OCR

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Monday 9 June 2014 – 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).
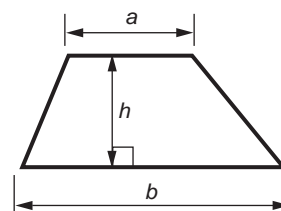*   Do **not** write in the bar codes.

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**.
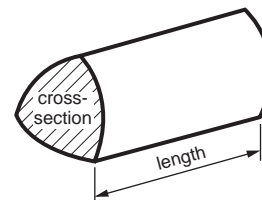*   This document consists of **16** pages. Any blank pages are indicated.

> You are permitted to use a calculator for this paper

OCR is an exempt Charity

Turn over

2
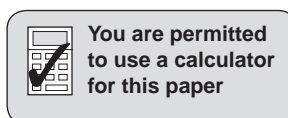
Formulae Sheet: Higher Tier

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

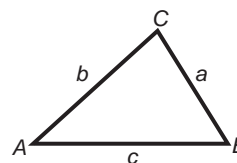**Volume of prism** = (area of cross-section) × length

In any triangle *ABC*

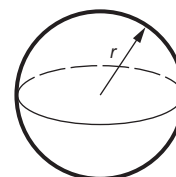**Sine rule** $\quad \dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

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

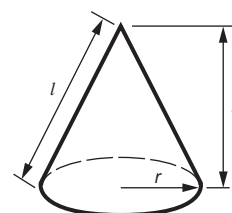**Area of triangle** = $\frac{1}{2}ab\sin C$

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 = $\pi r l$

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

3

Answer **all** the questions.

1   Caroline and Helen share a job in the ratio 3 : 2.

   (a) Caroline works for 24 hours a week.

   Calculate how many hours a week Helen works.

   (a) .... hours **[2]**

   (b) The annual pay for the whole job is £26 000.

   Work out the annual pay for Caroline and for Helen.

   (b) Caroline £ ....

   Helen £ .... **[3]**

4

2 **(a)** Calculate.

   (i) $\sqrt{28.09^3}$

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

   (ii) $\dfrac{3.6 + 9.42}{2.4}$

   Give your answer correct to 1 decimal place.

   (ii) .... **[2]**

(b) Calculate the reciprocal of 2.5.

   (b) .... **[1]**

(c) Insert brackets to make these calculations correct.

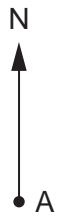 $7 \times 2 + 6\ ^2 = 400$

   $6 + 4 \times 2 - 5 = 15$ **[2]**

3 This scale drawing shows the positions of two ports, Aylton (A) and Borsey (B).

N
↑

• A

N
↑

• B

Scale: 1 cm represents 5 km

(a) Find the actual distance of Aylton from Borsey.

(a) .... km **[2]**

(b) Find the bearing of Aylton from Borsey.

(b) ....° **[1]**

(c) A boat sails from Aylton on a bearing of 213° for 16 km to C.

On the scale drawing, construct the position of C. **[2]**

4 **(a)** Multiply out and simplify.

$4(2a + 5) - 3(a + 2)$

(a) .... **[3]**

(b) Factorise fully.

$12y + 4y^2$

(b) .... **[2]**

5 **(a)** The nth term of a sequence is $n^2 + 5$.

Work out the first three terms of this sequence.

(a) .... **[2]**

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

$$5 \qquad 11 \qquad 17 \qquad 23$$

Find an expression for the nth term of this sequence.

(b) .... **[2]**

6 Find the highest common factor (HCF) of 108 and 72.

.... **[2]**

Turn over

7 The students in two maths groups were each asked to solve a puzzle.

(a) This table summarises the times taken by the 30 members of group 7P.

Time (*t* seconds)	Frequency
$20 \leqslant t < 30$	3
$30 \leqslant t < 40$	7
$40 \leqslant t < 50$	13
$50 \leqslant t < 60$	6
$60 \leqslant t < 70$	1

Calculate an estimate of the mean time taken by group 7P.

(a) .... seconds **[4]**

(b) This box plot represents the times taken by members of group 7S.
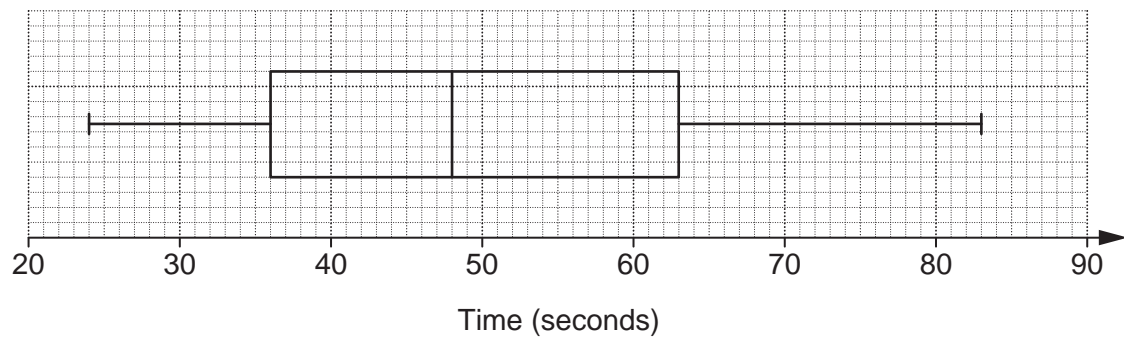
Time (seconds)

(i) Find the median time taken by group 7S.

(b)(i) .... seconds **[1]**

(ii) Find the interquartile range of the times taken by group 7S.

(ii) .... seconds **[2]**

Turn over

8 (a) Solve.

$6x^2 = 150$

(a) .... **[3]**

(b) Rearrange this formula to make a the subject.

$S = 4bc + 2a^2$

(b) .... **[3]**

9 Kahli has a sewing box which is a cuboid measuring 15 cm by 35 cm by 10 cm.
She buys a pair of thin knitting needles which are 40 cm long.

Calculate whether a 40 cm knitting needle can fit in her sewing box.
Show how you decide. **[3]**

10 A staircase consists of treads of length T and risers of length R, as shown.
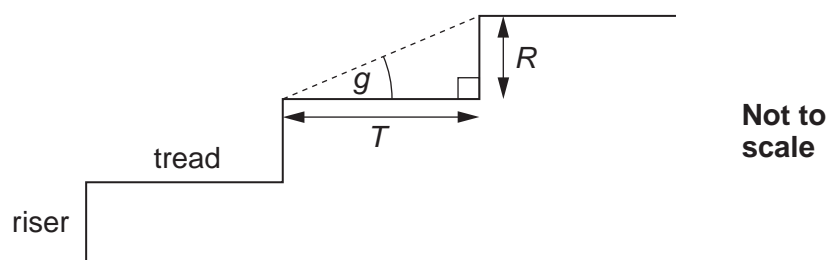
There are four safety requirements:

- T must be at least 220 mm
- R must be at most 220 mm
- $T + 2R$ must be at least 550 mm and at most 700 mm
- angle g must not be more than 42°.

(a) Russell wants a staircase with $T = 222$ mm and $R = 218$ mm.
These values satisfy the first two safety requirements.

Show whether these values satisfy each of the other two safety requirements. **[4]**

(b) Calculate the largest value that R can be when $T = 270\,\text{mm}$.
Show that your solution satisfies all the safety requirements.

(b) .... mm **[4]**

11 **(a)** This table summarises the distances cycled by members of a cycling group during one weekend.

Distance (d km)	Frequency
$10 \leqslant d < 20$	4
$20 \leqslant d < 30$	7
$30 \leqslant d < 50$	25
$50 \leqslant d < 100$	40
$100 \leqslant d < 150$	18

Draw a histogram to represent this information.

Distance (d km)

[4]

15
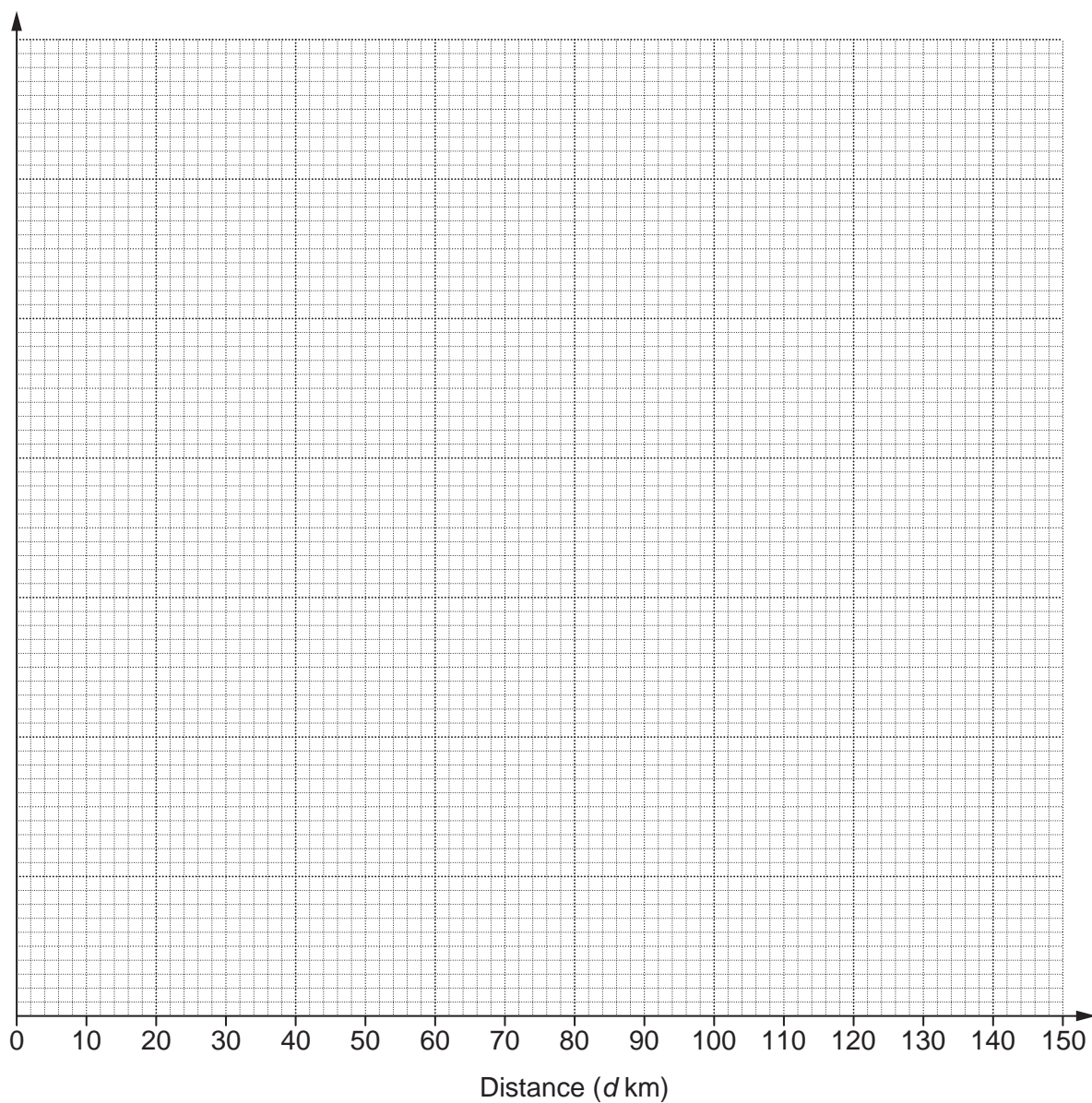
(b) This histogram represents the times spent cycling by the members of the group that weekend.
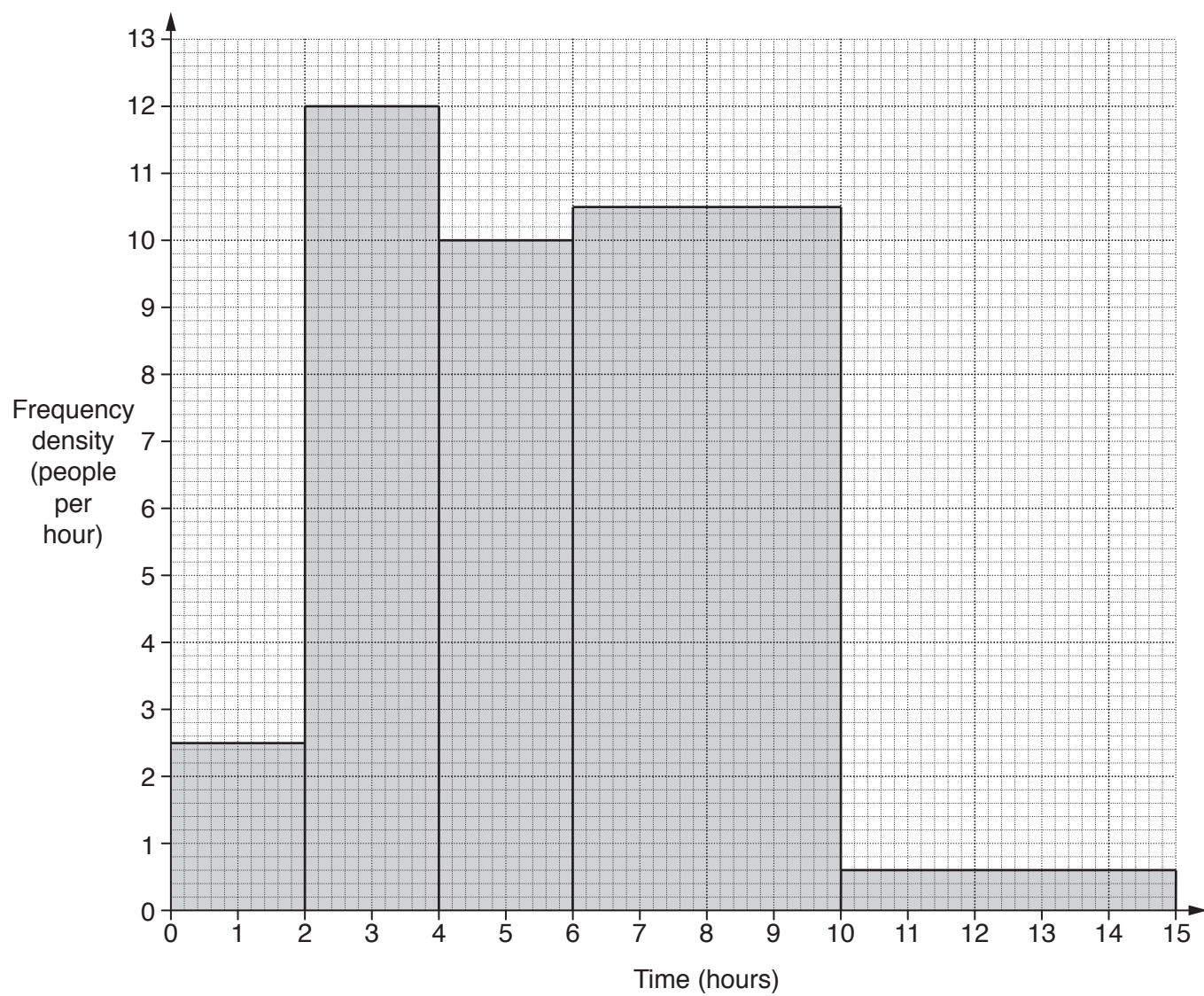
(i) How many of the group cycled for 10 hours or more that weekend?

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

(ii) What can you tell from the histogram about the shortest time spent cycling?

.... **[1]**

TURN OVER FOR QUESTION 12

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12 You are given that f(*x*) = *cx* + *d* and that f(0) = ⁻6 and f(2) = 10.

Find the values of *c* and *d*.

c = ...

d = ... **[3]**

END OF QUESTION PAPER