OCR
RECOGNISING ACHIEVEMENT

H

# Tuesday 11 June 2013 – Morning

## 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



| 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**

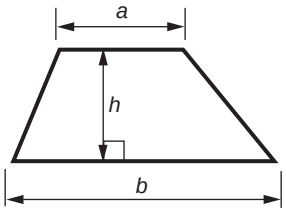
This paper has been pre modified for carrier language



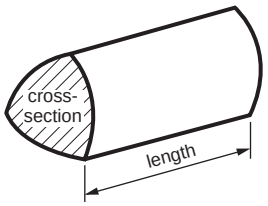
OCR is an exempt Charity

# Formulae Sheet: Higher Tier

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




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

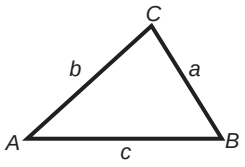



**In any triangle *ABC***

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

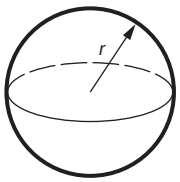
**Cosine rule** $a^2 = b^2 + c^2 - 2bc\cos A$

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



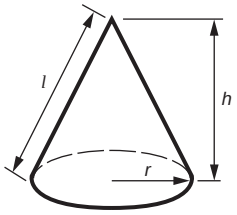

**Volume of sphere** = $\frac{4}{3}\pi r^3$

**Surface area of sphere** = $4\pi r^2$




**Volume of cone** = $\frac{1}{3}\pi r^2 h$

**Curved surface area of cone** = $\pi r l$




**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)** Sarah's height is 1.56 m.
David's height is 180 cm.

Express the ratio Sarah's height : David's height in its simplest form.

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

**(b)** Sarah and David share the running costs of their car in the ratio 3 : 2.
One year, the running costs for the car are £3700.

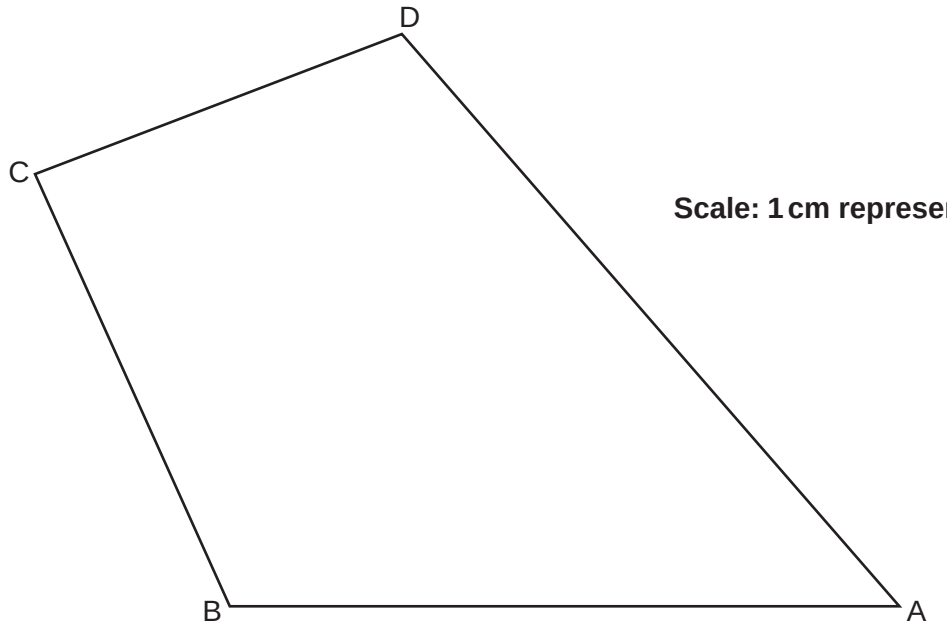
Calculate how much they each pay.

**(b)** Sarah £ _____

David £ _____ **[3]**

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

The scale drawing ABCD shows Sam's garden.
BA is the wall of Sam's house.




**Scale: 1 cm represents 2 m**

Sam wants to put a pond in his garden.
He wants it to be:

- nearer to B than A
- more than 8 metres from D.

Construct and shade the region where the pond can be. **[4]**

**3** **(a)** Solve.

$5(2x - 3) = 1$

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

**(b)** Factorise completely.

$6a^2 - 10a$

**(b)** _____ **[2]**

**(c)** One solution of the equation $3x^2 = 108$ is $x = 6$.

Write down the other solution.

**(c)** _____ **[1]**

**4** **(a)** Josh is designing a survey about the trees people have in their gardens.

Complete this part of the survey by adding suitable response boxes for this question.

| What is the height of the tallest tree in your garden? |
|---|
| |

**[2]**

**(b)** Josh wants to survey a sample of 50 students from his school.
The sample is to be representative of the different year groups.

This table shows how many students there are in each year group.

| Year | Number of students |
|---|---|
| 7 | 202 |
| 8 | 178 |
| 9 | 162 |
| 10 | 139 |
| 11 | 142 |
| Total | 823 |

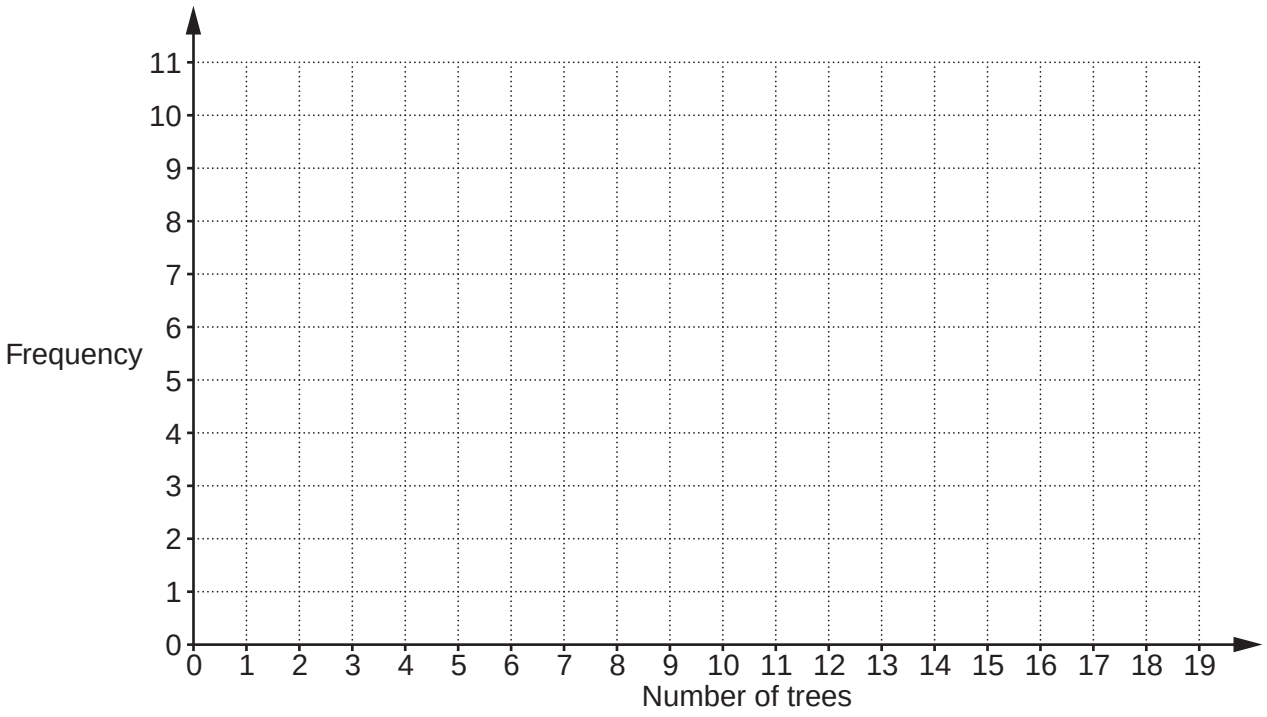
Calculate how many of the students in the sample should be from year 7.

**(b)** _____ **[2]**

**(c)** This table summarises the number of trees in the gardens of the 25 houses in Brackley Close.

| Number of trees | Frequency |
|---|---|
| 0 – 4 | 7 |
| 5 – 9 | 10 |
| 10 – 14 | 6 |
| 15 – 19 | 2 |

**(i)** Draw a frequency polygon to represent this information.




**[3]**

**(ii)** Calculate an estimate of the mean number of trees in a garden in Brackley Close.

**(c)(ii)** _____ **[4]**

**5** **(a)** Write 12 as the product of its prime factors.

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

**(b)** Jacinda makes sweets for a party.
The party is for **either** 8 people **or** 12 people.
She wants everyone at the party to have the same number of sweets, at least 3 sweets each, **with none left over**.

**(i)** Find the least number of sweets she must make, suitable for either 8 people or 12 people.

**(b)(i)** _____ **[2]**

**(ii)** Jacinda decides to make more than this least number of sweets for the party.

Describe a rule for her to work out greater numbers to make, so that everyone at the party can still have the same number of sweets as each other, with none left over.

_____

_____ **[2]**

**6** **(a)** Here are the first four terms of a sequence.

5 9 13 17

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

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

**(b)** The $n$th term of another sequence is $3^n$.

**(i)** Work out the first three terms of this sequence.

**(b)(i)** _____ _____ _____ **[2]**

**(ii)** Find the first number in this sequence which is over 1 million and state which term this is.

**(ii)** The number is _____

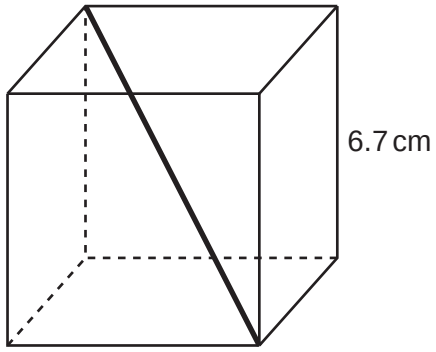
It is the _____th term **[3]**

**7** Point A has coordinates (-1, 1).
Point B has coordinates (10, 7).

Calculate the coordinates of the midpoint of AB.

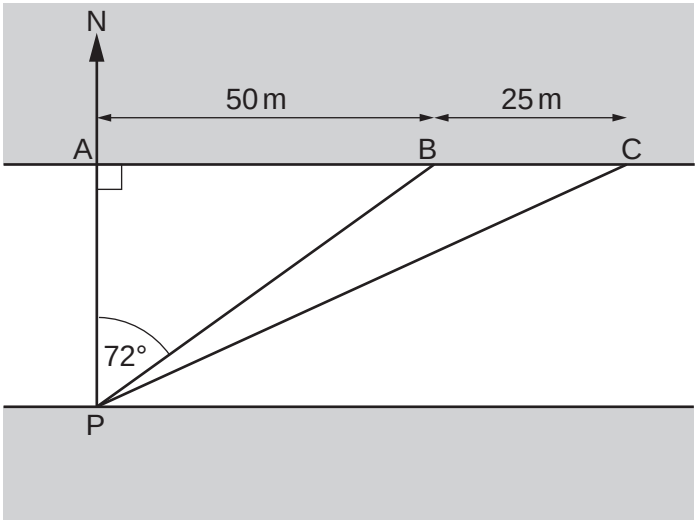
( _____ , _____ ) **[2]**

**8** Calculate the length of the diagonal of a cube with side 6.7 cm.




_____ cm **[3]**

**9** Paul stands on one bank of a river at point P.
Aleysha stands on the other bank due North of Paul, at point A.
She then walks 50 m due East to point B.
At B her bearing from Paul is 072°.




**Not to scale**

**(a)** Calculate AP, the width of the river.

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

**(b)** Aleysha walks 25 m further East to point C.

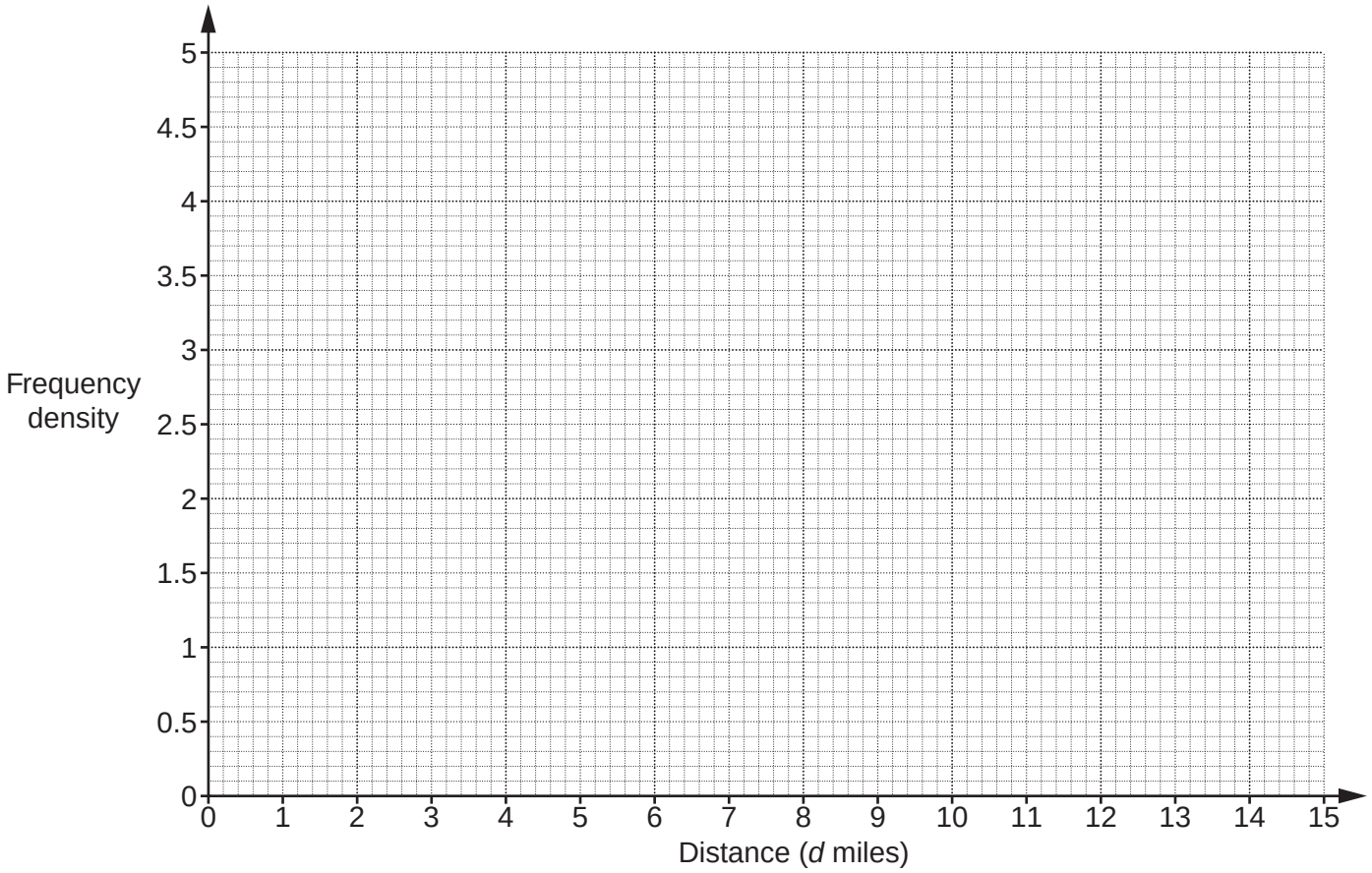
Calculate the bearing of C from P.

**(b)** _____ ° **[3]**

**10** Anouk asked some people how far they had walked the previous day.
This table summarises the responses.

| Distance ($d$ miles) | Frequency |
|---|---|
| $0 \leqslant d < 1$ | 3 |
| $1 \leqslant d < 3$ | 8 |
| $3 \leqslant d < 5$ | 10 |
| $5 \leqslant d < 10$ | 5 |
| $10 \leqslant d < 15$ | 2 |

Construct a histogram to represent this information.




**[3]**

**11** **(a)** Find the values of $a$ and $b$ so that the following is an identity.

$$2x + a(3x + 5) \equiv bx + 30$$

**(a)** $a =$ _____

$b =$ _____ **[3]**

**(b)** Rearrange this formula to make $p$ the subject.

$$H = \sqrt{\frac{10p^3}{c}}$$

**(b)** _____ **[4]**

**END OF QUESTION PAPER**

**PLEASE DO NOT WRITE ON THIS PAGE**