Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

General Certificate of Secondary Education
November 2003

MATHEMATICS (SPECIFICATION A)   3301/1I
Intermediate Tier
Paper 1 Non-Calculator

Tuesday 11 November 2003 9.00 am to 11.00 am

AQA

ASSESSMENT and
QUALIFICATIONS
ALLIANCE

In addition to this paper you will require:
   mathematical instruments.
You must **not** use a calculator.

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	

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.

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.
- The use of a calculator is **not** permitted.

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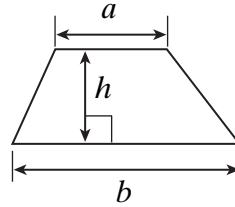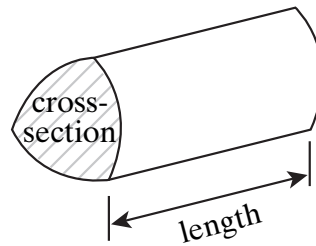- In all calculations, show clearly how you work out your answer.

3301/1I

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 Work out the difference between the two square numbers in this list of numbers.

6   11   15   21   27   36   48   64

....

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Answer .... *(2 marks)*

2 Fill in the **two** missing numbers in this sequence.

31,   29,   25,   19, ... ,   1, ...

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(2 marks)

3 Videos are stored on shelves.
Each video is 25 mm wide.
Each shelf is 90 cm long.

How many videos can be stored on 5 shelves?

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Answer .... *(3 marks)*

4 A rectangle has an area of 40 cm^2 and a perimeter of 26 cm.
Find the length and width of the rectangle.
You may use the grid to help you.

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Answer   Length .... cm

Width .... cm
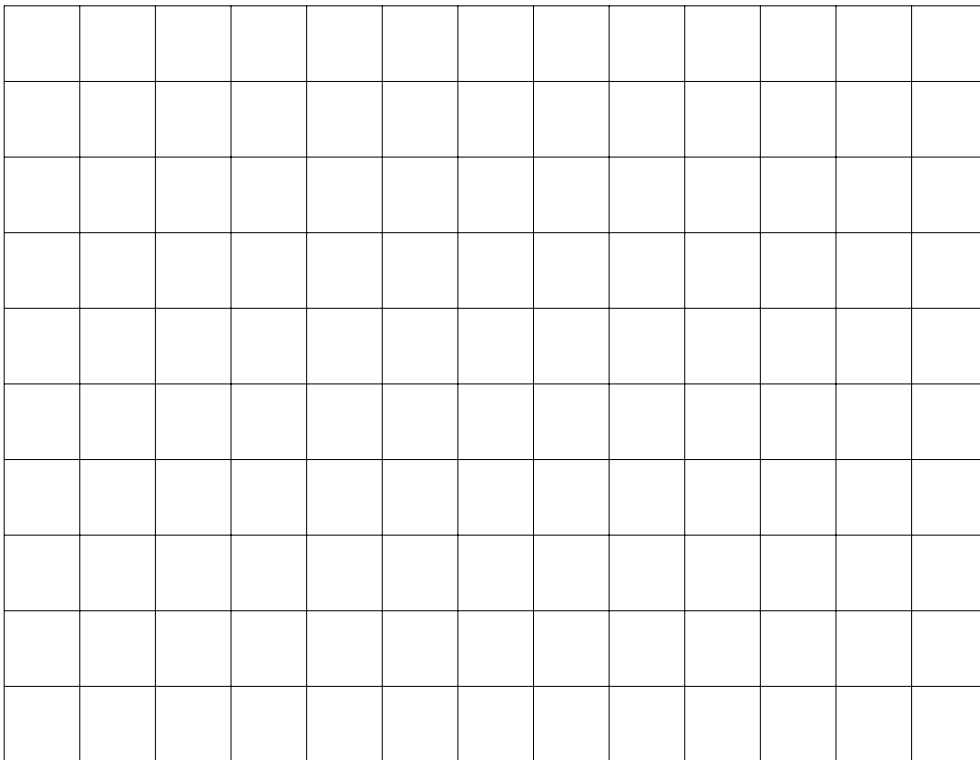
(2 marks)

5 (a)   On the grid below draw and label the lines $y = -4$ and $y = 2x + 1$

....

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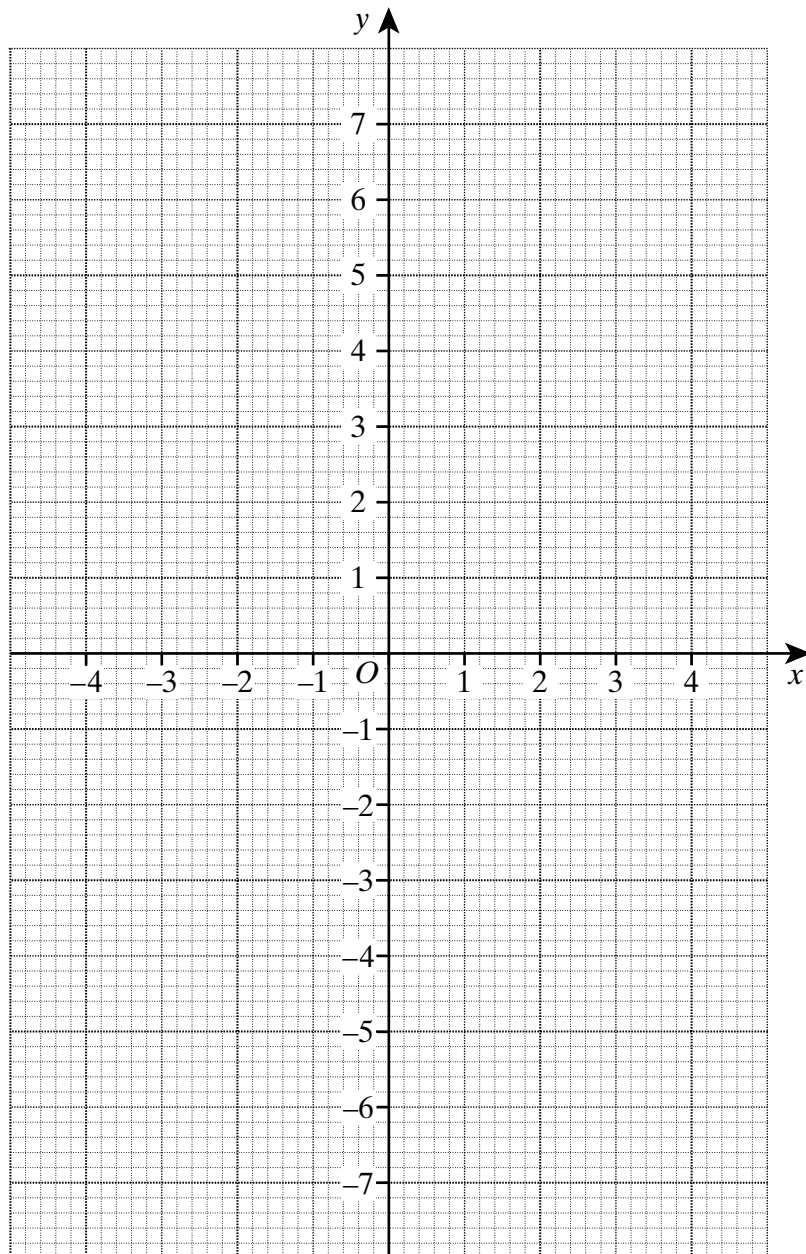
(4 marks)

(b)   Write down the coordinates of the point where the lines $y = -4$ and $y = 2x + 1$ cross.

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

Turn over ▶

7

6 What percentage of this shape is shaded?

5 m

3 m

3 m

5 m

Not to scale

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....
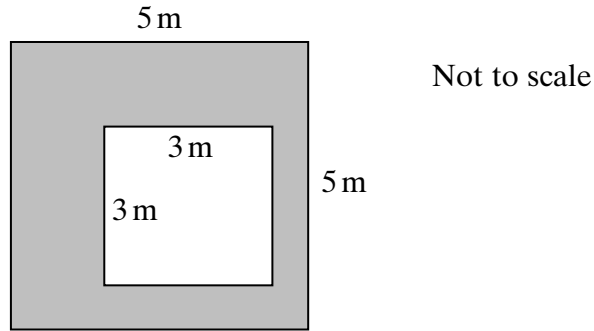
Answer ....% *(4 marks)*

7 (a) The stem and leaf diagram shows the amounts that 15 pupils spend on healthy food.

Key: | **3** | 5   means 35 pence

3	5	9			
4	0	5	8	8	
5	0	1	5	6	8	9
6	5	8			
7	5				
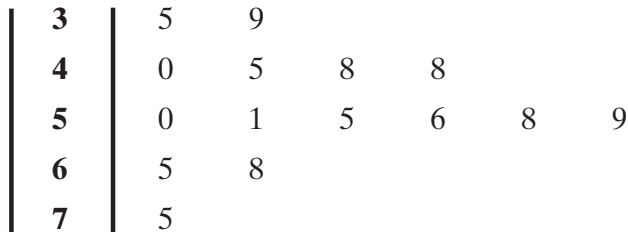
(i) What is the range of the amounts spent?

....

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

(ii) What is the median of the amounts spent?

....

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

(iii) What is the mode of the amounts spent?

....

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

(b)   Seema wants to find out who eats healthy food.
      She decides to investigate this hypothesis:

      > Girls are more likely to eat healthy food than boys.

(i)   Design a two-way table that Seema might use to help her do this.

(2 marks)

(ii) Seema records information from a sample of 30 boys and 20 girls.
      She finds that 13 boys and 12 girls eat healthy food.
      Based on this sample, is the hypothesis correct?
      Explain your answer.

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      ....

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      ....

      ....

(2 marks)

11

Turn over ▶

8 *A* is due North of *B*.
The bearing of *C* from *A* is 115°.
The bearing of *C* from *B* is 075°.

North

A

B
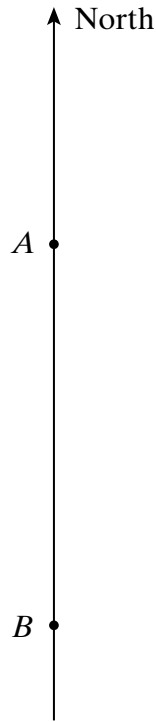
Mark the position of *C* on the diagram.

(3 marks)

9 Write down the values of *a* and *b*.

110°

50°

b
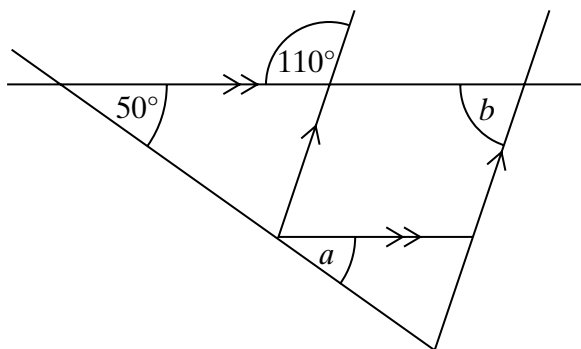
Not drawn accurately

a

....

....

Answer   *a* = ... degrees , *b* = ... degrees   *(2 marks)*

10 (a) Work out 600×0.3

....

....

Answer .... *(1 mark)*

(b) Work out $600 \div 0.3$

....

....

Answer .... *(1 mark)*

(c) You are told that $432 \times 21 = 9072$
Write down the value of $9072 \div 2.1$

....

Answer .... *(1 mark)*

(d) Find an approximate value of $\dfrac{2987}{21 \times 49}$

You **must** show all your working.

....

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Answer .... *(2 marks)*

11 (a) Find the value of a^3 when $a = 4$

....

Answer .... *(1 mark)*

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

....

....

Answer .... *(2 marks)*

(c) There are p seats in a standard class coach and q seats in a first class coach.
A train has 5 standard class coaches and 2 first class coaches.
Write down an expression in terms of p and q for the number of seats in the train.

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Answer .... *(2 marks)*

12 P is an odd number.
Q is an even number.

(a) Explain why $P + Q - 1$ is **always** an even number.

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(2 marks)

(b) Alex says that $P + Q - 1$ **cannot** be a prime number.
Explain why Alex is wrong.

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(1 mark)

13   The diagram shows a solid shape made from 8 cubes.

Plan

B

A
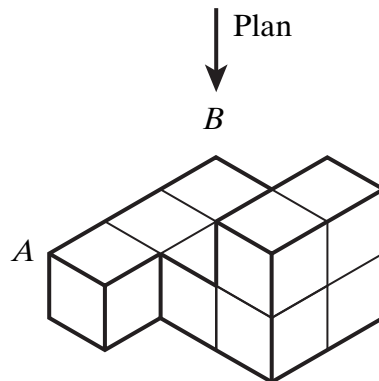
Complete the plan view of the shape on the grid below.

A —————— *B*
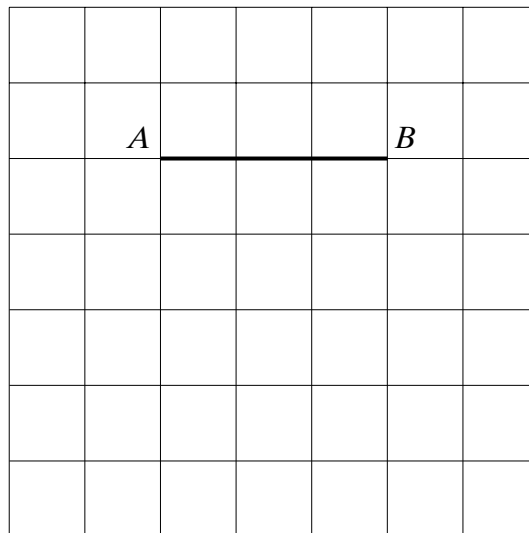
(2 marks)

TURN OVER FOR THE NEXT QUESTION

Turn over ▶

14 Triangle *A* has vertices (1,2), (1,5) and (3,2).
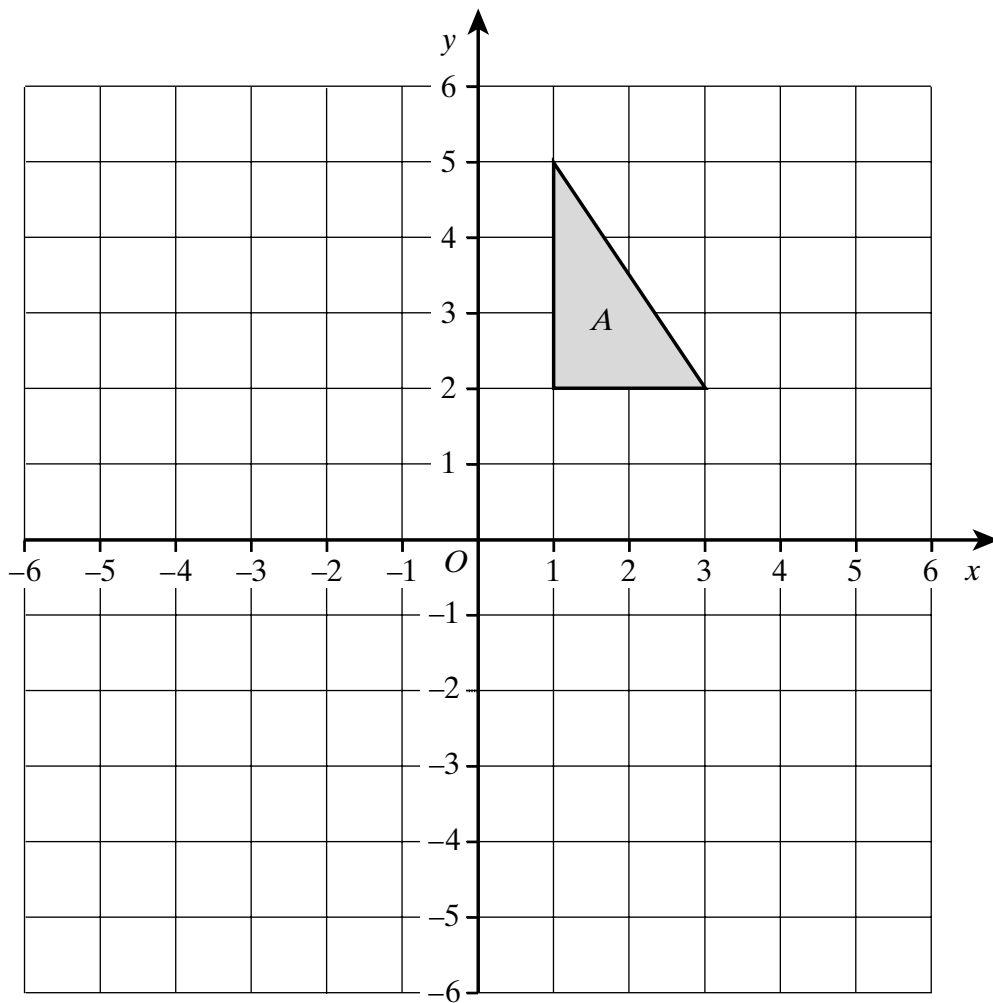
Draw the new position of triangle *A* after a rotation of 90° clockwise about the origin.

(3 marks)

15 (a) Matthew has a dice with 3 red faces, 2 blue faces and 1 green face.
He throws the dice 300 times.
The results are shown in the table.

Red	**Blue**	**Green**
153	98	49

   (i) What is the relative frequency of throwing a red?

   ....

   ....

   Answer ....   *(1 mark)*

   (ii) Is the dice fair?
   Explain your answer.

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   (2 marks)

(b) Emmie has a dice with 4 red faces and 2 blue faces.
She throws the dice 10 times and gets 2 reds.
Emmie says the dice is **not** fair.
Explain why Emmie could be wrong.

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(1 mark)

7

Turn over ▶

16 A pattern using pentagons is made of sticks.
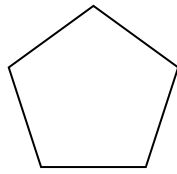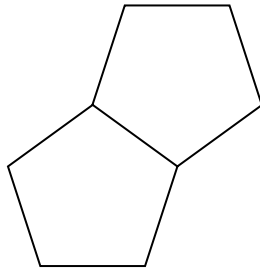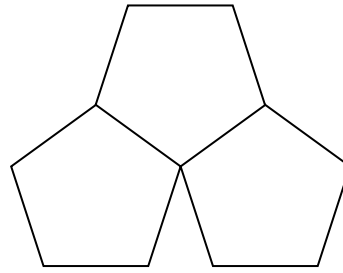
Diagram 1	Diagram 2	Diagram 3
5 sticks	9 sticks	13 sticks

(a) How many sticks are needed for Diagram 5?

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Answer .... *(2 marks)*

(b) Write down an expression for the number of sticks in Diagram *n*.

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Answer .... *(2 marks)*

(c) Which Diagram uses 201 sticks?

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Answer .... *(3 marks)*

17 (a) You are given that $2x^3 = 250$
Find the value of x.

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Answer $x =$ .... *(1 mark)*

(b) Write 75 as the product of its prime factors.

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Answer .... *(2 marks)*

18 Mary says the length of a corridor is 35 m to the nearest metre.
Habib says the length of the same corridor is 30 m to the nearest 10 metres.
Mary and Habib are both correct.
Give a possible value for the actual length of the corridor.

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Answer .... metres *(2 marks)*

19 Expand and simplify $(x - 3)(x + 1)$

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Answer .... *(2 marks)*

Turn over ▶

$\dfrac{}{14}$

20   The diagram shows a silver bar.
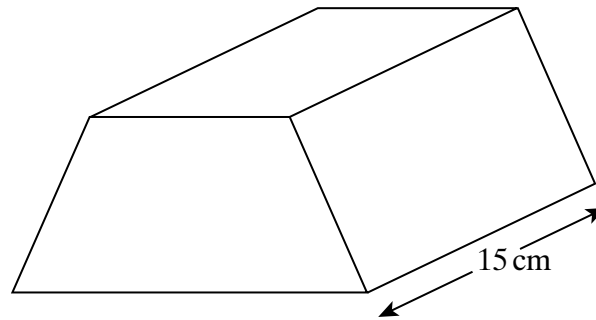
Not to scale

The cross-section of the silver bar is a trapezium.
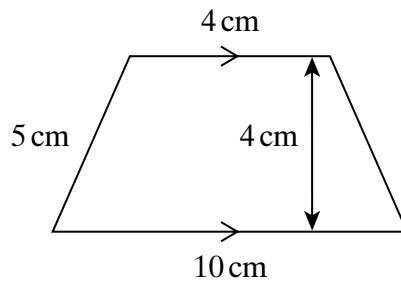
Not to scale

(a)   Calculate the area of the cross-section.

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

(b)   The silver bar is 15 cm long.
      The bar is melted and the silver is then made into a cuboid.
      The base of the cuboid is 10 cm by 10 cm.

Not to scale

h cm

10 cm   10 cm
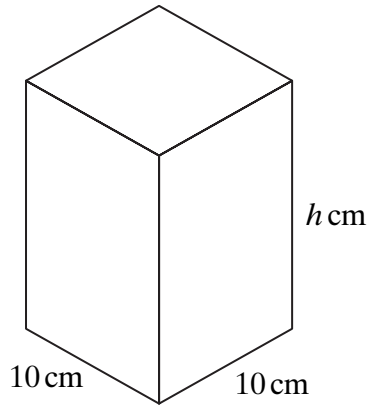
What is the height, h, of the cuboid?

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

TURN OVER FOR THE NEXT QUESTION

5

Turn over ▶

21 Susan completes a journey in two stages.
In stage 1 of her journey, she drives at an average speed of 80 km/h and takes 1 hour 45 minutes.

(a) How far does Susan travel in stage 1 of her journey?

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Answer .... km   *(2 marks)*

(b) Altogether, Susan drives 190 km and takes a total time of 2 hours 15 minutes.
What is her average speed, in km/h, in **stage 2** of her journey?

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Answer .... km/h   *(2 marks)*

22 A special savings account earns 10% per year compound interest.

(a) Jill invests £2 500 in the special account.
How much will she have in her account after 2 years?

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Answer £ .... *(3 marks)*

(b) James also invests in the special account.
After earning interest for one year, he has £1 320 in his account.
How much money did James invest?

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Answer £ .... *(3 marks)*

23 The diagram shows a cylinder.
The volume of the cylinder is $320\pi\,\text{cm}^3$.
The height of the cylinder is 3.2 cm.

3.2 cm
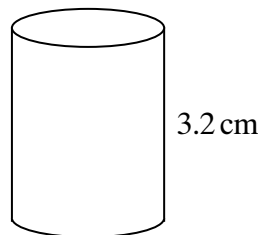
Not to scale

Calculate the radius of the base of the cylinder.

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

13

Turn over ▶

24 Tom and Sam take turns to throw a dart at a target.
The probability that Tom hits the target is 0.3
The probability that Sam hits the target is 0.2

(a) Complete the tree diagram.

Tom's throw   **Sam's throw**

(1 mark)

(b) What is the probability that Tom and Sam both hit the target?

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Answer .... *(2 marks)*

25 Calculate 15% of 3×10^7
Give your answer in standard form.

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Answer .... *(2 marks)*

26 (a) (i) Factorise $x^2 - 7x - 8$

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Answer .... *(2 marks)*

(ii) Hence solve the equation $x^2 - 7x - 8 = 0$

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Answer .... *(1 mark)*
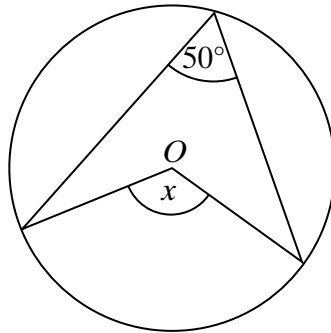
(b) Solve the simultaneous equations

$$5x + 3y = 13$$
$$3x + 5y = 3$$

You **must** show your working.
Do **not** use trial and improvement.

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

12

Turn over ▶

27 (a)   The diagram shows a circle with centre *O*.

Not drawn accurately

Work out the size of the angle marked *x*.

....

....

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

(b)   The diagram shows a different circle with centre *O*.
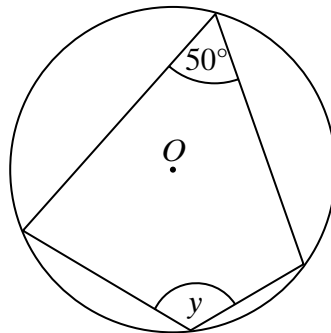
Not drawn accurately

Work out the size of the angle marked *y*.

....

....

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

(c) *A*, *B* and *C* are points on the circumference of a circle with centre *O*.
BOC is a straight line.
Angle *ABC* = 20°
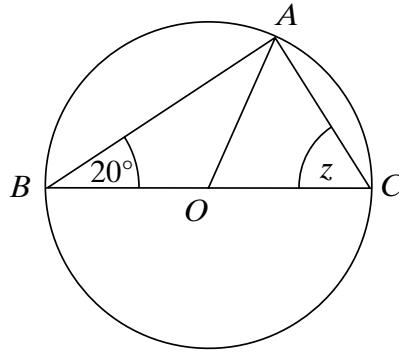
Not drawn accurately

Work out the size of the angle marked *z*.
Explain your answer.

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Answer .... degrees   *(2 marks)*

END OF QUESTIONS