OCR
RECOGNISING ACHIEVEMENT

H

Friday 8 November 2013 – Morning

GCSE MATHEMATICS A

A503/02   Unit C (Higher Tier)

A5168403I3

Candidates answer on the Question Paper.
OCR supplied materials: None
Other materials required: • Scientific or graphical calculator • Geometrical instruments • Tracing paper (optional)

Duration: 2 hours

A50302
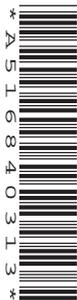
Candidate forename		Candidate surname	

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.
* Your quality of written communication is assessed in questions marked with an asterisk (*).
* Use the π button on your calculator or take π to be 3.142 unless the question says otherwise.
* The total number of marks for this paper is **100**.
* This document consists of **20** pages. Any blank pages are indicated.

You are permitted
to use a calculator
for this paper

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Turn over
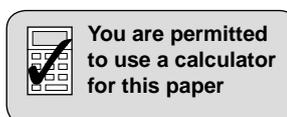
2

Formulae Sheet: Higher Tier

Area of trapezium $= \frac{1}{2}(a+b)h$
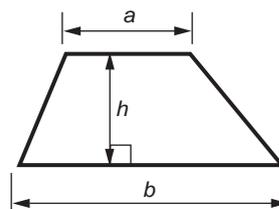
**Volume of prism** = (area of cross-section) × length
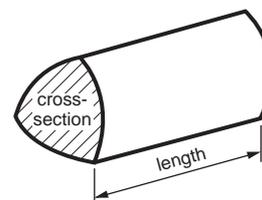
In any triangle *ABC*

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

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

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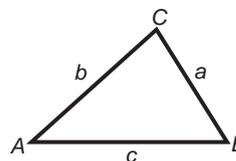
Volume of sphere $= \frac{4}{3}\pi r^3$

Surface area of sphere $= 4\pi r^2$
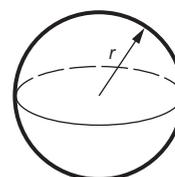
Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi rl$
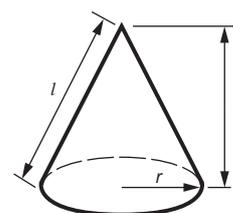
The Quadratic Equation

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

3

Answer **all** the questions.

1 Annabel has two fair spinners.
One spinner is numbered 1, 3, 5, 7 and the other is numbered 2, 4, 6, 8.
Both spinners are spun and the scores are added together.

(a) Complete the table to show all possible totals.

	2	4	6	8
1	3	5	7	
3	5			
5				
7				

[2]

(b) Choose a word from this list to complete each sentence.

impossible	*unlikely*	*evens*	*likely*	*certain*

It is _____ that the total will be an odd number.

It is _____ that the total will be 7 or less.

[2]

(c) Work out the probability that the total will be 9.
Give your answer as a fraction in its simplest form.

(c) _____ [2]

**(d)** Work out the probability that the total will be a multiple of 5.

(d) _____ [1]

Turn over

2 Here is a cuboid.

4 cm

3 cm

7 cm
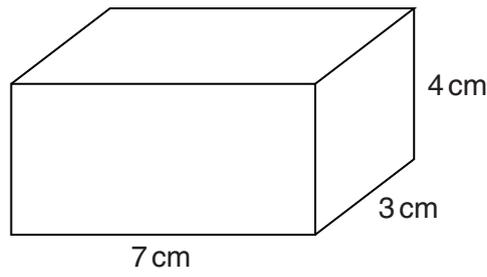
(a) Calculate the volume of the cuboid.

(a) _____ cm³ **[2]**

(b) On the grid below, make an accurate isometric drawing of the cuboid.
Two of the edges have already been drawn.
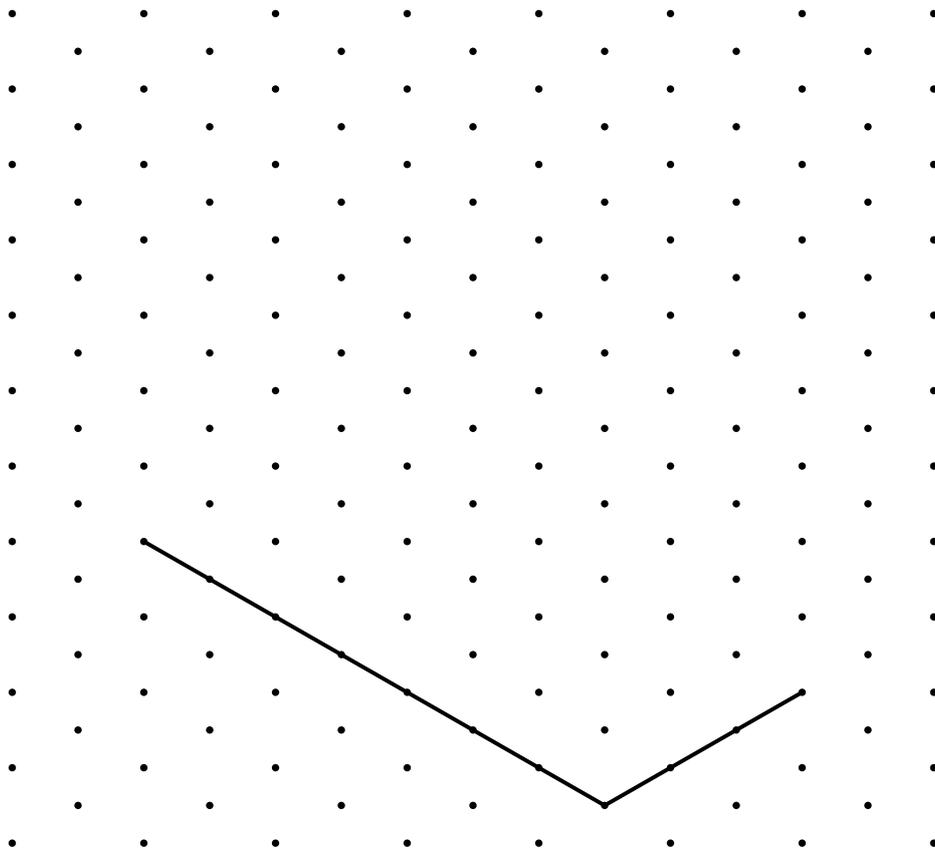
[3]

5

3 At a fish and chip shop, a fish costs £3.32 and a portion of chips costs £1.24.

(a) Sameira buys x fish and 6 portions of chips.
She pays £34.

Use this information to write down an equation in x and solve it to find how many fish Sameira buys.

(a) _____ **[4]**

(b) When Sameira goes to the fish and chip shop the following week, all prices have been increased by 12%.

How much will she have to pay in total if she buys one fish and one portion of chips?

(b) £ _____ **[3]**

Turn over

4 **(a)** Here is a rectangle.

2.1 cm

Not to scale

3.7 cm
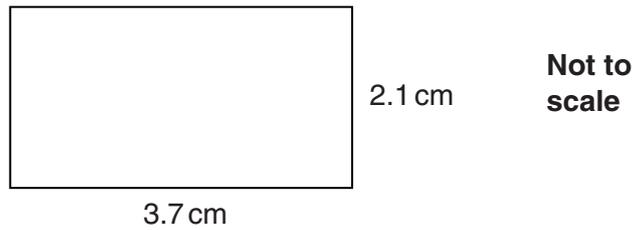
Work out the perimeter of the rectangle.

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

(b) Here is a different rectangle.
All lengths are in centimetres.

$2x - 5$

Not to scale

$3x + 2$
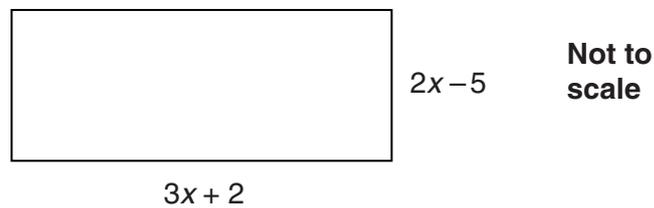
Work out the perimeter of the rectangle.
Give your answer in its simplest form.

(b) _____ cm **[3]**

(c) A circular tea plate has a diameter of 15.5 cm.

15.5 cm
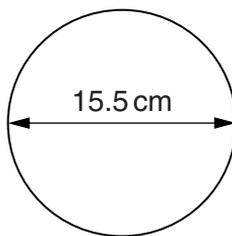
(i) Work out the circumference of this plate.

(c)(i) _____ cm **[2]**

(ii) A circular dinner plate is an enlargement of the circular tea plate.
The dinner plate has a diameter of 27.9 cm.

Complete the following sentences.

The scale factor of the enlargement is _____ .

The circumference of the dinner plate is _____ times the circumference of the tea plate.

[3]

Turn over

5 Complete this multiplication grid by filling in the shaded squares.

✖	$\dfrac{1}{6}$	
$\dfrac{1}{5}$		1
	$\dfrac{1}{16}$	

[4]

6 An athletics competition is held between four schools.
The table shows the probability of each school winning the competition.

School	1	2	3	4
Probability	0.15	0.37	x	$2x$

Work out the probability, x, of School 3 winning the athletics competition.

_____ **[3]**

7 **(a)** Factorise.

$$5x + 10$$

(a) _____ **[1]**

(b) Multiply out the brackets and simplify completely.

(i) $x(x^2 - 5)$

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

(ii) $3(x + 2) + 4(2x - 1)$

(ii) _____ **[3]**

8 A kite has dimensions as shown in the diagram.

0.3 m

0.5 m

Not to scale

0.7 m
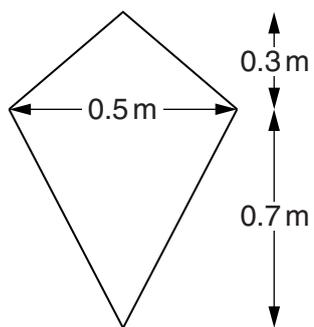
(a) Work out the area of the kite.

(a) _____ m^2 **[4]**

(b) Convert your answer in part **(a)** to cm^2.

(b) _____ cm^2 **[1]**

9 Noah invested £3000 in a bank at a fixed annual compound interest rate.
In 2013, the bank used this calculation to work out how much the investment was worth.

$$3000 \times 1.025^{16}$$

(a) (i) What rate of interest was given?

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

(ii) In which year did Noah originally invest the money?

(ii) _____ **[2]**

(b) Calculate the value of the investment in 2013.

(b) £ _____ **[1]**

Turn over

10 (a) Arrange these standard form numbers in order, smallest first.

$$8.6 \times 10^5 \qquad 8.5 \times 10^{-6} \qquad 5.6 \times 10^8 \qquad 6.8 \times 10^{-5}$$

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

(b) The diameter of the Sun is 1.4×10^{11} cm.
The diameter of the Earth is 1.3×10^9 cm.
The diameter of the Sun is K times the diameter of the Earth.

Find K.

(b) _____ **[2]**

11 Solve these simultaneous equations.

$$4y + 3x = 3$$
$$2y - x = {}^-2$$

$x =$ _____ $y =$ _____ **[3]**

12 The probability that an *Everbright* battery works for more than 50 hours is 0.8.
A torch needs two working *Everbright* batteries to operate.

(a) Two new *Everbright* batteries are put into the torch.

Complete the tree diagram for the life of these two batteries.

First
battery

Second
battery

more than
50 hours

_____

0.8

more than
50 hours

_____

50 hours
or less

_____

more than
50 hours

_____

50 hours
or less

_____
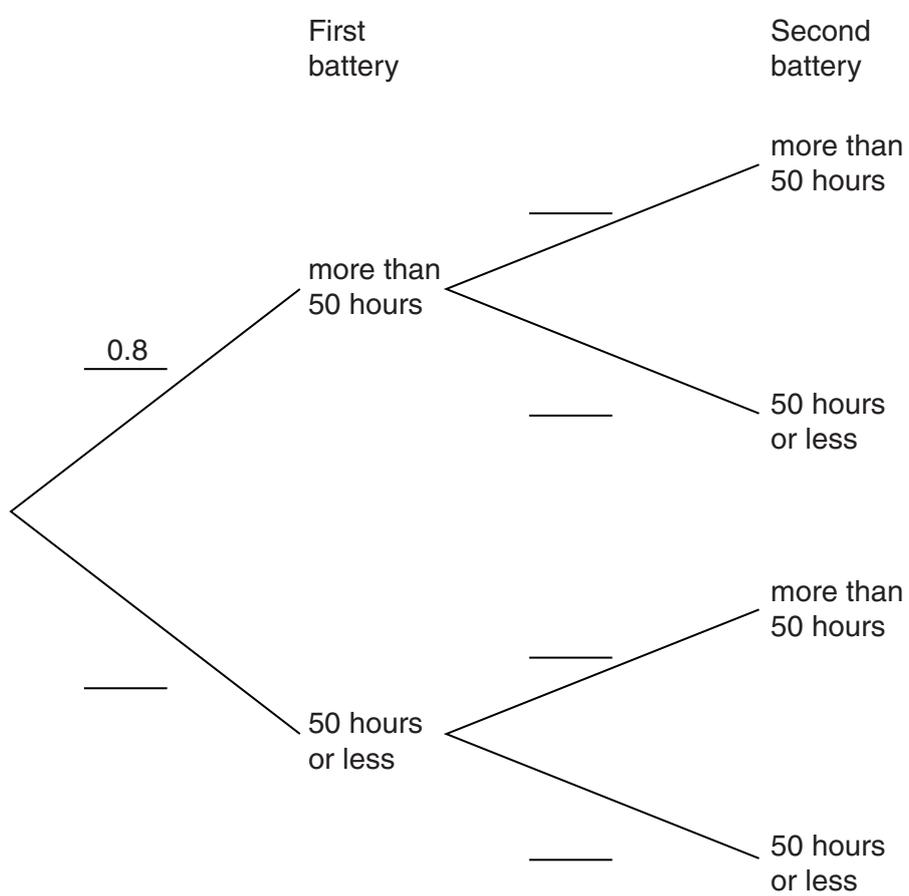
50 hours
or less

[2]

(b) Calculate the probability that the torch will **not** work for more than 50 hours.

(b) _____ **[3]**

13 (a) Complete the table for $y = x^2 + x$.

x	⁻3	⁻2	⁻1	0	1	2
y	6			0	2	

[2]

(b) Draw the graph of $y = x^2 + x$ for $^-3 \leqslant x \leqslant 2$.
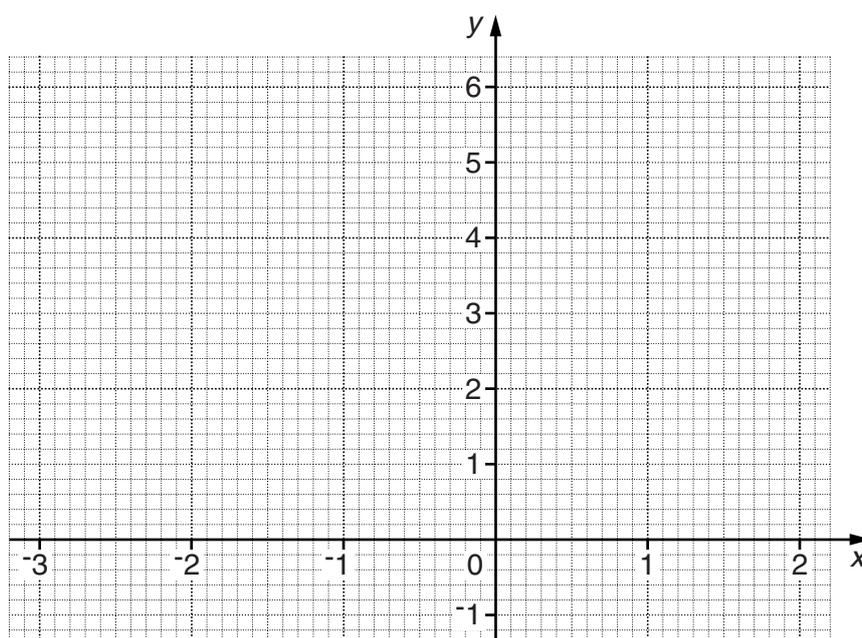
[3]

(c) Use your graph to solve $x^2 + x = 3$.
Give your answers correct to 1 decimal place.

(c) _____ [2]

(d) Use your graph to solve these simultaneous equations.

$$y = x^2 + x$$
$$y = x + 2$$

Give your answers correct to 1 decimal place.

(d) $x =$ _____ $y =$ _____

$x =$ _____ $y =$ _____ **[3]**

14 Use the quadratic formula to solve this equation.

$$x^2 + 5x + 1 = 0$$

Give your answers correct to 2 significant figures.

_____ **[3]**

15 (a) Factorise.

$$x^2 - 9$$

(a) _____ **[1]**

(b) Factorise.

$$x^2 - 4x + 3$$

(b) _____ **[2]**

(c) Use your answers to parts **(a)** and **(b)** to simplify this expression.

$$\frac{x^2 - 4x + 3}{x^2 - 9}$$

(c) _____ **[1]**

16 Multiply out and simplify.

$$(4 + \sqrt{3})(1 - \sqrt{3})$$

Give your answer in the form $a + b\sqrt{3}$ where a and b are integers.
Show all your working.

_____ **[3]**

17 A sack of coffee weighs 25 kg, correct to the nearest kg.
The coffee is used to fill bags that hold 500 g, correct to the nearest 10 g.

Work out the largest number of bags that could be filled from the sack of coffee.

_____ **[4]**

Turn over

18 A grain store is a hollow cylinder joined to a hollow cone.
The cylinder and cone each have radius 1.2 m and height 3 m.
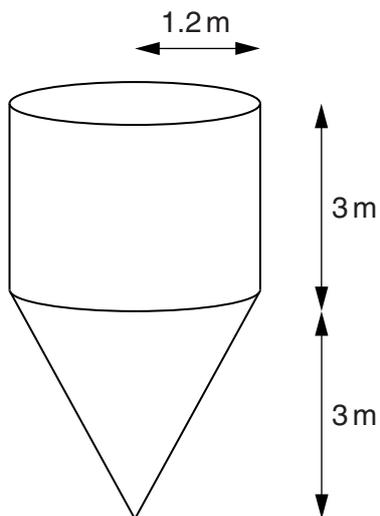
The grain store is full of grain.
The grain has a density of 0.79 tonnes per cubic metre.

Work out the total mass of the grain.

_____ tonnes **[7]**

19* The diagonal, AB, of this cube has length 9 cm.
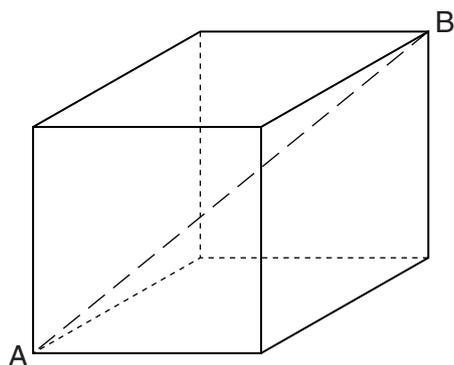
Work out the total surface area of the cube.
You may find it useful to call the length of the edges of the cube *x*.

_____ cm^2 **[6]**

END OF QUESTION PAPER

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