

Surname											Other Names											
Centre Number							Candidate Number															
Candidate Signature																						

For Examiner's Use

General Certificate of Secondary Education
June 2007

MATHEMATICS (SPECIFICATION A)
Intermediate Tier
Paper 2 Calculator

3301/2I



Monday 11 June 2007 9.00 am to 11.00 am

<p>For this paper you must have:</p> <ul style="list-style-type: none"> • a calculator • mathematical instruments. 	
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Time allowed: 2 hours

Instructions

- Use blue or black ink or ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- Answer the questions in the spaces provided.
- Use a calculator where appropriate.
- Do all rough work in this book.
- If your calculator does not have a π button, take the value of π to be 3.14 unless another value is given in the question.

Information

- The maximum mark for this paper is 100.
- The marks for questions are shown in brackets.
- You may ask for more answer paper, graph paper and tracing paper. They must be tagged securely to this answer book.

Advice

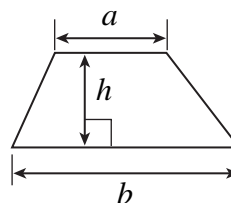
- In all calculations, show clearly how you work out your answer.

For Examiner's Use	
Pages	Mark
3	
4–5	
6–7	
8–9	
10–11	
12–13	
14–15	
16–17	
18–19	
20–21	
TOTAL	
Examiner's Initials	

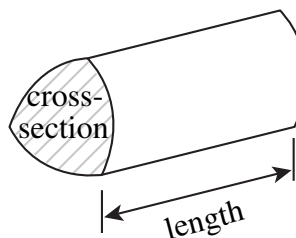
Formulae Sheet: Intermediate Tier

You may need to use the following formulae:

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



Volume of prism = area of cross-section \times length



Answer **all** questions in the spaces provided.

- 1 (a) Calculate the cube of 8.7

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Answer (1 mark)

- (b) Calculate $\sqrt{\frac{7}{2.3}}$

.....

Answer (1 mark)

- (c) Calculate $\frac{(8.7 + 4.2)}{1.75}$

.....

Answer (1 mark)

- 2 Jack buys 1.5 kilograms of oranges at 98 pence per kilogram.
He also buys some bananas at 85 pence per kilogram.
His total bill is £2.49
What is the weight of the bananas that he buys?

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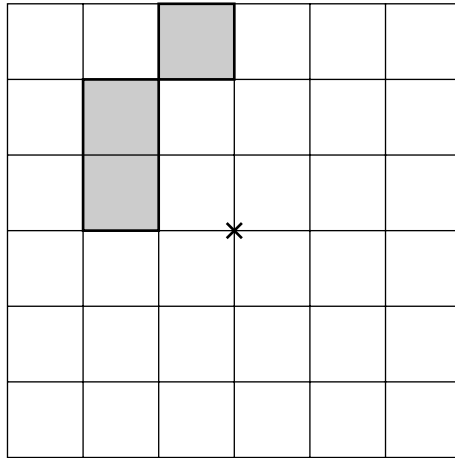
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Answer kg (4 marks)

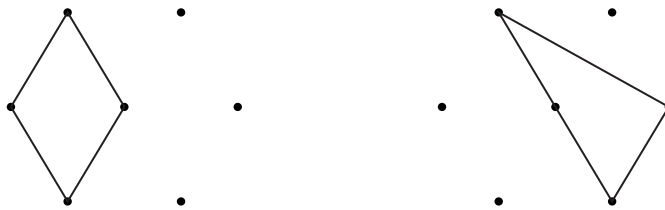
Turn over ►

- 3 Shade 9 more squares so that the grid has rotational symmetry of order 4 about centre \times .



(3 marks)

- 4 A quadrilateral and a triangle are drawn on separate seven-point triangular grids.



Explain why the areas of the two shapes are the same.

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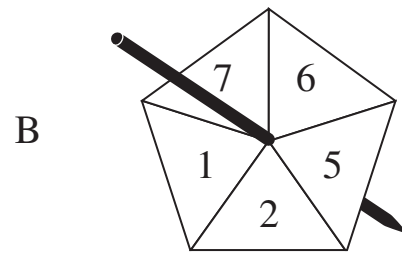
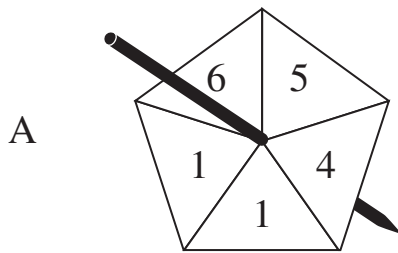
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(2 marks)

5 Two fair spinners A and B are shown.



James plays a game using the two spinners.

His score is the sum of the two numbers on spinner A and spinner B.

He wins if his score is even.

James plays the game many times.

Is he likely to win more times than he loses?

You **must** show your working.

You may use this table if you wish.

		Spinner A				
Spinner B	+	1	1	4	5	6
	1					
	2					
	5					
	6					
	7					

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(4 marks)

Turn over ►

6 (a) Solve the equations

(i) $\frac{v}{4} = 8$

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.....

Answer $v =$ (1 mark)

(ii) $4w + 3 = 13$

.....
.....
.....

Answer $w =$ (2 marks)

(b) Find the value of $5x + 2y$ when $x = 4$ and $y = -3$

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.....

Answer (2 marks)

(c) Multiply out $4(x - 3)$

.....

Answer (1 mark)

(d) Factorise

(i) $6a + 9$

.....

Answer (1 mark)

(ii) $x^2 + 5x$

.....

Answer (1 mark)

7 Here is part of a railway timetable.

	Departure Times			
Newcastle	0840	0935	1040	1122
York	0943	1034	1144	1225
Leeds	1010	—	1210	—
Derby	1124	1157	1324	1355
Birmingham	1215	1315	1415	1515

- (a) A train leaves Newcastle at 1040.

How long is the journey to Birmingham for this train?
Give your answer in hours and minutes.

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Answer hours minutes (3 marks)

- (b) The 1225 train from York takes 1 hour 30 minutes to reach Derby.
The distance from York to Derby is 96 miles.

Calculate the average speed of the train in miles per hour.

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Answer mph (3 marks)

8



A golf ball is travelling towards a hole.

The distance of the ball from the hole, s feet, after time t seconds, is given by

$$s = t^2 - 6t + 9$$

The ball drops into the hole after 3 seconds.

By working out s when $t = 3$, show that this is correct.

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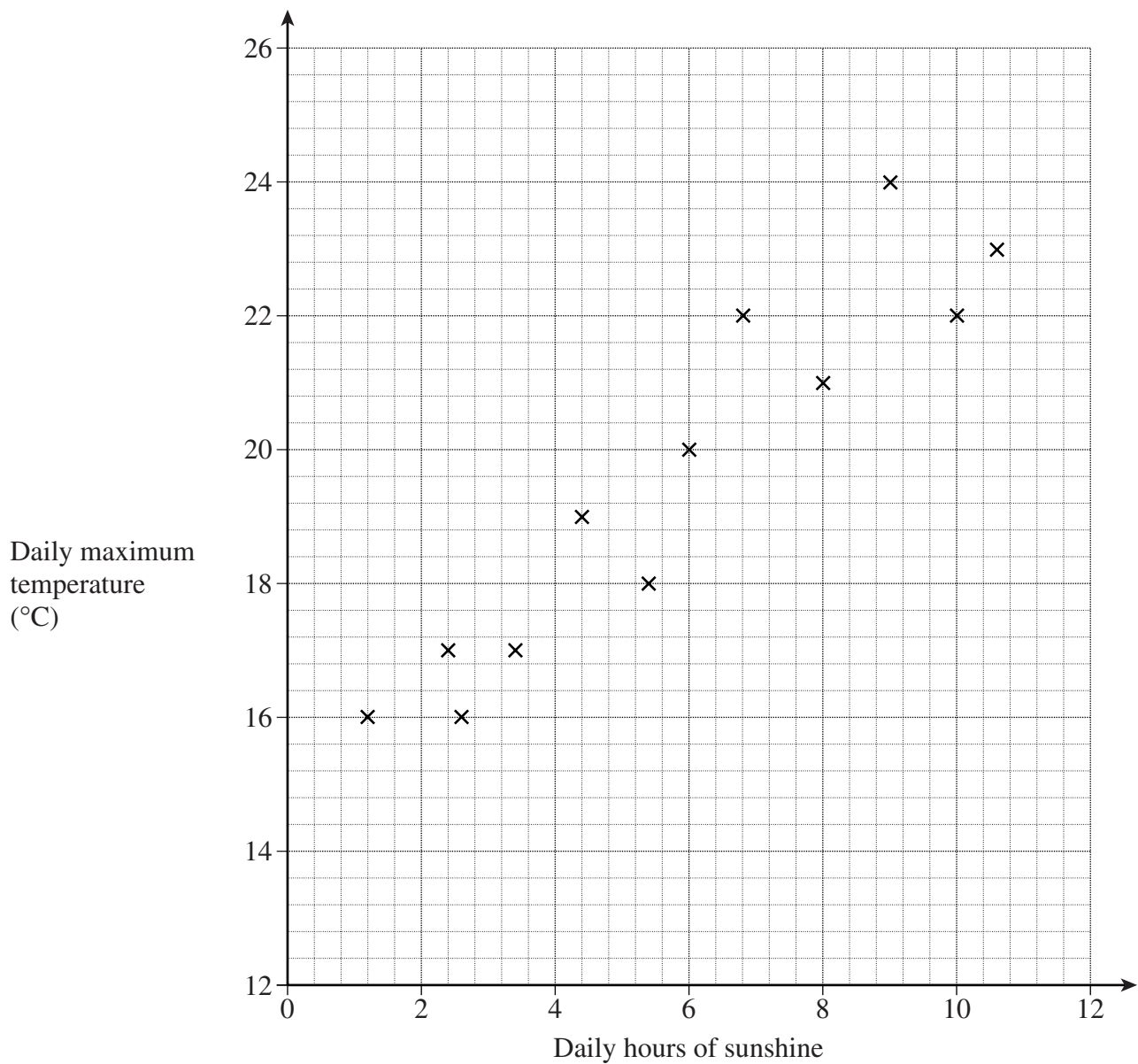
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(3 marks)

- 9 A newspaper records the daily maximum temperature of twelve seaside resorts in Britain. It also records the daily hours of sunshine. The scatter graph shows the data collected for a day last July.



- (a) Draw a line of best fit. (1 mark)
- (b) What is the connection between daily hours of sunshine and daily maximum temperature for these resorts?

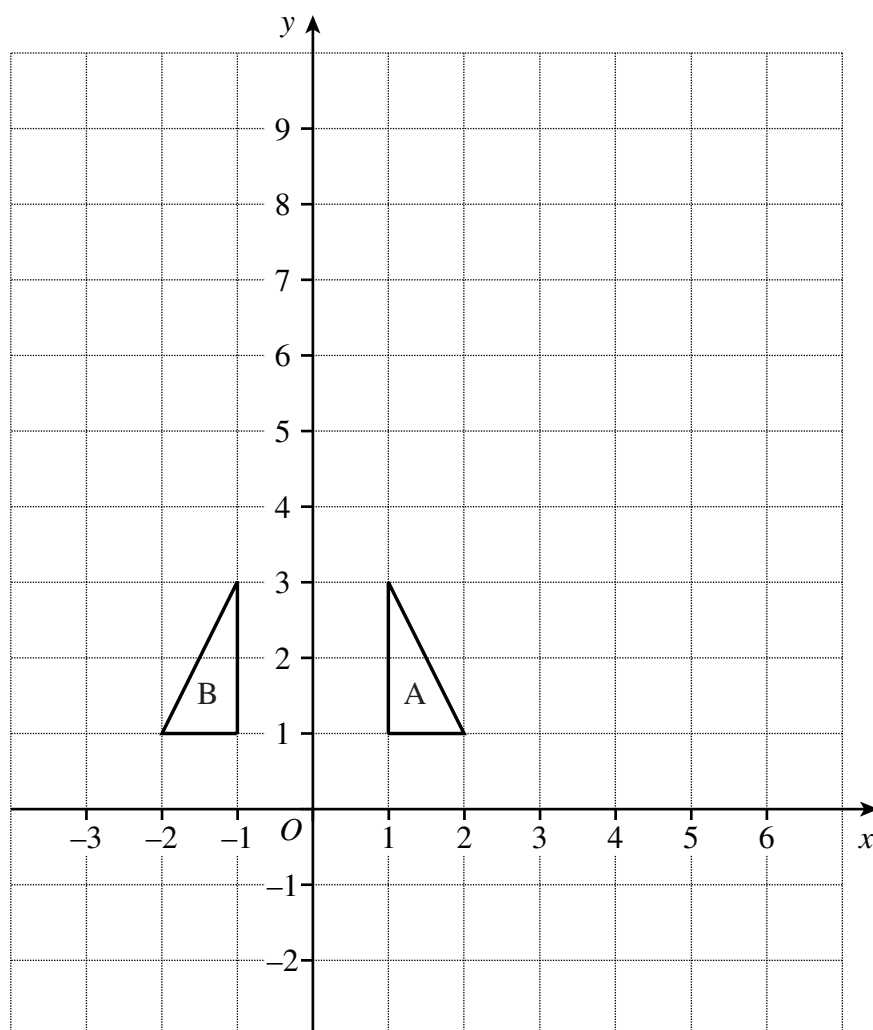
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(1 mark)

Turn over ►

10 This question is about transformations of triangle A.



- (a) Describe fully the single transformation that takes triangle A onto triangle B.

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(2 marks)

- (b) Translate triangle A, 2 units to the left and 3 units down.
Label the new triangle C.

(1 mark)

- (c) Enlarge triangle A by a scale factor of 3, centre (0, 1).
Label the new triangle D.

(3 marks)

- 11** Amir works in a sports shop.
He can have a discount of 40% on anything he buys for himself.

How much will Amir pay for a pair of trainers priced at £65 ?

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Answer £ (3 marks)

- 12** The table shows the amounts needed to make 24 biscuits.

Ingredient	Amount for 24 biscuits	Amount for 36 biscuits
Sugar	80 g	
Flour	280 g	
Butter	190 g	

Calculate the amounts needed to make 36 biscuits.
Write your answers in the table.

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(3 marks)

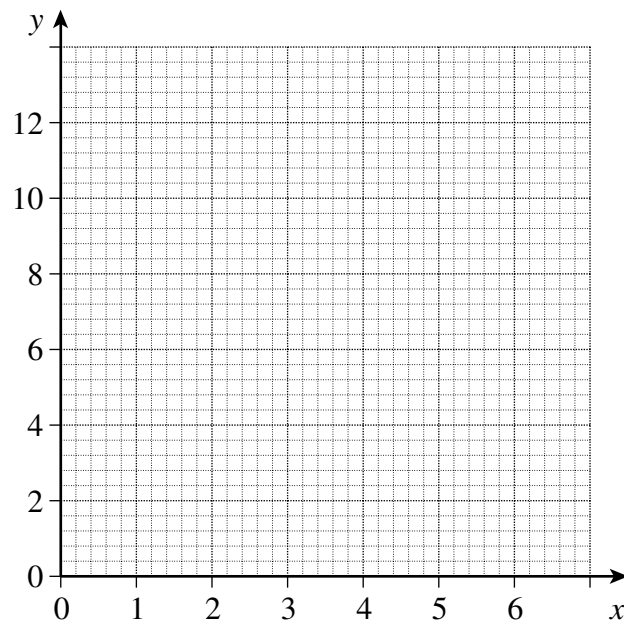
- 13** (a) On the grid draw the graph of $y = 10 - 2x$ for values of x from 0 to 5.

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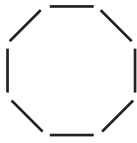


(3 marks)

- (b) On the grid draw the line $y = 7$

(1 mark)

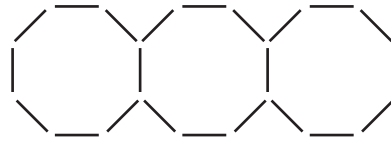
- 14** A sequence of patterns is made using octagons.
Each octagon is made of sticks.



Pattern 1
8 sticks



Pattern 2
15 sticks



Pattern 3
22 sticks

- (a) (i) How many sticks are needed for Pattern 5 ?

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Answer (1 mark)

- (ii) Explain how you worked out your answer.

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(1 mark)

- (b) Write down an expression for the number of sticks in Pattern n .

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Answer (2 marks)

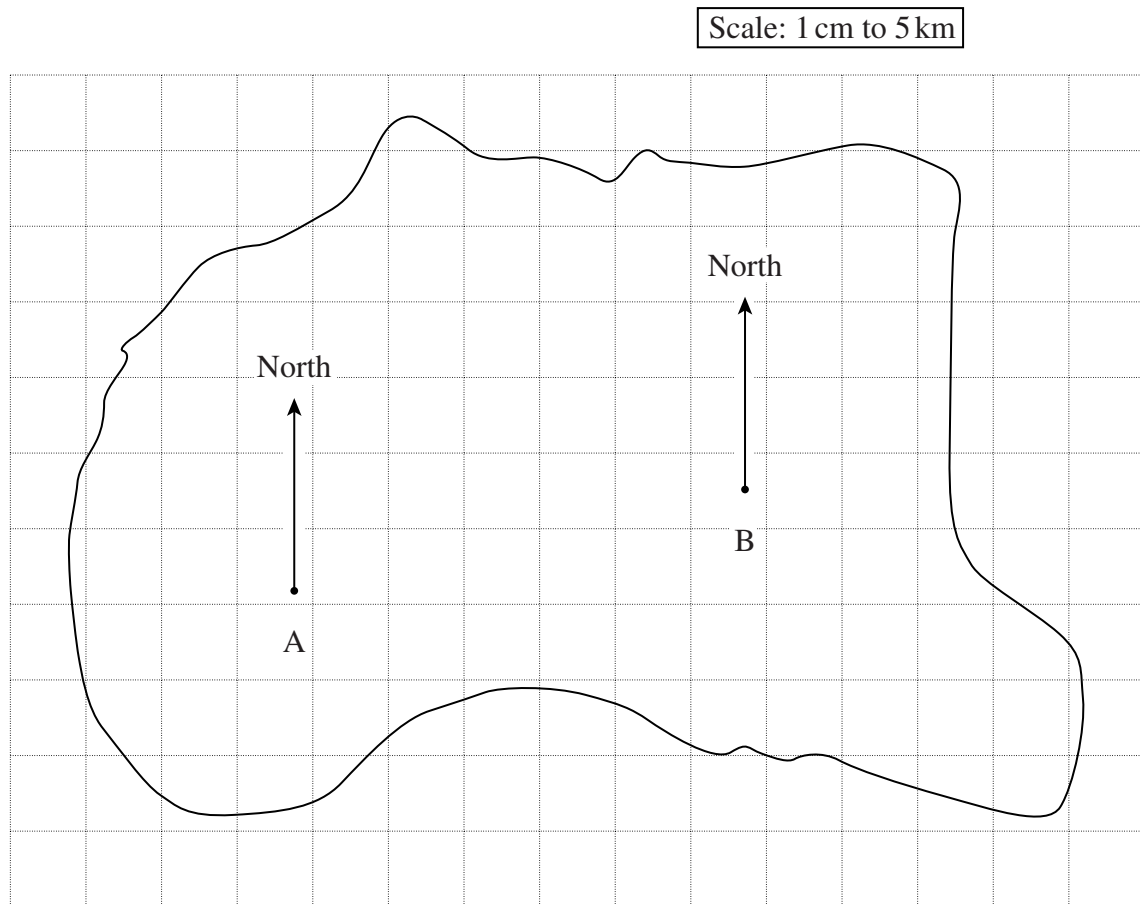
- (c) Which pattern uses 358 sticks ?

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Answer (2 marks)

- 15 The diagram shows an island with North lines drawn at points A and B.



- (a) Treasure is buried on a bearing of 037° from A and 290° from B.
Mark, with a \times , the position of the treasure.

(3 marks)

- (b) Find the real distance between the points A and B.

.....

Answer km (3 marks)

16 Paul and Kelly each buy a can of drink.



Volume 500 ml
Sugar per can 35 g



Volume 330 ml
Sugar per can 28 g

Paul drinks 100 ml of the Blackcurrant juice.

Kelly drinks 100 ml of the Fizzy orange.

Who drinks more sugar?

You **must** show your working.

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Answer (3 marks)

Turn over for the next question

Turn over ►

- 17 The table shows the heights of 30 students in a class.

Height, h , (cm)	Number of students
$140 < h \leq 144$	4
$144 < h \leq 148$	5
$148 < h \leq 152$	8
$152 < h \leq 156$	7
$156 < h \leq 160$	5
$160 < h \leq 164$	1

By using the midpoints of each group, calculate an estimate for the mean height of the students.

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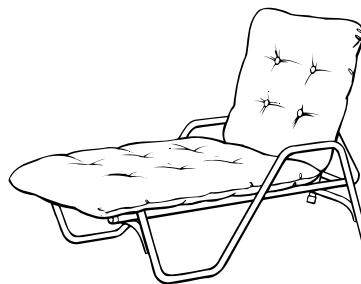
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Answer cm (3 marks)

18

Sale!
12% off
Garden Seat
Save £15



What is the normal price of the garden seat?

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Answer £ (3 marks)

- 19 (a) Write down whether each of the following is an expression (X), an identity (I), an equation (E) or a formula (F).

	X, I, E or F
$v = u + at$	
$3n + 2n \equiv 5n$	
$3x + 2 = 7$	
$4x^2 + 2x - 3$	

(3 marks)

- (b) Show clearly that $(a + b)(a - b) \equiv a^2 - b^2$

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(2 marks)

- 20 The following information is from a table on the side of a packet of biscuits.

NUTRITION INFORMATION		
AVERAGE VALUES	PER BISCUIT	PER 100 g
PROTEIN	0.7 g	5.5 g

Use this information to work out the weight of one biscuit.
Give your answer to an appropriate degree of accuracy.

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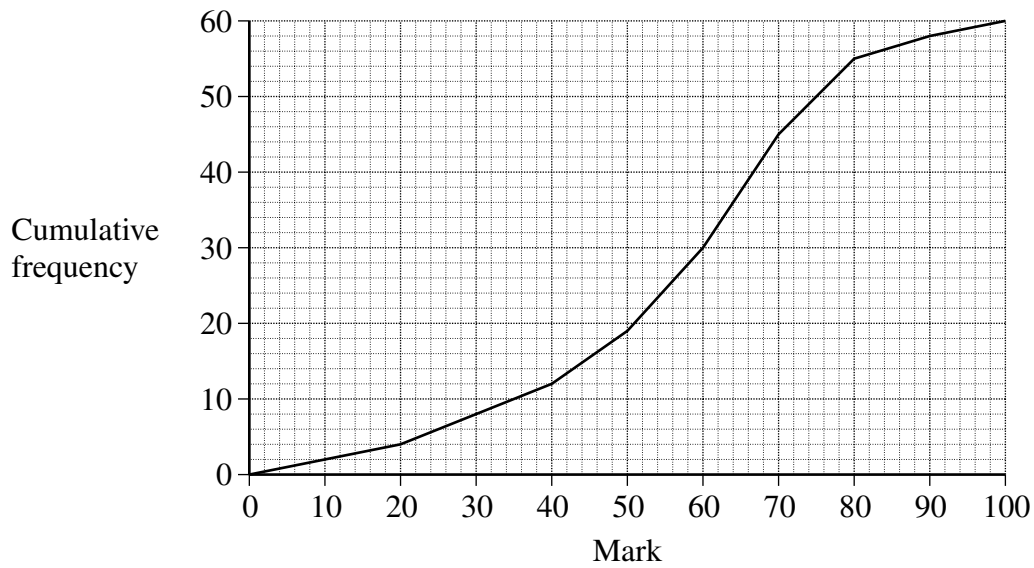
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Answer g (3 marks)

Turn over ►

- 21 The cumulative frequency diagram shows the distribution of marks for 60 students in a science examination.



(a) Estimate

(i) the median mark

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Answer (1 mark)

(ii) the interquartile range of the marks.

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Answer (2 marks)

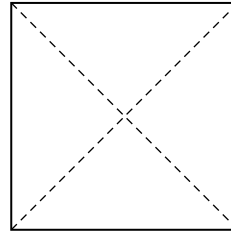
(b) The pass mark for the examination is 55 marks.
How many students passed the examination?

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Answer (2 marks)

- 22 A square has diagonals of length 15 cm.
Calculate the area of the square.



Not drawn
accurately

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Answer cm^2 (3 marks)

- 23 This table shows some corresponding values of x and y .

x	-2	-1	0
y	1	2	3

This table shows some relationships between x and y .

Relationship	True/False
$y = x + 3$	
$y = (x + 2)^3 + 1$	

Put True in the last column if the relationship is true for all three pairs of values.
Put False in the last column if the relationship is **not** true for all three pairs of values.

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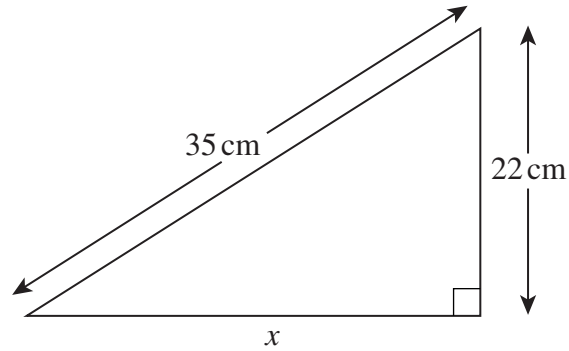
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(2 marks)

Turn over ►

24 (a)

Not drawn
accuratelyCalculate the length x .

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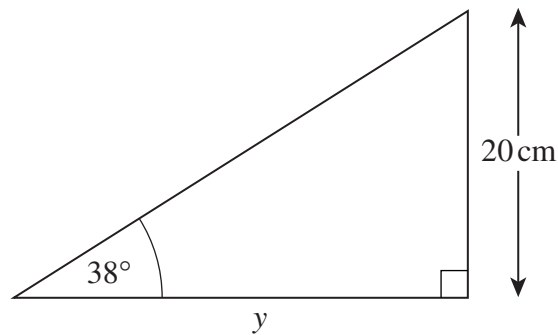
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Answer cm (3 marks)

(b)

Not drawn
accuratelyCalculate the length y .

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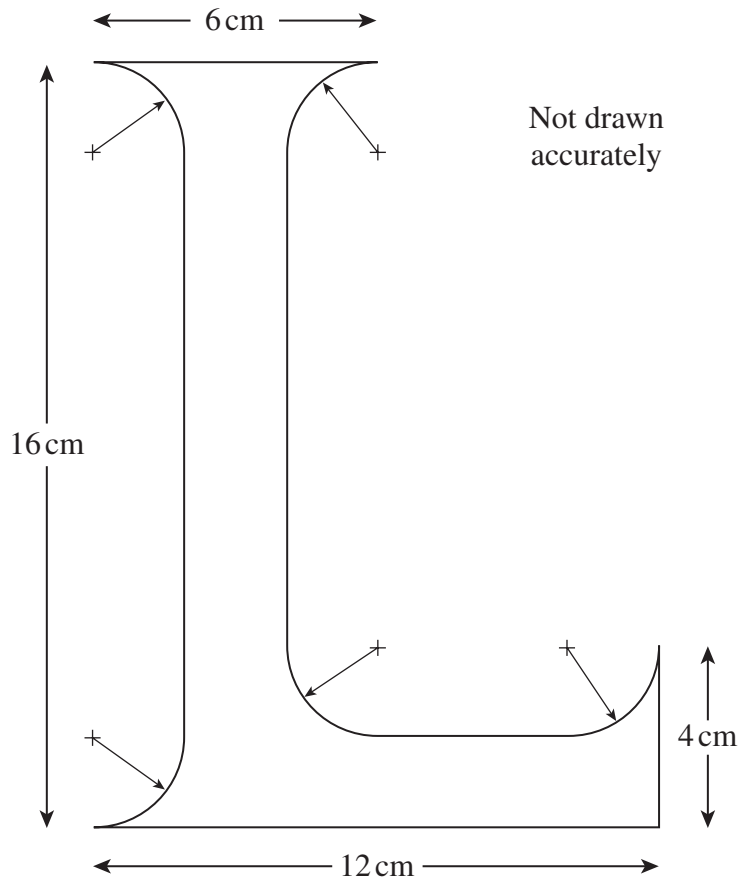
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Answer cm (3 marks)

- 25 A sign maker designs a letter L.
All arcs are quarter circles of radius 2 cm.



Calculate the area of the L.

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Answer cm^2 (4 marks)

END OF QUESTIONS

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