OXFORD CAMBRIDGE AND RSA EXAMINATIONS

GCSE

A501/02

MATHEMATICS A

Unit A (Higher Tier)

THURSDAY 21 MAY 2015: Morning

DURATION: 1 hour
plus your additional time allowance

MODIFIED ENLARGED

Candidate forename		Candidate surname	

Centre number					Candidate number				

Candidates answer on the Question Paper.

OCR SUPPLIED MATERIALS:

None

OTHER MATERIALS REQUIRED:

Scientific or graphical calculator
Geometrical instruments
Tracing paper (optional

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

READ INSTRUCTIONS OVERLEAF

INSTRUCTIONS TO CANDIDATES

Write your name, centre number and candidate number in the boxes on the first page. 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).
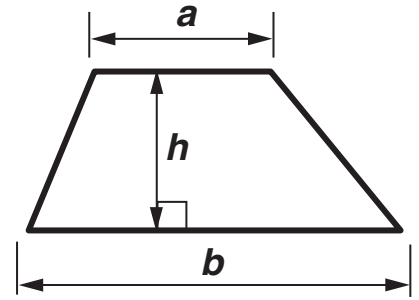
INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question.

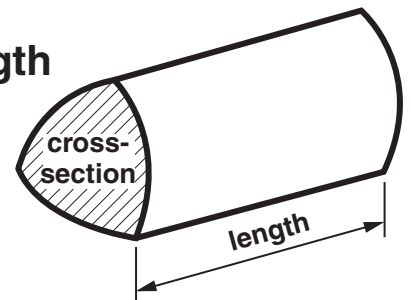The total number of marks for this paper is 60.

Any blank pages are indicated.

FORMULAE SHEET: HIGHER TIER

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

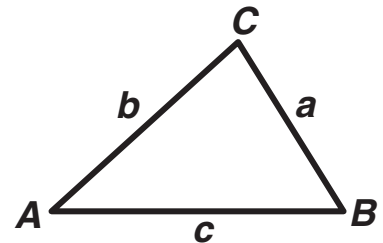**Volume of prism = (area of cross-section) × length**

In any triangle *ABC*

Sine rule $\quad \dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$
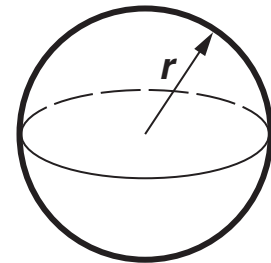
Cosine rule $\ a^2 = b^2 + c^2 - 2bc \cos A$
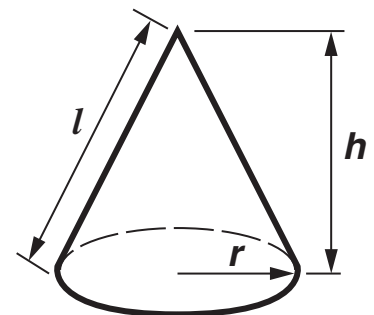
Area of triangle $= \frac{1}{2} ab \sin C$

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**

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

3

1 Samira and Joanne share their living costs in the ratio 3 : 2.

(a) The rent for their flat for a month is £700.

Work out how much of this rent they each pay.

(a) Samira £ _____

Joanne £ _____ [3]

(b) For one gas bill, Joanne pays £84 for her share.

How much was the whole gas bill?

(b) £ _____ **[3]**

2 Calculate.

(a) $\dfrac{13.72 - 8.96}{8.4 \times 6.4}$

Give your answer correct to 3 decimal places.

(a) _____ [2]

(b) $\sqrt{80.2^3 + 250}$

Give your answer correct to the nearest 100.

(b) _____ [2]

3 **(a)** When $a = -5$, $b = -2$ and $c = 6$, find the value of

(i) a^2,

(a)(i) _____ [1]

(ii) $1000b$,

(ii) _____ [1]

(iii) $\dfrac{a + c}{b}$.

(iii) _____ [1]

7

(b) Solve these equations.
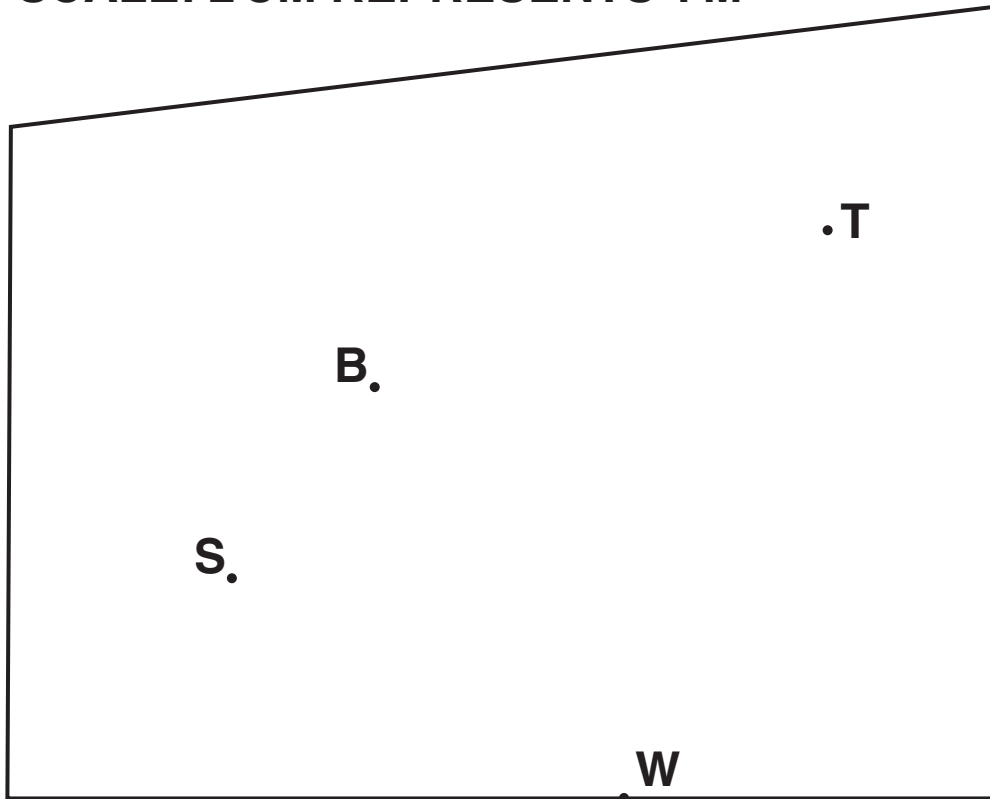
(i) $2(3x - 1) = 10x - 5$

(b)(i) _____ [4]

(ii) $x^2 - 4 = 60$

(ii) _____ [3]

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

This scale drawing shows Colin's garden.

SCALE: 2 CM REPRESENTS 1 M

·T

B.

S.

W

Colin wants to put a bird feeder in his garden. He wants it to be

up to 3 m from the tree T
up to 2 m from the bush B
 nearer to the water tap W than to the seat S.

Construct the region where Colin can put the bird feeder.
Label the region R. **[5]**

5 (a) The *n*th term of a sequence is 6*n* – 2.

Find the first three terms of this sequence.

(a) _____ _____ _____ [2]

(b) The *n*th term of another sequence is $5n^2$.

Is the number 1000 a term in this sequence?
Show how you decide.   [3]

6 (a) Form 11T had 30 students.
Sasha asked each of the students how many items they had downloaded the previous day.
This table summarises their responses.

Number of downloads	Frequency
0	4
1 – 5	2
6 – 10	8
11 – 15	7
16 – 20	6
21 – 25	2
26 – 30	1

(i) Write down the modal class.

(a)(i) _____ [1]

(ii) Calculate an estimate of the mean number of downloads.

(ii) _____ **[4]**

(b) Sasha decides to ask a random sample from the whole school how many items they had downloaded the previous day.
This sample is to be representative of the different year groups.
She decides to use a sample size of 50.

Here are the numbers in each year group.

Year	Number of students
7	155
8	170
9	178
10	180
11	165
12	102
13	93
Total	1043

(i) Calculate how many Year 13 students should be in the sample.

(b)(i) _____ [2]

(ii) State one advantage and one disadvantage of Sasha using a larger sample size than 50.

Advantage: _____

_____

Disadvantage: _____

_____ **[2]**

7 **Paris, P, is 343 km from London, L.**
It is 294 km south of London.

N

NOT TO
SCALE

L

343 km

294 km

a

P
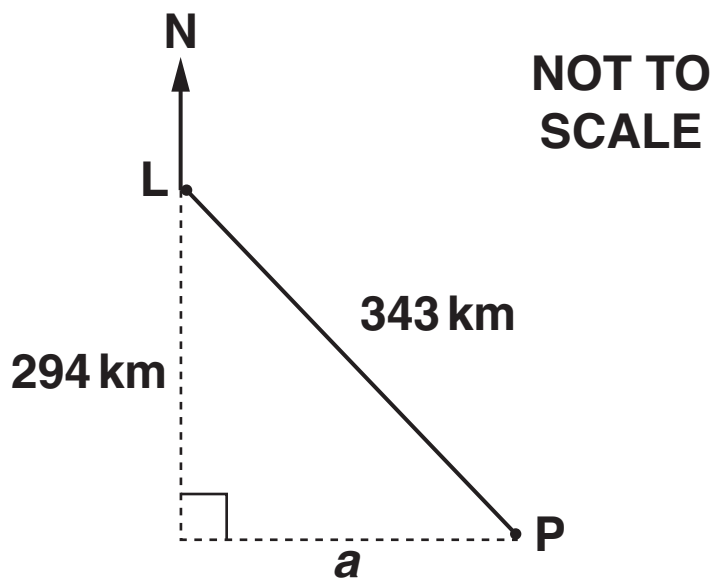
(a) Calculate _a_, the distance that Paris is east of London.

(a) _____ km [3]

(b) Calculate the bearing of Paris from London.

(b) _____° **[4]**

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

Construct the perpendicular to AB which passes through point C.

A

C

B
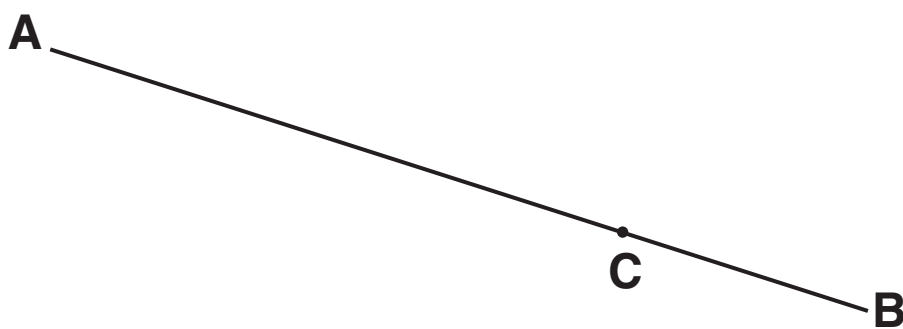
[2]

9 A travel agent did a survey about the amount spent per person on a week's holiday.

(a) This table summarises the amount spent on travel and accommodation.

Amount spent (£a)	Frequency
$0 \leqslant a \leqslant 100$	12
$100 < a \leqslant 300$	40
$300 < a \leqslant 500$	36
$500 < a \leqslant 1000$	86
$1000 < a \leqslant 1500$	66
$1500 < a \leqslant 2000$	10

Draw a histogram to represent this information on the grid opposite.
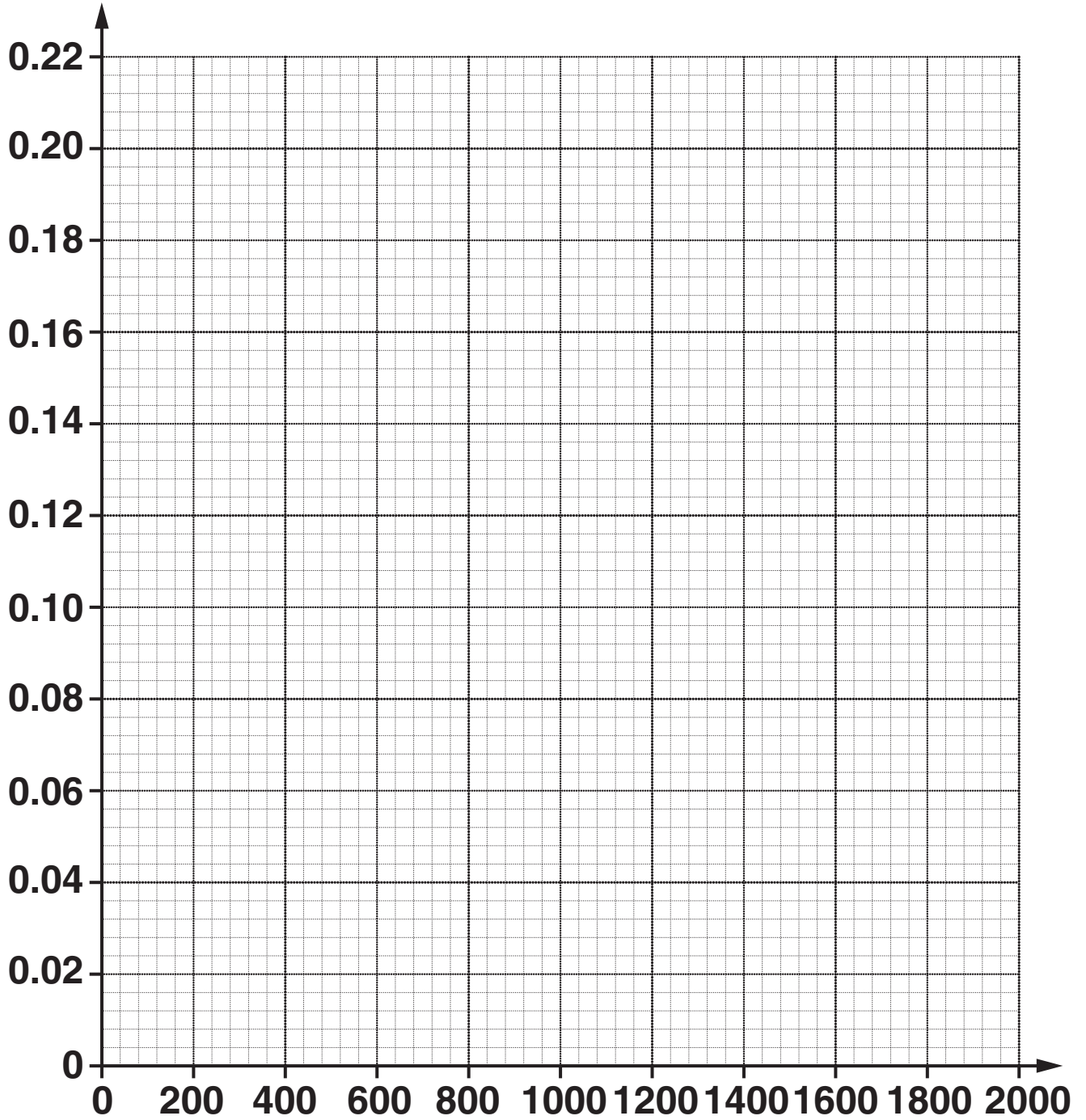
Frequency density (people per £) vs **Amount spent (£a)**

[3]

(b) The histogram opposite represents the amount spent on food, drink and entertainment.

How many people spent from £600 to £900 on food, drink and entertainment?

(b) _____ [1]

(c) The travel agent totalled the amounts spent by each person on travel and accommodation and on food, drink and entertainment to work out their total spending on a holiday.
The travel agent said

The person who spent most on their holiday spent £3100 altogether.

Explain how this is possible, given the data in parts (a) and (b).

_____

_____

_____ [1]

Frequency density (people per £)

Amount spent (£)

21
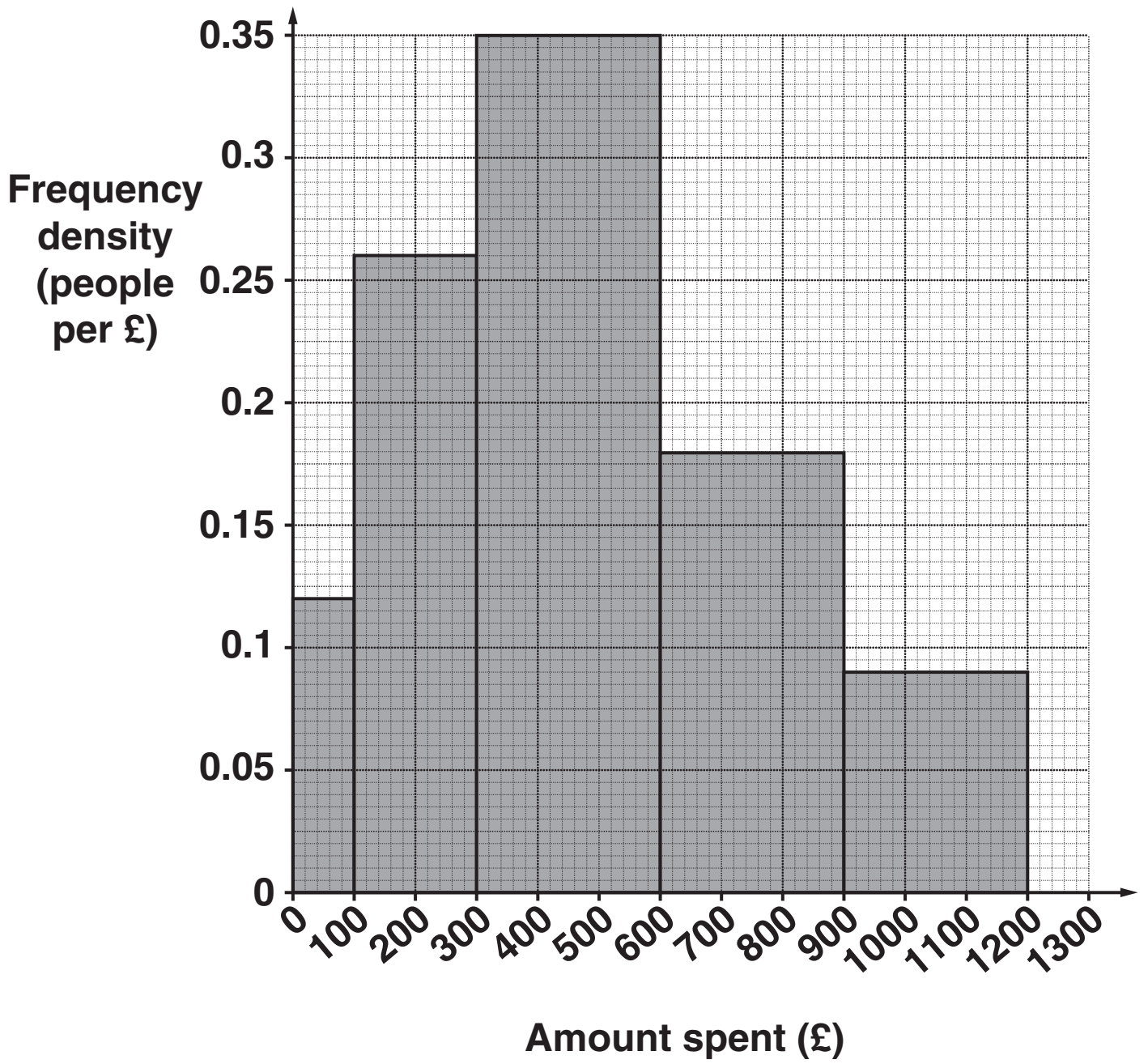
10 (a) Rearrange this formula to make *a* the subject.

$$5(a + b) = 2ab$$

(a) _____ [4]

(b) You are given that f(x) = 2x – 5.

   (i) Find f(3.5).

                        (b)(i) _____ **[1]**

   (ii) Express f(3x + 4) in the form $ax + b$.

                        (ii) _____ **[2]**

END OF QUESTION PAPER

OCR

Oxford Cambridge and RSA