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General Certificate of Secondary Education  
June 2006

**MATHEMATICS (SPECIFICATION A)**  
**Intermediate Tier**  
**Paper 2 Calculator**

**3301/2I**



Monday 12 June 2006 9.00 am to 11.00 am

<p><b>For this paper you must have:</b></p> <ul style="list-style-type: none"> <li>• a calculator</li> <li>• mathematical instruments</li> </ul>	
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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.
- Do all rough work in this book.

**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 booklet.

**Advice**

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

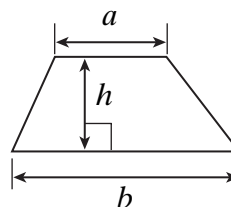
For Examiner's Use	
Pages	Mark
3	
4–5	
6–7	
8–9	
10–11	
12–13	
14–15	
16–17	
18–19	
20–21	
TOTAL	
Examiner's Initials	

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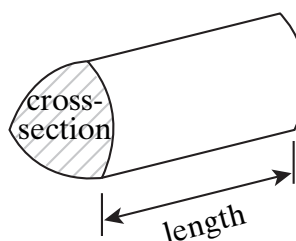
**Formulae Sheet: Intermediate Tier**

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 (a) Calculate  $\frac{4.5}{0.6^2}$

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.....

Answer ..... (1 mark)

(b) Calculate 36% of £420.

.....

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.....

Answer £ ..... (2 marks)

(c) What percentage is £84 of £240?

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.....

Answer ..... % (2 marks)

**Turn over for the next question**

Turn over ►

- 2 The cost of a holiday is made up of three parts.

accommodation + insurance + travel

**City break to Paris**

**3 nights**

**Total cost of £ 245**

The accommodation for this holiday costs £52 each night.

The insurance costs £26.

How much does the travel cost?

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Answer £ ..... (4 marks)

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

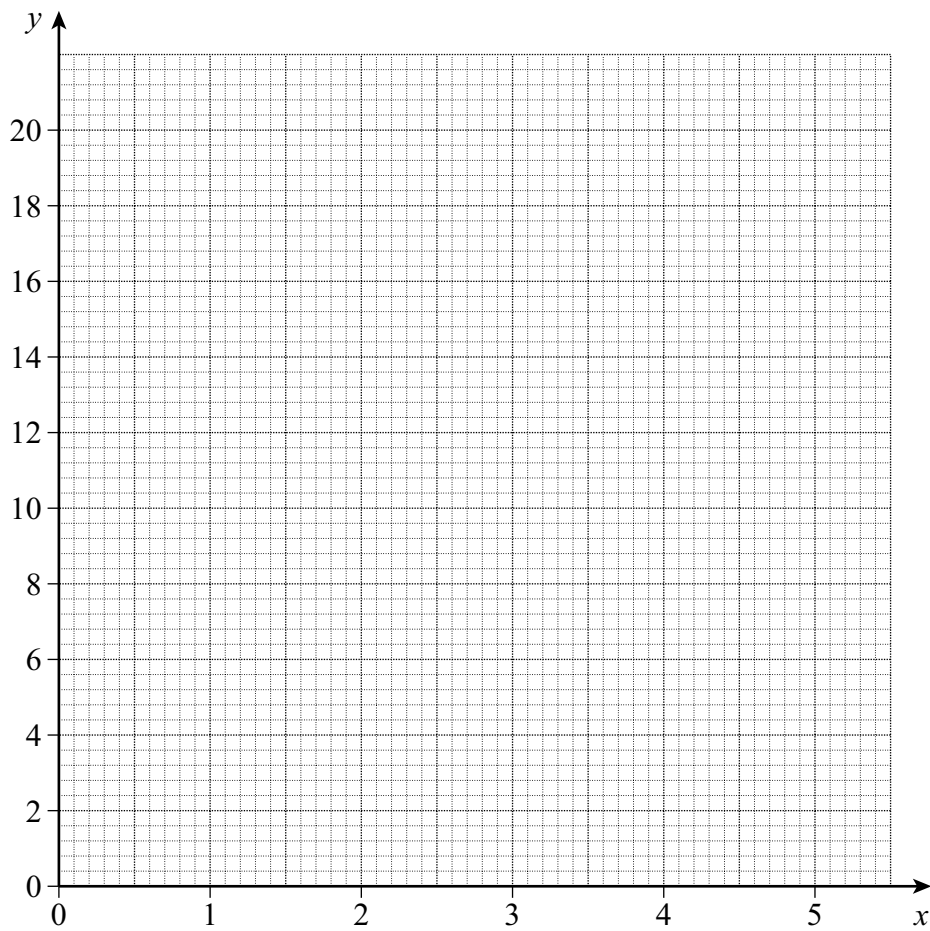
$x$	0	1	2	3	4	5
$y$	4		10		16	19

(1 mark)

.....

.....

- (b) On the grid draw the graph of  $y = 3x + 4$  for values of  $x$  from 0 to 5.



(2 marks)

- (c) On the grid draw and label the line  $x = 2.5$

(1 mark)

- 4 (a) Change a speed of 72 kilometres per hour into miles per hour.

.....

.....

Answer ..... miles per hour (2 marks)

- (b) A car travels 200 kilometres in 3 hours 30 minutes.  
Calculate its average speed in kilometres per hour.  
Give your answer to an appropriate degree of accuracy.

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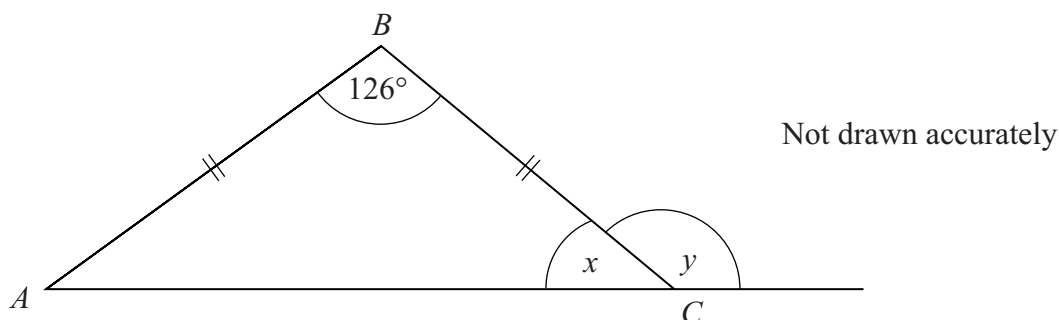
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Answer ..... kilometres per hour (4 marks)

- 5 Draw a sketch of a prism with a triangular cross-section.

(2 marks)

- 6  $ABC$  is an isosceles triangle.  
 $AB = BC$



Work out the values of  $x$  and  $y$ .

.....

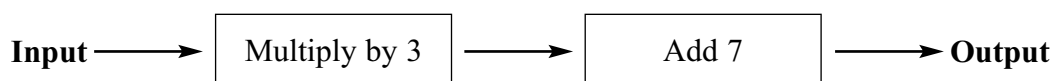
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Answer  $x =$  ..... degrees

$y =$  ..... degrees (3 marks)

- 7 A two-stage operation is shown.



- (a) When the input is  $-2$  what is the output?

.....

.....

Answer ..... (1 mark)

- (b) When the input is  $n$  what is the output?

.....

Answer ..... (2 marks)

- 8 A rounders coach records the number of rounders the players in her squad scored in a season. All the players scored at least once. She shows the data in a stem and leaf diagram.

Key    | 2 | 7    represents 27 rounders scored

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

- (a) What is the range of the data?

.....  
.....

Answer ..... (1 mark)

- (b) How many players are there in the squad?

.....  
.....

Answer ..... (1 mark)

- (c) What is the median number of rounders scored?

.....  
.....

Answer ..... (1 mark)

- (d) Calculate the mean number of rounders scored.

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.....

Answer ..... (3 marks)



9 Hassan says



When you square a positive number the answer is **always** bigger than the original number.

For example

$$2.5^2 = 6.25 \quad \text{and} \quad 6.25 \text{ is bigger than } 2.5$$

Find an example to show that Hassan is wrong.  
You **must** show your working.

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..... (2 marks)

10 The  $n$ th term of a sequence is given by the expression  $n^2 - 3$   
Write down the first three terms of the sequence.

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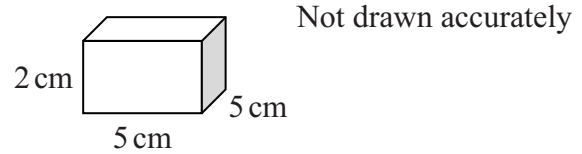
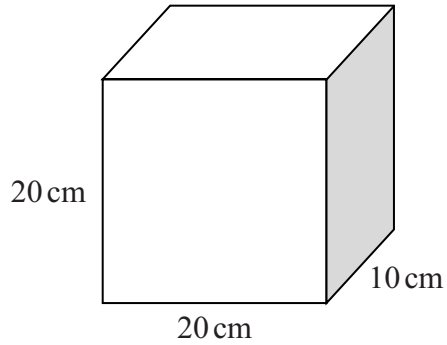
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Answer ....., ....., ..... (2 marks)

Turn over for the next question

Turn over ►

- 11** The diagram shows two boxes that are cuboids.  
 The larger box measures 20 cm by 10 cm by 20 cm.  
 It is partly filled with 70 smaller boxes each measuring 5 cm by 5 cm by 2 cm.  
 The smaller boxes are packed so that there are no gaps between them.



How many more smaller boxes could be fitted in the larger box?

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Answer ..... (4 marks)

**12** Solve the equations

(a)  $4v - 1 = 9$

.....

.....

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

(b)  $3w + 4 = 19 - 2w$

.....

.....

.....

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

(c)  $\frac{x}{5} - 2 = 11$

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.....

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

(d)  $4(y + 3) = 9(y - 2)$

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

- 13** Solve the inequality

$$5x + 3 > 10$$

.....

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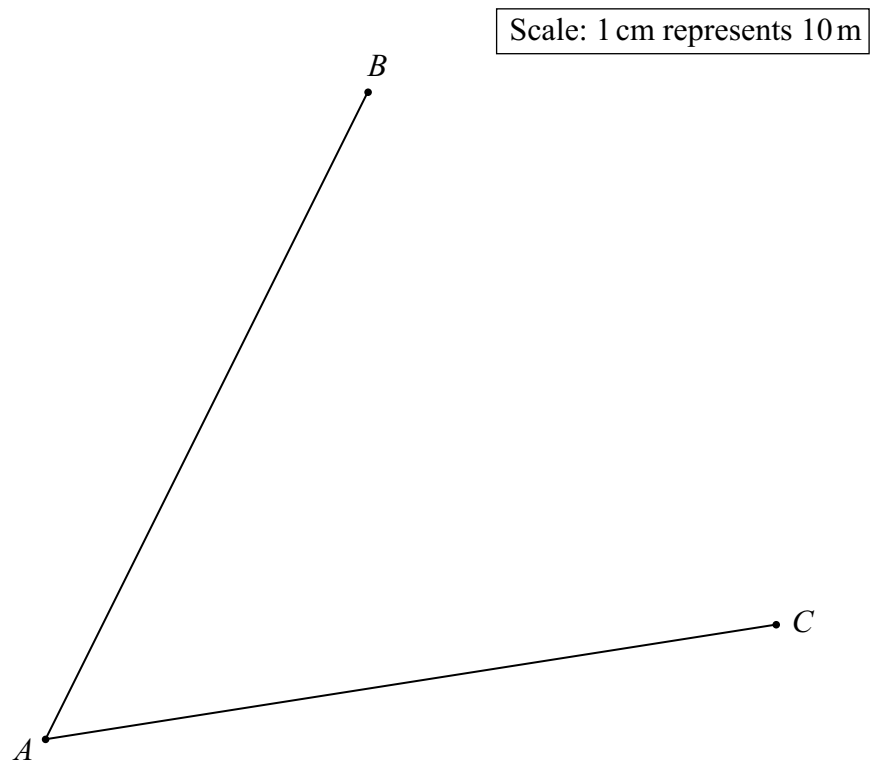
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Answer ..... (2 marks)

- 14** Use a ruler and compasses to construct a rhombus that has sides of 6 cm and whose shorter diagonal is 4 cm.

(4 marks)

- 15**  $AB$  and  $AC$  represent two walls.  
A mast is to be erected that is  
  
equidistant from  $AB$  and  $AC$   
  
between 40 m and 70 m from  $A$ .



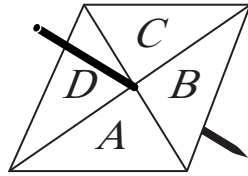
Show clearly all the possible positions of the mast.

(3 marks)

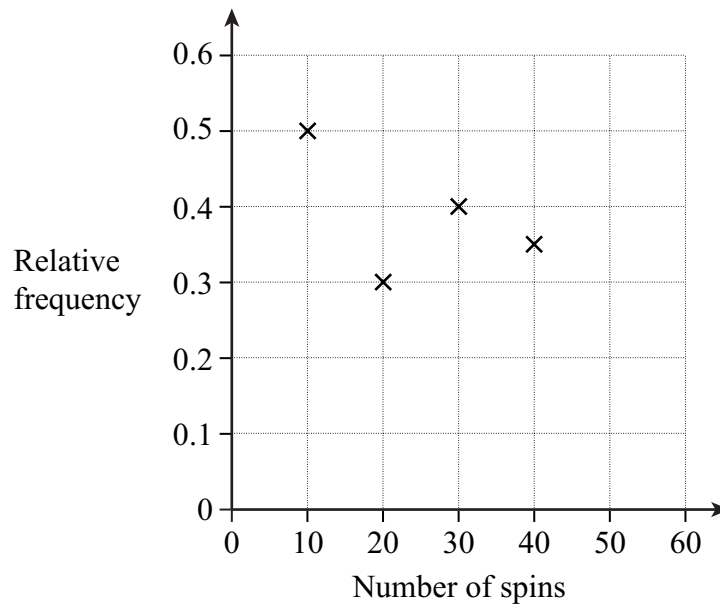
**Turn over for the next question**

Turn over ►

- 16 A four-sided spinner has sections labelled A,B,C,D.



The spinner is spun and the relative frequency of the letter A is recorded after every 10 spins.



- (a) After 50 spins there were 20 letter As.  
Plot this relative frequency on the diagram.

..... (1 mark)

- (b) The relative frequency after the first 60 spins is 0.45  
How many times does the spinner land on A in the first 60 spins?

.....

Answer ..... (1 mark)

- (c) Is the spinner biased?  
Give a reason for your answer.

.....

.....

(2 marks)

- (d) The spinner is spun 1000 times.  
How many times would you expect the spinner to land on A?

.....

Answer ..... (2 marks)

- (e) A different four-sided spinner has these probabilities.

Letter	A	B	C	D
Probability	0.2	0.3	0.4	0.1

What is the probability of getting a B or a C with one spin?

.....

.....

Answer ..... (2 marks)

- 17 The labels on two types of cereal bar show the following information.

	Fat per 100g	Bar weight	Fat per bar
<b>Fruity bar</b>	17.4 g	62.6 g	
<b>Sports bar</b>	10.3 g		3.4 g

Complete the table.

You **must** show your working.

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(4 marks)

Turn over ►

- 18 (a) Factorise  $m^2 - 49$

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Answer ..... (1 mark)

- (b) Solve these simultaneous equations

$$\begin{aligned} 5x + 3y &= 6 \\ 3x - 7y &= 19 \end{aligned}$$

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

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



- 19 Jack and Jill want to buy some towels.  
A store displays the following signs.

**January Sales**  
*All towels 60% off*  
**Normally ~~£10~~**  
**January sale price £4**



**Today Only**  
**EXTRA**  
**25% off the**  
**January sale price**

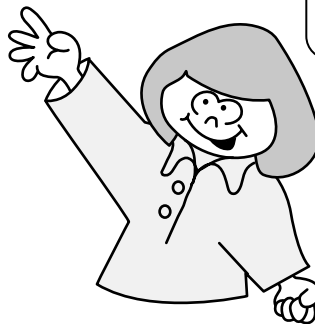
That is 85%  
off the  
original price

Jack



No, it is only 70%  
off the  
original price

Jill



Who is correct, Jack or Jill?  
Explain your answer fully.

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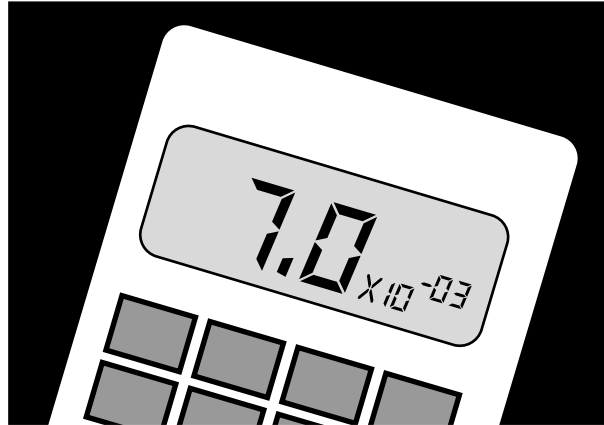
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(2 marks)

Turn over ►

- 20 (a) A calculator displays a number in standard form as



Which of the following numbers does the display show?  
Circle the correct answer.

7000

0.700

0.007

700

0.0007

(1 mark)

- (b) Use your calculator to work out

$$\cos(\tan^{-1}0.45)$$

- (i) Give **all** the figures in your calculator display.

Answer ..... (1 mark)

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

Answer ..... (1 mark)

- (c) Use your calculator to work out

$$\frac{(3.45 \times 10^4) \times (4.9 \times 10^{-2})}{(2.1 \times 10^5)}$$

Answer ..... (1 mark)

- 21 Find the equation of the line through  $(0, -2)$  and  $(4, 18)$ .

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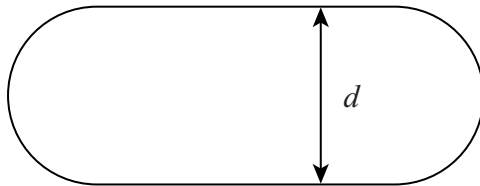
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Answer ..... (3 marks)

- 22 A race track is made from two straights and two semicircles.  
The straights are 80 m long.  
The race track has a total perimeter of 400 m.



Not drawn accurately

Calculate the distance,  $d$ , between the two straights.

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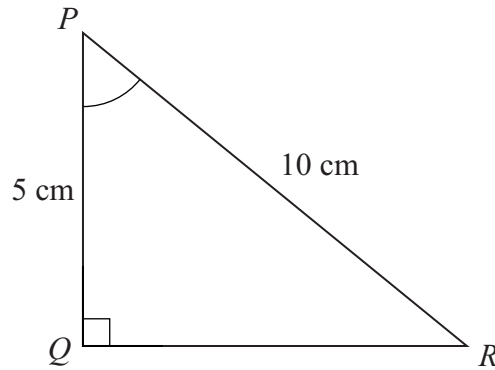
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Answer  $d =$  ..... m (4 marks)

Turn over ►

- 23  $PQR$  is a right-angled triangle.  
 $PR = 10$  cm and  $PQ = 5$  cm



Not drawn accurately

- (a) Calculate the length  $QR$ .

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Answer ..... cm (3 marks)

- (b) Calculate the size of angle  $QPR$ .

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Answer ..... degrees (3 marks)

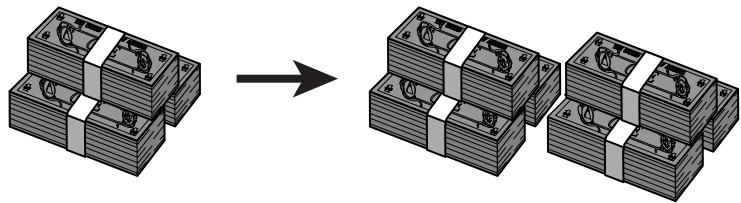
- 24 John has £2000 to invest.  
He sees this advert.

**SureFire Investments**

Don't see your money  
go up in smoke!



**Double your money in 10 years!**



The average annual growth of our investment  
account is **7.2%**

Will John double his money in ten years with SureFire Investments?  
You **must** show your working.

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(4 marks)

**END OF QUESTIONS**

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