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General Certificate of Secondary Education  
June 2003



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

Tuesday 10 June 2003 9.00 am to 11.00 am

<p><b>In addition to this paper you will require:</b></p> <ul style="list-style-type: none"> <li>• a calculator</li> <li>• mathematical instruments.</li> </ul>	
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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 – 23	
24	
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  $\pi$  button, take the value of  $\pi$  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**

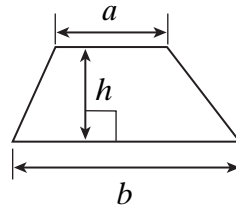
- In all calculations, show clearly how you work out your answer.

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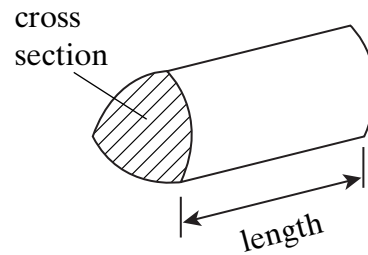
**Formulae Sheet: Intermediate Tier**

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 The table shows the exchange rates between different currencies.

£1 (pound) is worth 1.64 euros
\$1 (dollar) is worth 1.05 euros

- (a) Jane changes £400 into euros.  
How many euros does she receive?

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Answer ..... euros (2 marks)

- (b) Sonia changes 672 euros into dollars.  
How many dollars does she receive?

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Answer ..... dollars (2 marks)

- 2 An approximate rule for converting degrees Fahrenheit into degrees Centigrade is

$$C = \frac{F - 30}{2}$$

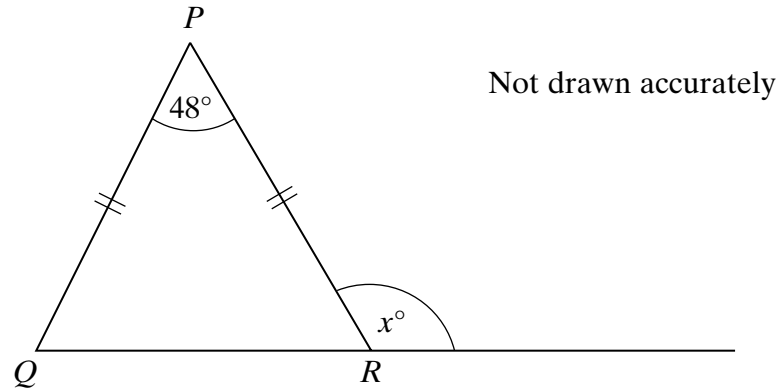
Use this rule to convert 22 °F into °C.

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Answer ..... degrees Centigrade (2 marks)

Turn over 

- 3 (a) Triangle  $PQR$  is isosceles.  
 $PQ = PR$ .



Work out the value of  $x$ .

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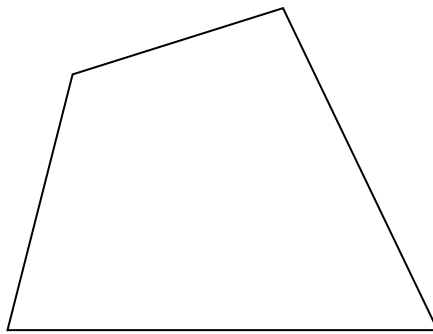
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Answer ..... degrees (3 marks)

- (b) Explain why the sum of the interior angles of any quadrilateral is  $360^\circ$ .



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(2 marks)

- 4 (a) Tom has £2 200.  
He gives  $\frac{1}{4}$  to his son and  $\frac{2}{5}$  to his daughter.  
How much does Tom keep for himself?  
You **must** show all your working.

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Answer £ ..... (3 marks)

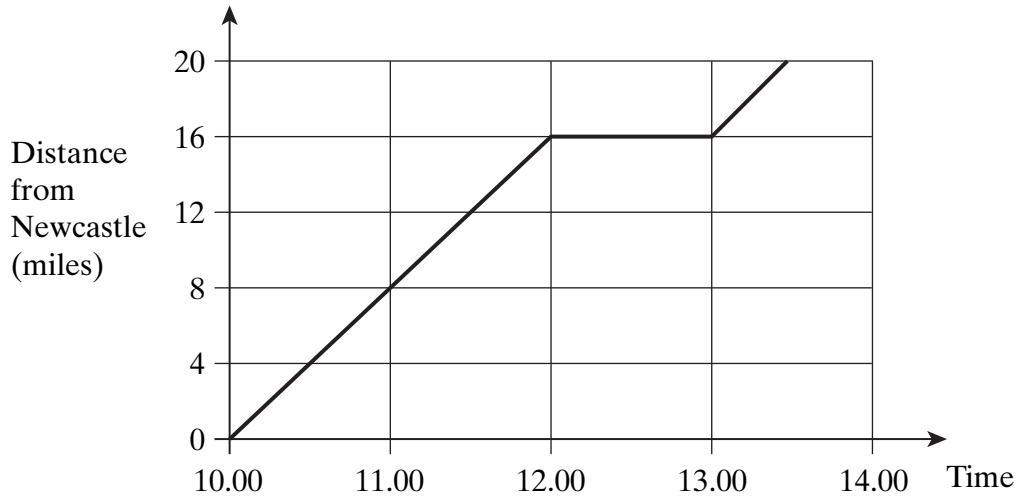
- (b) Mrs Jones inherits £12 000.  
She divides the £12 000 between her three children Laura, Mark and Nancy in the ratio 7 : 8 : 9, respectively.  
How much does Laura receive?

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Answer £ ..... (2 marks)

**TURN OVER FOR THE NEXT QUESTION**

- 5 Wayne cycles from Newcastle to Ashington, a distance of 20 miles.  
The diagram shows the distance-time graph of his journey.



- (a) Describe what is happening between 12.00 and 13.00

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 .....  
 (1 mark)

- (b) How far does Wayne travel in the first 2 hours of his journey?

Answer ..... miles (1 mark)

- (c) What is Wayne's average speed over the first 2 hours of his journey?

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 Answer ..... mph (2 marks)

- (d) Darren travels from Ashington to Newcastle by bus.  
He leaves Ashington at 10.00 and arrives in Newcastle at 11.00  
On the diagram draw a possible distance-time graph of Darren's journey.

(1 mark)

**6** Solve the equations

(a)  $8z - 5 = 11$

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Answer  $z =$  ..... (2 marks)

(b)  $3(w - 2) = 9$

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Answer  $w =$  ..... (3 marks)

**7** A circular pond has a radius of 2.2 m.

(a) Calculate the circumference of the pond.

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Answer ..... m (2 marks)

(b) Calculate the area of the pond.

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Answer ..... (3 marks)

- 8 Forty people take a driving test at Centre *A* on one day.  
The table shows the results.

	Pass	Fail
Male	10	13
Female	6	11

- (a) A person is chosen at random from the group.  
What is the probability that the person is male?

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Answer ..... (2 marks)

- (b) A person is chosen at random from the group.  
What is the probability that the person passed the test?

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Answer ..... (1 mark)

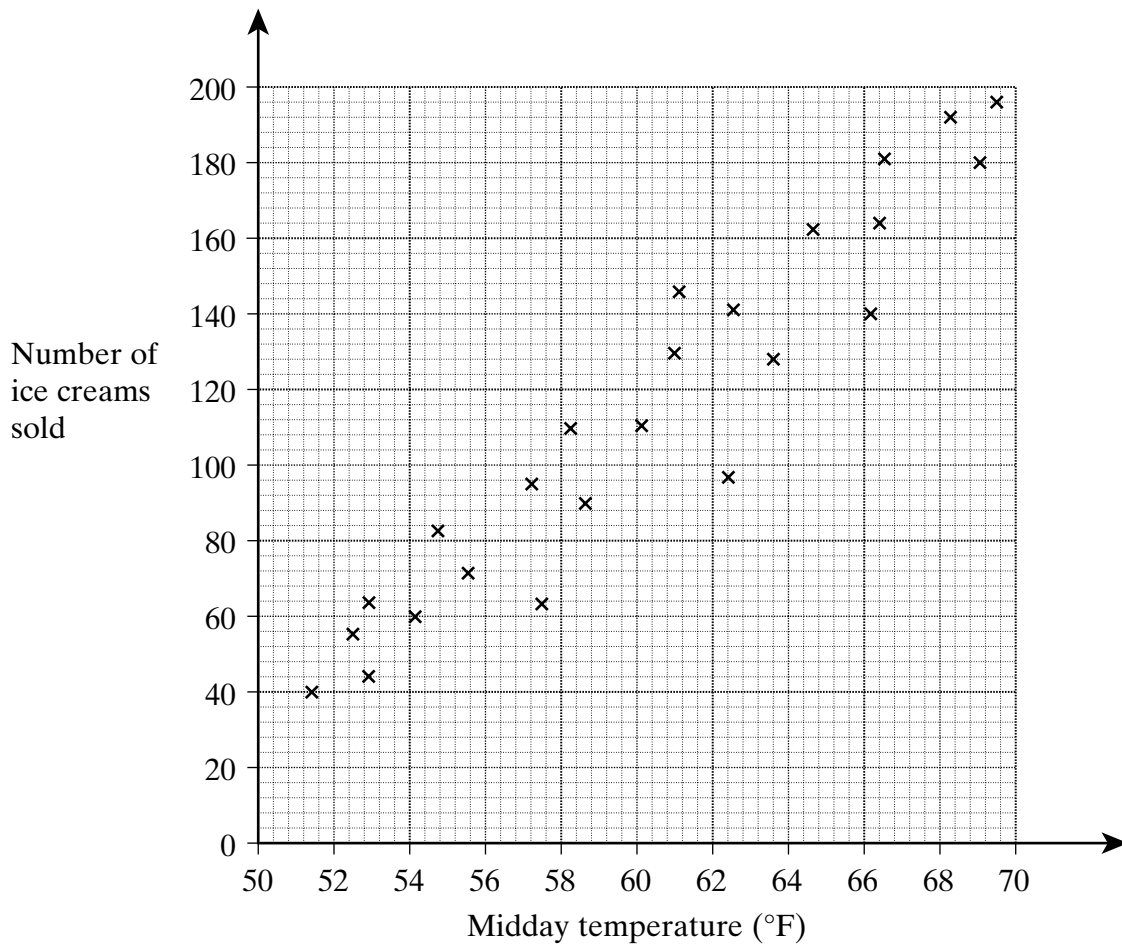
- (c) It is known that throughout Britain the probability of a person passing their test is 0.7  
John says it is easier to pass the test at Centre *A*.  
Explain why John could be wrong.

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(1 mark)



- 9 The scatter graph shows the number of ice creams sold plotted against the midday temperature.



- (a) Draw a line of best fit on the scatter graph.

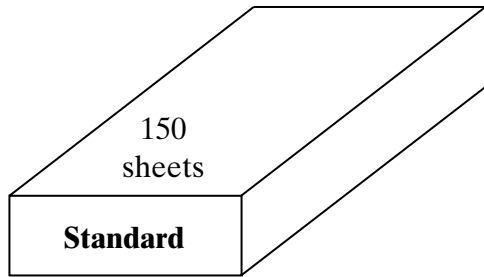
(1 mark)

- (b) Describe the relationship between the number of ice creams sold and the midday temperature.

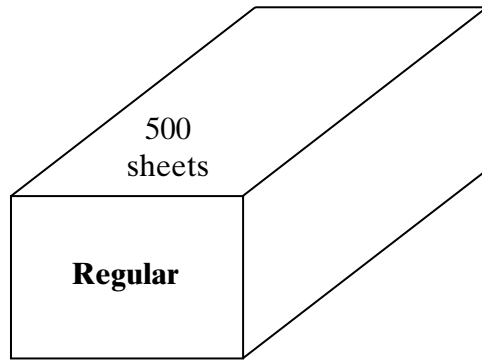
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(1 mark)

10 A shop sells two different packs of the same brand of paper.



Cost 95p



Cost £3.20

Which of the two packs gives the better value for money?  
You **must** show all your working.

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(4 marks)

**11** Here are three statements about probability.  
Tick a box to show whether you agree or disagree with each statement.  
Give a reason for each answer.

(a) Graham says, "The probability that it will rain tomorrow is  $\frac{6}{5}$  "

Agree

Disagree

Reason .....

.....

(1 mark)

(b) Mandy says, "In my box of chocolates there are 13 soft centres and 15 hard centres so the probability of my choosing a soft centre is  $\frac{13}{28}$  "

Agree

Disagree

Reason .....

.....

(1 mark)

(c) Tom tosses a fair coin twice.  
He gets a head both times.  
He says, "The probability that I will get a head the next time I throw the coin is  $\frac{1}{8}$  "

Agree

Disagree

Reason .....

.....

(1 mark)

- 12 (a) Miss Evans earns £240 per week.  
She is awarded a pay rise of 3.5%.

Mr Dale earns £220 per week.  
He is awarded a pay rise of 4%.

Whose weekly pay increases by the greater amount of money?  
You **must** show all your working.

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Answer ..... (4 marks)

- (b) In 2003 the State Pension was increased by 2% to £78.03  
What was the State Pension before this increase?

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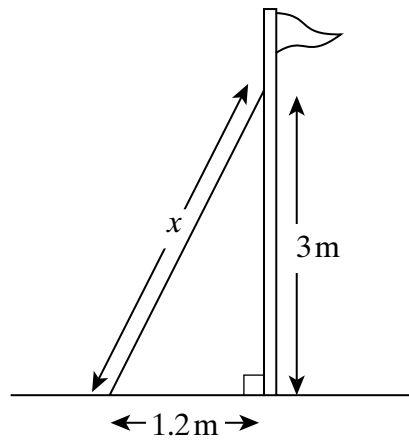
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Answer £ ..... (3 marks)

- 13 A support for a flagpole is attached at a height of 3m and is fixed to the ground at a distance of 1.2m from the base.



Not to scale

Calculate the length of the support (marked  $x$  on the diagram).

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Answer ..... m (3 marks)

**TURN OVER FOR THE NEXT QUESTION**

14 Parveen is using trial and improvement to find a solution to the equation

$$x^3 + 7x = 30$$

This table shows her first two trials.

$x$	$x^3 + 7x$	Comment
2	22	Too small
3	48	Too big

Continue the table to find a solution to the equation.

Give your answer to 1 decimal place.

Answer ..... (3 marks)

15 Jane records the times taken by 30 pupils to complete a number puzzle.

Time, $t$ (minutes)	Number of pupils
$2 < t \leq 4$	3
$4 < t \leq 6$	6
$6 < t \leq 8$	7
$8 < t \leq 10$	8
$10 < t \leq 12$	5
$12 < t \leq 14$	1

Calculate an estimate of the mean time taken to complete the puzzle.

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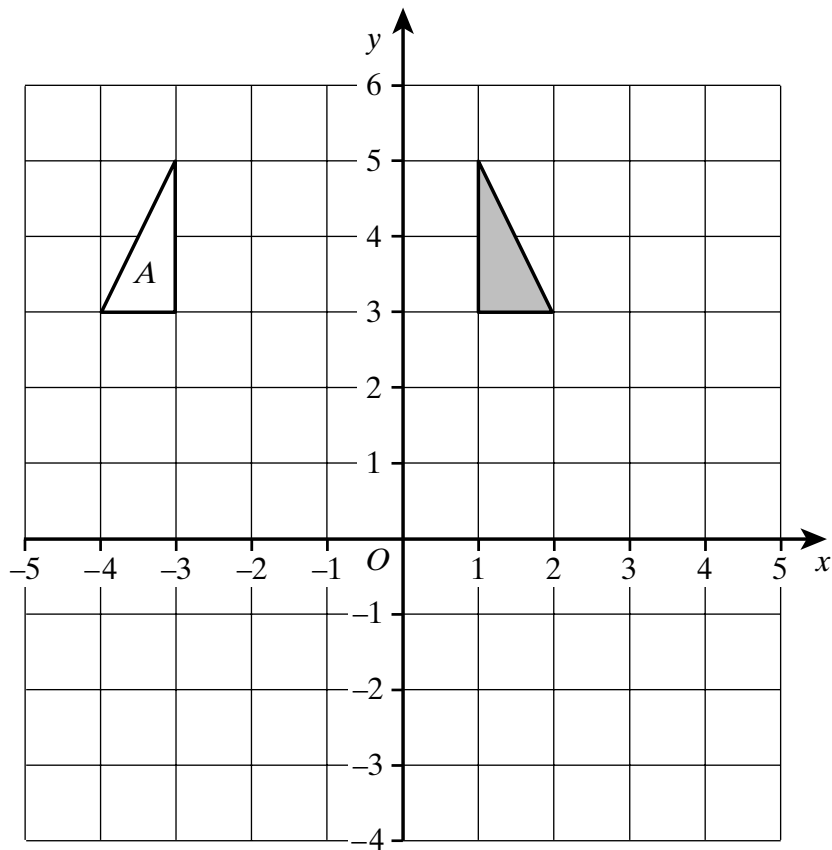
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Answer ..... minutes (4 marks)

**TURN OVER FOR THE NEXT QUESTION**

16 (a)



- (i) Describe fully the **single** transformation that takes the shaded triangle to triangle A.

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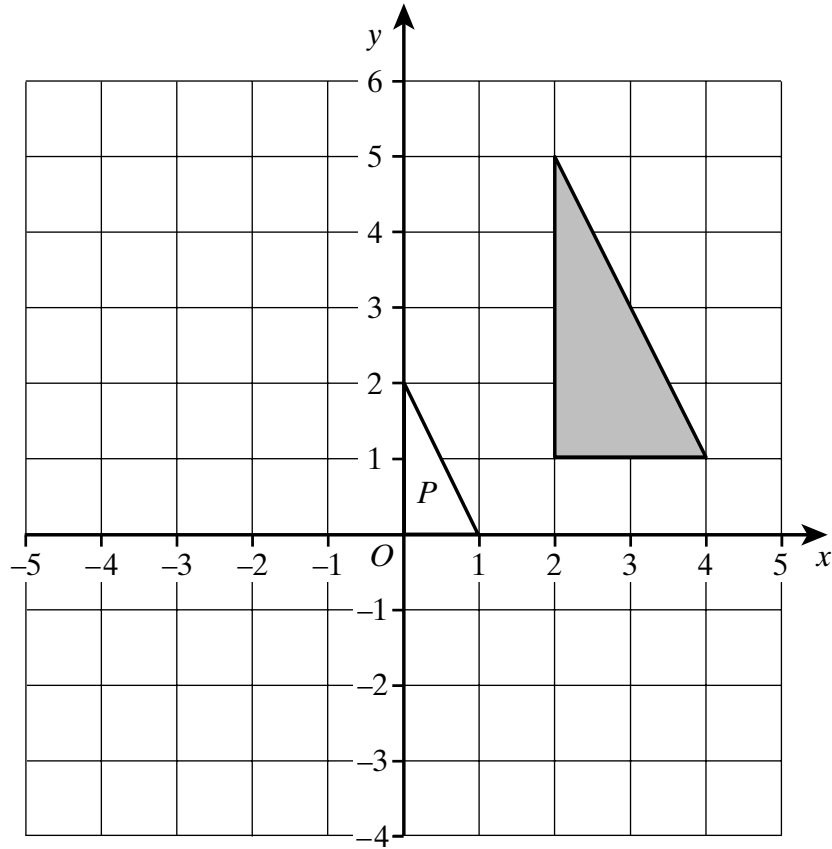
(2 marks)

- (ii) On the grid above translate the **shaded** triangle by 2 squares to the right and 4 squares down.

(1 mark)



(b) Triangle  $P$  is an enlargement of the shaded triangle.



(i) What is the scale factor of the enlargement?

Answer ..... (1 mark)

(ii) What is the centre of enlargement?

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

17 (a) Simplify  $4x - 5x + 7x$

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Answer ..... (1 mark)

(b) Simplify

(i)  $x^5 \times x^{-2}$

.....

.....

Answer ..... (1 mark)

(ii)  $y^5 \div y^{-2}$

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Answer ..... (1 mark)

(c) Expand and simplify  $(4x - 3)(x + 5)$

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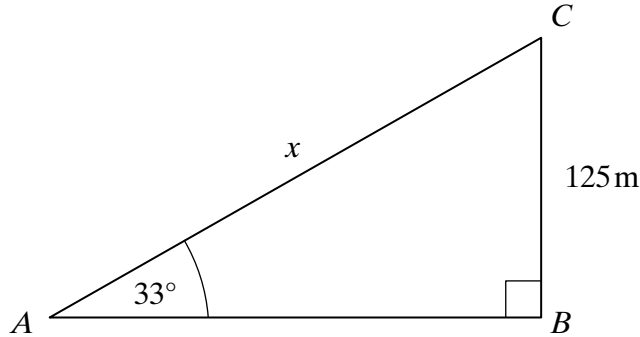
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Answer ..... (3 marks)

- 18**  $ABC$  is a right-angled triangle.  
 $BC = 125$  m.  
 Angle  $CAB = 33^\circ$ .



Not drawn accurately

Find the length of  $AC$  (marked  $x$  in the diagram).  
 Give your answer to an appropriate degree of accuracy.

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Answer ..... m (4 marks)

**TURN OVER FOR THE NEXT QUESTION**

- 19 (a) (i) Use your calculator to find  $\sqrt{28.9^2 - 9.24^2}$

Give **all** the figures in your calculator display.

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Answer ..... (1 mark)

- (ii) Write your answer to 3 significant figures.

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Answer ..... (1 mark)

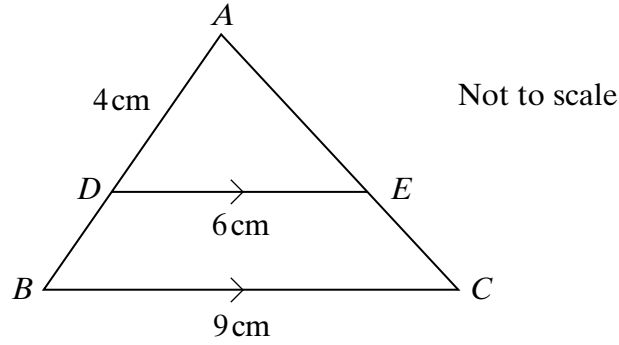
- (b) Find the value of  $(3.18 \times 10^5) \times (4.25 \times 10^3)$ .

Give your answer in standard form.

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Answer ..... (2 marks)

- 20** Triangles  $ADE$  and  $ABC$  are similar.  
 $DE$  is parallel to  $BC$ .  
 $AD = 4\text{ cm}$ ,  $DE = 6\text{ cm}$  and  $BC = 9\text{ cm}$ .



Calculate the length of  $BD$ .

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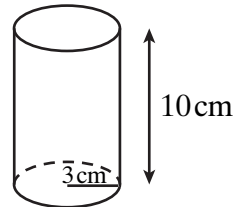
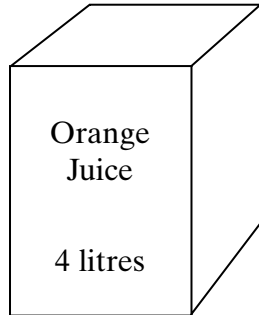
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Answer ..... cm (3 marks)

**TURN OVER FOR THE NEXT QUESTION**

- 21 A large carton contains 4 litres of orange juice.  
Cylindrical glasses of height 10 cm and radius 3 cm are to be filled from the carton.



How many glasses can be filled?  
You **must** show all your working.

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Answer ..... glasses (5 marks)

- 22 Make  $x$  the subject of the formula

$$w = x^2 + y$$

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Answer  $x =$  ..... (2 marks)

- 23** Jenny is organising a barbecue.  
 There are 30 bread rolls in a pack.  
 There are 16 sausages in a pack.  
 She needs **exactly** the same number of bread rolls as sausages.  
 What is the smallest number of each pack she must buy?  
 You **must** show all your working.

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Answer ..... packs of rolls  
 and ..... packs of sausages (3 marks)

- 24** (a) Solve the equation  $\frac{23 - 2x}{5} = 3$

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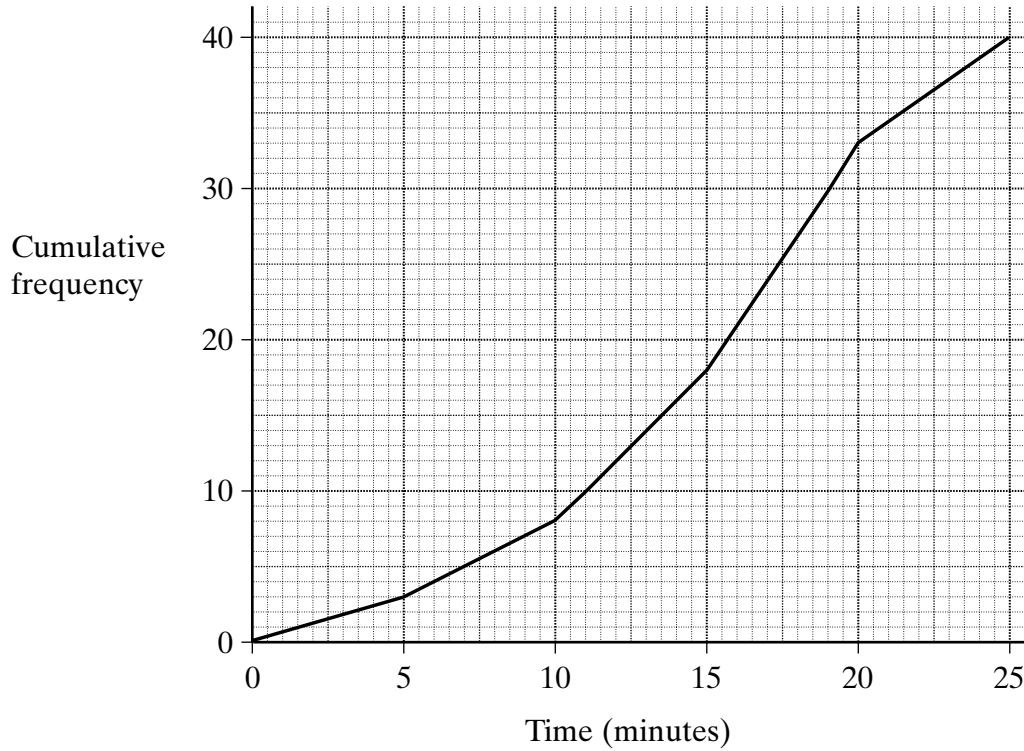
Answer  $x =$  ..... (3 marks)

- (b) Solve the inequality  $3x + 8 < 29$

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Answer ..... (2 marks)

- 25 The length of time, in minutes, of 40 telephone calls was recorded. A cumulative frequency diagram of this data is shown on the grid below.



Use the diagram to find the limits between which the middle 50% of the times lie.

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Answer ..... minutes and ..... minutes (2 marks)

**END OF QUESTIONS**