OCR
RECOGNISING ACHIEVEMENT

H

## Monday 11 June 2012 – Afternoon

GCSE 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) |

Duration: 1 hour

A50102

INSTRUCTIONS TO CANDIDATES

| Candidate forename | | Candidate surname | |

| Centre number | | | | | Candidate number | | | | |
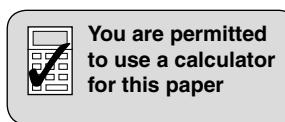
INSTRUCTIONS TO CANDIDATES

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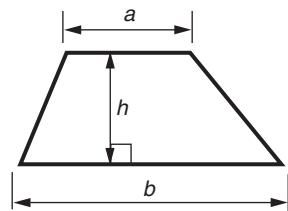
- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- The total number of marks for this paper is **60**.
- This document consists of **16** pages. Any blank pages are indicated.

You are permitted
to use a calculator
for this paper
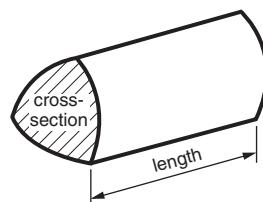
This paper has been pre modified for carrier language

OCR is an exempt Charity

Turn over

Formulae Sheet: Higher Tier

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

Volume of prism = (area of cross-section) × length
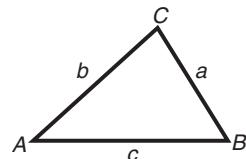
In any triangle *ABC*

Sine rule $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$
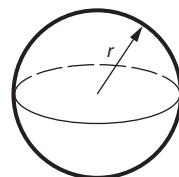
Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$

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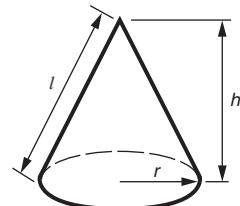
Volume of sphere $= \frac{4}{3}\pi r^3$

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

1 **(a)** Calculate.

$$\frac{4.6 + 9.37}{750.81}$$

Give your answer correct to 3 decimal places.

(a) _____ **[2]**

(b) Insert brackets to make each of these statements correct.

2 × 2 + 6 × 4 = 64

2 × 2 + 6 × 4 = 40

[2]

Turn over

2 (a) Express 90 as a product of its prime factors.

(a) _____ **[2]**

(b) A factory has a buzzer which sounds every 90 minutes.
It also has a bell which sounds every 150 minutes.
The buzzer and bell sound together at 9 am.

At what time do they next sound together?

(b) _____ **[3]**

3 **(a)** For one day's hire, *Carol's Coaches* charges 30p for each mile travelled, plus £120.

Write a formula for the charge, £*C*, for one day's hire from *Carol's Coaches* when *n* miles are travelled.

(a) _____ **[2]**

(b) (i) This is the formula for the charge, £*B*, for one day's hire from *Ben's Buses* when *n* miles are travelled.

$B = 0.4n + 80$

Ben's Buses charged an athletics club £110 for one day's hire.

How many miles did the bus travel that day?

(b)(i) _____ miles **[3]**

(ii) *Ben's Buses* asks the athletics club to complete a customer satisfaction survey. Here is one question in the survey.

Don't you think that your bus hire was good value for money?

Make one criticism of the question and write an improved version of the question.
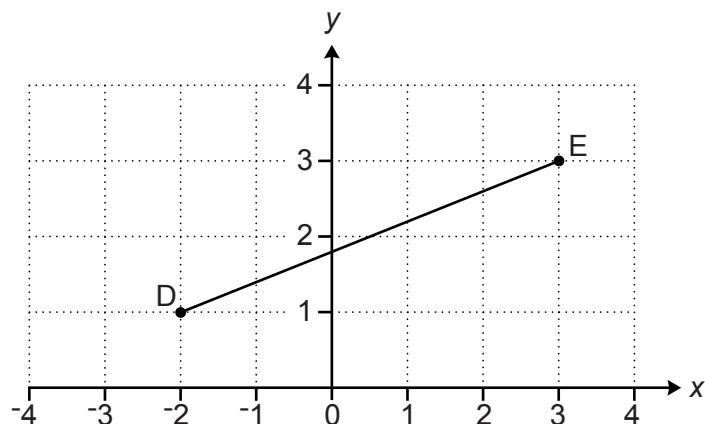
Criticism: _____

_____ **[1]**

Improved version: _____

_____

_____ **[1]**

Turn over

4 This is a grid of centimetre squares.

Calculate the length DE, giving your answer correct to 2 decimal places.

_____ cm **[5]**

5 *In this question, use a ruler and a pair of compasses.*
Leave in all your construction lines.

The scale drawing shows Steve's garden and part of his house.
Steve decides to put a pond in his garden.
He wants it to be
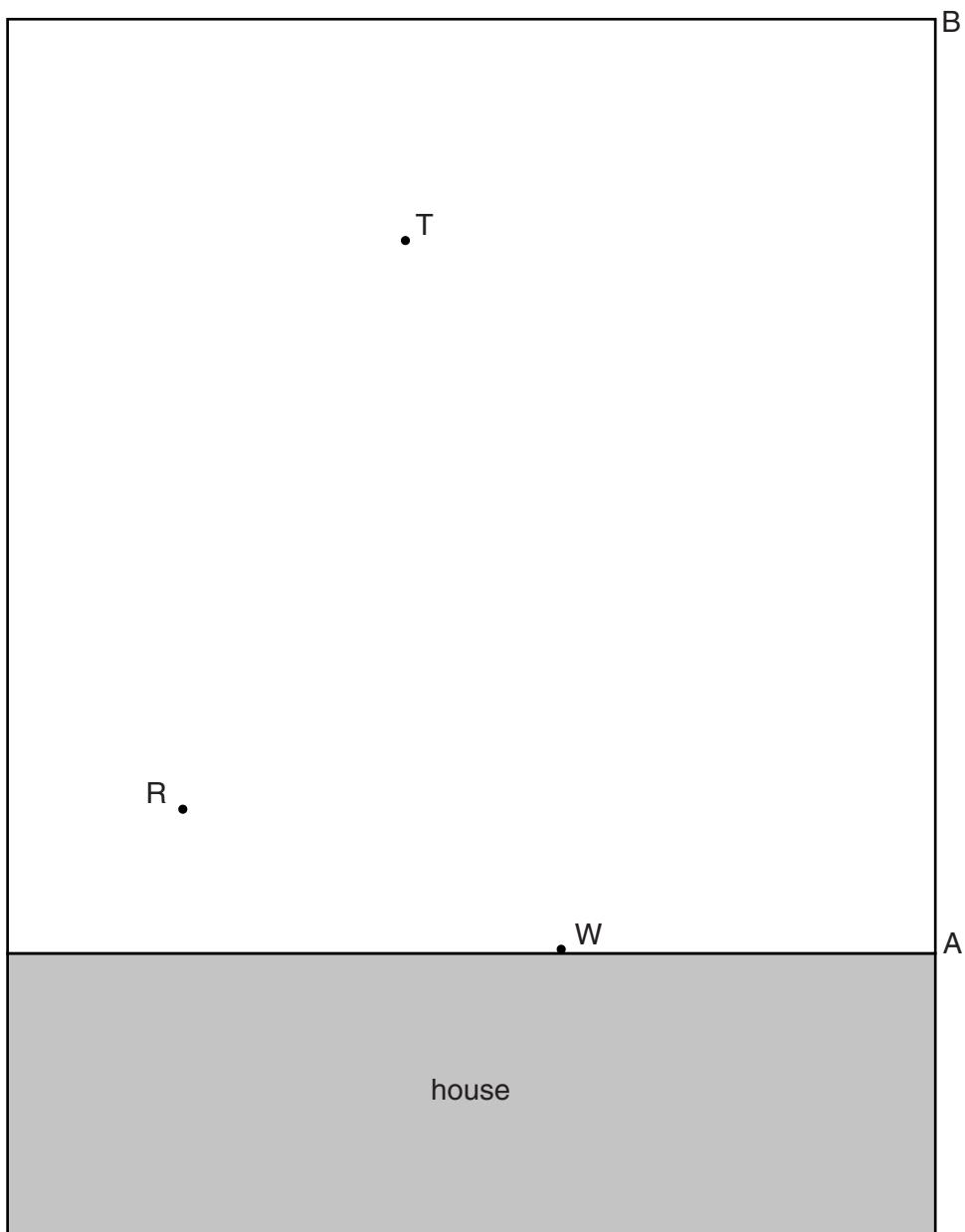
- at least 1.5 m from the rotary clothes dryer R
- at least 1.5 m from the hedge AB
- nearer to the watertap W than to the tree T.

Construct and shade the region where the pond can go.

Scale: 2 cm represents 1 metre.

B

.T

R .

. W   A

house

[5]

Turn over

6 A research project studied two different varieties of daffodil, A and B.
50 bulbs of each variety were grown.
For each bulb, the height of the top of the flower above the soil was measured.
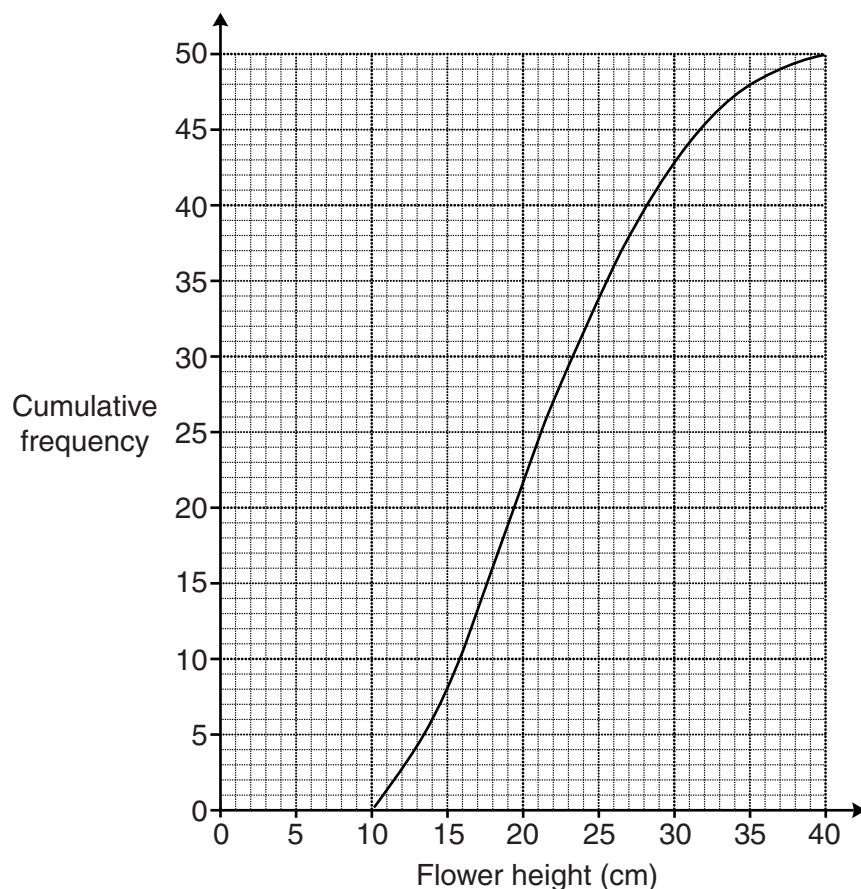
(a) This table summarises the results for variety A.

Flower height (h cm)	Frequency
$10 < h \leqslant 15$	14
$15 < h \leqslant 20$	20
$20 < h \leqslant 25$	11
$25 < h \leqslant 30$	5

Calculate an estimate of the mean flower height for variety A.

(a) _____ cm **[4]**

(b) This cumulative frequency diagram represents the results for variety B.

Use the cumulative frequency diagram to answer the following for variety B.

(i) How many bulbs had a flower height of 15 cm or less?

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

(ii) Find an estimate of the median flower height.

(ii) _____ cm **[1]**

(iii) Find an estimate of the interquartile range of the flower heights.

(iii) _____ cm **[2]**

Turn over

7 **(a)** Write a **number** in each box so that the following is an identity.

$$5x - 7(2x - 3) \equiv 6x + 3 - \boxed{}\, x + \boxed{}$$

<div align="right">

[2]

</div>

(b) Solve this equation.

$$\frac{5x + 4}{2} = x - 1$$

<div align="right">

(b) _____ **[3]**

</div>

(c) Solve this equation.

$$x^2 = 81$$

(c) _____ **[2]**

(d) Rearrange this formula to make p the subject.

$$H = \sqrt{10p + c}$$

(d) _____ **[3]**

Turn over

8   An aircraft flew from Amsterdam to Singapore.
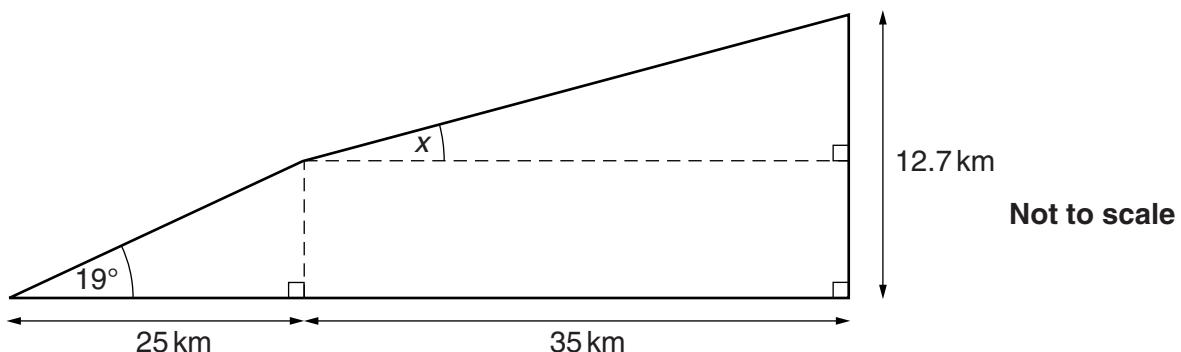
(a) On the flight there were 325 passengers.
The ratio   adults : children   on this flight was 23 : 2.

How many children were on this flight?

(a) _____ **[2]**

(b) As the aircraft left Amsterdam, at sea level, it climbed at an angle of 19° to the horizontal until it was above a point 25 km from Amsterdam.
It then changed the angle of climb until its height above sea level was 12.7 km.
The aircraft was then above a point a further 35 km from Amsterdam, as shown in the diagram.

Not to scale
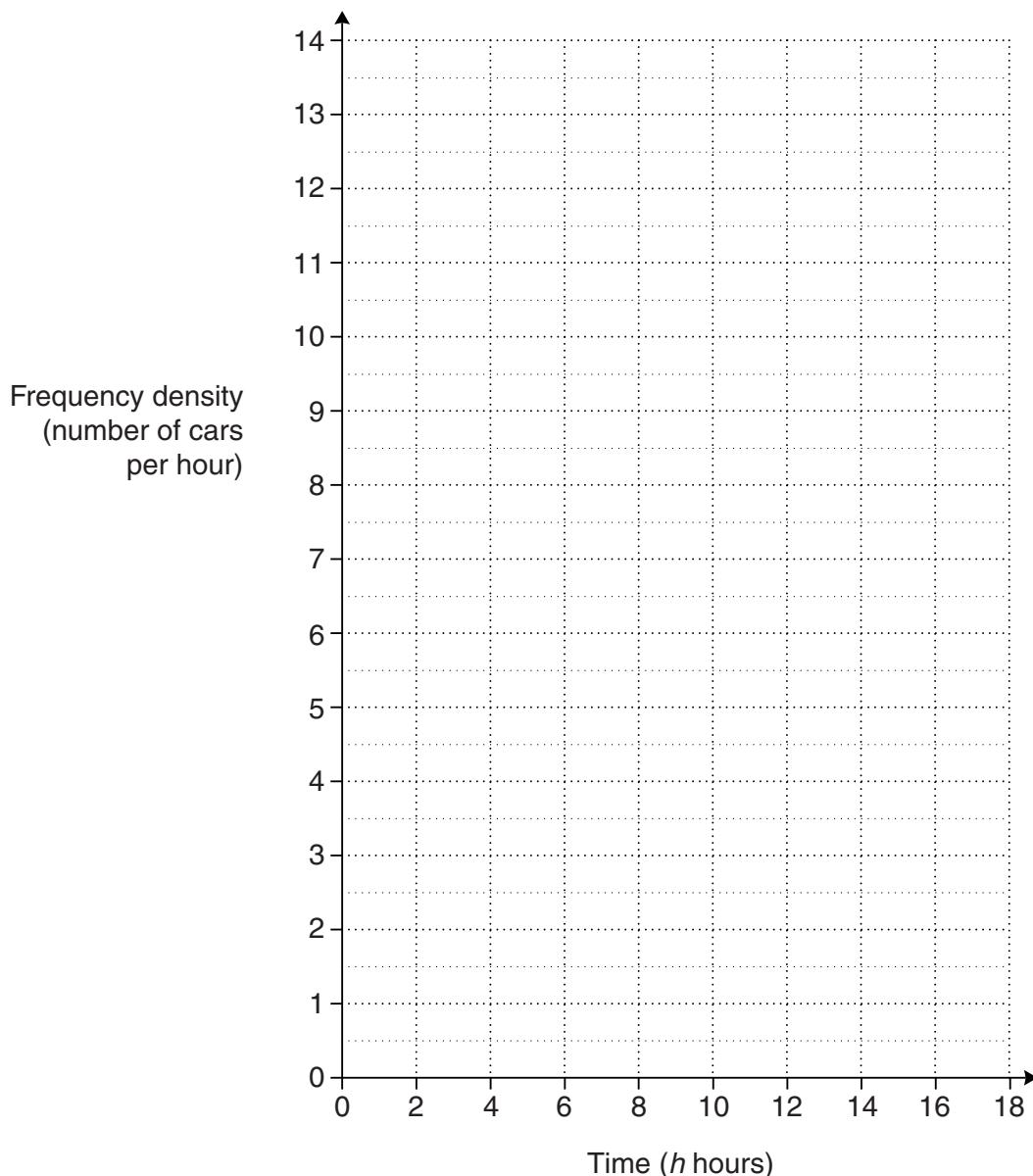
Calculate x, the angle of climb on the second stage of its journey.
Show your method clearly.

(b) _____ ° **[5]**

9 **(a)** This table summarises the lengths of time that cars were parked in Ayton station car park one day.

Time (*h* hours)	Frequency
$0 < h \leqslant 2$	7
$2 < h \leqslant 4$	12
$4 < h \leqslant 8$	36
$8 < h \leqslant 12$	54
$12 < h \leqslant 18$	15
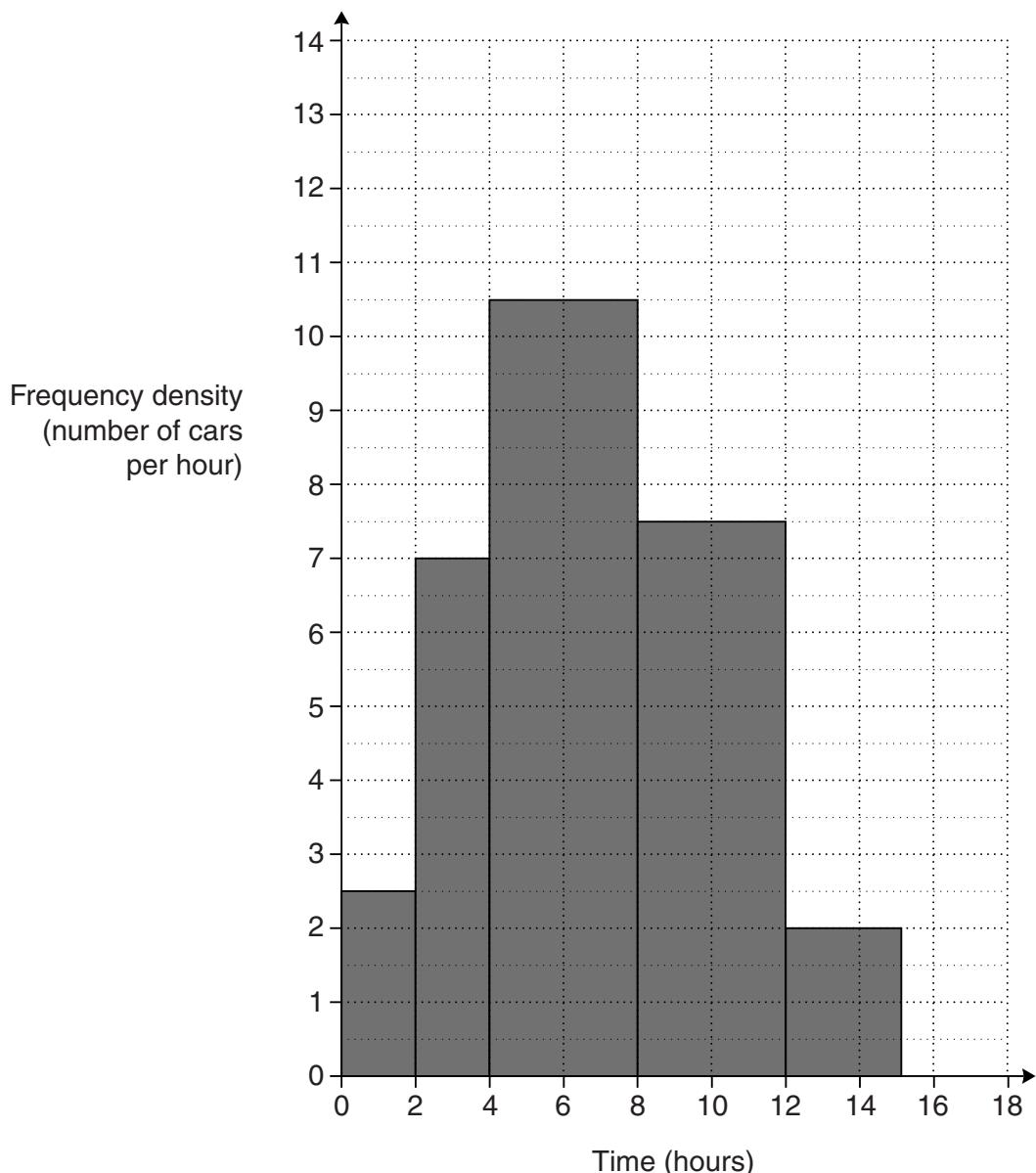
Draw a histogram to represent this information.

[3]

(b) This histogram represents the lengths of time that cars were parked in Beeton station car park that day.

Make two comparisons between these distributions of times spent in Ayton and Beeton car parks.
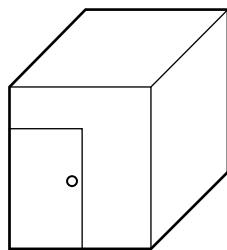
1 _____

_____

2 _____

_____ **[2]**

TURN OVER FOR QUESTION 10

10 Anil's shed is a cuboid 220 cm by 180 cm by 200 cm.
He buys a thin metal pole of length 3 m.

Will this 3 m pole fit in the shed?
Show calculations to support your answer. **[4]**