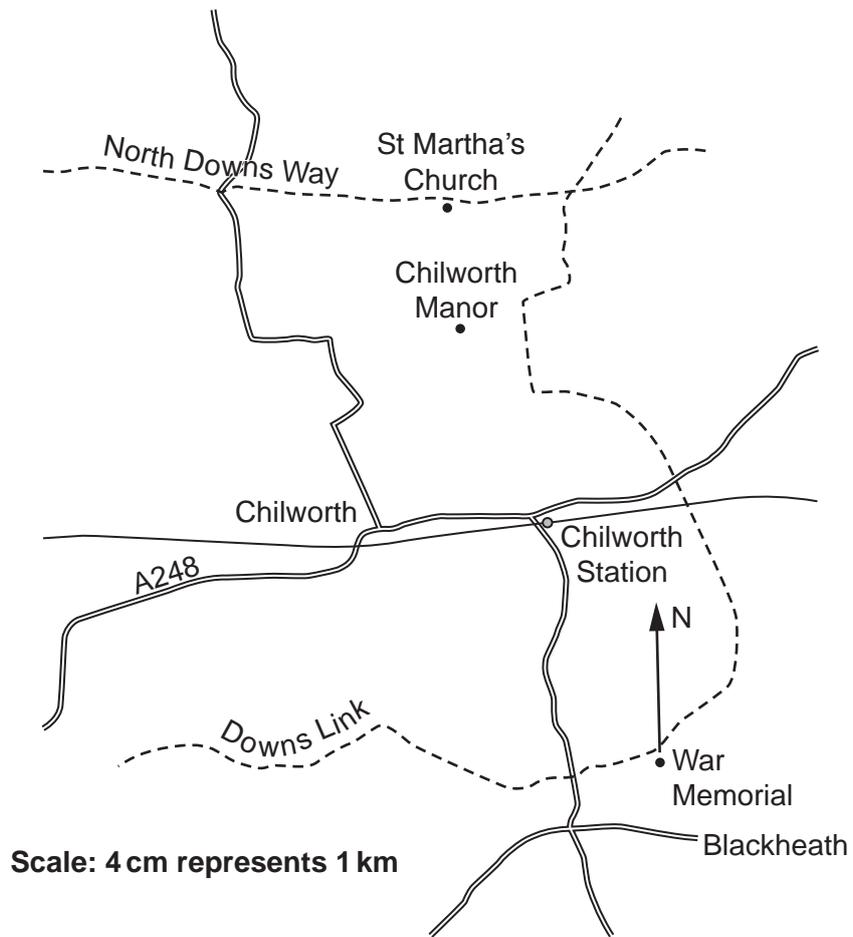
From the War Memorial she can see St Martha's Church.

(i) Measure the bearing of St Martha's Church from the War Memorial.

(a)(i) ....° **[1]**

(ii) Find the distance a bird would fly when going directly from the War Memorial to St Martha's Church.

(ii) .... km **[2]**

(b) Part of the Downs Link footpath goes up 35 m in a horizontal distance of 80 m, as shown in this sketch.

footpath

35 m

Not to scale

80 m
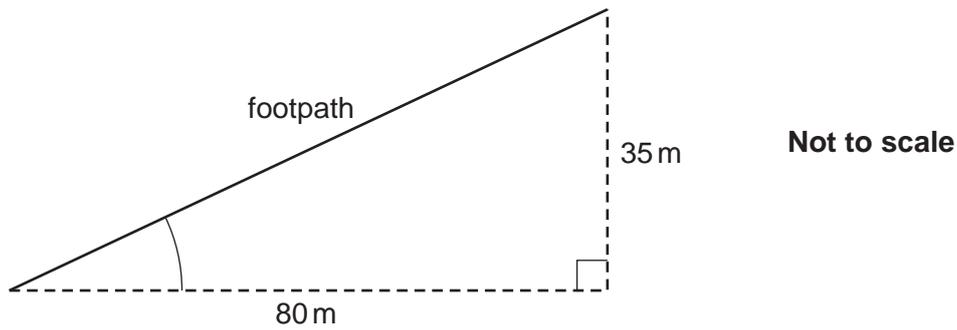
(i) Calculate the length of this part of the footpath.

(b)(i) .... m **[3]**

(ii) Calculate the angle between the footpath and the horizontal.

(ii) ....° **[3]**

Turn over

7 Members of a health club were asked how many hours they had spent in the gym in one particular week.
This table summarises their responses.

Time (*h* hours)	Frequency
$0 \leqslant h < 2$	10
$2 \leqslant h < 4$	21
$4 \leqslant h < 6$	24
$6 \leqslant h < 8$	15
$8 \leqslant h < 10$	8
$10 \leqslant h < 12$	3

Draw a frequency polygon to represent this information.
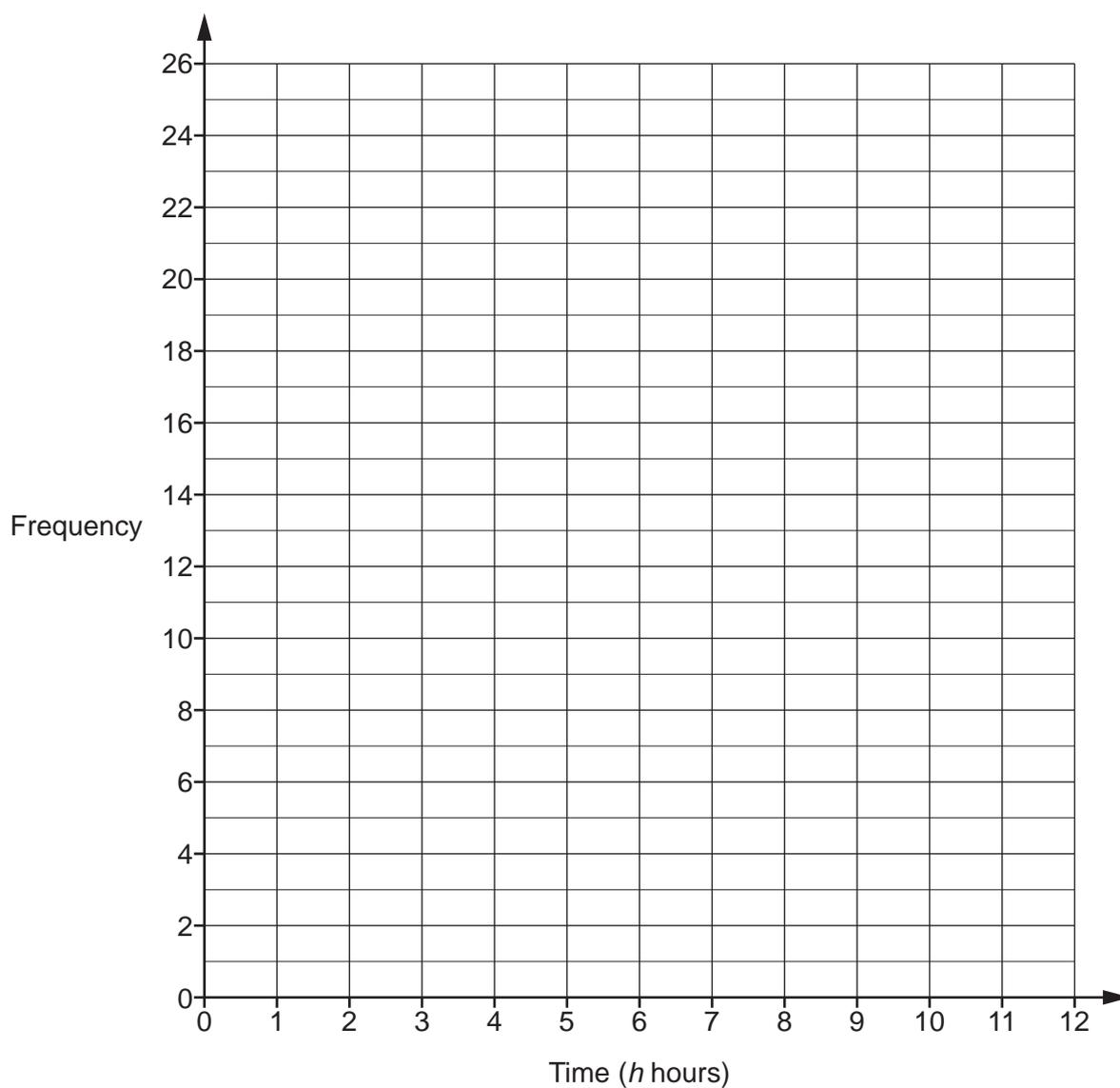
[3]

8 Solve these equations.

(a) $7x - 5 = 3(x + 4)$

(a) .... **[4]**

(b) $\dfrac{x^2}{9} = 16$

(b) .... **[3]**

Turn over

9 Pierre goes on the London Eye observation wheel.
T is the top of the wheel.
The wheel has centre O and radius 60 m.
The wheel takes 30 minutes to do one complete rotation.

Not to scale
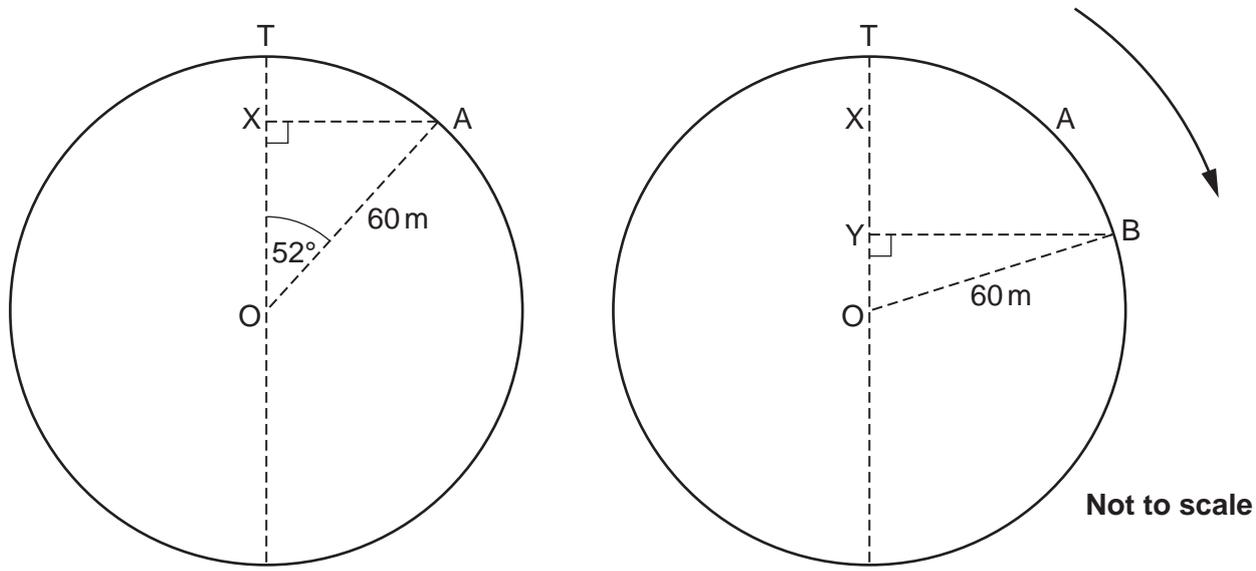
At 11:00, Pierre is at position A, where angle TOA is 52°.
Two minutes later, Pierre is at position B.

Calculate XY, the vertical distance that B is below A.

.... m **[6]**

10 Rearrange this formula to make *a* the subject.

$$R = 5(a^2 + b)$$

.. **[3]**

11   Some girls and boys were each given a puzzle to complete.

   (a) This information summarises the times taken by the girls to complete the puzzle.

Time (t minutes)	Frequency
$0 < t \leqslant 10$	2
$10 < t \leqslant 30$	11
$30 < t \leqslant 50$	27
$50 < t \leqslant 70$	14
$70 < t \leqslant 100$	6

   Draw a histogram to represent the results for the girls.

Frequency density
(people per minute)

Time (t minutes)

[4]
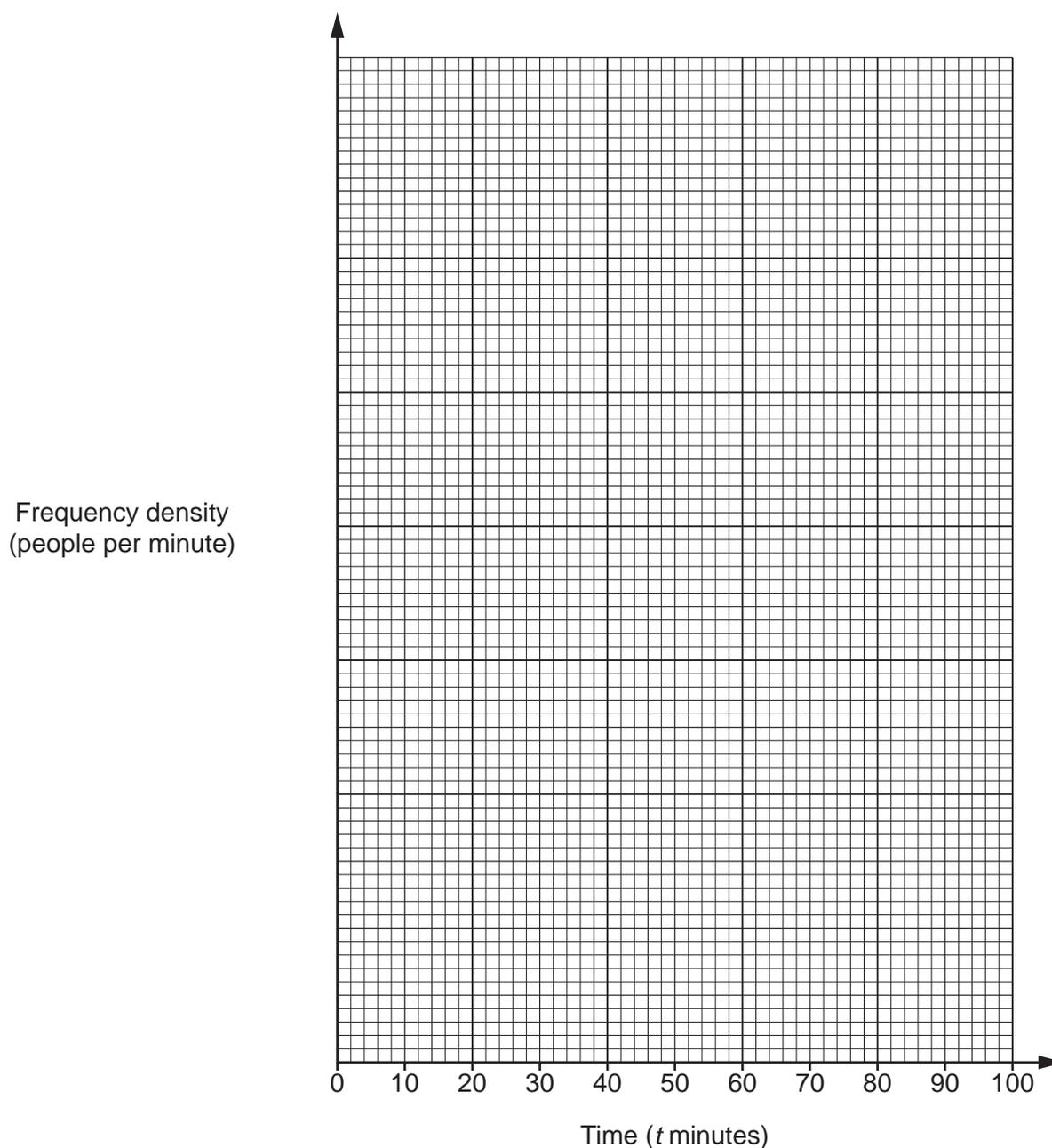
15

(b) This histogram represents the results for the boys.

Time (*t* minutes)
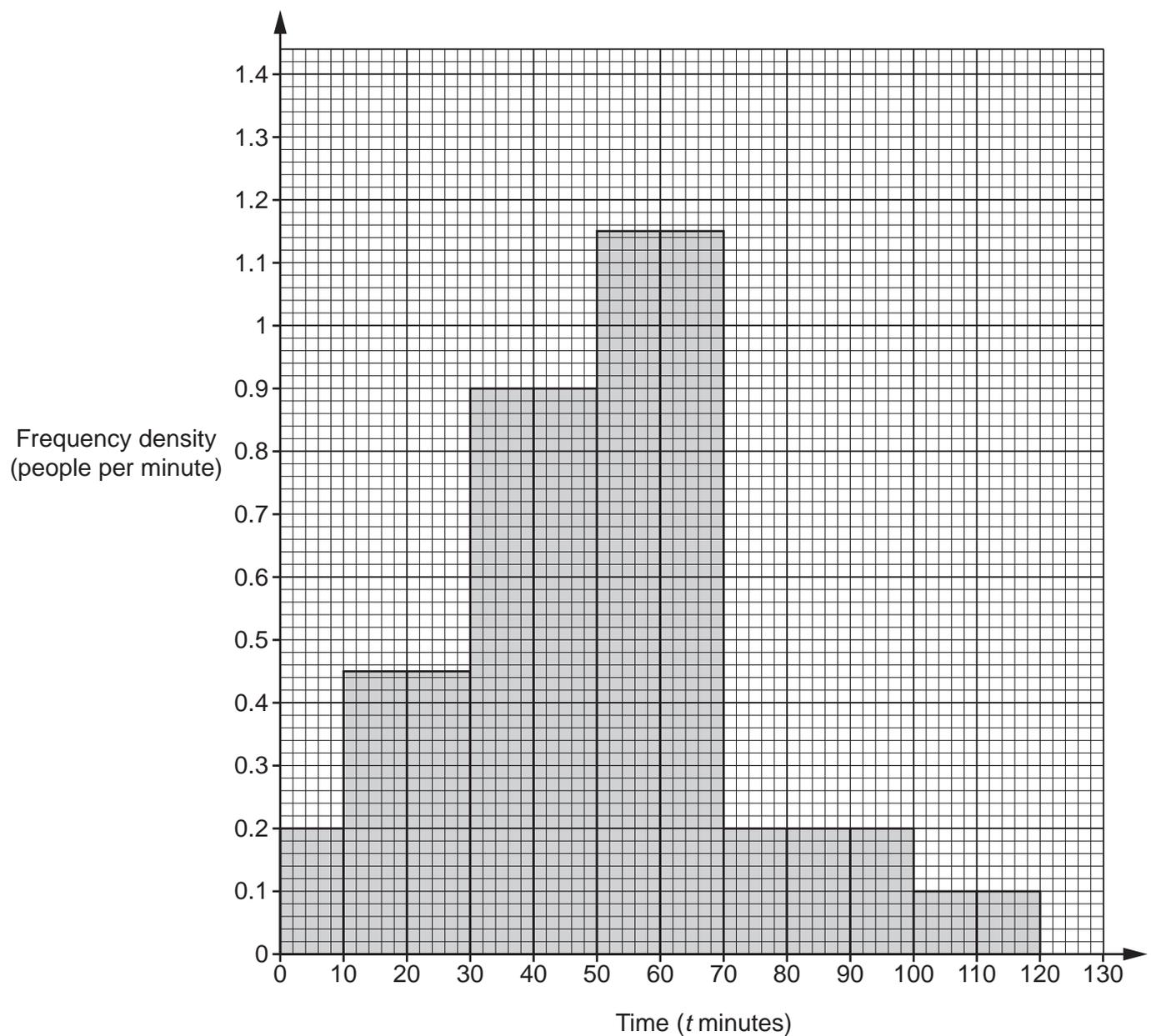
Make two comparisons between the distributions of the girls' times and the boys' times. Support each comparison with numerical or graphical evidence.

1 ....

....

....

2 ....

....

.... **[4]**

TURN OVER FOR QUESTION 12

12 You are given that

- $f(x) = cx + d$

- $f(0) = 5$

- $f(2x + 1) = 2cx + 3$.

(a) Find the value of *c* and the value of *d*.

(a) *c* = ...

d = ... **[4]**

(b) Hence find $f(8)$.

(b) .... **[1]**

END OF QUESTION PAPER

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