THIS IS A NEW SPECIFICATION

OCR
RECOGNISING ACHIEVEMENT

H

GENERAL CERTIFICATE OF SECONDARY EDUCATION

MATHEMATICS A

A501/02

Unit A (Higher Tier)

A511550611

Candidates answer on the question paper.

OCR supplied materials:
None

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

Monday 13 June 2011
Afternoon

Duration: 1 hour

A501102

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. 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.
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

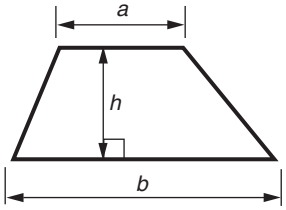
- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- The total number of marks for this paper is **60**.
- This document consists of **16** pages. Any blank pages are indicated.

You are permitted to use a calculator for this paper

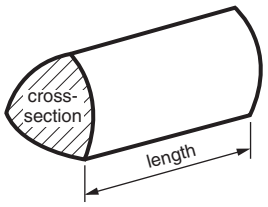
This paper has been pre modified for carrier language

Formulae Sheet: Higher Tier

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



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

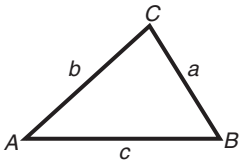


In any triangle *ABC*

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

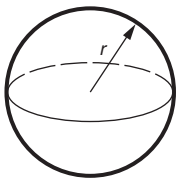
Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

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



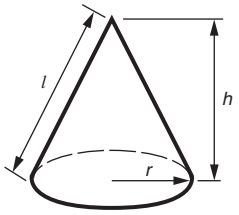
Volume of sphere $= \frac{4}{3}\pi r^3$

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

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

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1 **(a)** Calculate.

(i) $\dfrac{151.2}{16.8 + 5.6}$

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

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

(ii) _____ **[1]**

(b) Insert brackets to make this calculation correct.

$$2 + 3 \times 2 + 7 = 29$$ **[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]**

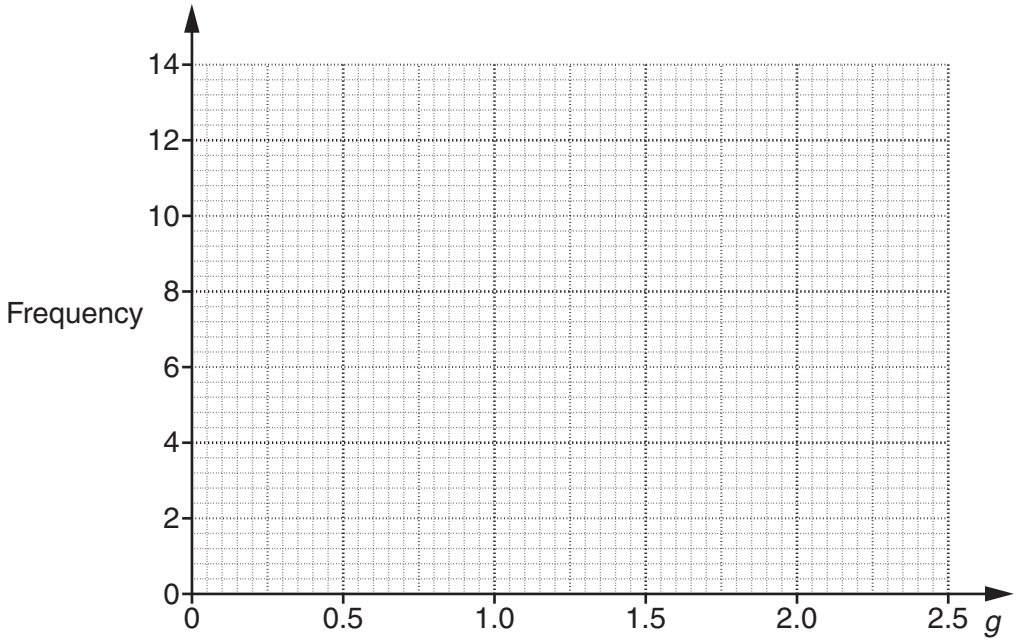
5 This table summarises the average number of goals scored by teams per game in the Football World Cup in 2010.

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

(a) State the modal group for these data.

(a) _____ **[1]**

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



[3]

6 **(a)** The nth 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 nth term of this sequence.

(b) _____ **[2]**

7 **(a)** Multiply out.

$2x(3x - 5)$

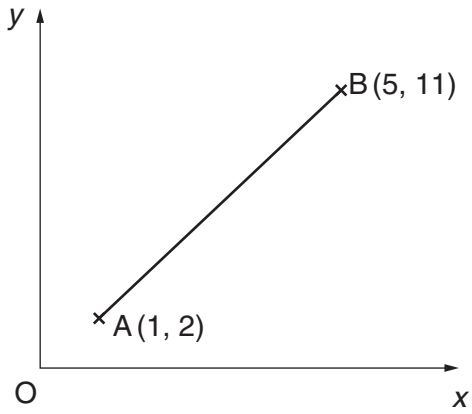
(a) _____ **[2]**

(b) Factorise.

$10xy + 15y^2$

(b) _____ **[2]**

8



Not to scale

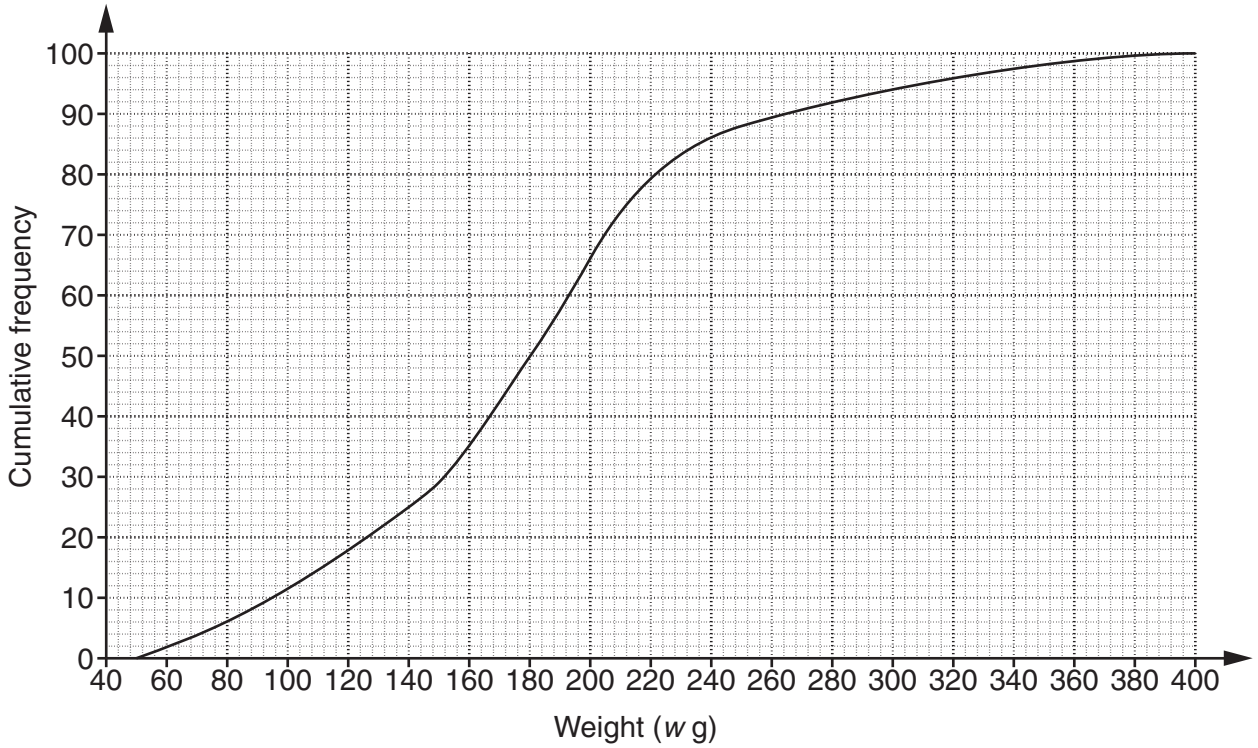
(a) Find the coordinates of the midpoint of AB.

(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 represents the results for the *Pellow* potatoes.



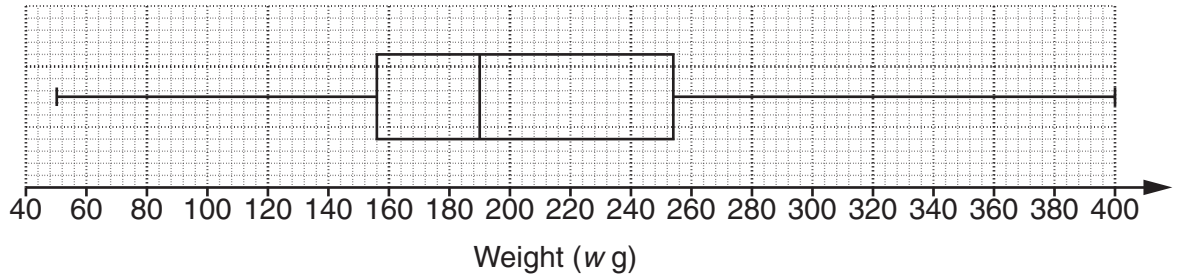
(a) (i) How many of this sample of *Pellow* potatoes weighed 250 g or more?

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

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

(ii) _____ g **[2]**

This box plot 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]**

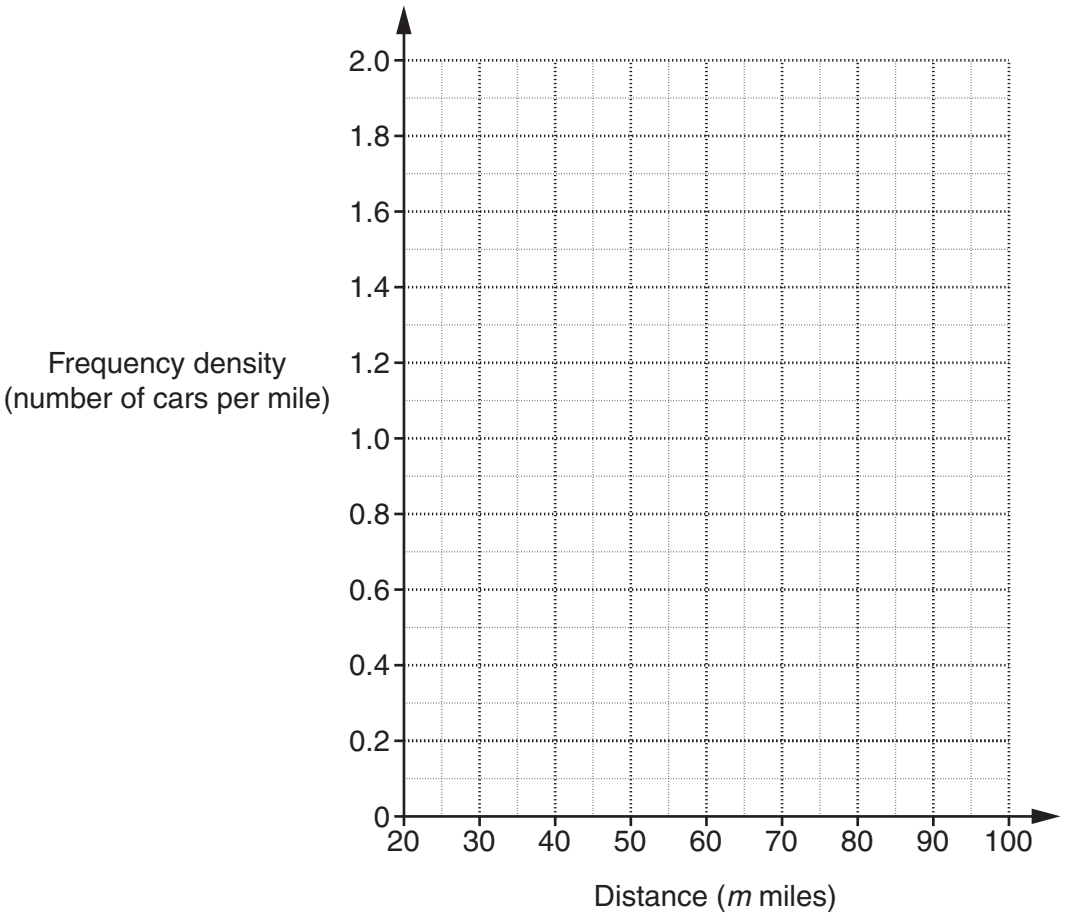
(ii) Find $f(x + 1)$. Give your answer in the form $ax + b$.

(ii) _____ **[2]**

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

Distance (m miles)	Frequency
$20 \leqslant m < 30$	7
$30 \leqslant m < 40$	16
$40 \leqslant m < 45$	10
$45 \leqslant m < 50$	5
$50 \leqslant m < 70$	6
$70 \leqslant m < 100$	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°.

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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