OCR
RECOGNISING ACHIEVEMENT

F

GENERAL CERTIFICATE OF SECONDARY EDUCATION
APPLICATIONS OF MATHEMATICS
Paper 1
(Foundation Tier)

A381/01
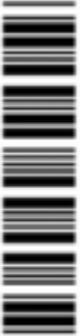
SPECIMEN

Duration: 1 hour

Candidates answer on the Question Paper

OCR Supplied Materials:
None

Other Materials Required:
- Geometrical instruments
- Tracing paper (optional)
- Scientific or graphical calculator

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that 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.
- Answer **all** the questions.
- Do **not** write in the bar codes.
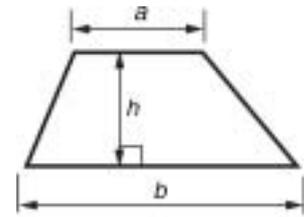- Write your answer to each question in the space provided.

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**.
- Use the π button on your calculator or take π to be 3·142 unless the question says otherwise.
- Your Quality of Written Communication is assessed in questions marked with an asterisk (*).
- This document consists of **16** pages. Any blank pages are indicated.

You are permitted to use a calculator for this paper.
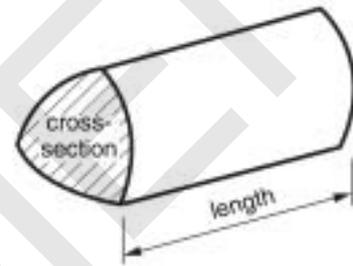
OCR is an exempt Charity

Turn over
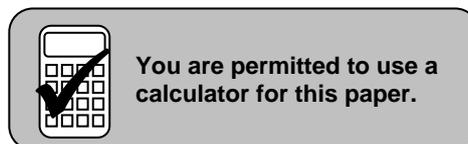
Formulae Sheet: Foundation Tier
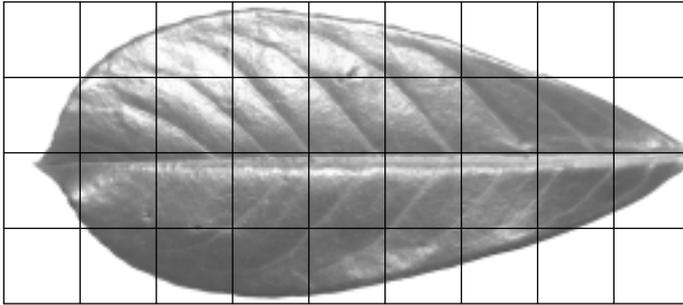
Area of trapezium = $\frac{1}{2}(a + b)\, h$

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

PLEASE DO NOT WRITE ON THIS PAGE

1 Estimate the area of this leaf. It is shown on a 1 cm square grid.

_____ cm² **[2]**

Turn over

2 During a marathon run, it is important to drink water. Volunteers along the race course hand out plastic cups of water. One cup holds $\frac{1}{8}$ litre.

(a) Shakira's trainer tells her to drink a total of $2\frac{1}{2}$ litres during the race.

How many cups of water should she drink during the race?

(a) _____ **[2]**

(b) Wesley's running magazine tells him to drink about 0·5 litres every hour.

How many cups of water should he drink in an hour?

(b) _____ **[2]**

3 These are the 8 UK coins in everyday use.

(a) A company sells boxed sets of these coins to tourists and collectors.

The boxes which hold the coins cost 12p each.

A box containing 8 coins is sold for £6.

What profit does the company make on each box of coins it sells?

(a) £ _____ **[4]**

(b) Machines that sort coins or count change just 'look' at the size (diameter and/or thickness) and the weight of each coin to decide what the coin is.

Here is some information about UK coins.

Coin	Diameter (mm)	Thickness (mm)	Weight (g)
1p	20·3	1·65	3·56
2p	25·9	2·03	7·12
5p	18·0	1·70	3·25
10p	24·5	1·85	6·50
20p	21·4	1·70	5·00
50p	27·3	1·78	8·00
£1	22·5	3·15	9·50
£2	28·4	2·50	12·00

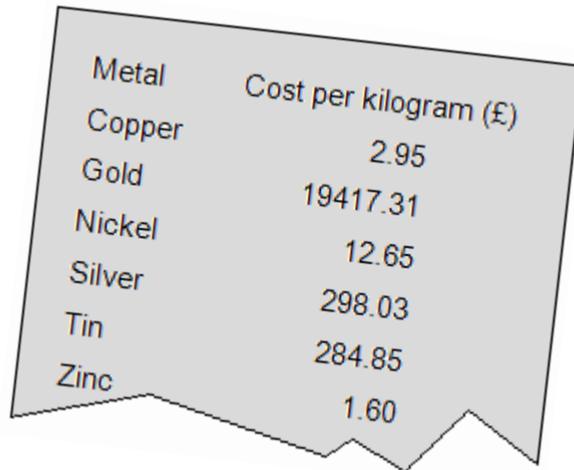**(i)** Which coin fits this description?

More than 2 mm thick and weighing less than 8g.

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

(ii) Write a description involving diameter and thickness, which will identify the 50p coin.

_____

_____ **[2]**

Turn over

4 Here is a clip from a financial newspaper.
It gives the price for a kilogram of various metals.

Metal	Cost per kilogram (£)
Copper	2.95
Gold	19417.31
Nickel	12.65
Silver	298.03
Tin	284.85
Zinc	1.60

A 5p coin weighs 3·25 g.
A 5p coin is made up of 75% copper and 25% nickel.

How much in total are the two metals in a 5p coin worth?

_____p **[4]**

5 Before the **Global Positioning System (GPS)** sailors used geometry to help them navigate.

Here is one such method.
It is called 'doubling the angle at the bow'.
It was used to calculate the distance between a ship and a
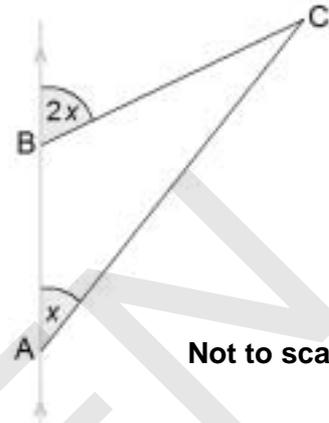point on land, for example a tower.

A ship is travelling along the straight line AB.
A tower is at C.
When the ship is at A, the bearing of the tower at C is x.
The ship continues to B where the bearing of the tower at
C is $2x$.

Show that the distance BC is equal to the distance that has
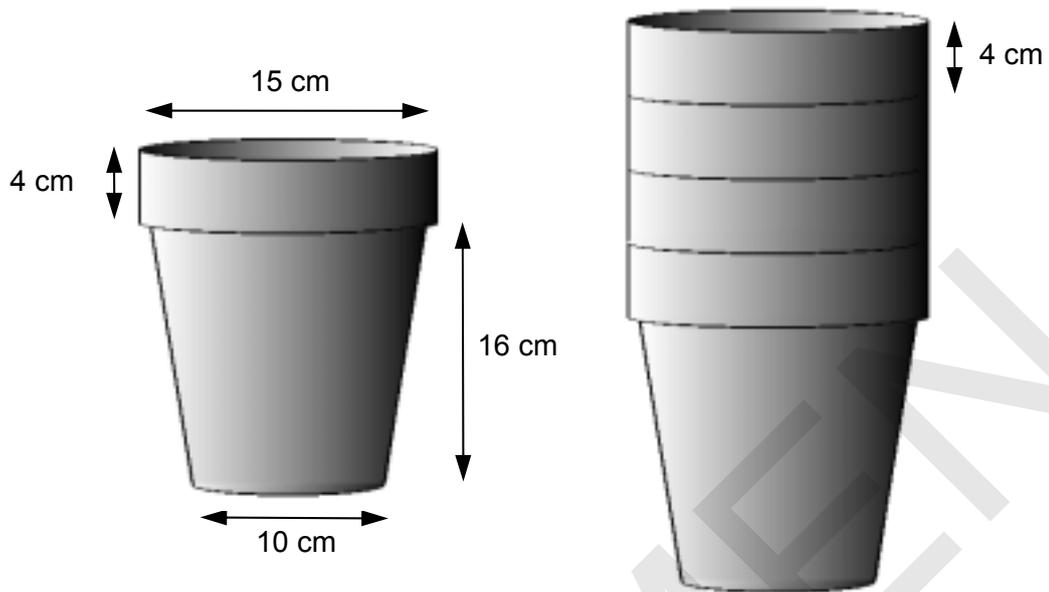been travelled by the ship from A to B.

Not to scale

_____

_____
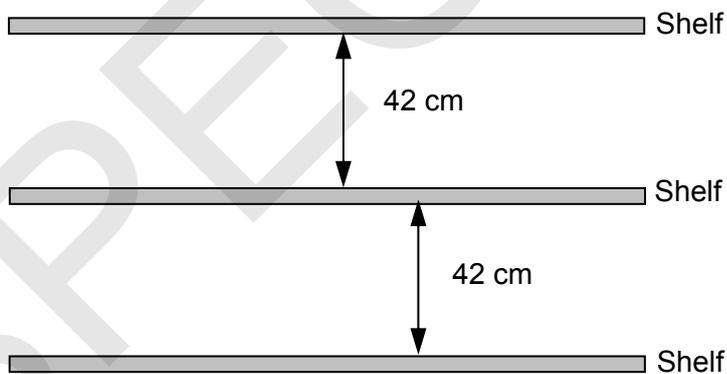
_____

_____

_____ **[3]**

6 The diagram shows a single plant pot, with its dimensions marked, and a stack of four pots.

(a) How high is the stack of four pots?

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

The pots are stacked on shelves. The shelves are 42 cm apart.

(b) A stack of pots is placed vertically between two shelves.

What the maximum number of pots in the stack?

(b) _____ **[3]**

Each pot costs £1·50. If you buy at least 8 pots you get a 15% discount.

(c) How much would you pay for 8 pots?

(c) £ _____ **[3]**

Turn over

7*

£1 Million Bank Raid
One million taken in used £10 notes.
Raiders escape with haul in suitcase.
It was reported that an armed man arrived at
the Peoples Bank, Hull, about

Is it possible to fill an average suitcase with £1 million in £10 notes?

Show all your assumptions, estimates and working clearly.

_____

_____

_____

_____

_____

_____ **[5]**

8 A doll is dropped and lands on the ground.

The formula $v = \sqrt{20h}$ gives the speed of the doll when it hits the ground.

h is the distance it has dropped, in metres, and v is its speed in metres per second.

(a) Find the speed when the doll is dropped from a height of 1·5 m.
Give your answer correct to 1 decimal place.

(a) _____ m/s **[3]**

(b) The doll is dropped from a window in the upstairs floor of a two-storey house.

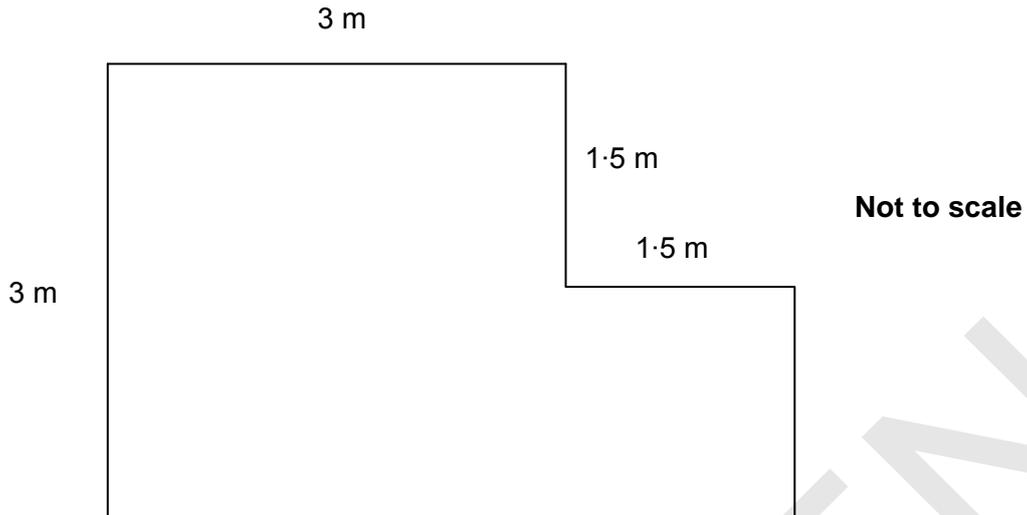   **(i)** Estimate the height it falls.

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

    (ii) Jamilla guesses that the doll hits the ground at about 6 m/s.

    Is Jamilla's guess too low, about right or too high?
    Show how you make your decision.

_____

_____

_____ **[3]**

Turn over

9

3 m

1·5 m

Not to scale

1·5 m

3 m

The diagram shows a room. All the corners are right angles. Maria wants to carpet the room using a carpet with no pattern.

There are two possible ways to do this; carpet tiles or carpet from a roll.

Carpet tiles

Each carpet tile measures 0·5 m by 0·5 m.

Each carpet tile costs £6.

(a) (i) How many carpet tiles are needed to cover the floor?

(a)(i) _____ **[5]**

(ii) Use your answer to part **(a)(i)** to find how much it costs to cover the floor with carpet tiles.

(ii) £ _____ **[2]**

Carpet from a roll

The roll of carpet is 3 m wide.

Only a whole number of metres from the roll can be bought.

It is possible to join pieces together to carpet a room.

The carpet costs £18 per square metre.

(b) (i) How many metres of 'roll carpet' will Maria need to buy for the room?
You must explain how you got your answer.

_____

_____

_____

_____

_____ **[2]**

(ii) Use your answer to **(b)(i)** to work out how much the 'roll carpet' for the room costs.

(b)(ii) £_____ **[3]**

(c) Would you advise Maria to use the carpet tiles or carpet from a roll? Why?

_____

_____

_____

_____ **[2]**

10 Ryan is going hang-gliding. He finds this information on the internet.

> As you climb higher into the sky it gets colder.
> For each 200 m rise in height the temperature drops by 1°C.

(a) Ryan wants to write a formula giving the temperature, T°C, at a height of h metres up, when the temperature on the ground is G°C.

Write down the formula he should use.

(c) _____ **[2]**

(b) According to the hang-gliding school, Ryan's first flight will be up to about 600 metres with an instructor.

Assuming the weather will be sunny, will Ryan need any special clothing with him to keep out the cold?

_____ because _____

_____

_____ **[2]**

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OXFORD CAMBRIDGE AND RSA EXAMINATIONS

General Certificate of Secondary Education

APPLICATIONS OF MATHEMATICS **A381/01**
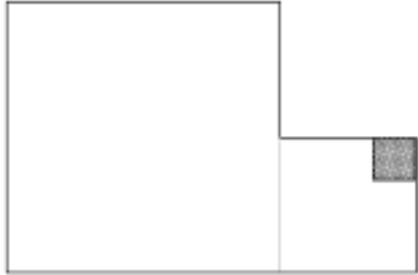
Paper 1 (Foundation)

Specimen Mark Scheme

The maximum mark for this paper is **60**.

This document consists of **4** printed pages.

1		22 cm^2 Accept answers between 20 and 24. Method: counting squares half or more than half full, OR filling leaf with rectangles and/or triangles	2	**M1** evidence of method **A1** answers between 20 and 24
2	**(a)**	Each litre is 8 cups 20 cups	1 1	**Or** $2\frac{1}{2} \div \frac{1}{8}$
	(b)	4 cups is 0·5 litres 4 cups per hour	1 1	For 0·5 = $\frac{1}{2}$ or $\frac{1}{2} = \frac{4}{8}$

3	**(a)**	£2 + £1 + 50p + 20p + 10p + 5p + 2p + 1p
		    = £3·88
		"£3·88" + 12 p
		    = £4
		So profit = £6 − £4 = £2
			1
			
			1
			
			1
			1	

	(b)	**(i)** 2p	2	1 for £1 or £2 as answers
		(ii) 1 for each condition fitting a 50p coin	2	**0** for each condition involving weight
4		0·75 × 3·25 (= 2·4375) oe 0·25 × 3·25 (= 0·8125) oe "2·4375" × 2·95 ÷ 1000 = £0·007(19…) "0·8125" × 12·65 ÷ 1000 = £0·01(027…) Total cost of 5p coin works out at £(0·007(19 …) + 0·01(02 ...) = 1·7(…)p	1 1 1 1	One needed to gain mark Allow ft on their calculation for mass of copper Allow ft on their calculation for mass of nickel Allow full follow through on "their" figures.
5		∠DBC = ∠BCA + ∠BAC or equivalent, so ∠ BCA = x Triangle ABC is isosceles So BA = BC	1 1 1	Need both to gain credit. Other correct methods should be accepted.

6	(a)	16 + 4 × 4 = 32	B2	M1 for adding some 4s to 16 (could be a sequence)
	(b)	10 cm more space than needed for 4 pots 10 ÷ 4 = 2·5 so 2 more pots = 6	1 1 1	Or M1 seq. 20, 24, 28, 32, 36, … continued past 32 M1 for continuing up to 40 A1 for 6 Or M1 42 – 16 (= 26) M1: 26/4 = $6\frac{1}{2}$ so A1 6 pots
	(c)	8 × £1·50 = £12(.00) 15% of £12 = £1·80 OR 15% of £1·50 then multiply by 8 Cost = £12 - £1·80 = £10·20	1 1 1	Multiply £1·50 by 8 Attempt to find 15% of their total or 0·85 times total
7*		A fully explained and 'correct' answer, eg estimates for volume of banknote and suitcase together with calculation of number of banknotes the suitcase will hold and the value of these notes.	5	£10 note: (10–20) cm by (5–10) cm by (0·005–0·05) cm, giving a volume within the range (0·25–10) cm³ Suitcase: (100–150) cm by (50–100) cm by (30–60) cm, giving a volume within the range (150000–900000) cm³
		A 'correct' answer using dimensions outside the range or an 'incorrect' answer which uses appropriate estimates for dimensions	3-4	For lower mark – an attempt to calculate the number of banknotes the suitcase will hold based on *their* values for the volume of the suitcase and the volume of a banknote.
		A clear attempt to calculate the volume of a banknote and the volume of the suitcase.	1-2	For lower mark - an attempt, possibly poorly expressed, to calculate the volume of a banknote or the volume of the suitcase.
		No relevant comment or calculation.	0	
8	(a)	5·5	3	B2 5·47… or 5·48 Or M1 20 × 1·5 or 30 seen
	(b)	(i) 3 – 5 m	2	Allow B1 for 3 – 5 with no units
		(ii) Too slow, with justification.	3	M1 √(20 × (i)) seen A1 evaluated correctly Or M1A1 6²/20 = 1·8
9	(a)	(i) Large square area is 9 m²	1 1 1 1 1 Or 1 1	Method A (find area 1ˢᵗ) Split into 2 parts Attempt area of one rectangle (with correct length and width). Finding total area Finding area of one tile = 0·25 m² 45 tiles Method B (use tile as unit of area) Split into 2 parts Realise how many tiles each way in

		4 tiles for a square metre so 36 tiles for large square Small square needs 3 tiles each way so 9 tiles [or scale drawing] 45 tiles	**1** **1** **1** **Or** **1** **1** **1** **1** **1**	one part eg 1·5 x 1·5 square is 3 tiles each way Number of tiles in part of shape (9 or 36) Number of tiles in other part 45 tiles Method C (scale drawing) Scale drawing of floor (drawing on paper can be used but tiles must be correct size) Draw some square tiles on floor at correct scale (may switch to method B after this mark) Completion of square tiles Number of tiles in diagram correct (and all whole tiles) 45 tiles
		(ii) 45 × £6 = £270	**2**	ft ans from **(a)(ii)** **B1** for clear intention to multiply by £6
	(b)	**(i)** 4·5 m would be enough but can only buy whole number of metres. She should buy 4 m and use the off-cut to finish the small square.	**2**	**B1** for 4 m without explanation or for 5 m
		(ii) 4 × 3 = 12 m² 12 × £18 = £216	**3**	**M1 (b)(i)** × 3 **M1** × 18
	(c)	The squares because they are not much more expensive and it is easy to replace a square if it is damaged. **Or** Carpet from a roll because it is cheaper. Clear recommendation with reasoning / explanation.	**2**	**B1** Recommendation clear but reasoning unclear or incomplete 0 no relevant answer.
10	**(a)**	$T = G - \dfrac{h}{200}$ or equivalent	**2**	1 for $T = G - \dfrac{h}{k}$, $T = G - kh$ or $\dfrac{h}{200}$
	(b)	The temperature will drop by 3°C A sunny day is about (18-25)°C So he'll not need any special clothing	**1** **1**	Need both for 1 mark. Clear conclusion drawn in "good" English dependent on some (not necessarily correct calculation using the rule given). Accept answers involving wind chill if logical and reasonable.

Assessment Objectives and Functional Elements Grid

GCSE Applications of Mathematics

A381/01 (Foundation)

Qn	Topic	AO1	AO2	AO3	Functional
1	Area: irregular shape			2	2
2a	Fractions	2			2
2b	Decimals	2			2
3a	Money/profit	3	1		
3bi	Ordering numbers	1	1		
3bii	Probability		2		
4	Percentage/ info	4			
5	Isos. Triangles			3	
6a	Length	2			
6b	Length		3		3
6c	Percentage	3			
7*	Volume/estimat.		3	2	5
8	Use of formula	5		3	3
9ai	Area		5		
9aii	Number	2			
9bi	Area			2	2
9bii	Area		3		
9c	Interpretation		2		2
10a	Formula construction	2			
10b	Using word formula	1	1		
	TOTAL	27	21	12	21

Turn over