

Thursday 8 November 2012 – Afternoon

GCSE MATHEMATICS A

A503/02 Unit C (Higher Tier)

Candidates answer on the Question Paper.

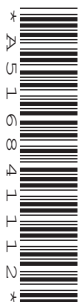
OCR supplied materials:

None

Other materials required:

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

Duration: 2 hours



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.

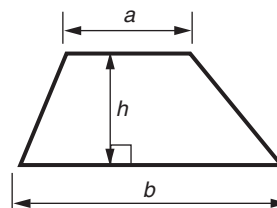


**You are permitted
to use a calculator
for this paper**

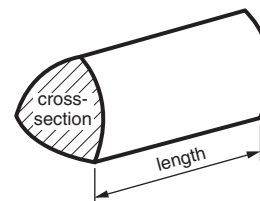
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Formulae Sheet: Higher Tier

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



Volume of prism $= (\text{area of cross-section}) \times \text{length}$

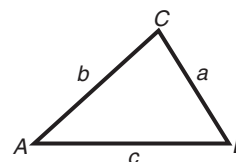


In any triangle ABC

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

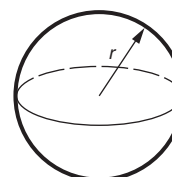
Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$

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



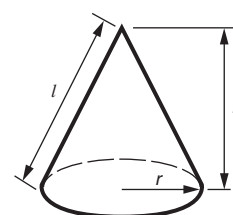
Volume of sphere $= \frac{4}{3} \pi r^3$

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

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

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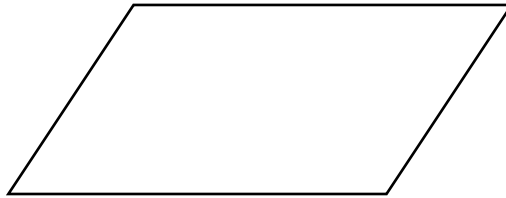
- 1 Geta did a survey of the type and weight of tea bought by 100 people. She displayed her results in a table.

Complete the table.

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

4

- 3 One week, a factory produced 2000 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?

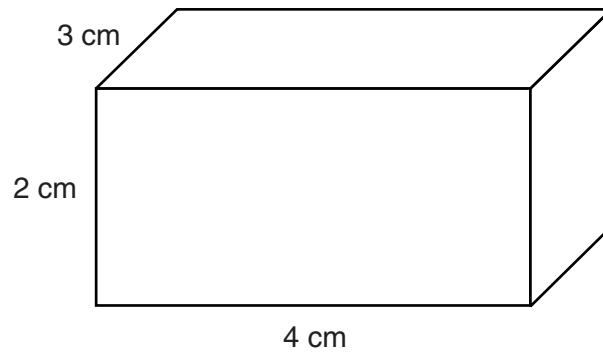
(c) _____ **[2]**

(d) The dice is thrown 250 times.

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

(d) _____ **[3]**

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

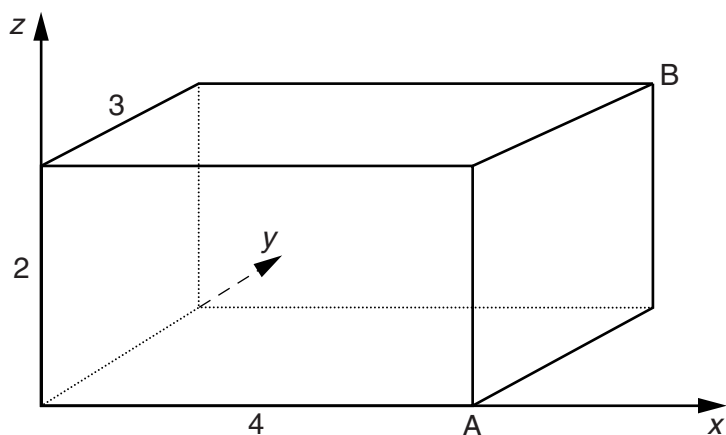


- (a) On the centimetre square grid below, draw accurately a net of the cuboid.



[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.

$$5xy + 10x$$

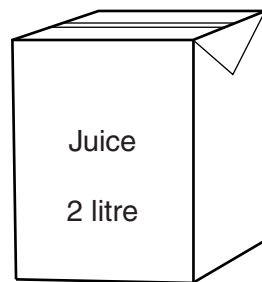
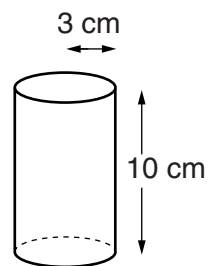
(b) _____ [2]

- 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.

$$t = 2p - 3$$

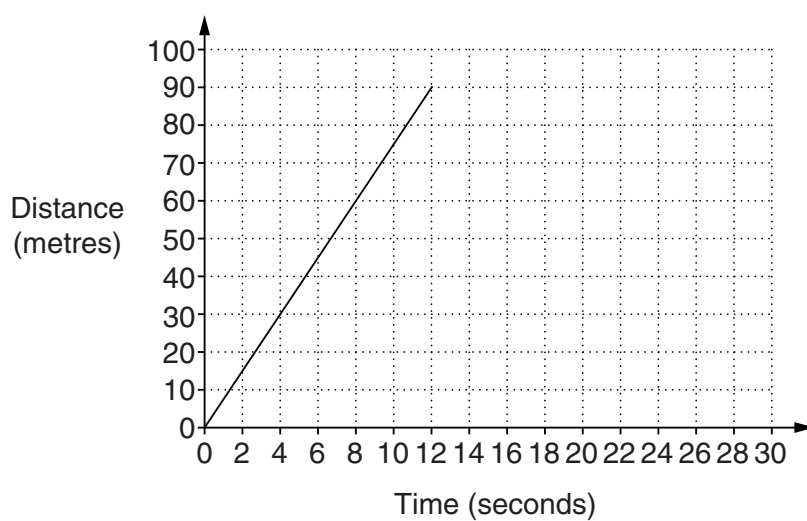
(a) _____ [2]

(b) Solve these simultaneous equations.

$$\begin{aligned}x + y &= 7 \\x - y &= -3\end{aligned}$$

(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.

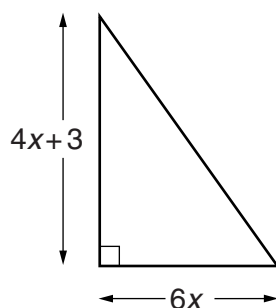
[1]

- 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]

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]

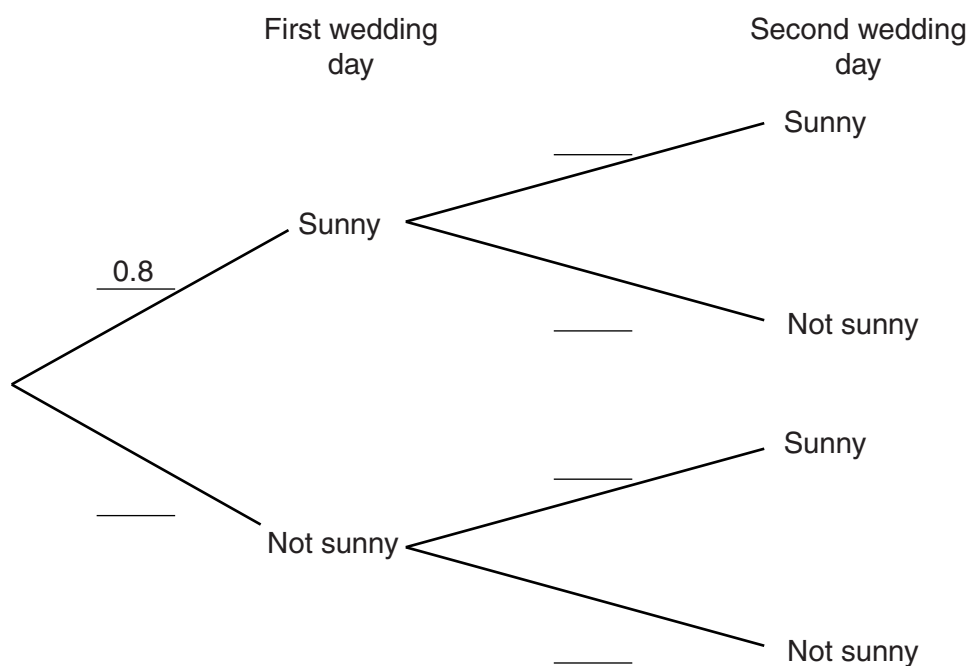
(c) Solve by factorisation.

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

(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.

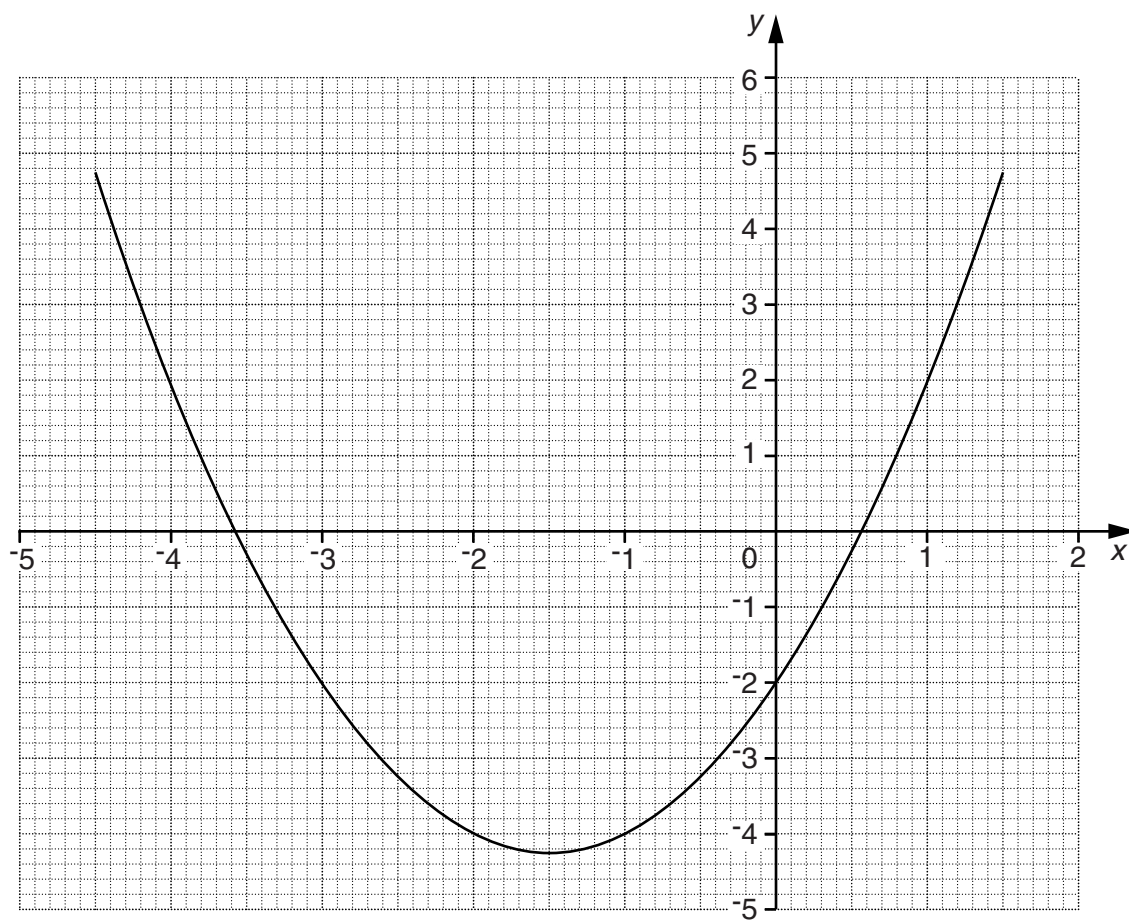


[2]

(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.

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

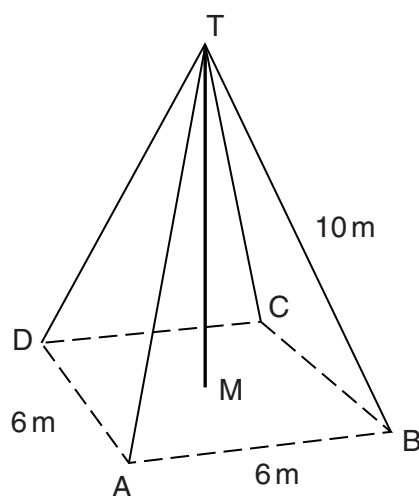
(a) _____ [2]

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

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

(b) _____ [3]

- 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?

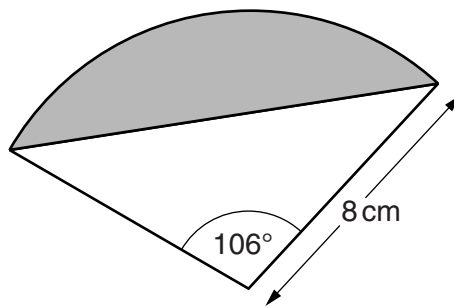
(b) _____ [2]

- 20 Simplify.

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

_____ [4]

- 21 The diagram shows part of a circle, radius 8 cm.

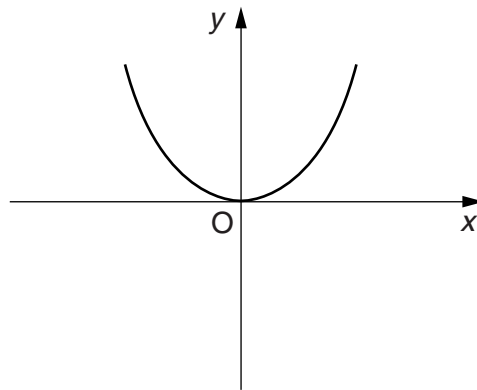


Not to scale

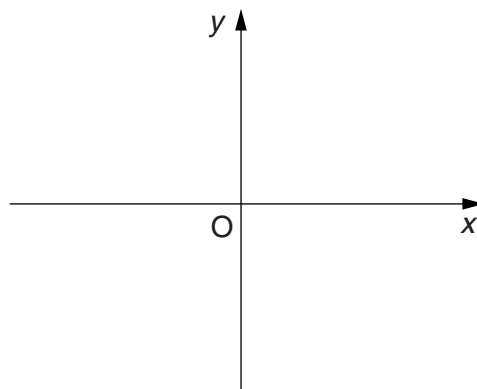
Calculate the area of the shaded segment.

_____ cm^2 [5]

22 Here is the graph of $y = f(x)$.

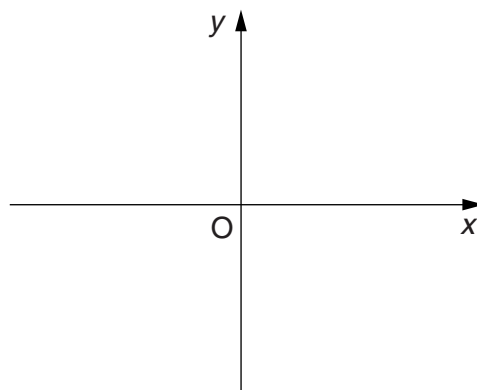


(a) Sketch the graph of $y = f(x) + 4$.



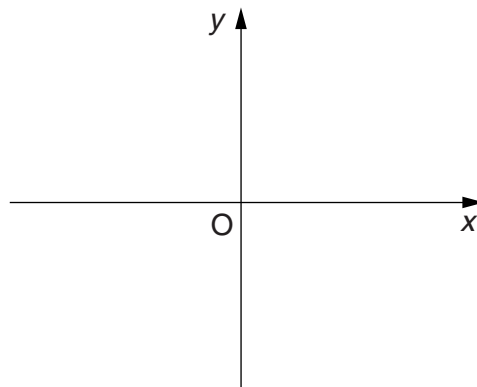
[1]

(b) Sketch the graph of $y = 2f(x)$.



[1]

(c) Sketch the graph of $y = -f(x)$.



[1]

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