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| Candidate<br>forename |  | Candidate<br>surname |  |
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| Centre<br>number |  |  |  |  |  | Candidate<br>number |  |  |  |  |
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**OXFORD CAMBRIDGE AND RSA EXAMINATIONS  
GENERAL CERTIFICATE OF SECONDARY EDUCATION**

**A501/02**

**MATHEMATICS A**

**Unit A (Higher Tier)**

**MONDAY 13 JUNE 2011: Afternoon**

**DURATION: 1 hour**

**SUITABLE FOR VISUALLY IMPAIRED CANDIDATES**

**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**

**This paper has been pre modified for carrier language  
OCR is an exempt Charity**

**READ INSTRUCTIONS OVERLEAF**

## **INSTRUCTIONS TO CANDIDATES**

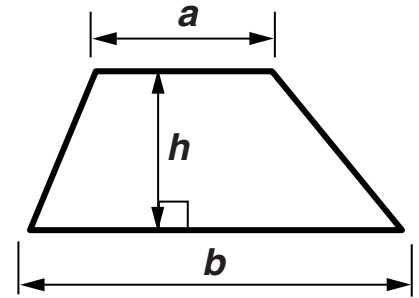
- **Write your name, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.**
- **Use black ink. Pencil may be used for graphs and diagrams only.**
- **Read each question carefully. Make sure you know what you have to do before starting your answer.**
- **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).**
- **Answer ALL the questions.**

## **INFORMATION FOR CANDIDATES**

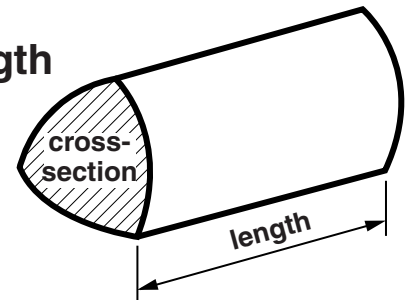
- **The number of marks is given in brackets [ ] at the end of each question or part question.**
- **The total number of marks for this paper is 60.**

# FORMULAE SHEET: HIGHER TIER

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



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

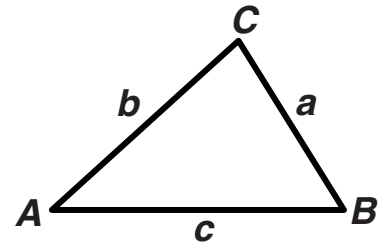


In any triangle  $ABC$

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

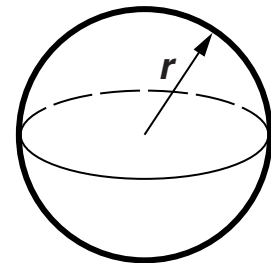
Cosine rule  $a^2 = b^2 + c^2 - 2bc \cos A$

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



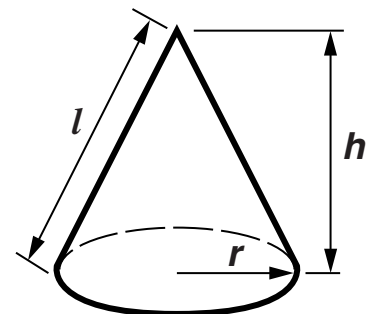
Volume of sphere =  $\frac{4}{3} \pi r^3$

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

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

**1 (a) Calculate.**

**(i)  $\frac{151.2}{16.8 + 5.6}$**

**(a)(i) \_\_\_\_\_ [1]**

**(ii)  $(2.6 + 5.9)^3$**

**(ii) \_\_\_\_\_ [1]**

**(b) Insert brackets to make this calculation correct.**

**2 + 3 × 2 + 7 = 29 [1]**

**(c) Vita calculated that, on average, students in her class took 3.85 minutes to complete a puzzle.**

**Write this average time in seconds.**

**(c) \_\_\_\_\_ s [2]**

- 2 Use a ruler and a pair of compasses to answer this question.  
Leave all your construction lines.**

**ABCD is a quadrilateral.  
Sides AB and BC have been drawn below.**



- (a) The other sides are AD and CD.  
AD = 9.5 cm and CD = 4.8 cm.**

**Complete the construction of quadrilateral ABCD. [2]**

- (b) Construct the bisector of angle B of the quadrilateral. [2]**

**3 Janet is planning a conference.  
The hotel charges £150 for the meeting room plus £70  
for each person who attends.**

**(a) Write a formula for the total charge, £ $C$ , when  $n$   
people attend a conference.**

**(a)  $C =$  \_\_\_\_\_ [2]**

**(b) Janet can afford a maximum total charge of £3300.**

**Write an equation and solve it to find the largest  
number of people that could attend.**

**(b) \_\_\_\_\_ [3]**

- 4 Tony's car will travel 42 miles on one gallon of petrol. One day he filled up his car with petrol costing 121.9p per litre.  
He then went on a 70 mile journey.

Calculate the cost of the petrol used on this journey.  
Use 1 gallon = 4.5 litres and show your method clearly.

£ \_\_\_\_\_ [4]



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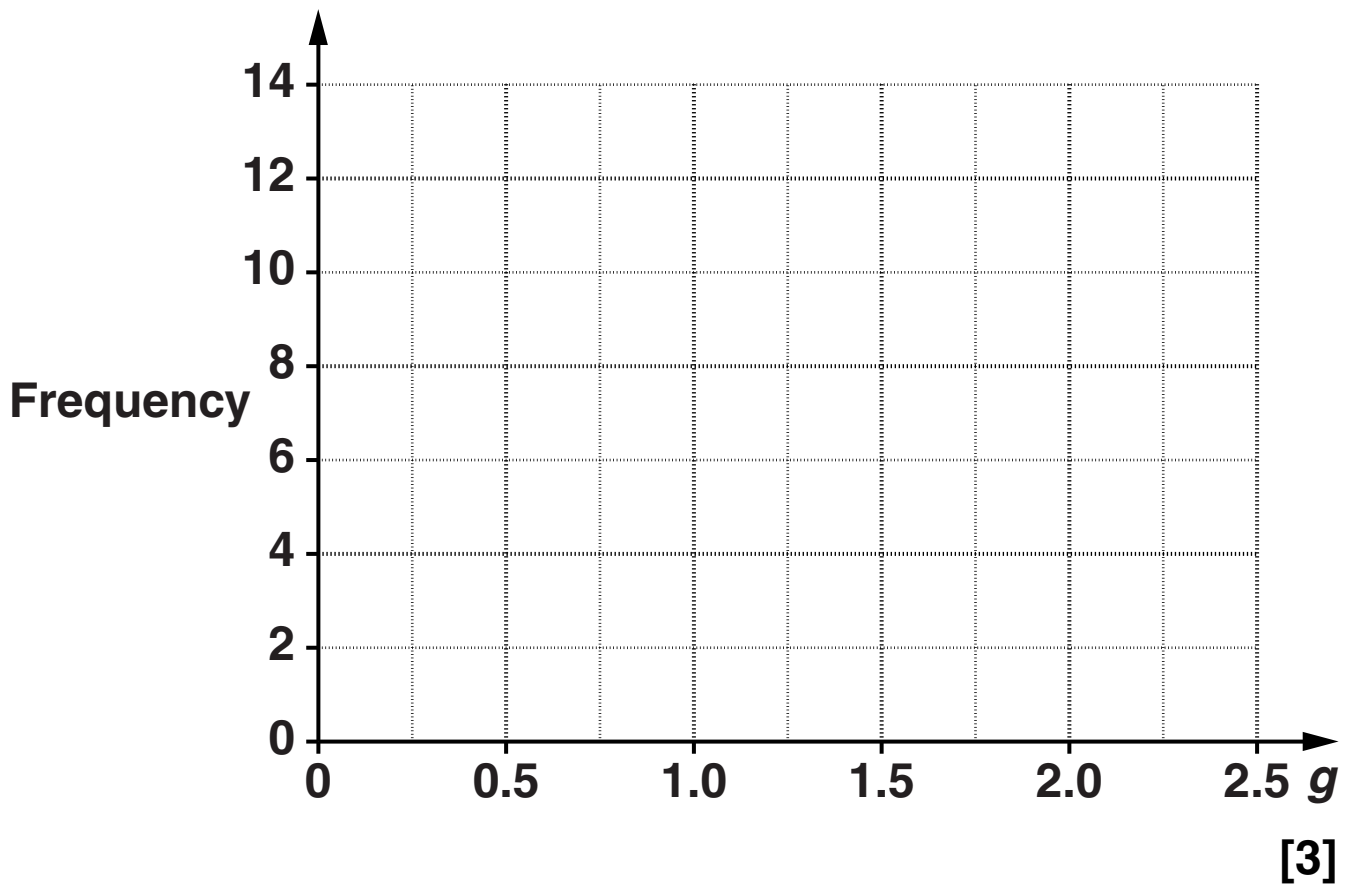
- 5 This table summarises the average number of goals scored by teams per game in the Football World Cup in 2010.

| Average number of goals scored by a team per game ( $g$ ) | Number of teams |
|---|-----------------|
| $0 \leq g < 0.5$  | 5               |
| $0.5 \leq g < 1.0$  | 7               |
| $1.0 \leq g < 1.5$  | 13              |
| $1.5 \leq g < 2.0$  | 5               |
| $2.0 \leq g < 2.5$  | 2               |

- (a) State the modal group for these data.

(a) \_\_\_\_\_ [1]

**(b) Draw a frequency polygon to represent the data.**



6 (a) The  $n$ th term of a sequence is  $\frac{n(n-1)}{2}$ .

(i) Work out the first term of this sequence.

(a)(i) \_\_\_\_\_ [1]

(ii) Work out the 10th term of this sequence.

(ii) \_\_\_\_\_ [1]

(b) Here are the first four terms of another sequence.

2

6

10

14

Write an expression for the  $n$ th term of this sequence.

(b) \_\_\_\_\_ [2]

**7 (a) Multiply out.**

$$2x(3x - 5)$$

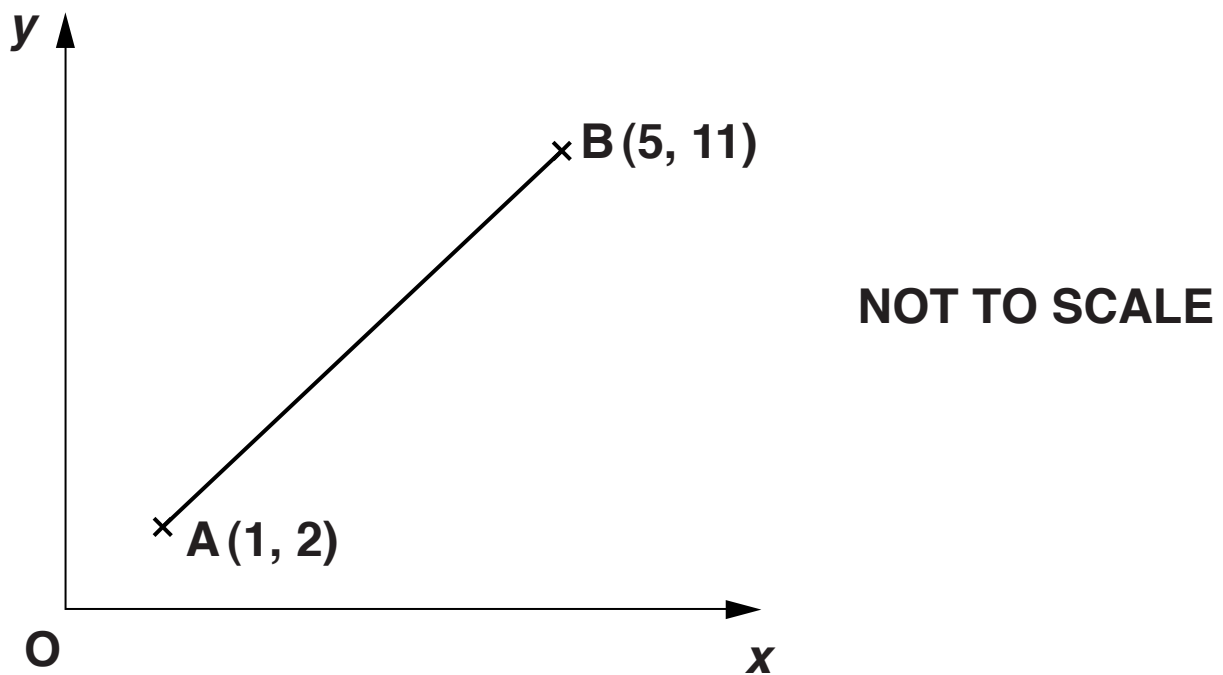
**(a)** \_\_\_\_\_ **[2]**

**(b) Factorise.**

$$10xy + 15y^2$$

**(b)** \_\_\_\_\_ **[2]**

- 8 Use the diagram below to answer the questions that follow.



- (a) Find the coordinates of the midpoint of AB.

(a) ( \_\_\_\_\_ , \_\_\_\_\_ ) [2]

**(b) Calculate the length of AB.**

**(b) \_\_\_\_\_ [4]**

9 *Pellow* and *Delta* are two varieties of potato. In a trial, 100 of each variety of potato were weighed. This cumulative frequency diagram on the page opposite, represents the results for the *Pellow* potatoes.

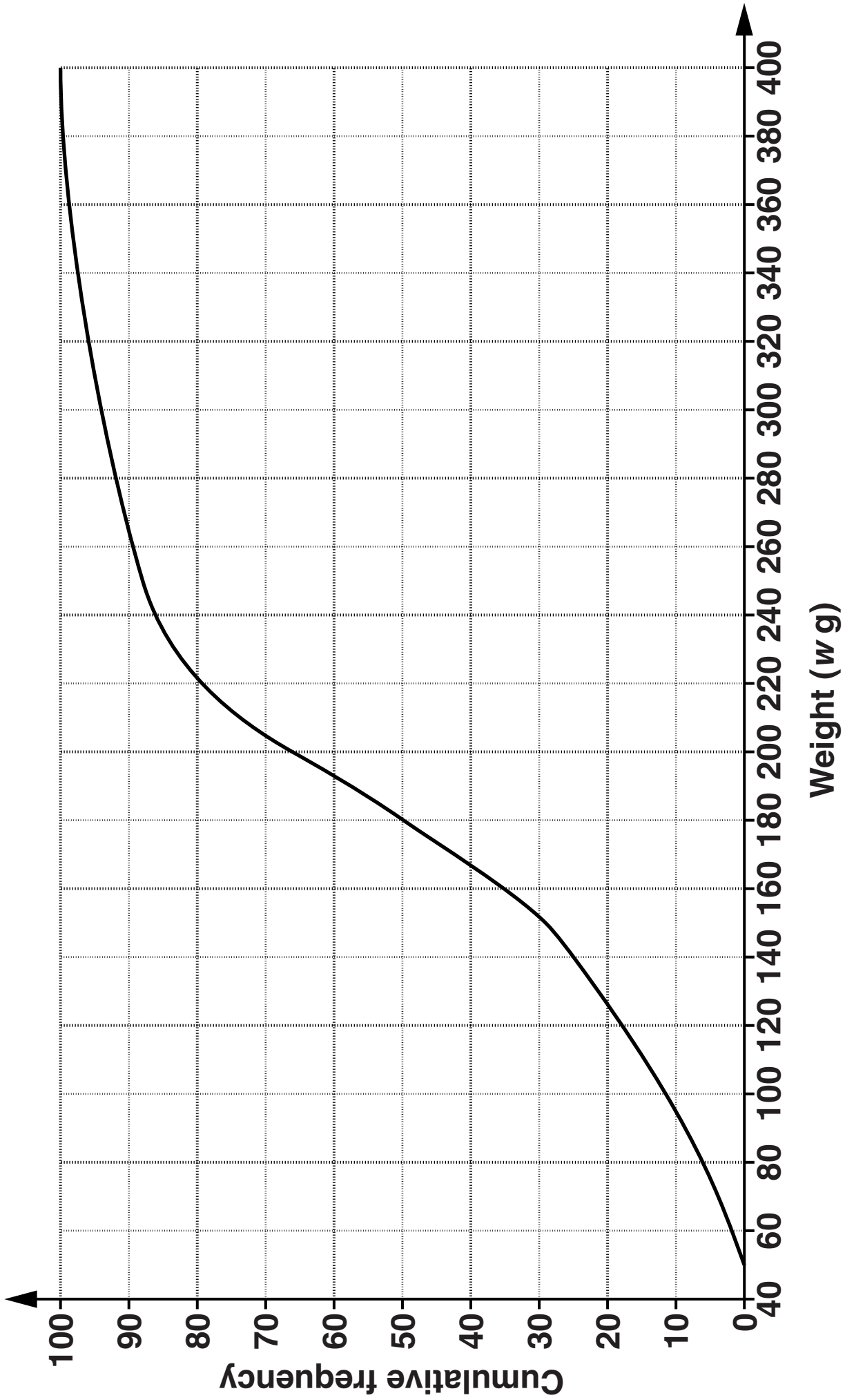
(a) (i) How many of this sample of *Pellow* potatoes weighed 250 g or more?

(a)(i) \_\_\_\_\_ [1]

(ii) Find the interquartile range for these 100 *Pellow* potatoes.

(ii) \_\_\_\_\_ g [2]





The box plot on the page opposite summarises the results for the *Delta* potatoes.

(b) For each of the following situations, recommend which of the two varieties should be used. State the evidence you use in your decision, giving NUMERICAL VALUES.

(i) Hazel needs potatoes which have a larger weight, on average.

Recommended variety \_\_\_\_\_

Reason \_\_\_\_\_

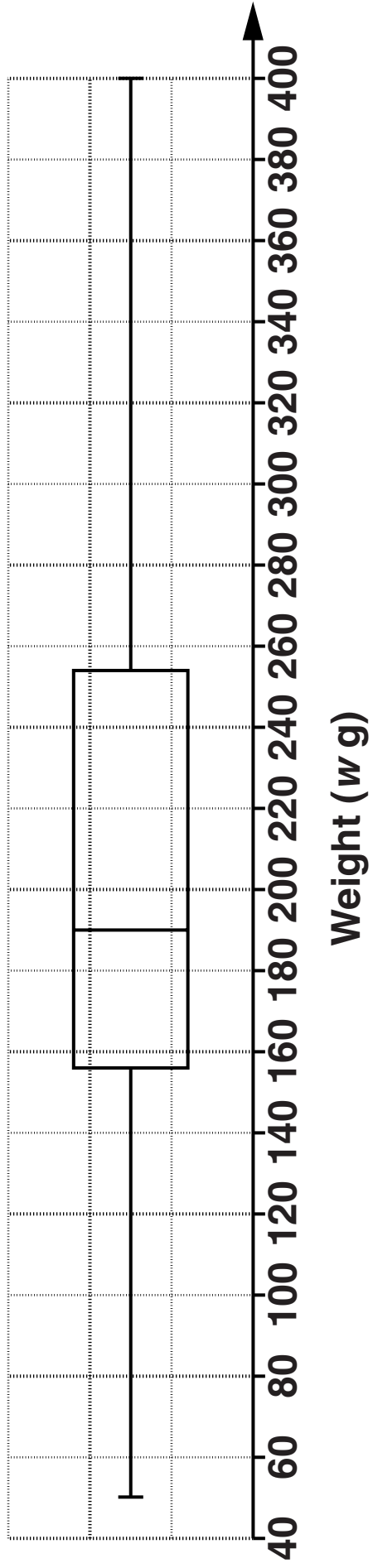
\_\_\_\_\_ [2]

(ii) Richard needs potatoes which are consistent in weight.

Recommended variety \_\_\_\_\_

Reason \_\_\_\_\_

\_\_\_\_\_ [2]



**10 (a) Rearrange the following to make  $c$  the subject.**

$$11a + 5c = d(6 + 2c)$$

**(a) \_\_\_\_\_ [4]**

**(b)  $f(x) = 5x - 12$ .**

**(i) Calculate  $f(4)$ .**

**(b)(i) \_\_\_\_\_ [1]**

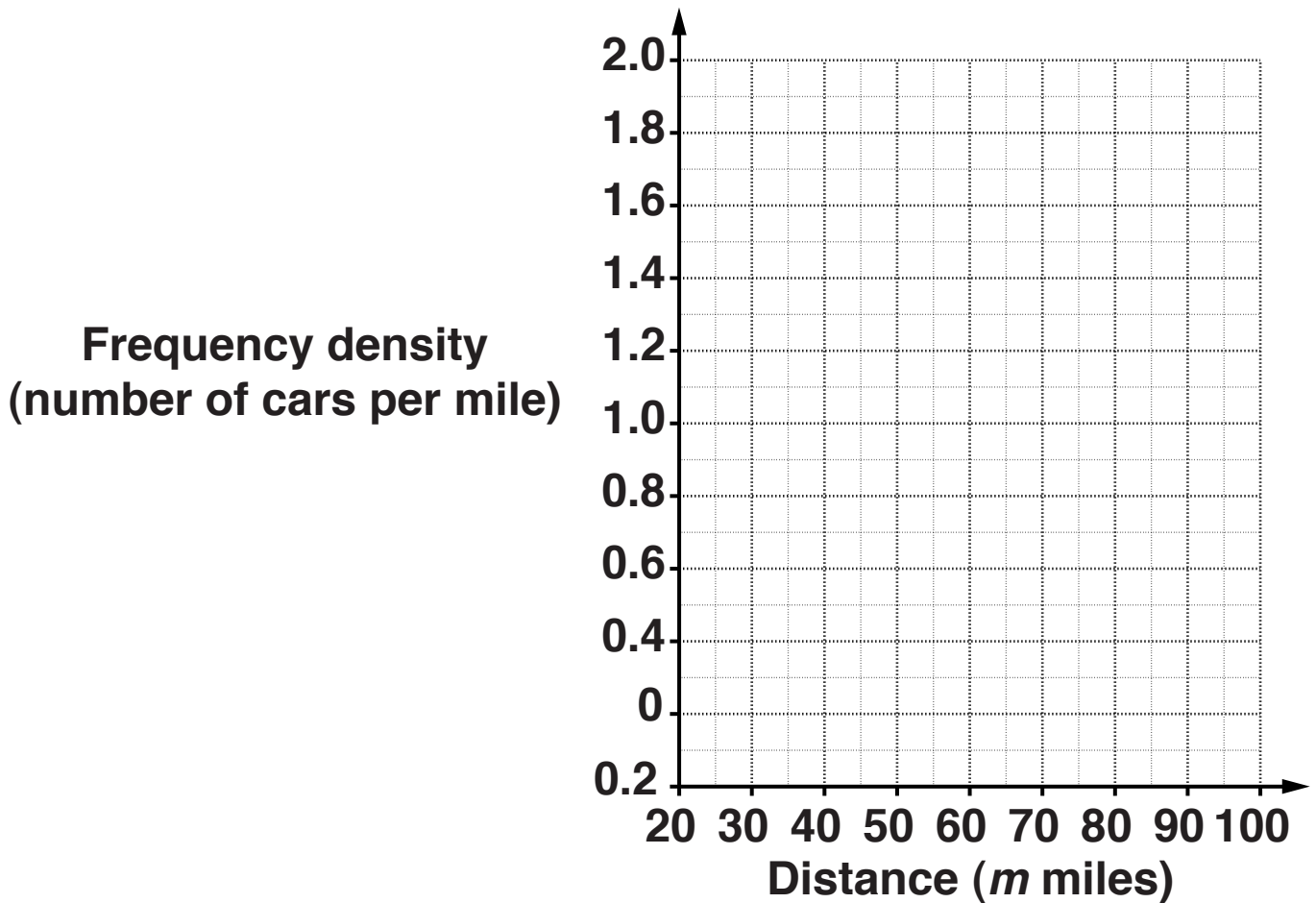
**(ii) Find  $f(x + 1)$ . Give your answer in the form  $ax + b$ .**

**(ii) \_\_\_\_\_ [2]**

11 The table summarises the distance, in miles, travelled on one gallon of fuel for 50 different cars.

| Distance ( $m$ miles) | Frequency |
|-----------------------|-----------|
| $20 \leq m < 30$      | 7         |
| $30 \leq m < 40$      | 16        |
| $40 \leq m < 45$      | 10        |
| $45 \leq m < 50$      | 5         |
| $50 \leq m < 70$      | 6         |
| $70 \leq m < 100$     | 6         |

Draw a histogram to represent this information.



[3]

**12 In triangle ABC,**

- **the sizes of the angles A, B and C are in the ratio 2 : 3 : 5,**
- **the length of the longest side is 6 cm,**
- **the angles add up to  $180^\circ$ .**

**Calculate the length of the shortest side of triangle ABC.**

**Use this to show that the ratio of the sides is not the same as the ratio of the angles.**

**[7]**

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