General Certificate of Secondary Education
June 2004

MATHEMATICS (SPECIFICATION A)   3301/2I
Intermediate Tier
Paper 2 Calculator

Tuesday 15 June 2004 9.00 am to 11.00 am

AQA

ASSESSMENT and
QUALIFICATIONS
ALLIANCE

In addition to this paper you will require:
• a calculator
• mathematical instruments.

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 in the spaces provided.
- Do all rough work in this booklet.
- If your calculator does not have a π button, take the value of π to be 3.14 unless otherwise instructed in the question.

Information
- The maximum mark for this paper is 100.
- Mark allocations are shown in brackets.
- Additional answer paper, graph paper and tracing paper will be issued on request and must be tagged securely to this answer booklet.
- You are expected to use a calculator where appropriate.

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	
22 – 23	
TOTAL	
Examiner's Initials	

3301/2I

Formulae Sheet: Intermediate Tier

You may need to use the following formulae:

Area of trapezium $= \frac{1}{2}(a+b)h$
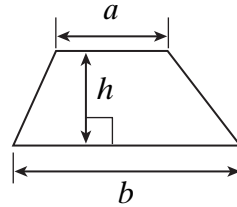
Volume of prism = area of cross-section × length
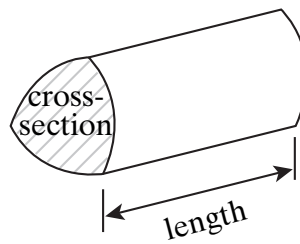
Answer **all** questions in the spaces provided.

1 The length of a rectangle is 10.8 cm.
The perimeter of the rectangle is 28.8 cm.

width [rectangle]

—— 10.8 cm ——

Not to scale
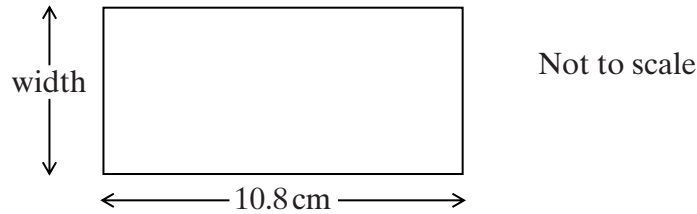
Calculate the width of the rectangle.

....

....

....

Answer .... cm   *(3 marks)*

2 (a) Work out the cube of 4

....

Answer ....   *(1 mark)*

(b) Work out $3 \div 0.7^2$

(i)   Write down the full calculator display.

Answer ....   *(1 mark)*

(ii) Give your answer to the nearest whole number.

Answer ....   *(1 mark)*

(c) (i) Calculate $\dfrac{9.8}{6.7 - 1.2}$

Answer ....   *(1 mark)*

(ii) Give your answer to an appropriate degree of accuracy.

Answer ....   *(1 mark)*

8

Turn over ▶

3 Here is a sequence of numbers.

3   5   9   17

The rule for continuing this sequence is

Multiply by 2 and subtract 1

The same rule is used for a sequence that starts with the number –5.
What are the next **two** numbers in this sequence?

....

....

Answer ....   *(2 marks)*

4 Ann has two spinners.

The first spinner has five equal sections.
Two sections are red, one is yellow, one is green and one is white.
The second spinner has six equal sections.
Three sections are red, one is yellow and two are blue.
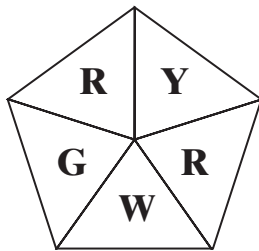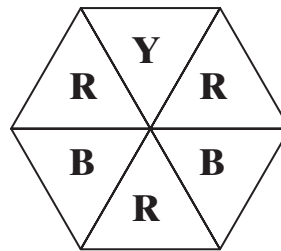
First spinner   **Second spinner**

(a) Ann spins the second spinner once.
     What is the probability that this spinner lands on red?

....

Answer ....   *(2 marks)*

(b) Ann thinks that she has more chance of getting yellow on the second spinner.
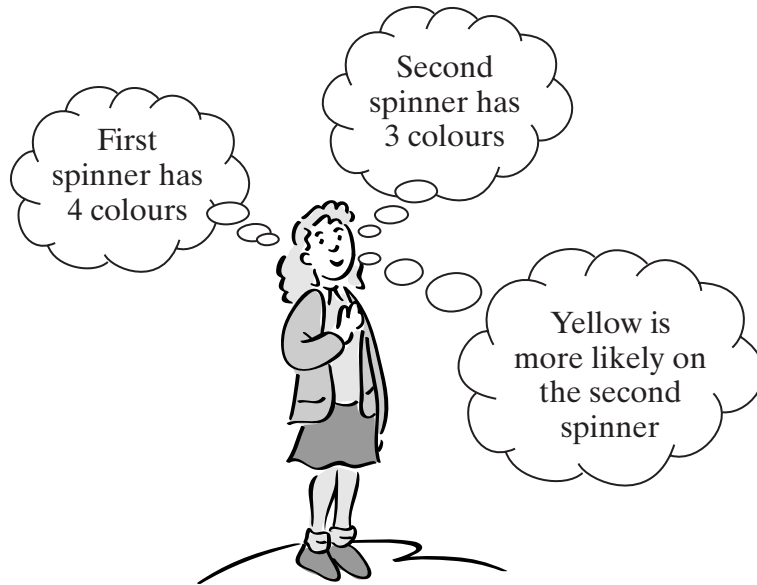
Explain why Ann is wrong.

....

....

....

....

(2 marks)

TURN OVER FOR THE NEXT QUESTION

5
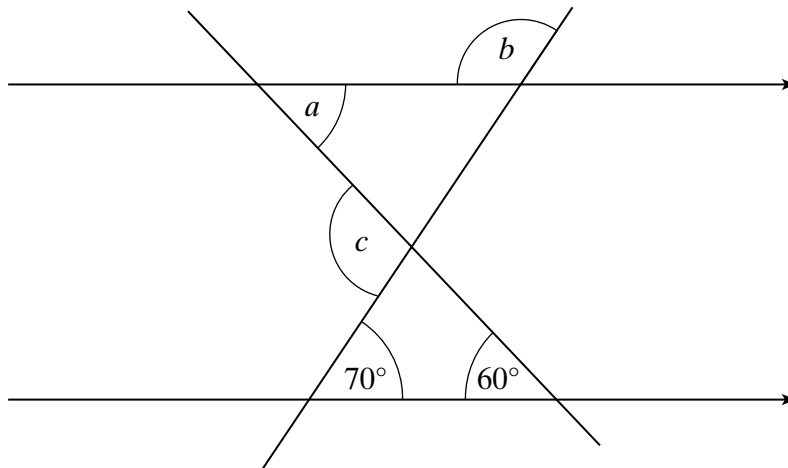
Not drawn accurately

Work out the values of *a*, *b* and *c*.

....

....

Answer *a* = ... degrees

b = ... degrees

c = ... degrees   *(3 marks)*

6 The table shows the amounts needed to make 36 mince pies.

Ingredient	Amount for 36 pies	Amount for 48 pies
Plain Flour	330g	
Lard	75g	
Butter	75g	
Mincemeat	720g	

Calculate the amounts needed to make 48 mince pies.
Put your answers in the table.

....

....

....

(3 marks)

7 (a) John, Paul and Mark go on holiday for 6 days.
Altogether they spend £800.
John spends £350.
Paul spends £40 each day.
On average how much does Mark spend each day?

....

....

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....

....

Answer £ ....   *(4 marks)*

(b) On the day he returns from his holiday John spends 3 hours waiting at the airport.
What percentage of the day does John spend waiting at the airport?

....

....

....

Answer .... %   *(3 marks)*

TURN OVER FOR THE NEXT QUESTION

Turn over ▶

8 (a) On the isometric grid complete the drawing of a cuboid 4 cm by 3 cm by 2 cm.
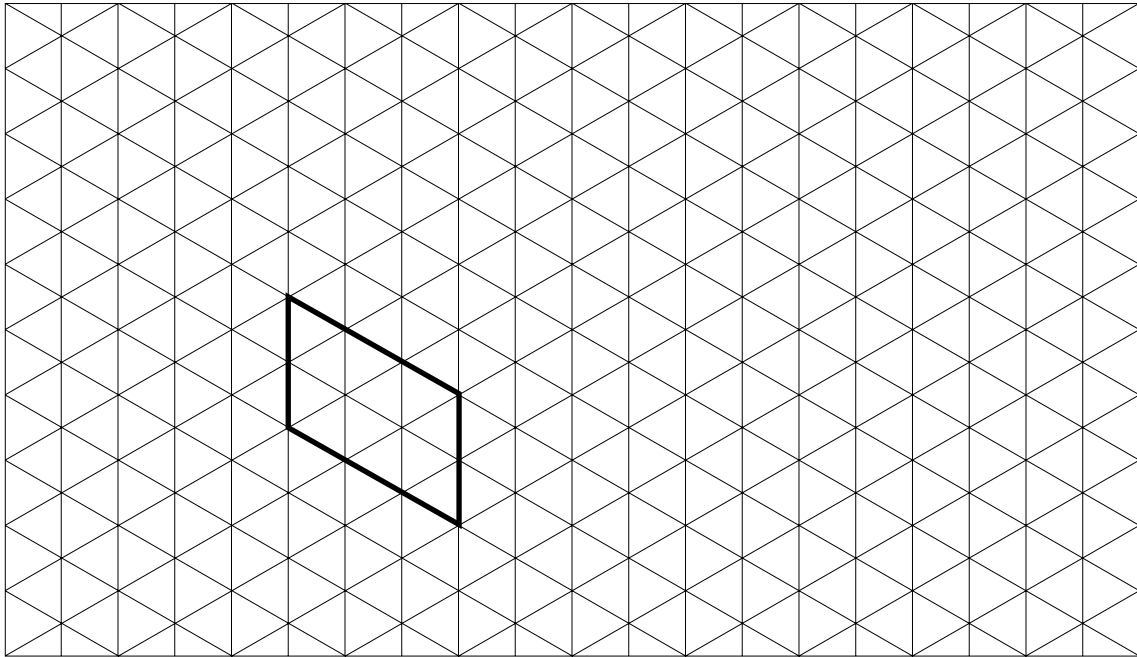
(2 marks)

(b) Calculate the volume of the cuboid.

....

....

....

Answer .... cm³   *(2 marks)*

9 (a) Andy has a part-time job.
He is paid £31.50 for working from 8.00 am to 3.30 pm.
How much is this per hour?

....

....

....

Answer £ ....   *(2 marks)*

(b) Andy is saving for a bike that costs £150.
What percentage is £31.50 of £150?

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....

....

Answer .... %   *(2 marks)*

10 (a) k is an even number.
Jo says that $\frac{1}{2}k + 1$ is always even.

Give an example to show that Jo is wrong.

....

....

(1 mark)

(b) The letters a and b represent prime numbers.
Give an example to show that $a + b$ is **not** always an even number.

....

....

(1 mark)

$\frac{}{10}$

Turn over ▶

11 The diagram shows two points *A* and *B*.

N

A ×

× B
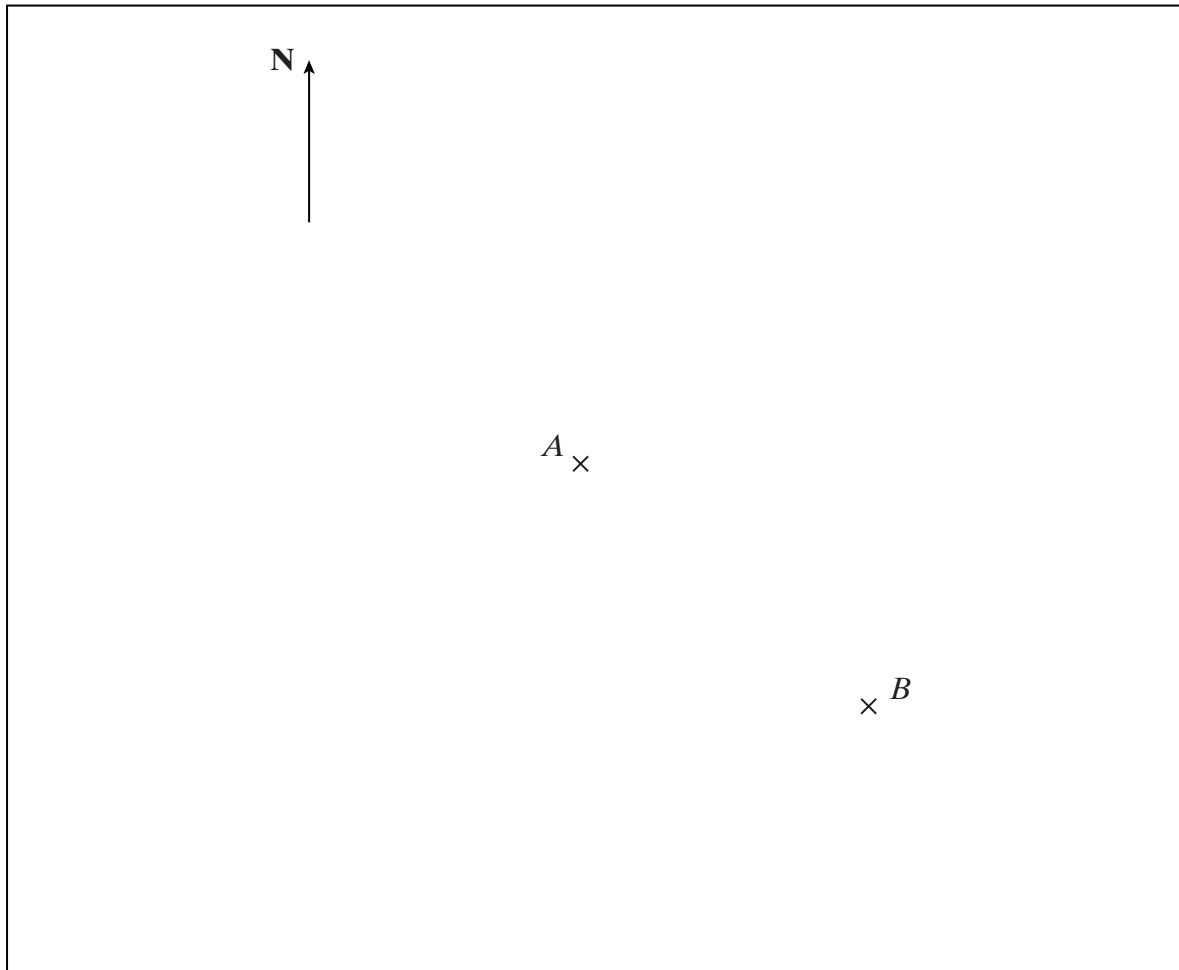
(a) Measure the bearing of *B* from *A*.

....

Answer .... ° *(1 mark)*

(b) Point *C* is South–West of *A* and West of *B*.
Mark the position of *C* on the diagram.

(2 marks)

12 The distance-time graph shows the journey of a train between two stations.
The stations are 6 kilometres apart.

Distance
(kilometres)

Time (minutes)
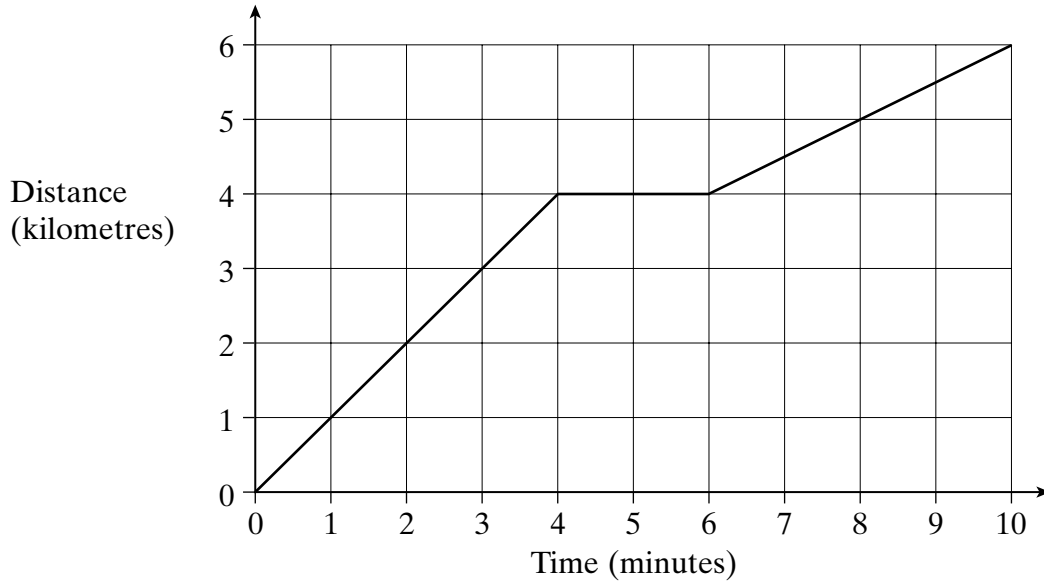
(a) During the journey the train stopped at a signal.
For how long was the train stopped?

....

Answer .... minutes   *(1 mark)*

(b) What was the average speed of the train for the **whole** journey?
Give your answer in kilometres per hour.

....

....

....

Answer .... kilometres per hour   *(2 marks)*

6

Turn over ▶

13 Mr and Mrs Smith are buying a washing machine.

SALE

15% OFF

Washing Machine
Was £380

Now £

How much do they pay in the sale?

....

....

....

Answer £ ....   *(3 marks)*

14 A circular dish has a diameter of 9 cm.
Calculate the circumference of the dish.

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....

Answer .... cm   *(2 marks)*

15 On the grid draw the graph of $y = 2x + 1$ for values of x from 0 to 5.

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(3 marks)

8
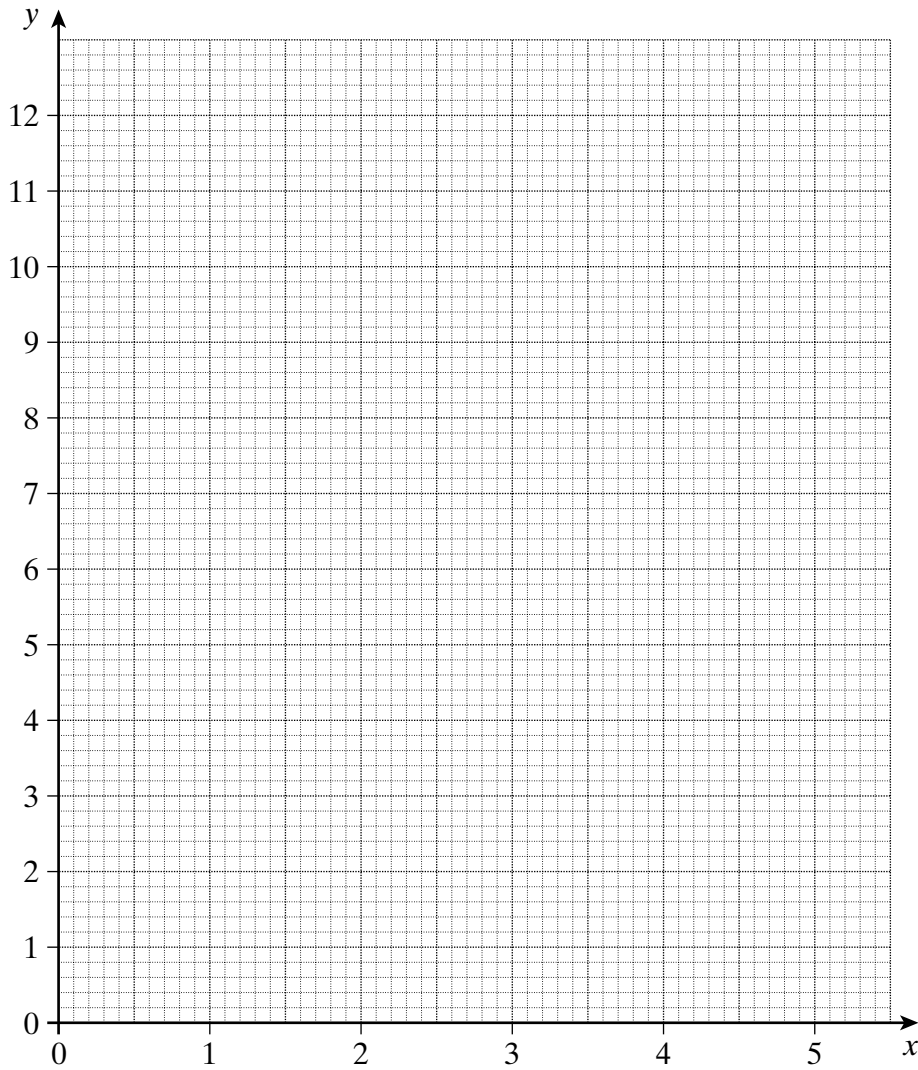
Turn over ▶

16 Jane conducts a survey of the favourite colours of the students in her class.
She records the results.

Male	Red	Female	Yellow
Male	Yellow	Female	Red
Male	Red	Female	Green
Female	Green	Female	Green
Female	Red	Male	Red
Male	Green	Male	Yellow
Male	Green		

Record the results in a two-way table.

(3 marks)

17 Dario is using trial and improvement to find a solution to the equation

$$x + \frac{1}{x} = 5$$

The table shows his first trial.

x	$x + \dfrac{1}{x}$	**Comment**
4	4.25	Too low

Continue the table to find a solution to the equation.
Give your answer to 1 decimal place.

Answer $x =$ .... *(4 marks)*

TURN OVER FOR THE NEXT QUESTION

7

Turn over ▶

18 (a) An ordinary six-sided dice is biased.
The probabilities of the dice landing on each of the numbers are

Number	1	2	3	4	5	6
Probability	p	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{2}{9}$

Work out the value of *p*.

....

....

....

Answer *p* = ... *(2 marks)*

(b) The dice is thrown twice.

(i) Complete the tree diagram.

First throw   Second throw

$\frac{1}{6}$ 4

....   Not 4

....   4

....   Not 4

....   4

....   Not 4
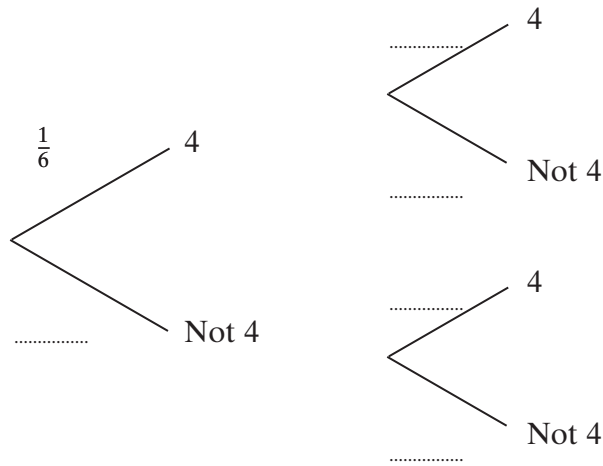
(2 marks)

(ii) Calculate the probability that only one 4 is thrown.

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....

Answer .... *(3 marks)*

19 (a) Solve the inequality $2x + 3 \geqslant 1$

....

....

Answer .... *(2 marks)*

(b) Write down the inequality shown by the following diagram.

....
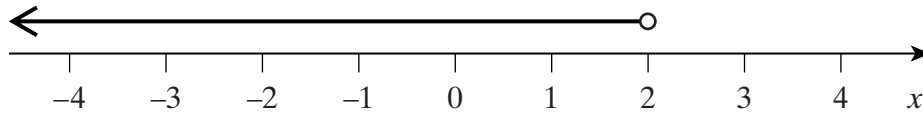
Answer .... *(1 mark)*

(c) Write down all the integers that satisfy both inequalities shown in parts (a) and (b).

....

Answer .... *(1 mark)*

TURN OVER FOR THE NEXT QUESTION

20 A tin of diameter 7 cm and height 12 cm has a label around it.
The label is glued together using a 1 cm overlap.
There is a 1 cm gap between the label and the top and the bottom of the tin.

1 cm

1 cm

Not to scale

1 cm
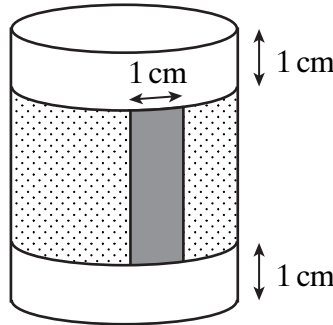
Find the length and the height of the label.

....

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....

Answer Length = ... cm

Height = ... cm   *(4 marks)*

21 Make x the subject of the formula

$$3x + 2y = 8y - 3$$

Simplify your answer as much as possible.

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Answer x = ...   *(3 marks)*

22 (a) (i) Multiply out and simplify $\quad 4(x - 2) + 3(x + 2)$

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....

Answer .... *(2 marks)*

(ii) Multiply out and simplify $\quad (n + 3)^2$

....

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....

Answer .... *(2 marks)*

(b) Factorise completely the following expressions

(i) $\quad 2a^2 + a$

....

....

Answer .... *(1 mark)*

(ii) $\quad 8x^3y^2 - 4xy^3$

....

....

Answer .... *(2 marks)*

$\dfrac{}{14}$

Turn over ▶

23   *ABCD* is a square of side 8 cm.

A ┌──────────────────────────────┐ B
  │   │
  │   │
  │   │
  │   │
  │   │
  │   │
  │   │
  │   │
  │   │
  │   │
  │   │
D └──────────────────────────────┘ C
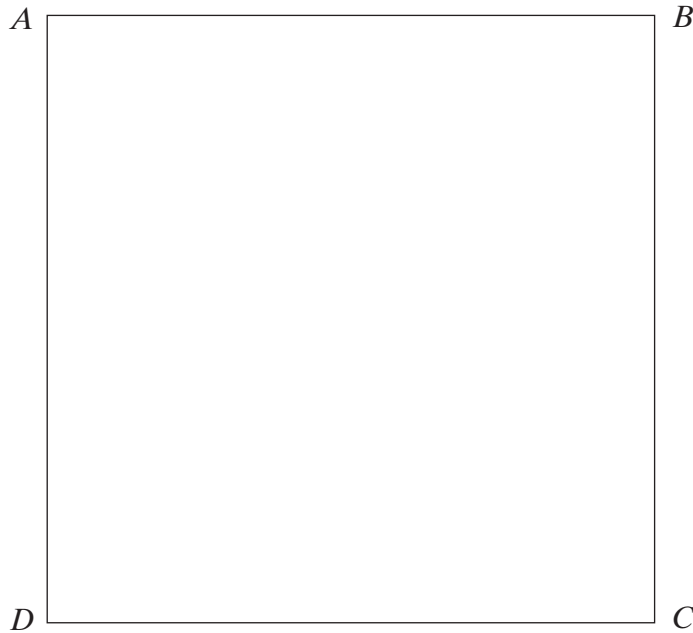
Show clearly the region inside the square that is both
         closer to the point *D* than to the point *A*,
     and closer to the side *CD* than the side *AD*.

(3 marks)

24   (a)   The star Alpha Centauri is approximately 40 653 230 000 000 kilometres from earth.
Write this number in standard form to 3 significant figures.

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....

Answer ....   *(2 marks)*

(b)   Light travels at approximately 298 000 kilometres per second.
There are 86 400 seconds in a day.
How many days will light take to reach the earth from Alpha Centauri?

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Answer .... days   *(3 marks)*

25 A shape has dimensions as shown.

Not to scale

4 cm

5 cm

5 cm

2 cm

10 cm
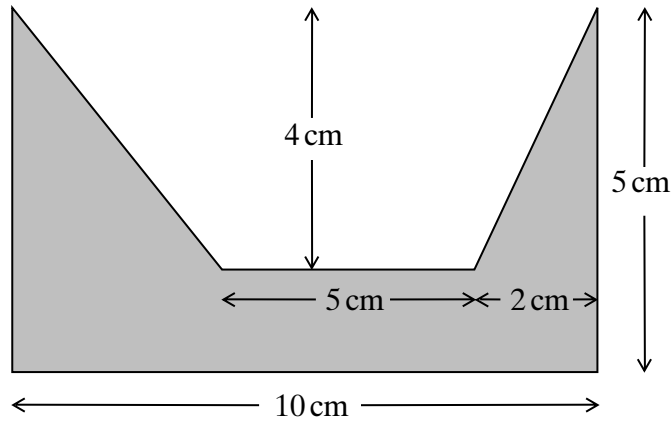
Calculate the shaded area.

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Answer .... cm^2 *(3 marks)*

TURN OVER FOR THE NEXT QUESTION

$\dfrac{}{11}$

26 Solve the equation

$$\frac{x+1}{2} + \frac{x-3}{4} = 2$$

You **must** show all your working.

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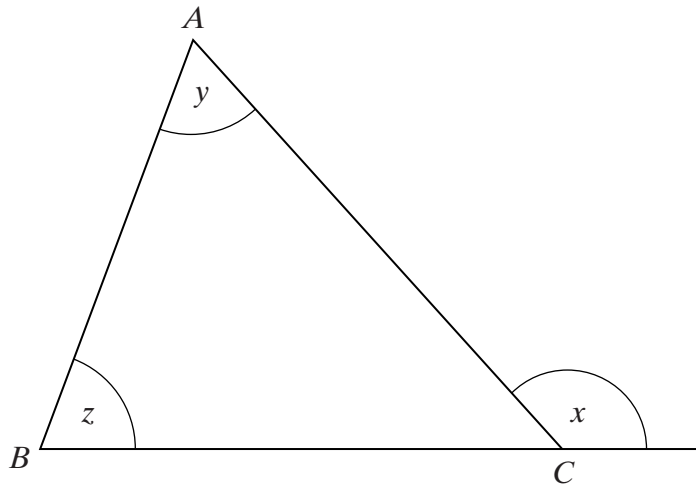Answer $x =$ ....   *(4 marks)*

27   *ABC* is a triangle.

Prove that the exterior angle at *C*, *x*, is equal to the sum of the opposite interior angles, *z* and *y*.

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(2 marks)

END OF QUESTIONS

THERE ARE NO QUESTIONS PRINTED ON THIS PAGE