H

Thursday 8 November 2012 – Afternoon

GCSE MATHEMATICS A

A503/02 Unit C (Higher Tier)

| Candidates answer on the Question Paper.	**Duration:** 2 hours
OCR supplied materials: None	
Other materials required: • Scientific or graphical calculator • Geometrical instruments • Tracing paper (optional)	

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**
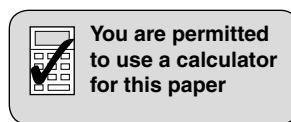
This paper has been pre modified for carrier language

OCR is an exempt Charity

Turn over

Formulae Sheet: Higher Tier

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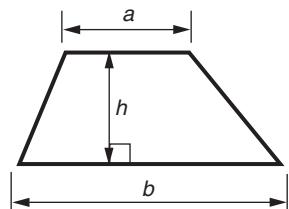
**Volume of prism** = (area of cross-section) × length
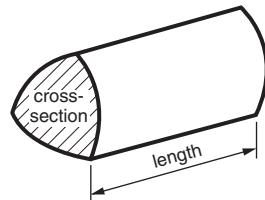
In any triangle *ABC*

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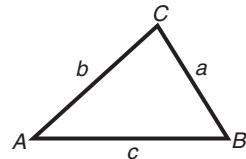
Volume of sphere $= \frac{4}{3}\pi r^3$

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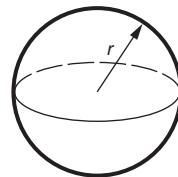
Volume of cone $= \frac{1}{3}\pi r^2 h$

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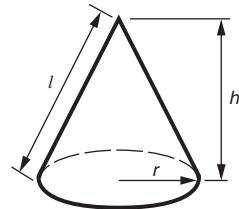
The Quadratic Equation

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 Geta did a survey of the type and weight of tea bought by 100 people.
She displayed her results in a table.

Complete the table.

Weight \ Tea type	Regular tea bags	Decaffeinated tea bags	Loose leaf tea	Total
50 g	2	0	5	
100 g	35	18		60
200 g	16			
Total		25		100

[3]

2 This is a parallelogram.
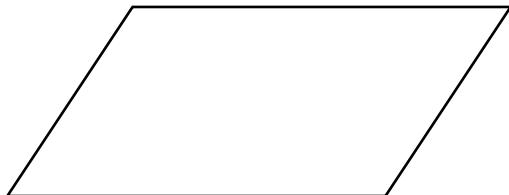
Using suitable measurements from the diagram, work out the area of the parallelogram.
Give the units of your answer.

_____ [3]

Turn over

3 One week, a factory produced 2 000 cars.
The following week, the factory produced 135% **more** cars.

How many cars did the factory produce that week?

_____ **[3]**

4 It takes John 45 minutes to walk 5 km.

(a) How long would it take John to walk 9 km at the same speed?

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

(b) Calculate John's speed in kilometres per hour.
Give your answer to an appropriate degree of accuracy.

(b) _____ km/h **[3]**

5 Jennifer has a biased six-sided dice with sides numbered 1 to 6.

(a) Complete the table to show the probability of the dice showing 4.

Score	1	2	3	4	5	6
Probability	0.2	0.15	0.11		0.17	0.24

[2]

(b) What is the probability that in one throw the dice will show an odd number?

(b) _____ [2]

(c) The dice is thrown twice.

What is the probability that the dice will show 2 on both occasions?

(c) _____ [2]

(d) The dice is thrown 250 times.

How many times might you expect the dice to show 3?

(d) _____ [3]

Turn over

6 A cuboid measures 2 cm by 3 cm by 4 cm.

3 cm

2 cm

4 cm
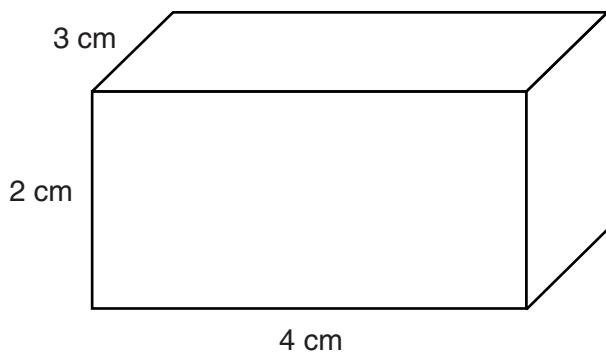
(a) On the centimetre square grid below, draw accurately a net of the cuboid.

[3]

The cuboid is drawn on 3D axes using a 1 cm scale.
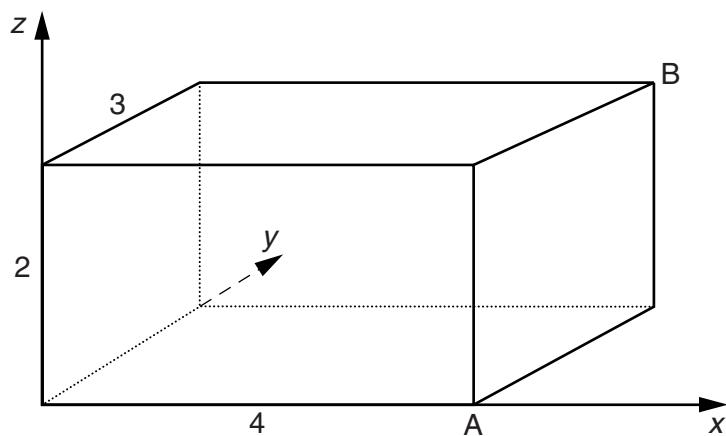
(b) Write down the coordinates of A and B.

(b) A (_____, _____, _____)

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

7 (a) Multiply out the brackets and simplify your answer.

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

(a) _____ **[3]**

**(b)** Factorise this expression completely.

$$5xy + 10x$$

(b) _____ **[2]**

Turn over

8 Tariq is investigating whether a coin is biased.
He tosses the coin 600 times.
The coin lands on heads 315 times.

Does this provide evidence that Tariq's coin is biased?
Justify your answer. **[3]**

9* A drinking glass is a cylinder of radius 3 cm and height 10 cm.
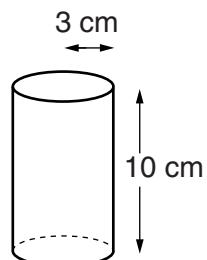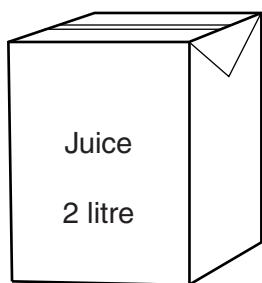
How many times can the glass be filled from a 2 litre carton of juice?
Show your working clearly. **[5]**

**10 (a)** Rearrange this formula to make p the subject.

$$t = 2p - 3$$

(a) _____ **[2]**

(b) Solve these simultaneous equations.

$$x + y = 7$$
$$x - y = {}^-3$$

(b) $x =$ _____ $y =$ _____ **[2]**

11 Here is part of a distance time graph for an object.
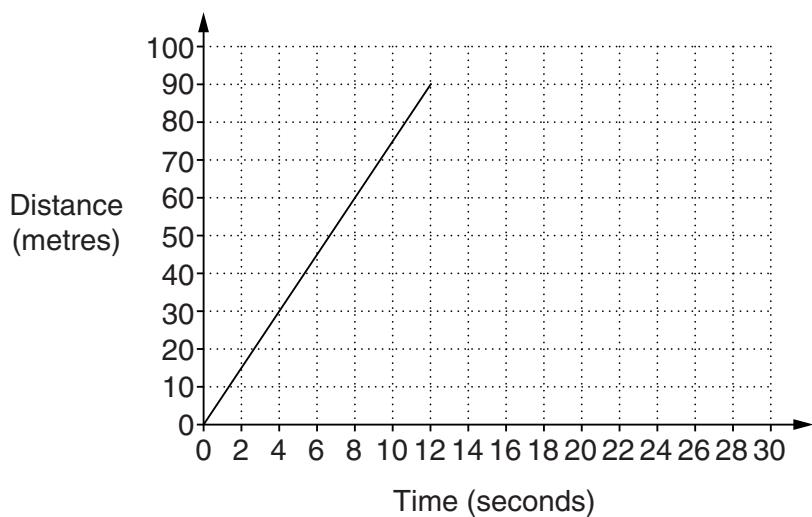
(a) Calculate the gradient of the line.
Give the units of your answer.

(a) _____ **[3]**

(b) What does the gradient represent?
Choose **two** words from this list.

increasing	**decreasing**	**constant**	**distance**	**speed**	**acceleration**

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

(c) Continue the distance time graph to represent the object being stationary for the
next 10 seconds. **[1]**

12 Elaine's pension increased by 2% to £1887.

What was Elaine's pension before the increase?

£ _____ **[3]**

13 In this question, all lengths are in centimetres.
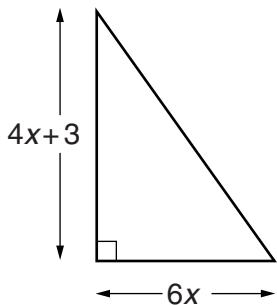
Work out the area of this triangle.
Give your answer in the form $ax^2 + bx$.

_____ cm^2 **[3]**

Turn over

14 Use your calculator to work these out.

(a) $4\frac{2}{3} - 1\frac{3}{4}$

Give your answer as a mixed number.

(a) _____ [1]

(b) 8^{-2}
Give your answer as a decimal.

(b) _____ [1]

(c) $(\sqrt{5})^6$

(c) _____ [1]

(d) $(9.1 \times 10^4) \times (3.8 \times 10^3)$
Give your answer in standard form.

(d) _____ [2]

15 (a) Multiply out and simplify.

$$(x - 3)(x + 5)$$

(a) _____ **[2]**

(b) Factorise.

$$4x^2 - y^2$$

(b) _____ **[2]**

(c) Solve by factorisation.

$$x^2 - 7x + 12 = 0$$

(c) _____ **[3]**

16 Emma is going to two weddings in June.
The probability that any day in June is sunny is 0.8.

(a) Complete the tree diagram.

First wedding
day

Second wedding
day

Sunny

0.8

Sunny

Not sunny

Not sunny

Sunny

Not sunny
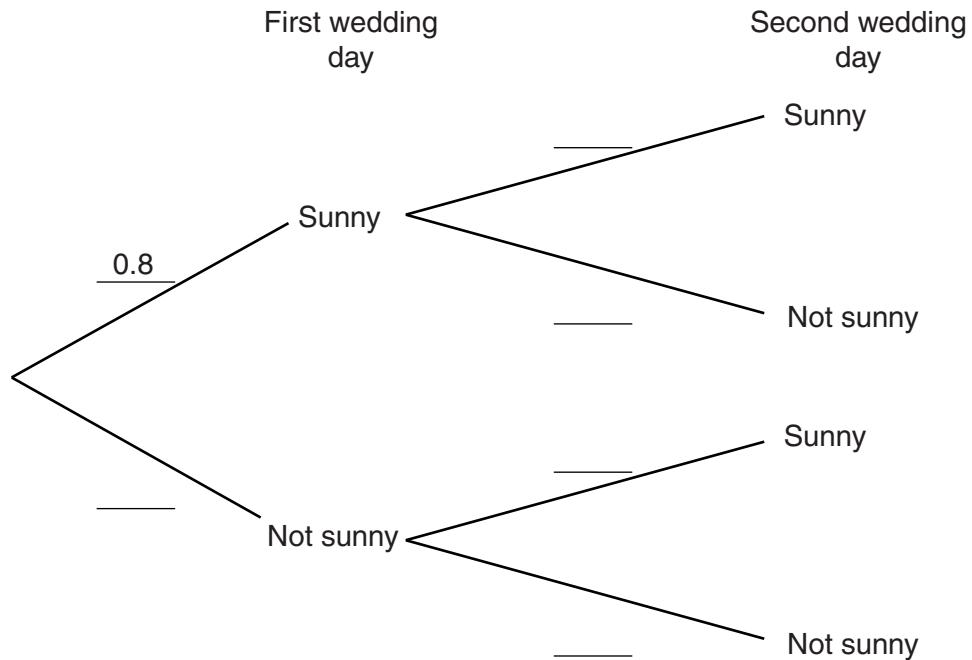
[2]

(b) Work out the probability that just one of the two wedding days is sunny.

(b) _____ **[3]**

17 Here is the graph of $y = x^2 + 3x - 2$.
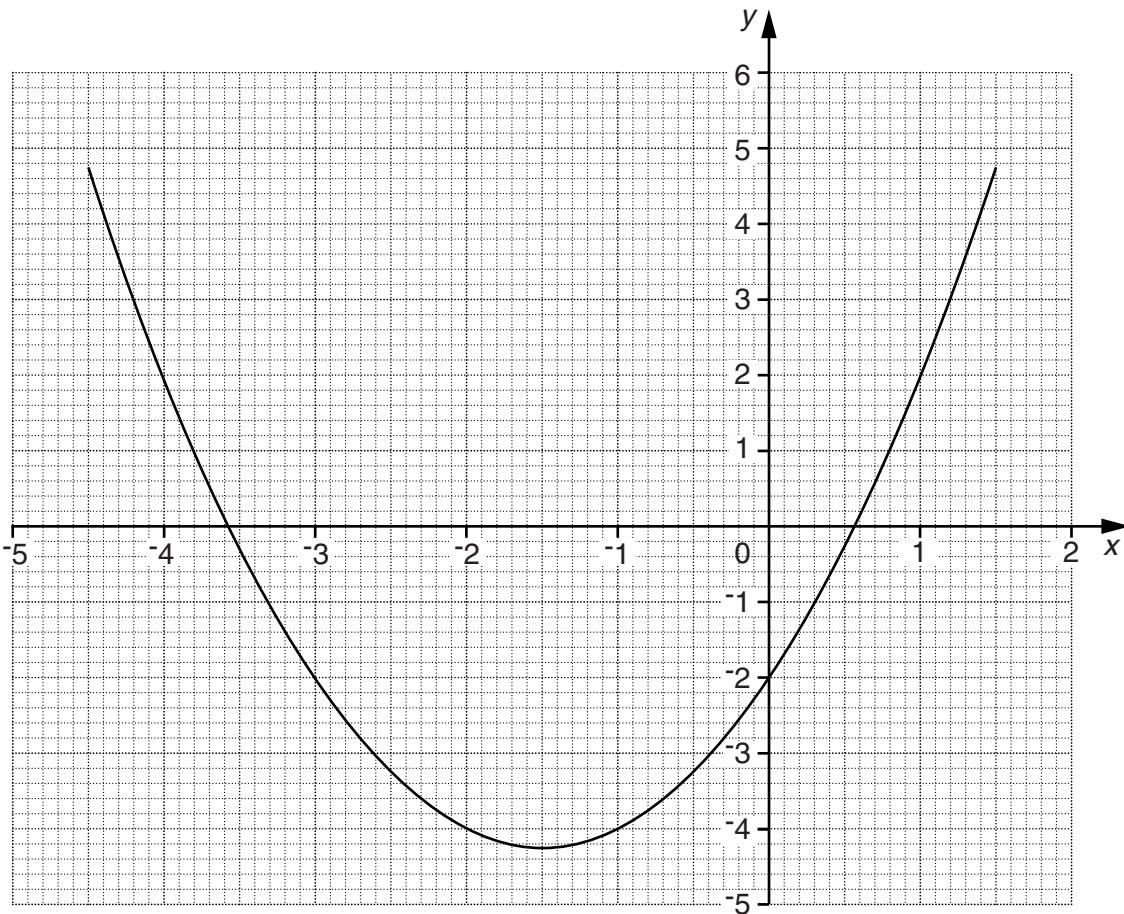
(a) Use the graph to solve this equation.

$$x^2 + 3x - 2 = 0$$

(a) _____ **[2]**

(b) By drawing a suitable straight line on the grid, solve this equation.

$$x^2 + 3x - 2 = x + 2$$

(b) _____ **[3]**

Turn over

18 A vertical transmitter mast, TM, stands on horizontal ground.
Straight wires, each of length 10 m, are fixed to the top of the mast, T, and to points A, B, C and D on the ground.
A, B, C and D are the corners of a square of side 6 m.
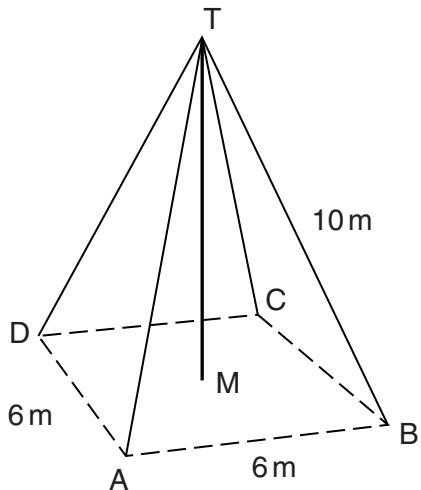
(a) Show that the height of the mast, TM, is 9.1 m correct to one decimal place.

_____

_____

_____

_____ **[3]**

(b) Calculate the angle that the wires make with the ground.

(b) _____ ° **[3]**

19 The population of a small village is given by this formula.

$$P = 850 \times 0.8^t$$

P is the population of the village and t is the number of years after the year 2009.

(a) What was the population of the village in the year 2009?

(a) _____ [1]

(b) What is the expected population of the village in 2013?

(b) _____ [2]

20 Simplify.

$$\frac{2x^2 - 9x + 4}{x^2 - 2x - 8}$$

_____ [4]

Turn over

21 The diagram shows part of a circle, radius 8 cm.
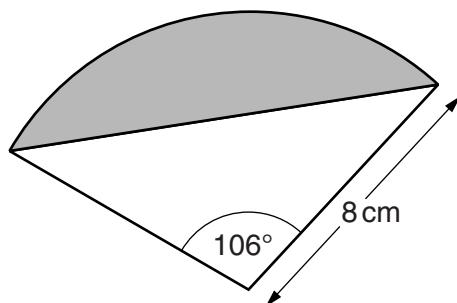
Not to scale

Calculate the area of the shaded segment.

_____ cm² **[5]**

22 Here is the graph of $y = \mathrm{f}(x)$.
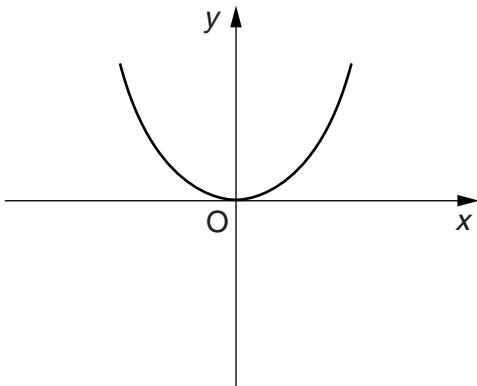
(a) Sketch the graph of $y = \mathrm{f}(x) + 4$.
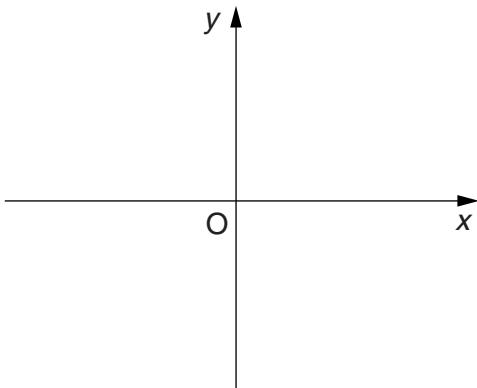
[1]

(b) Sketch the graph of $y = 2\mathrm{f}(x)$.
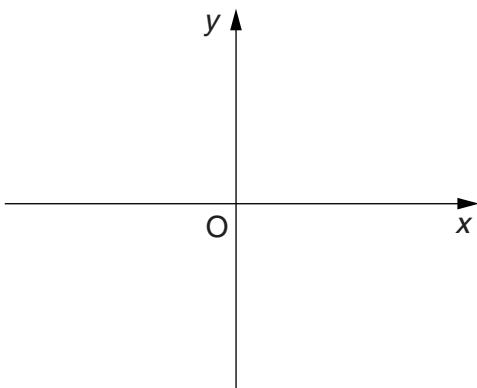
[1]

(c) Sketch the graph of $y = {}^{-}\mathrm{f}(x)$.

[1]

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