THIS IS A NEW SPECIFICATION

OCR
RECOGNISING ACHIEVEMENT

H

GENERAL CERTIFICATE OF SECONDARY EDUCATION

MATHEMATICS A

A501/02

Unit A (Higher Tier)

Candidates answer on the question paper.

OCR supplied materials:
None

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

Tuesday 9 November 2010
Morning

Duration: 1 hour

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

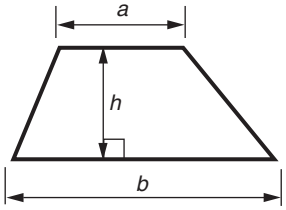
- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- The total number of marks for this paper is **60**.
- This document consists of **16** pages. Any blank pages are indicated.

You are permitted to use a calculator for this paper

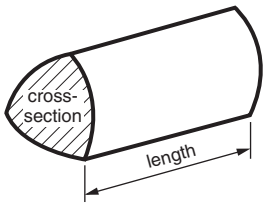
This paper has been pre modified for carrier language

Formulae Sheet: Higher Tier

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



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

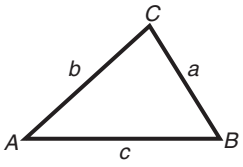


In any triangle *ABC*

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

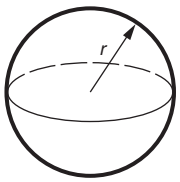
Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

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



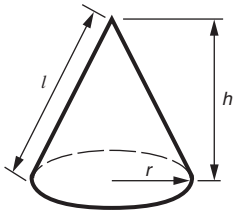
Volume of sphere $= \frac{4}{3}\pi r^3$

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

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

PLEASE DO NOT WRITE ON THIS PAGE

1 Sonja and Ben are gymnasts.

(a) On Tuesday Sonja practised for 40 minutes and Ben practised for 48 minutes.

Write the ratio of Sonja's practice time to Ben's practice time.
Give your answer in its simplest form.

(a) _____ **[2]**

(b) On Wednesday they spent a total of 140 minutes practising.
The ratio of Sonja's time to Ben's time was 4 : 3.

Work out how long they each spent practising on Wednesday.

(b) Sonja _____ minutes

Ben _____ minutes **[2]**

2 **(a)** Express 75 as the product of its prime factors.

(a) _____ **[2]**

(b) One set of traffic lights takes 75 seconds to complete its sequence.
Another set takes 120 seconds to complete its sequence.
Both sets turn green at precisely 2 pm.

How many seconds later do both sets next turn green at the same time?

(b) _____ seconds **[3]**

3 **(a)** Find the first three terms of the sequence whose nth term is $n^2 + 3$.

(a) _____ _____ _____ **[2]**

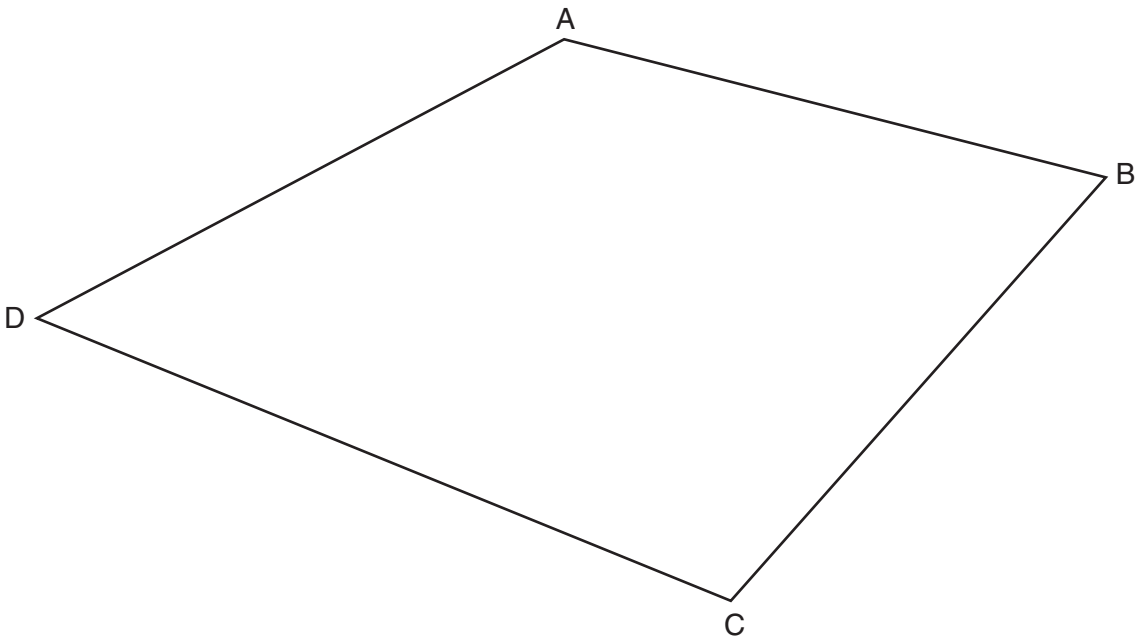
(b) Here are the first four terms of another sequence.

3 8 13 18

Write a formula for the nth term of this sequence.

(b) _____ **[2]**

4



(a) Using a ruler and a pair of compasses, construct the perpendicular bisector of AB and the perpendicular bisector of BC.
Label P, the point where these perpendicular bisectors cross. **[3]**

(b) Sumita says that P is the same distance from all the corners of the quadrilateral.

Is she correct?

_____ because _____

_____ **[1]**

5 Insert brackets to make these calculations correct.

(a) $6 + 2 \times 4 = 32$ **[1]**

(b) $6 + 2 \times 4 - 1 = 12$ **[1]**

(c) $6 + 2 \times 4^2 = 70$ **[1]**

6

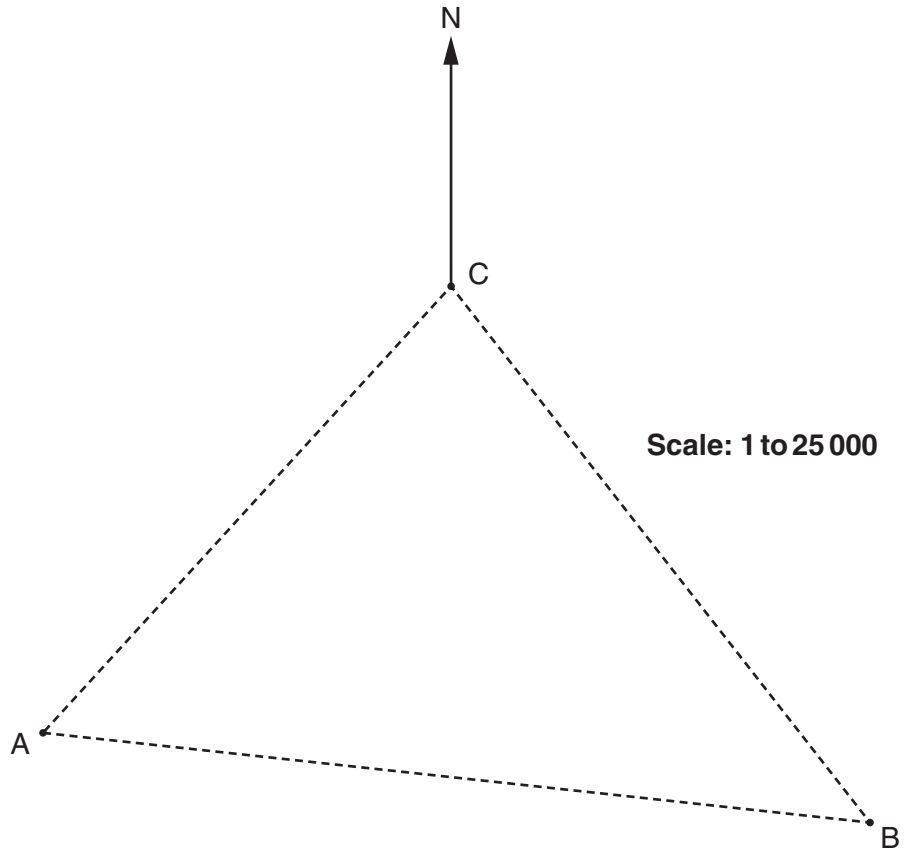
formula	expression	equation	identity

Write the correct word from the list above to describe each of the following.

$P = 2W + 2L$ $2(W + L) = 2W + 2L$

_____ _____ **[2]**

7 **(a)** This map shows three places A, B and C in some flat countryside.
They are joined by paths.



(i) By measuring, find the bearing of A from C.

(a)(i) _____ ° **[1]**

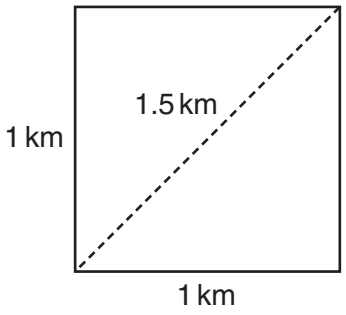
(ii) Ruth and Joy are planning a walk.
They want to start at A, walk to B, then to C and then to A along the paths shown.
Joy cannot walk more than 8 km.

Can Joy complete this walk?
Show how you decide.

(ii) _____ **[4]**

(b) A different map has a squared grid printed on it.
The distance between the gridlines represents 1 km.
A magazine for walkers gives this information to help estimate distances:

The distance across a diagonal of a square represents 1.5 km.



Use Pythagoras' theorem to calculate the length of a diagonal of a square and comment on the accuracy of the magazine's information.

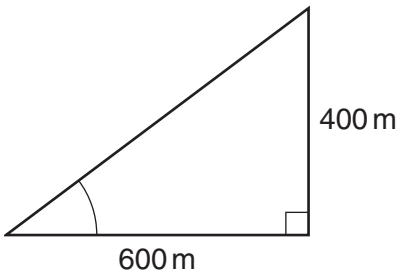
_____

_____ **[3]**

(c) Mike is walking up a path in hilly countryside.
The path increases in height by 400 m over a horizontal distance of 600 m, as shown on the diagram.

At the bottom of the path, Mike says:

It looks as if it goes up at 40° to the horizontal.



Not to scale

Calculate whether Mike's estimate is a good one.

_____

_____ **[3]**

8 **(a)** Solve.

(i) $3x + 7 = 15 - 2x$

(a)(i) _____ **[3]**

(ii) $\frac{8}{x} = 2$

(ii) _____ **[1]**

(iii) $3x^2 = 75$

(iii) _____ **[3]**

(b) Expand.

$4x(2x - 7)$

(b) _____ **[2]**

(c) Factorise.

$6 + 8x$

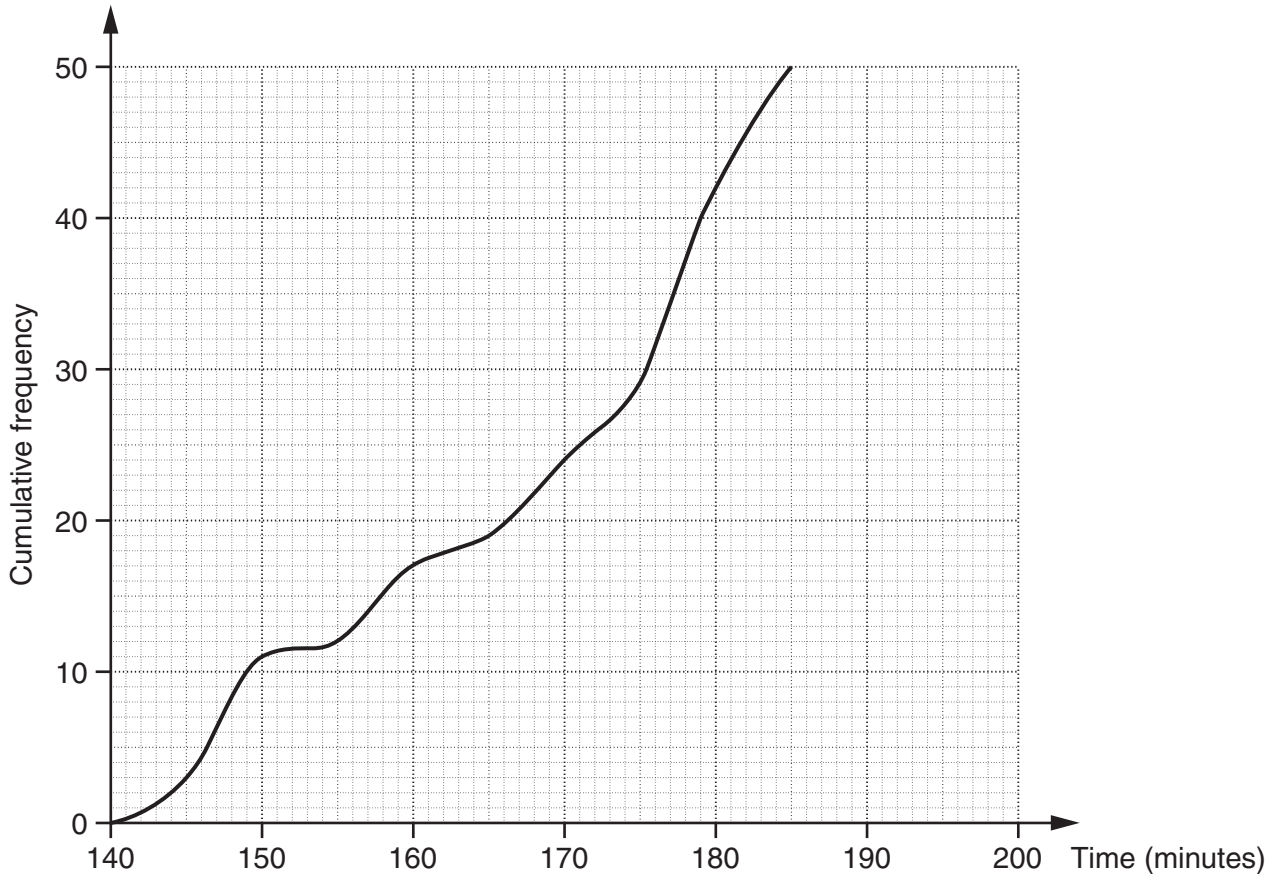
(c) _____ **[1]**

(d) Make x the subject of the following.

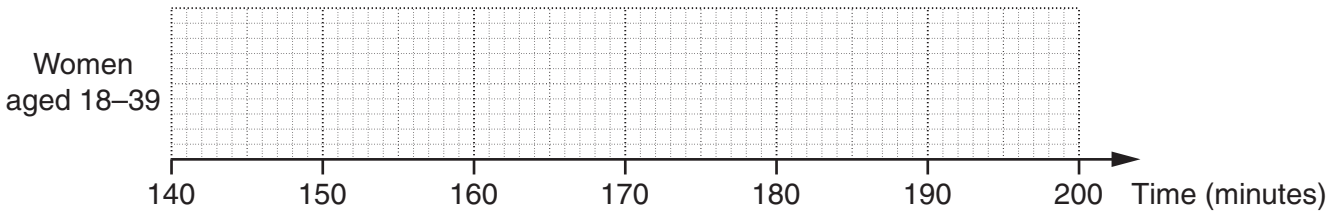
$x + 3 = 2a + bx$

(d) _____ **[4]**

9 This cumulative frequency graph represents the times of the first 50 women aged 18–39 to finish the London Marathon in 2009.

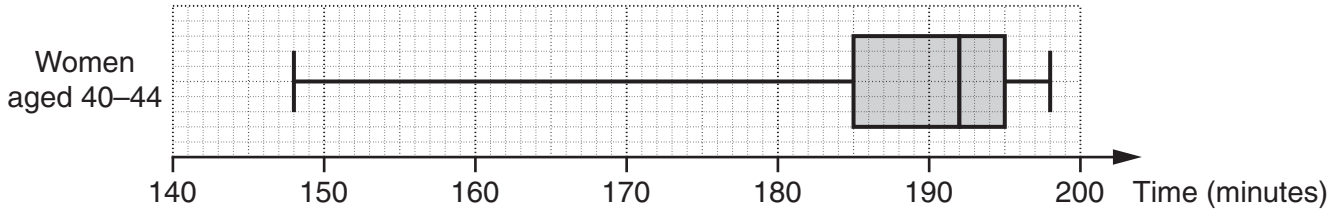


(a)



On the grid above, construct a box plot to represent this distribution. **[3]**

(b) The box plot below represents the times of the first 50 women aged 40–44 to finish the London Marathon in 2009.



Compare the average and spread of the two distributions.
Support your answers with numerical evidence.

1 _____

_____

_____

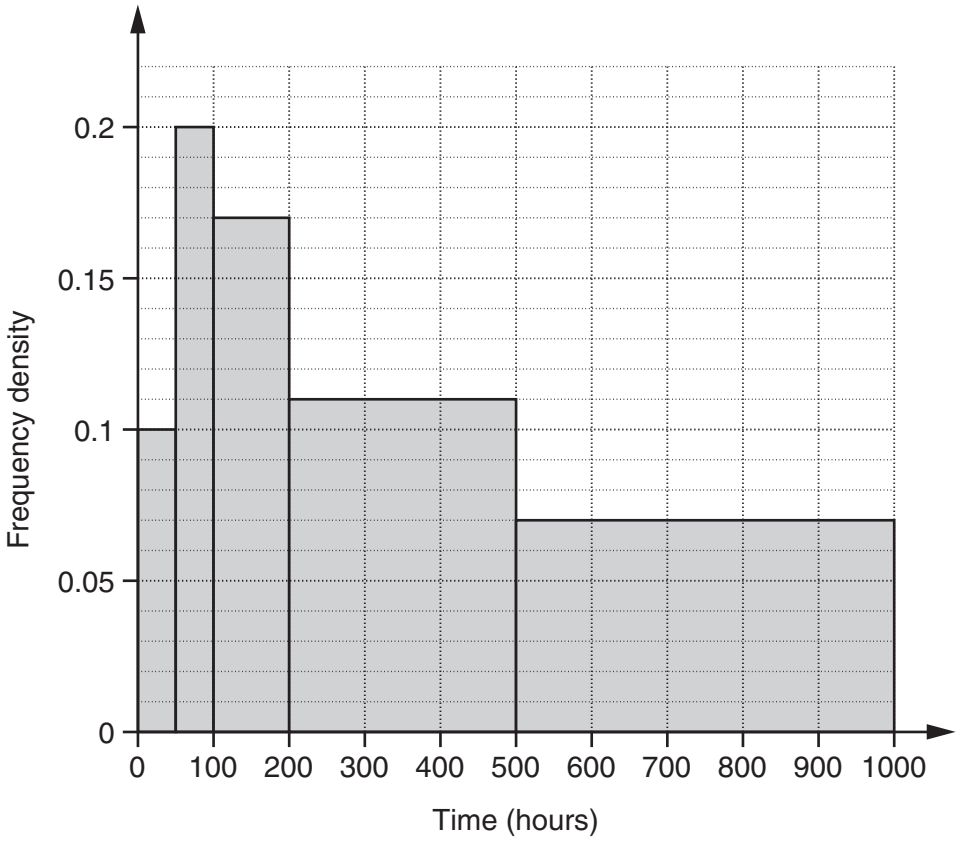
2 _____

_____

_____ **[4]**

TURN OVER FOR QUESTION 10

10 Some light bulbs were tested to see how long they lasted.
This histogram summarises the results for a sample of 100 light bulbs of one type.



The company which makes the light bulbs claims that the mean length of time the light bulbs last is over 400 hours.

(a) Complete the frequency distribution, and then use calculations to show that this sample meets the company's claim.

Time (t hours)	Frequency
$0 \leqslant t < 50$	5
$50 \leqslant t < 100$	
$100 \leqslant t < 200$	

_____

_____

_____ **[5]**

(b) Explain why calculations using information about each of the individual light bulbs may show that the sample does not meet the company's claim.

_____

_____ **[1]**

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