

Monday 9 June 2014 – Morning

GCSE MATHEMATICS A

A501/02 Unit A (Higher Tier)

Candidates answer on the Question Paper.

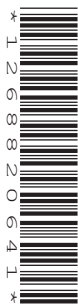
OCR supplied materials:

None

Other materials required:

- Scientific or graphical calculator
- Geometrical instruments
- Tracing paper (optional)

Duration: 1 hour



Candidate forename		Candidate surname	
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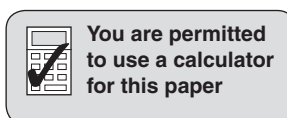
Centre number						Candidate number				
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INSTRUCTIONS TO CANDIDATES

- 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.

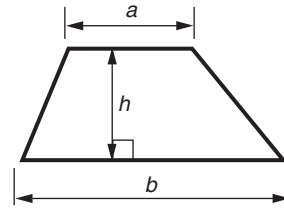
INFORMATION FOR CANDIDATES

- 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.

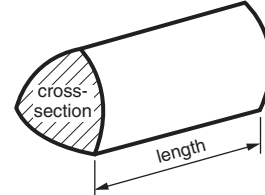


Formulae Sheet: Higher Tier

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



Volume of prism = (area of cross-section) \times length

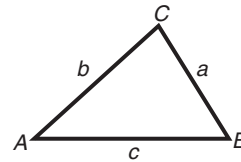


In any triangle ABC

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

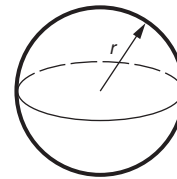
Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$

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



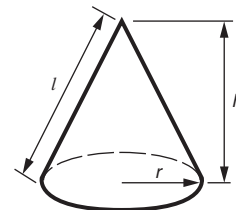
Volume of sphere = $\frac{4}{3}\pi r^3$

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

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]

2 (a) Calculate.

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

(a)(i) [1]

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

Give your answer correct to 1 decimal place.

(ii) [2]

(b) Calculate the reciprocal of 2.5.

(b) [1]

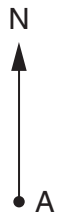
(c) Insert brackets to make these calculations correct.

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

$$6 + 4 \times 2 - 5 = 15$$

[2]

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



Scale: 1 cm represents 5 km

- (a) Find the actual distance of Aylton from Borseley.

(a) km [2]

- (b) Find the bearing of Aylton from Borseley.

(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 n th 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 11 17 23

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

(b) [2]

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

..... [2]

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

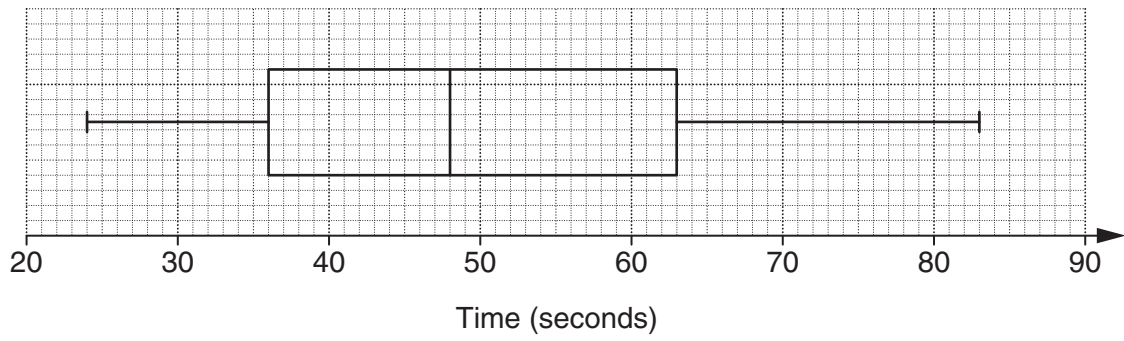
(a) This table summarises the times taken by the 30 members of group 7P.

Time (t seconds)	Frequency
$20 \leq t < 30$	3
$30 \leq t < 40$	7
$40 \leq t < 50$	13
$50 \leq t < 60$	6
$60 \leq t < 70$	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.



(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]

8 (a) Solve.

$$6x^2 = 150$$

(a) [3]

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

$$S = 4bc + 2a^2$$

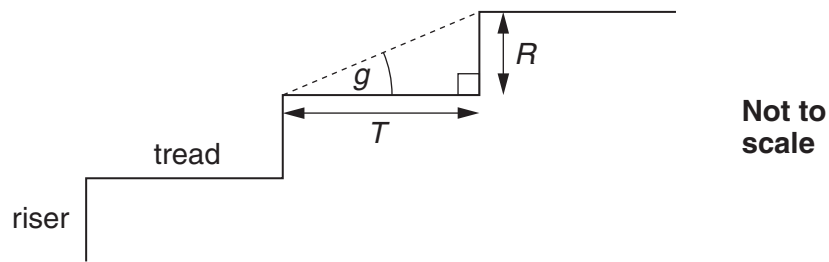
(b) [3]

- 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]

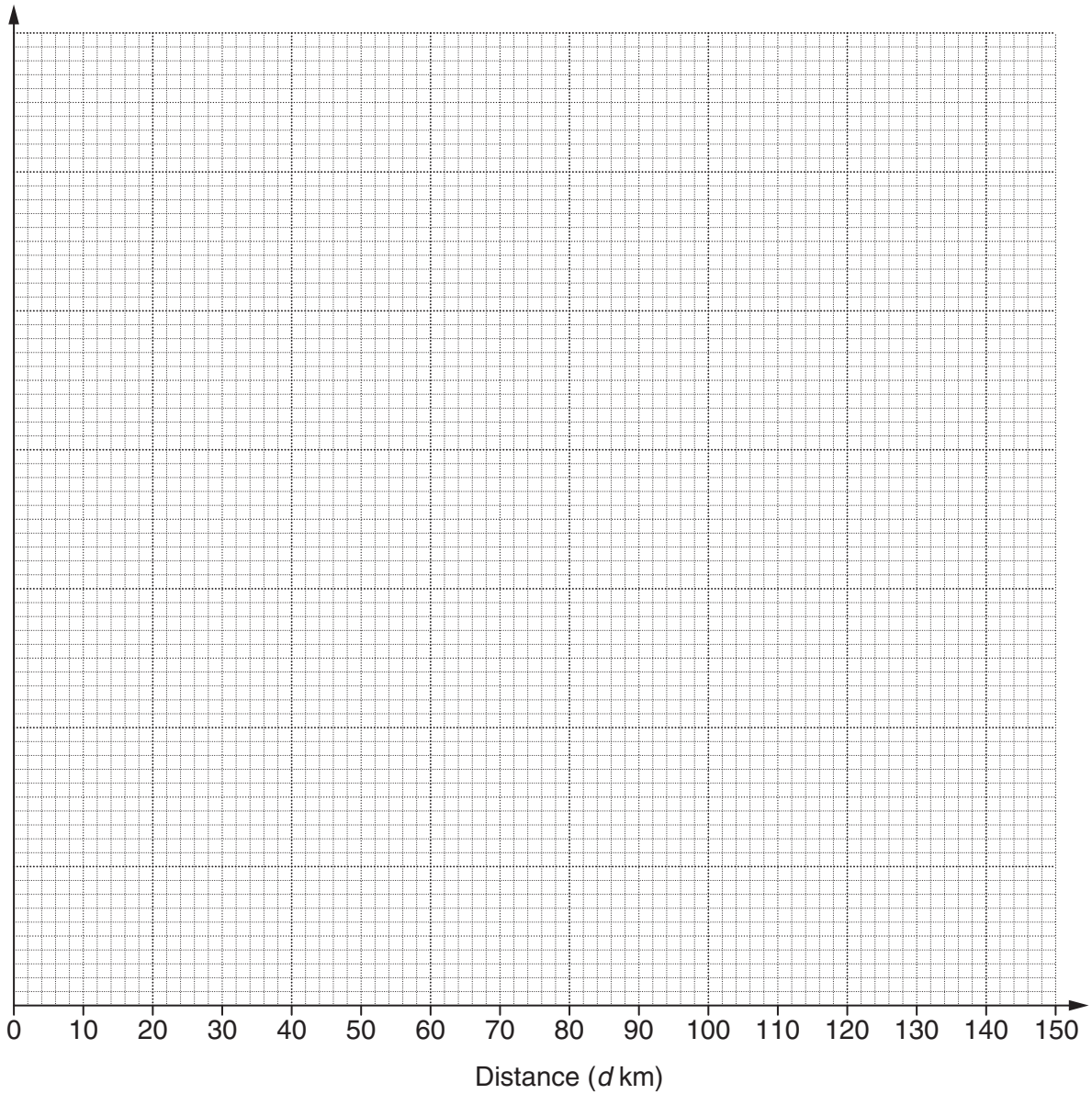
- (b) Calculate the largest value that R can be when $T = 270$ mm.
Show that your solution satisfies all the safety requirements.

(b) mm [4]

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

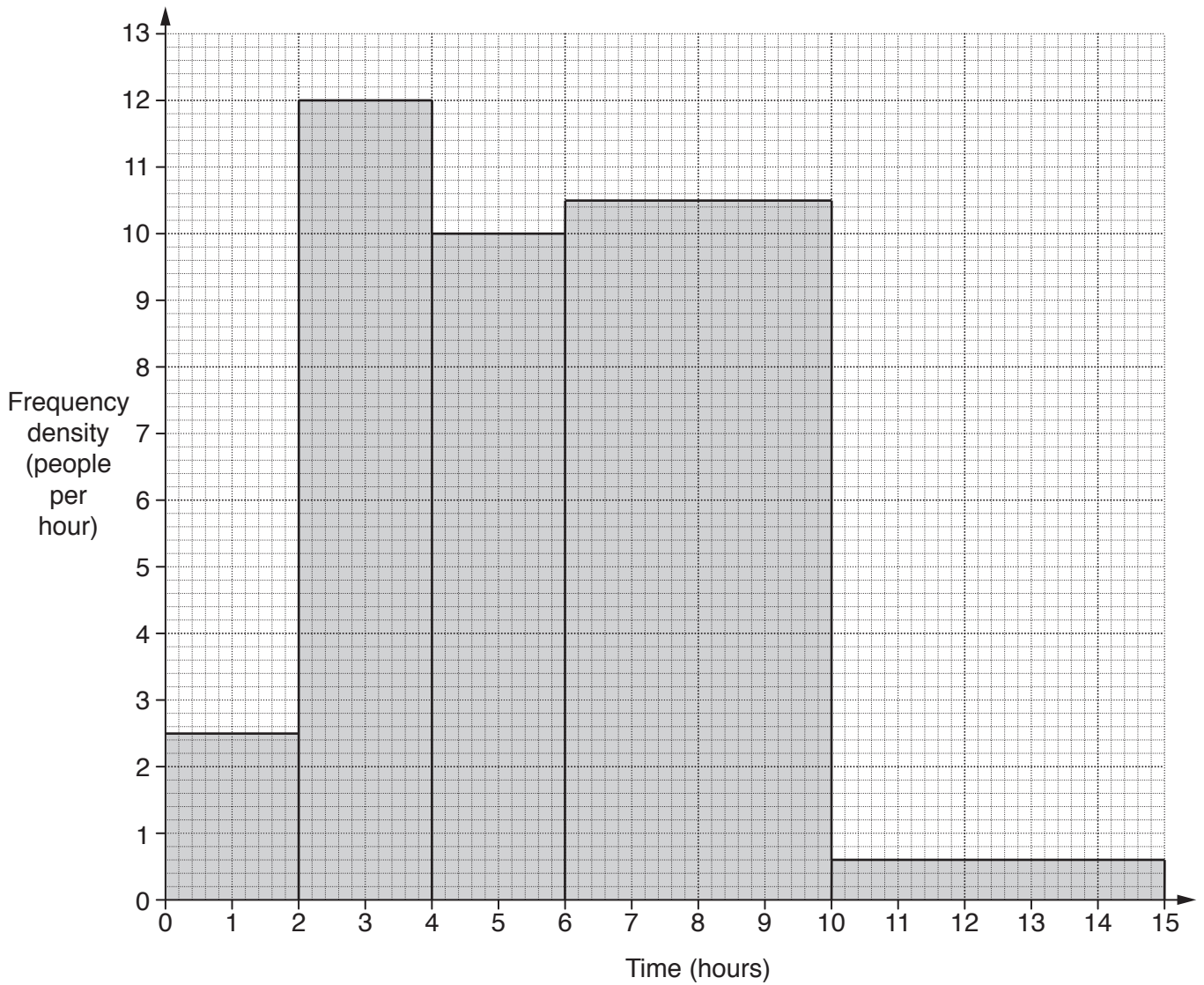
Distance (d km)	Frequency
$10 \leq d < 20$	4
$20 \leq d < 30$	7
$30 \leq d < 50$	25
$50 \leq d < 100$	40
$100 \leq d < 150$	18

Draw a histogram to represent this information.



[4]

(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

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



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