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H

Wednesday 4 November 2015 – 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

A501 02

5123232120

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

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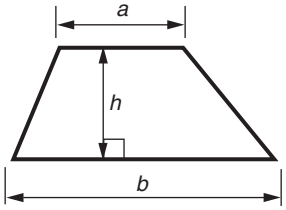
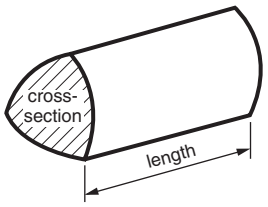
Formulae Sheet: Higher Tier

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



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

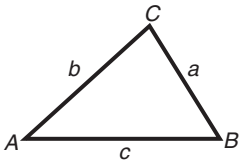


In any triangle *ABC*

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

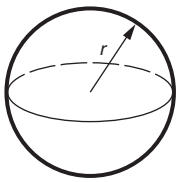
Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

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



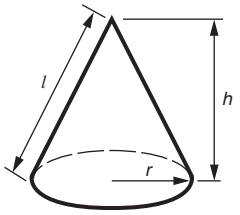
Volume of sphere $= \frac{4}{3}\pi r^3$

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

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

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1 In 2014 the Winter Olympics were held in Russia.

(a) This two-way table shows the medals won by the top three countries.

Country	Gold	Silver	Bronze	Total
Russian Federation	13			33
Norway	11		10	26
Canada	10	10	5	25
Total	34	26		

Complete the table. **[3]**

(b) In the men's 50 km cross-country skiing race, the winner finished in 1 hour 46 minutes 55.2 seconds.

The last competitor to finish took 21 minutes 6.8 seconds longer.

What was the last competitor's time for the race?

..... hours ..... minutes ..... seconds **[2]**

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2 **(a)** Calculate.

$$\frac{\sqrt{3.2^2 + 4.7^2}}{9.7}$$

Give your answer correct to 2 decimal places.

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

(b) Insert one pair of brackets so that this calculation is correct.

$$3 \times 6 + 5 - 1 = 32$$ **[1]**

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3 **(a)** Mary is knitting a cardigan for herself and one for her young sister Tasha.
The amounts of wool needed for Mary's cardigan and Tasha's cardigan are in the ratio 5 : 3.

(i) Mary needs 24 balls of wool in total for both cardigans.

How many balls of wool are needed for Tasha's cardigan?

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

(ii) Mary takes 6 weeks to knit Tasha's cardigan.
She knits for the same amount of time each week.

How many weeks should she expect to take to knit her own cardigan?

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

(b) Anya takes 20 minutes to knit one row of her cardigan.
Sally takes 16 minutes to knit one row of her cardigan.
They both start knitting a new row at 1 pm.
They carry on knitting.

What is the next time that they both start a new row together?

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

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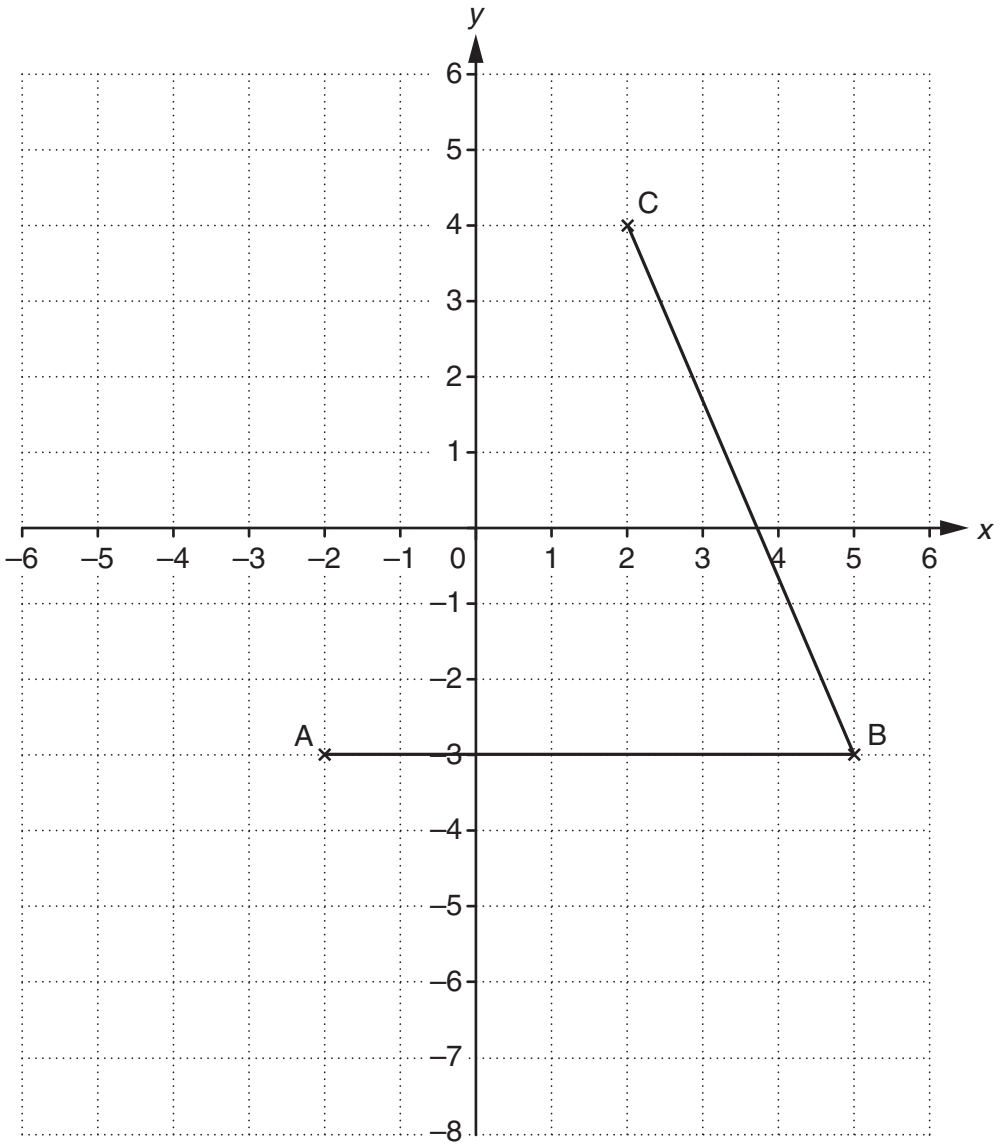
4 Points A, B and C are plotted on a one-centimetre square grid.



(a) Plot the point with coordinates (–4, 5). Label it D. **[1]**

(b) Write down the coordinates of the midpoint of BC.

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

(c) E is a point

- that is 5 cm from A
- whose coordinates are **both** different from those of A
- whose coordinates are whole numbers.

Find possible coordinates for E.

(c) (..... , ...) **[2]**

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(d) Bisect angle ABC on the grid opposite, using a ruler and a pair of compasses.
Do not rub out your construction lines. **[2]**

5 **(a)** Solve this equation.

$5x - 4 = 3x + 7$

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

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

4 7 10 13

Find an expression for the nth term of this sequence.

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

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6 **(a)** Jenny works out this calculation.

$6 \div 0.75$

Rob works out this calculation.

$6 \div 0.8$

Whose calculation has the larger answer?
Explain how you can tell this **without doing the calculations**.

..... has the larger answer because .....

.....

..... **[1]**

(b) Peter wrote this as part of his homework.

$12 \times 0.8 = 21.6$

Explain how you can tell that his answer is wrong **without doing the calculation**.

.....

..... **[1]**

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7 **(a)** Solve.

$5y^2 = 80$

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

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

$4a - 3c = ac + 6$

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

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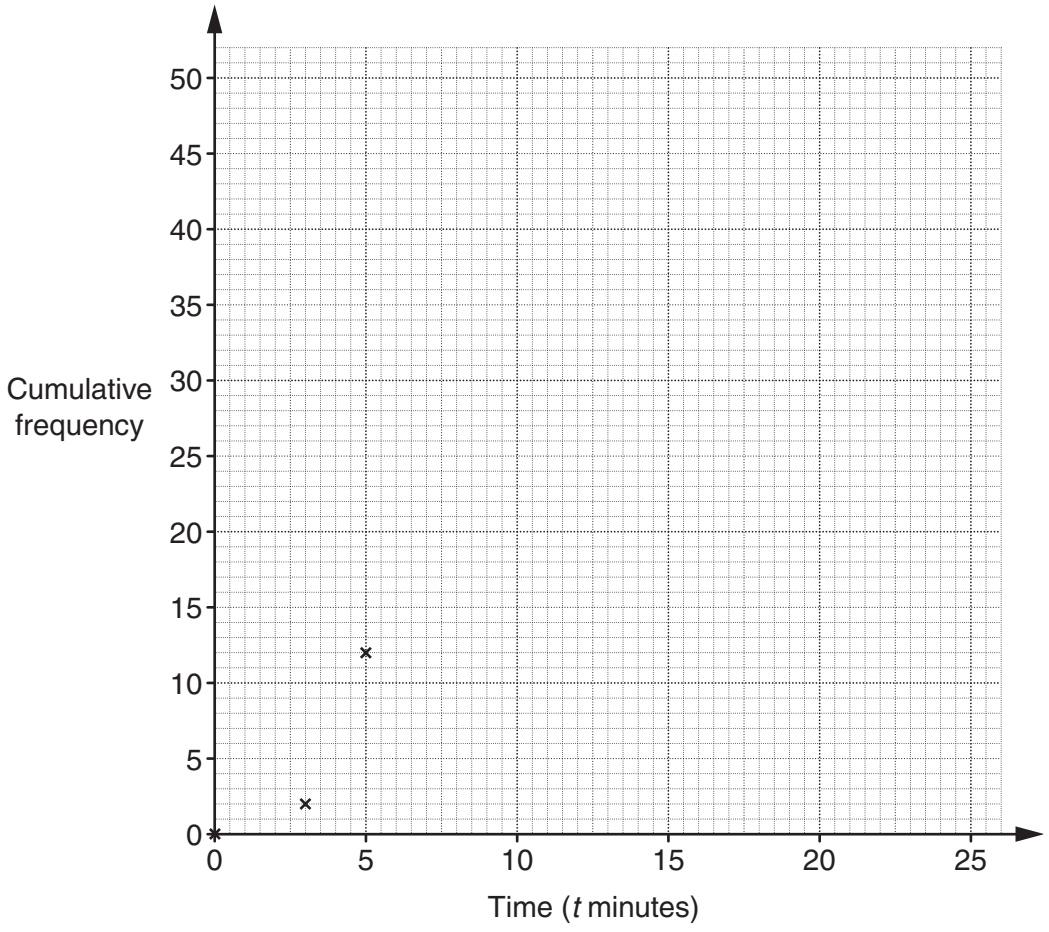
8 Marika Brown likes to play a game of solitaire.
This table summarises the times that she took to complete 50 games.

Time (t minutes)	Frequency
$0 < t \leqslant 3$	2
$3 < t \leqslant 5$	10
$5 < t \leqslant 10$	18
$10 < t \leqslant 15$	12
$15 < t \leqslant 20$	5
$20 < t \leqslant 25$	3

(a) Complete the **cumulative frequency** diagram to represent her times. **[4]**



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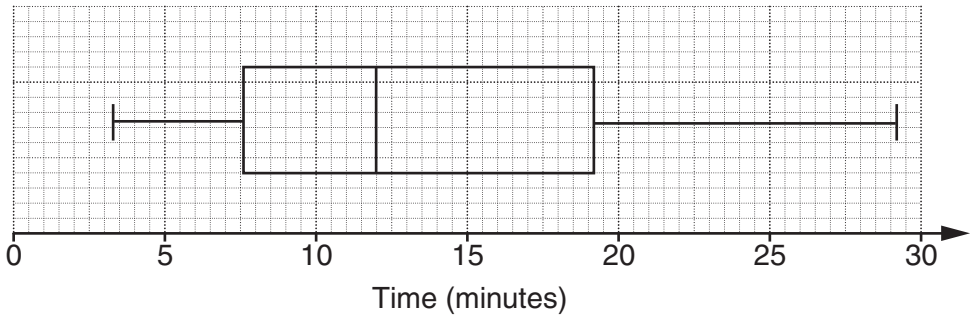
(b) Paul Brown also plays solitaire.
This box plot summarises the times that he took to complete 50 games.



Complete the following statements.
Use numerical evidence from both diagrams to compare the two sets of times.
State the evidence you use.

..... has a shorter average time because .....

.....

..... **[2]**

..... has more consistent times because .....

.....

..... **[2]**

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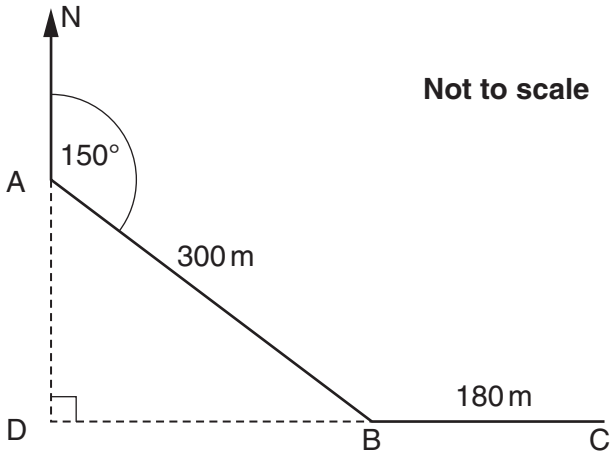
9 Haroon is orienteering in open, level countryside.

His instructions tell him:

- from the start, A, walk 300 m on a bearing of 150° to B
- then walk 180 m due east from B to C.



(a) AD is the distance that B is south of A.

Show by calculation that AD is 260 m, correct to the nearest metre. **[2]**

(b) Calculate the distance DC that C is east of A.

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

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(c) Calculate the bearing from C on which Haroon should walk to get back to the start, A.

(c) ..... ° **[4]**

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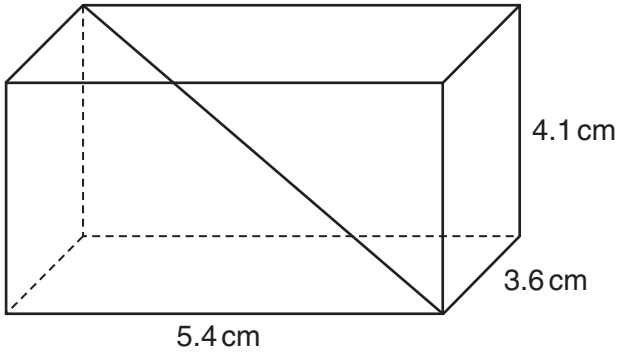
10 Calculate the length of a diagonal of a cuboid measuring 5.4 cm by 3.6 cm by 4.1 cm.



..... cm **[3]**

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11 You are given that $f(x) = 3x - 1$.

Express $f(5x + 2)$ in the form $ax + b$.

..... **[2]**

12 Find a value of c and a value of d so that the following is **not** an identity but **is** an equation with solution $x = 5$.

$$4(2x - 3) - 6x + 1 = cx + d$$

$c =$ .....

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

END OF QUESTION PAPER

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