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Centre Number							Candidate Number																		
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General Certificate of Secondary Education
November 2005



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

Friday 11 November 2005 9.00 am to 11.00 am

<p>In addition to this paper you will require:</p> <ul style="list-style-type: none"> a calculator mathematical instruments. 	
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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	
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.
- 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.

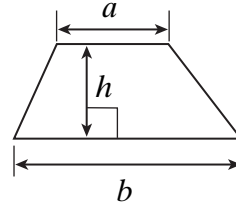
Advice

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

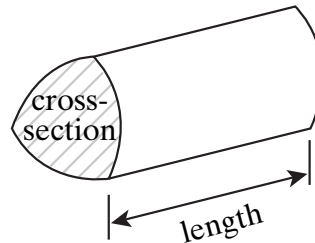
Formulae Sheet: Intermediate Tier

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) Here is a list of numbers.

4 6 8 9 10 11 12

- (i) Write down a prime number from the list.

Answer (1 mark)

- (ii) Write down a cube number from the list.

Answer (1 mark)

- (b) Calculate $2^3 \times 5^2$

.....

Answer (2 marks)

- 2 (a) A box of chocolates contains 7 soft centres, 5 toffee centres and 8 nut centres.
Mary chooses a chocolate at random.

What is the probability that she chooses a chocolate with a toffee centre?

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Answer (2 marks)

- (b) In a bag of sweets the probability of choosing a sweet with a soft centre is 0.4

What is the probability of choosing a sweet that does **not** have a soft centre?

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Answer (1 mark)

Turn over ►



- 3 (a) (i) Complete the table of values for $y = 4x - 3$

x	1	2	3	4	5
y	1			13	17

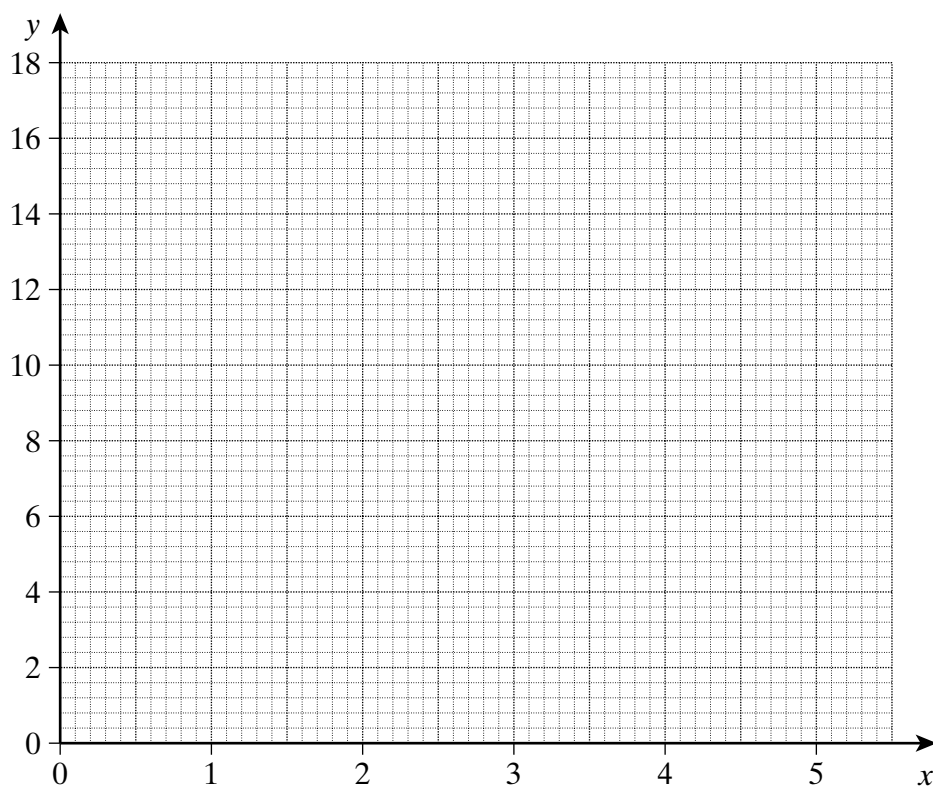
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(1 mark)

- (ii) On the grid draw the graph of $y = 4x - 3$ for values of x from 1 to 5

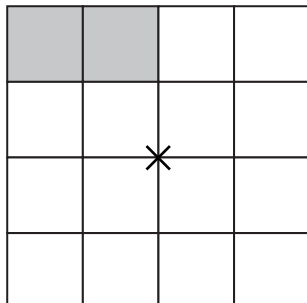


(2 marks)

- (b) Draw and label the line $y = 7$ on the grid.

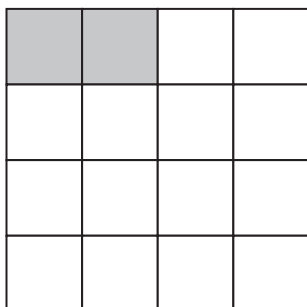
(1 mark)

- 4 (a) Shade **two** more squares to make a pattern with rotational symmetry of order 2 and centre \times .



(1 mark)

- (b) Shade **three** more squares to make a pattern with 1 line of symmetry.



(2 marks)

TURN OVER FOR THE NEXT QUESTION

Turn over ►

5 The table shows some exchange rates.

£1 is worth 1.82 American dollars
£1 is worth 194 Japanese yen

Joanne buys a camera in America and pays 200 dollars.
Jack buys a similar camera in Japan and pays 20 370 yen.

In which country is the camera cheaper and by how much?

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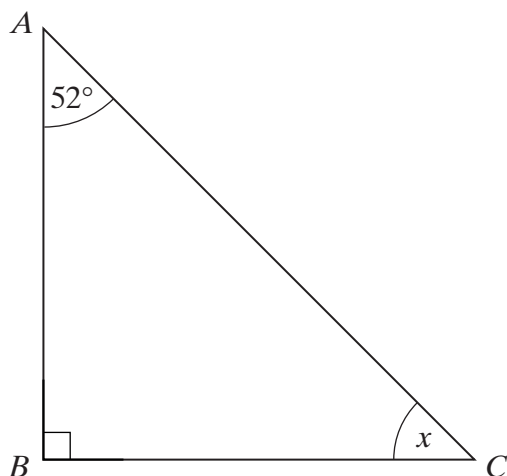
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Answer Country

Amount

(4 marks)

- 6 ABC is a right-angled triangle.



Not drawn accurately

Work out the value of x .

.....

.....

Answer $x =$ degrees (2 marks)

- 7 Julie is drawing a quadrilateral with these properties.

It has 4 equal sides.

Its diagonals intersect at 90° .

She draws a square.

- (a) Draw a different type of quadrilateral with these properties.

(1 mark)

- (b) What is the name of this quadrilateral?

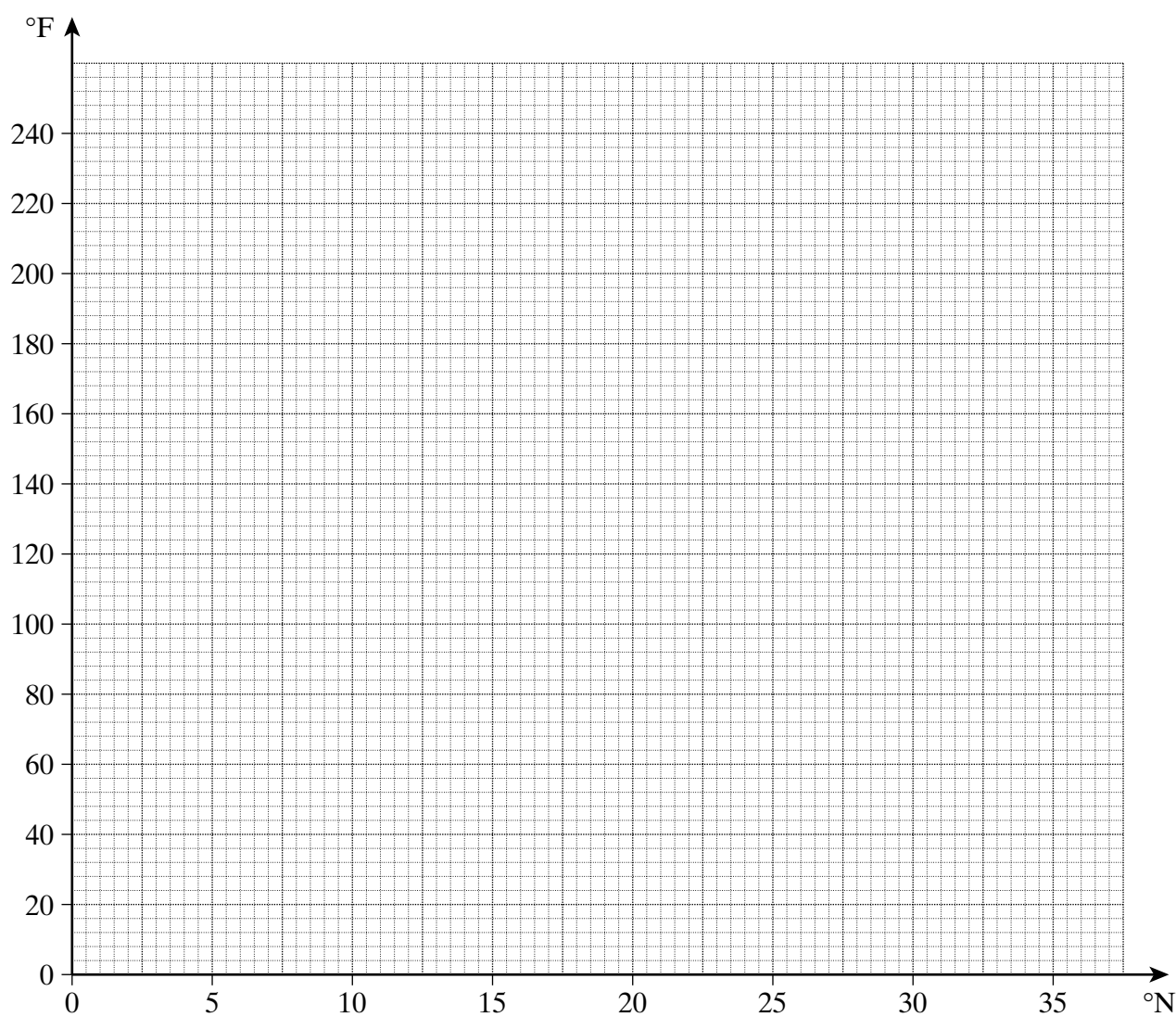
Answer (1 mark)

Turn over ►

- 8 The table shows various temperatures measured on scales invented by Newton and Fahrenheit.

	Freezing point of water	Boiling point of water
Newton ($^{\circ}\text{N}$)	0	33
Fahrenheit ($^{\circ}\text{F}$)	32	212

- (a) Draw a conversion graph on the grid.



(2 marks)

- (b) Blood temperature is 96°F .
What is blood temperature in $^{\circ}\text{N}$?

Answer $^{\circ}\text{N}$ (1 mark)

9 Alex and Ben share £520 in the ratio 1 : 3

(a) How much does Ben receive?

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Answer £ (2 marks)

(b) What percentage of the £520 does Ben receive?

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Answer % (2 marks)

10 Solve the equations.

(a) $\frac{w}{5} = 7$

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Answer $w =$ (1 mark)

(b) $4x - 5 = 7$

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Answer $x =$ (2 marks)

(c) $5y + 11 = 3(y + 7)$

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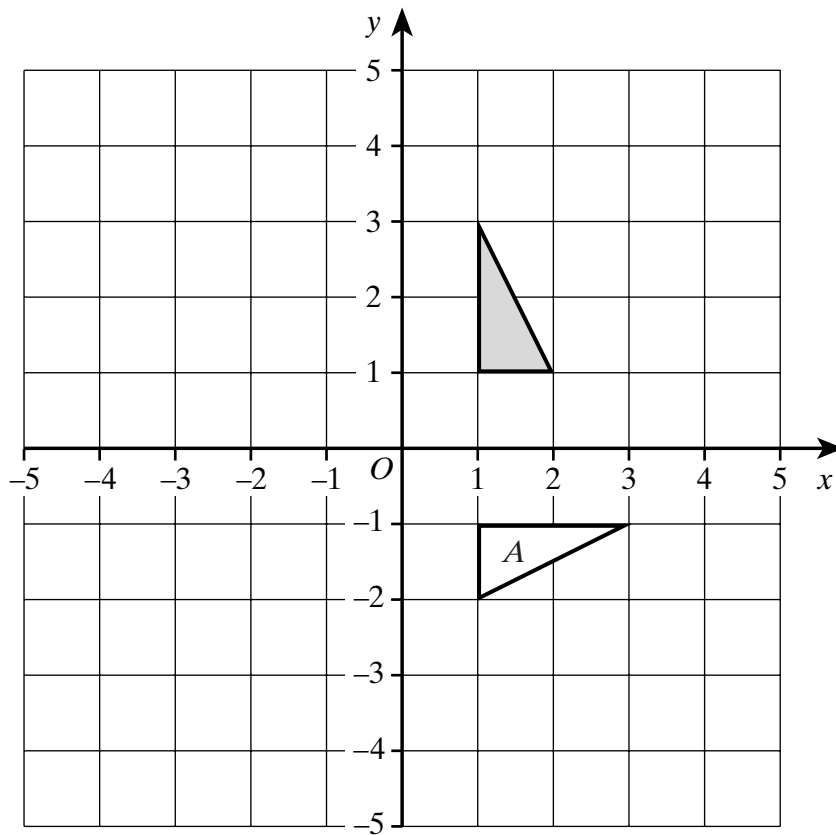
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Answer $y =$ (3 marks)

Turn over ►

- 11 The grid shows two triangles.



- (a) Describe fully the single transformation that maps the shaded triangle onto triangle A.

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(3 marks)

- (b) Reflect the shaded triangle in the line $x = -1$

(2 marks)

12 Mandip is doing a survey on “Healthy Eating” in the town where he lives.

- (a) Give **one** reason why he should **not** do the survey outside the sports centre.

.....

 (1 mark)

- (b) One of the questions he asks is

“Do you eat fruit or sweets?”

Explain why this is a poorly worded question.

.....

 (1 mark)

- (c) There are 2000 people in the town where Mandip lives.
 He interviews 15 people for his survey.

Explain why his survey may not be representative of the people in the town.

.....

 (1 mark)

- 13** (a) Emily earns £12 500 per year.
 She gets a pay rise of 3.2%

After her pay rise how much does she earn?

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Answer £ (3 marks)

- (b) Jane earns £11 400 per year.
 After her pay rise she earns £12 198 per year.

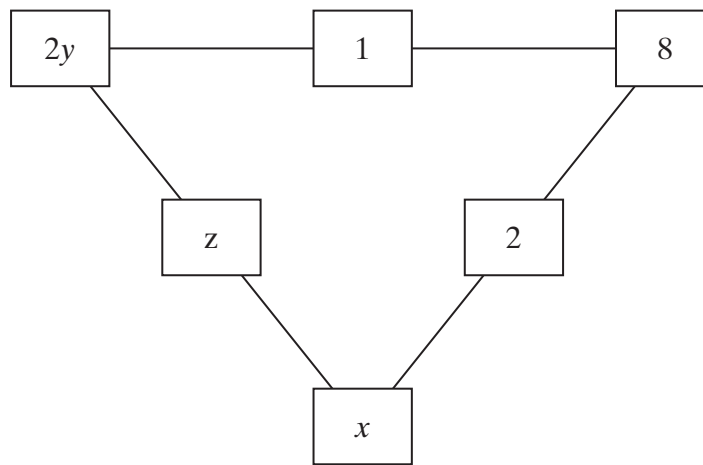
What was her percentage pay rise?

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Answer % (3 marks)

Turn over ►

- 14** The total for the three numbers along each side of the triangle is 17.



Find the values of x , y and z .

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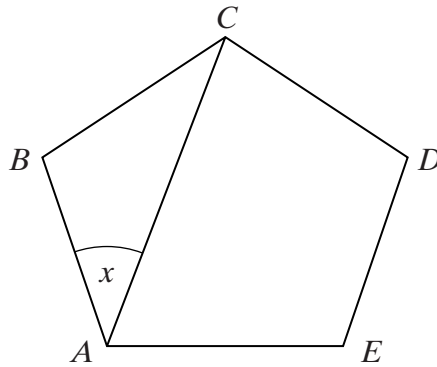
Answer $x =$

$y =$

$z =$

(4 marks)

- 15 $ABCDE$ is a regular pentagon.



Not drawn accurately

Work out the value of x .

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Answer $x =$ degrees (4 marks)

- 16 The ordered stem and leaf diagram shows the number of cameras sold each day, over a period of 20 days.

Key | 1 | 2 represents 12 cameras

0	4	8	9						
1	1	2	2	2	6	7	9	9	
2	0	3	5	8	8	8			
3	1	2	5						

The next day 28 cameras are sold.

Does the median increase, decrease or stay the same?

You **must** show your working.

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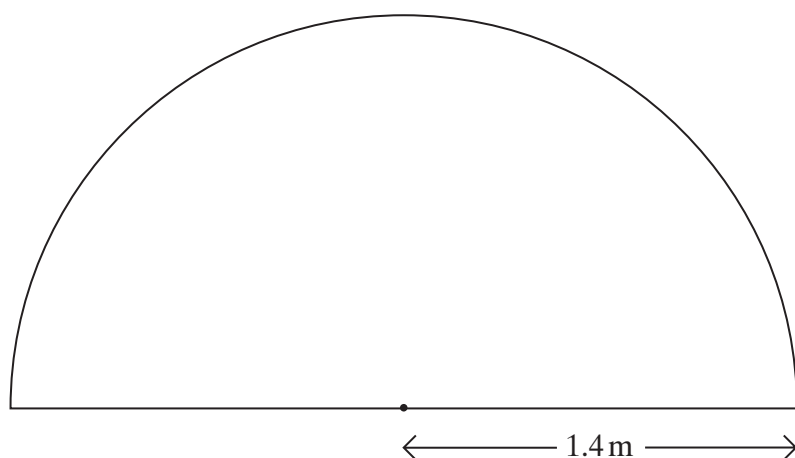
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(3 marks)

Turn over ►

- 17 Jasmin has a pond in her garden.
The surface of the pond is a semicircle of radius 1.4 m



Not to scale

- (a) Calculate the area of a semicircle of radius 1.4 m.
Give your answer to a sensible degree of accuracy.
You **must** show your working.

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Answer m^2 (3 marks)

- (b) The pond is 50 cm deep.
The sides of the pond are vertical.

Calculate the volume of the pond.
Give your answer in cubic metres.

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Answer m^3 (2 marks)

- 18 Use trial and improvement to find a solution to the equation

$$x^3 - x = 21$$

Give your answer to one decimal place.

You **must** show your working.

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Answer $x =$ (4 marks)

- 19 Caleb says that the cube root of any number is always smaller than the number.
Give an example to show that Caleb is wrong.

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(2 marks)

Turn over ►

20 A can of drink weighs 342g to the nearest gram.

(a) What are the minimum and maximum weights of the can?

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Answer Minimum weight g

Maximum weight g (2 marks)

(b) The cans are sold in packs of 12.

What are the minimum and maximum weights of a pack of cans?

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Answer Minimum weight g

Maximum weight g (2 marks)

21 Solve these simultaneous equations

$$x + 3.6y = 2$$

$$x - 2.4y = 5$$

You **must** show all your working.

Do **not** use trial and improvement.

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Answer $x =$

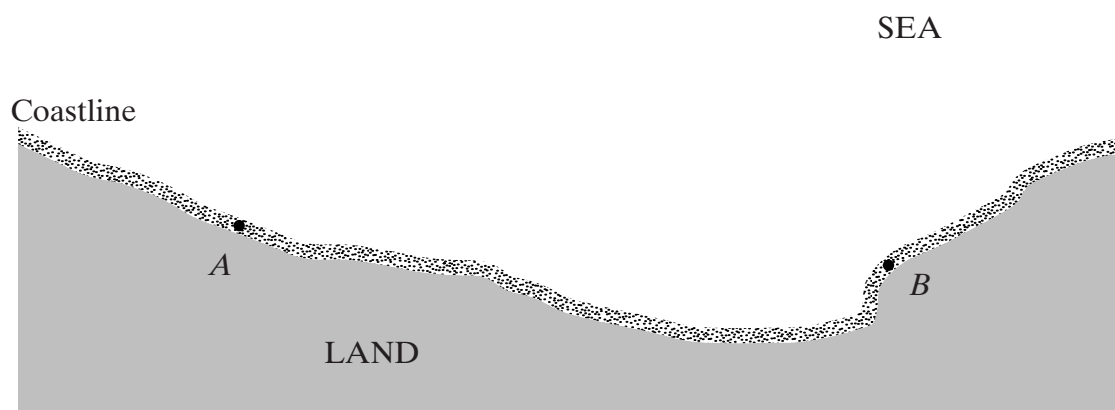
$y =$ (3 marks)

- 22 (a) Using a ruler and compasses only, construct an angle of 60° .
Show all your construction lines and arcs.

(2 marks)

- (b) Two lifeboat stations *A* and *B* receive a distress call from a boat.
The boat is within 6 kilometres of station *A*.
The boat is within 8 kilometres of station *B*.
Shade the possible area in which the boat could be.

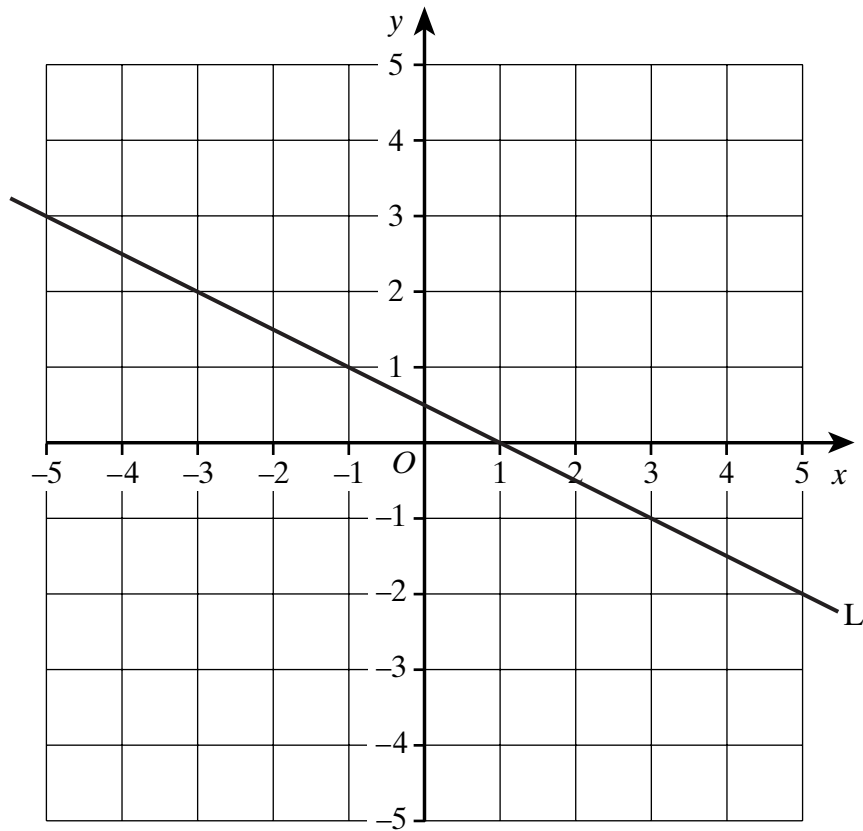
Scale: 1 cm represents 1 km



(2 marks)

Turn over ►

23



Find the equation of the line L.

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Answer (3 marks)

- 24 Sam sees this sign in a shop window.



How much was the phone before the price reduction?

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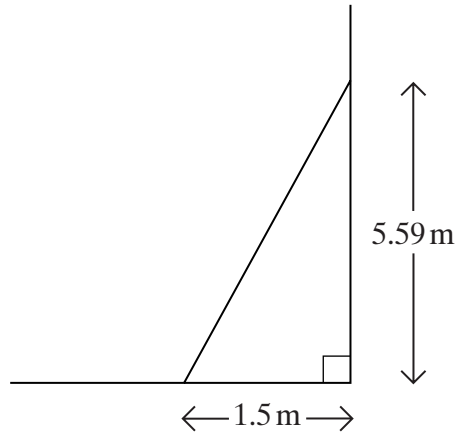
Answer £ (3 marks)

TURN OVER FOR THE NEXT QUESTION

Turn over ►

25 For a ladder to be safe it must be inclined at between 70° and 80° to the ground.

(a) The diagram shows a ladder resting against a wall.



Not to scale

Is it safe?

You **must** show your working.

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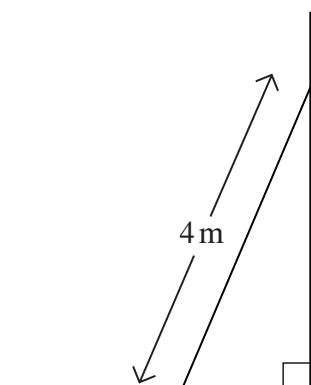
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(3 marks)

- (b) Another ladder rests against a wall.



Not to scale

Work out the closest distance that the bottom of the ladder can be from the wall so that it is safe.

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Answer m (3 marks)

- 26** Denmark has a population of 5.1×10^6

The amount of energy used per person each year is equivalent to 3918 kg of oil.

Calculate the total amount of energy used in Denmark each year.

Give your answer in standard form.

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Answer kg of oil (2 marks)

Turn over ►

- 27** The table shows the number of students at a tutorial college each term since Autumn 2002. The table also shows the 3-point moving averages for this data except for Spring 2003 and Summer 2005.

	Autumn 2002	Spring 2003	Summer 2003	Autumn 2003	Spring 2004	Summer 2004	Autumn 2004	Spring 2005	Summer 2005	Autumn 2005
Number of students	48	30	81	54	39	93	69	57	114	
3-point moving average			55	58	62	67	73	80		

- (a) Calculate the 3-point moving average for Spring 2003.
You **must** show your working.

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Answer (2 marks)

- (b) (i) By continuing the number sequence for the moving averages, predict the 3-point moving average for Summer 2005.

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Answer (1 mark)

- (ii) Show how the college predicted that the number of students in Autumn 2005 would be 93.

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(1 mark)

END OF QUESTIONS

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