Surname		Other Names	
Centre Number			Candidate Number									
Candidate Signature												

For Examiner's Use

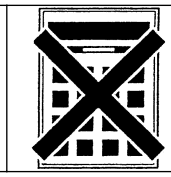
General Certificate of Secondary Education
November 2007

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

Tuesday 6 November 2007 9.00 am to 11.00 am

In addition to this paper you will require:
- mathematical instruments.

You must **not** use a calculator.



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.
- The marks for questions 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

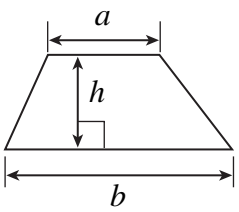
- In all calculations, show clearly how you work out your answer.

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	

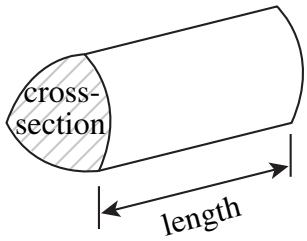
Formulae Sheet: Intermediate Tier

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 timetable shows the times of trains from Norwich to London.

Norwich	0630	0655	0710	0755
Ipswich	0709	0736	0751	0828
London	0824	0848	0903	0933

(a) Tom arrives at the station at Norwich at 0658 and gets the next train to London.

What times does this train leave Norwich?

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

(b) The 0630 train from Norwich arrives in London 6 minutes late.

What times does this train arrive in London?

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

(c) How long does the 0655 train take to travel from Norwich to Ipswich?

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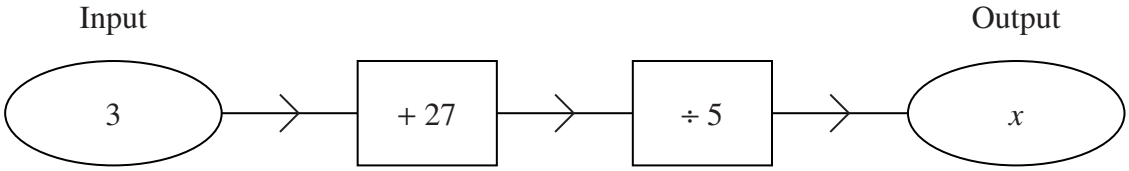
Answer ..... minutes *(2 marks)*

Turn over for the next question

4

2 (a) Show that the value of x is 6.



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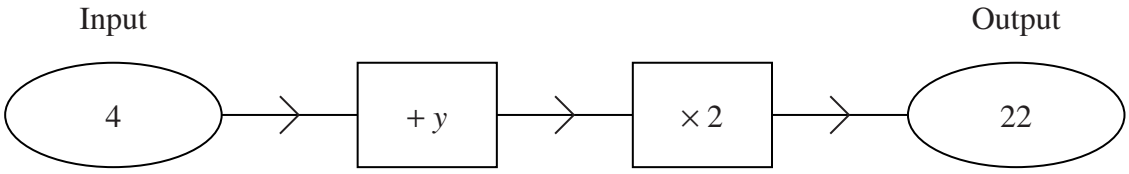
(1 mark)

(b) Calculate the value of y.



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

3 There are 30 students in a class.
14 of the students are boys.
On Monday morning 2 girls are late.
A total of 25 students are **not** late.
Complete the two way table to show this information.

.....

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	Boys		**Total**
Late		2	
Total	14		30

(4 marks)

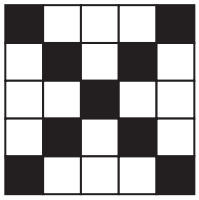
Turn over for the next question

7

4 Here is a pattern of squares.

Pattern 1

Pattern 2



Pattern 3

(a) Here is a method for working out the number of black squares in each pattern.

Complete the method for Pattern 10.

Pattern 1 $1 + 4 \times 0 = 1$

Pattern 2 $1 + 4 \times 1 = 5$

Pattern 3 $1 + 4 \times 2 = 9$

Pattern 4 $1 + 4 \times 3 = 13$

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Pattern 10 $1 + \ldots\ldots\ldots\ldots\ldots = \ldots\ldots\ldots\ldots$

(2 marks)

(b) Which of the following statements is true?

A Pattern 12 has 39 black squares

B The number of black squares is always odd

C Every pattern has more black squares than green squares

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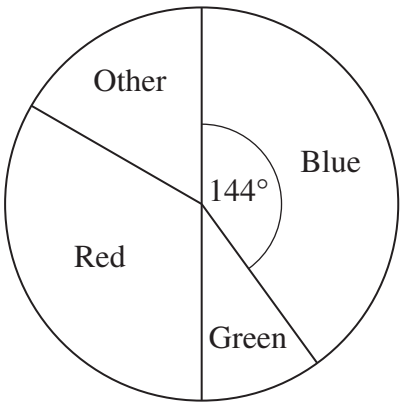
Answer ..... *(1 mark)*

5 Kim and Joe want to find the favourite colour of year 11 students in their school. There are 250 students in year 11.

(a) Kim asks 10 of these students to choose their favourite colour.

The pie chart shows the results.



How many of the 10 students choose blue?

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

(b) Joe plans to ask 100 of the students in year 11 to choose their favourite colour.

What percentage of the 250 students is this?

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

(c) Joe says "My conclusion is likely to be more reliable than Kim's".
Explain why Joe is right.

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(1 mark)

8

6 Here are four numbers.

2.6	0.26	12	1.2

(a) Tim adds **two** of the numbers.

Which numbers should he choose to get the largest possible total?

.....

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

(b) Penny subtracts one of the numbers from another.
Her answer is 0.94.

Which numbers does she use?

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

(c) (i) Which number is 10 multiplied by 0.26?

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

(ii) Which number is one tenth of 12?

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

(d) Adil divides one of the numbers by another and gets an answer greater than 40.
What calculation does he do?

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Answer ..... ÷ ..... *(1 mark)*

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7 (a) Helen says, "It is impossible to draw a triangle with **exactly two** acute angles".
Draw a triangle that shows that Helen is wrong.

(1 mark)

(b) Troy says "It is impossible to draw a triangle with two obtuse angles".
Explain why Troy is right.

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(2 marks)

8 (a) Simplify $6x \times 2$

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

(b) Simplify $6x \div 2$

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

(c) Factorise $2x + 6$

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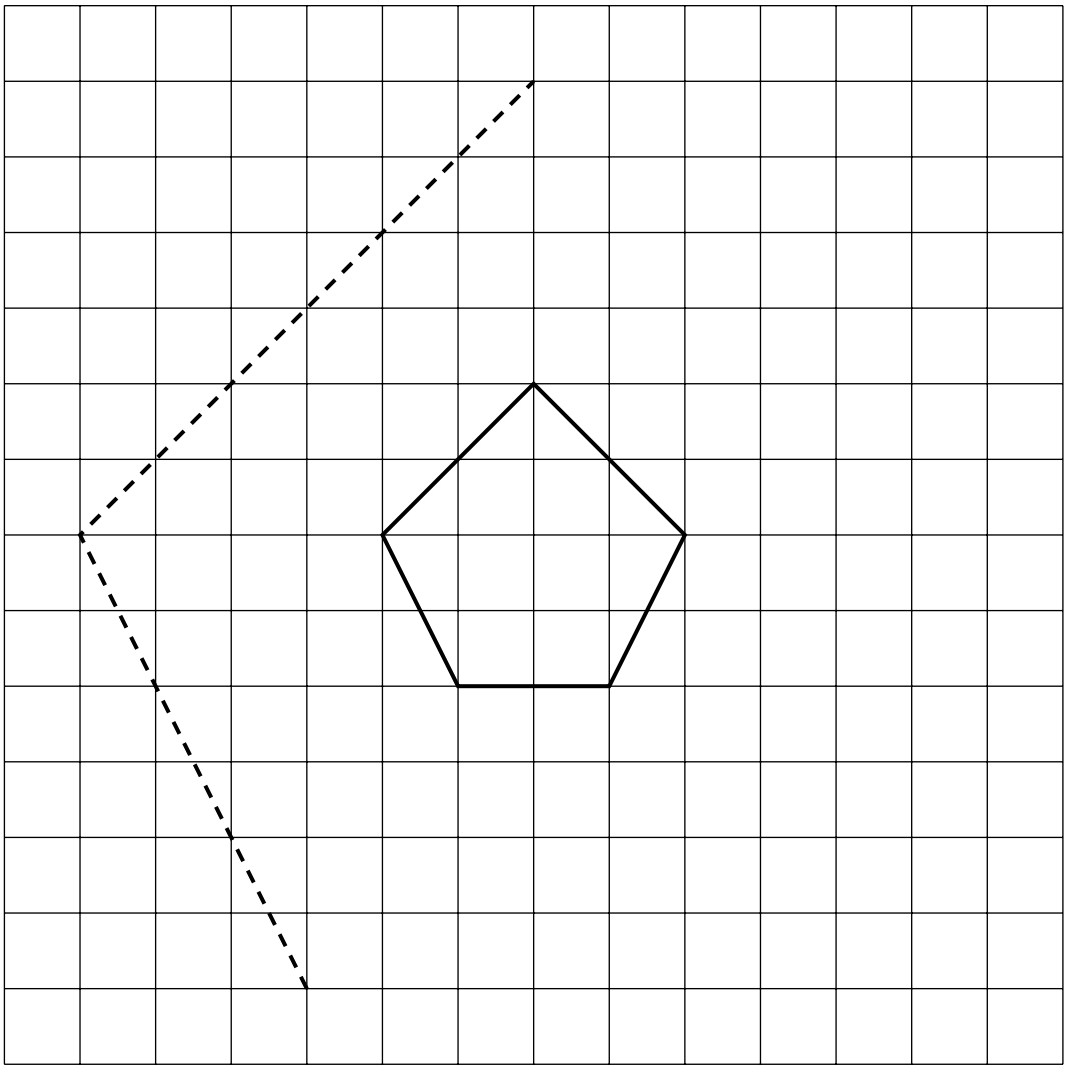
Answer ..... *(1 mark)*

11

9 The diagram shows a pentagon.
The dotted lines are two sides of an enlargement of the pentagon.



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

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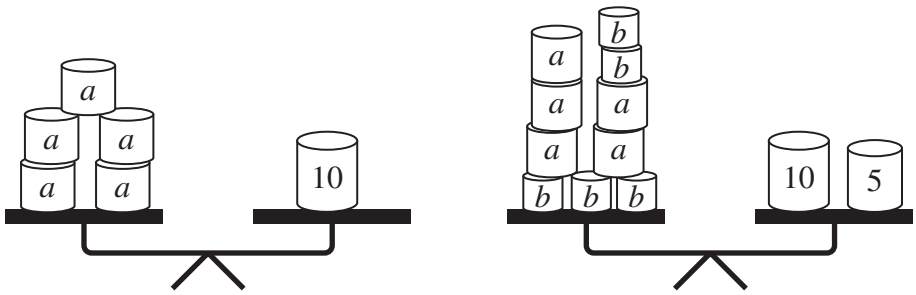
Answer ..... *(1 mark)*

(b) Complete the enlarged pentagon.

(2 marks)

10 Alan has some unknown weights labelled a and b and some 5 kg and 10 kg weights.
He finds that the following combinations of weights balance.



(a) (i) Find the value of a.

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Answer a = ... *(1 mark)*

(ii) Find the value of b.

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

(b) Alan also has some unknown weights labelled c.
He finds that $5c + 2b = c + 6a$

Find the value of c.

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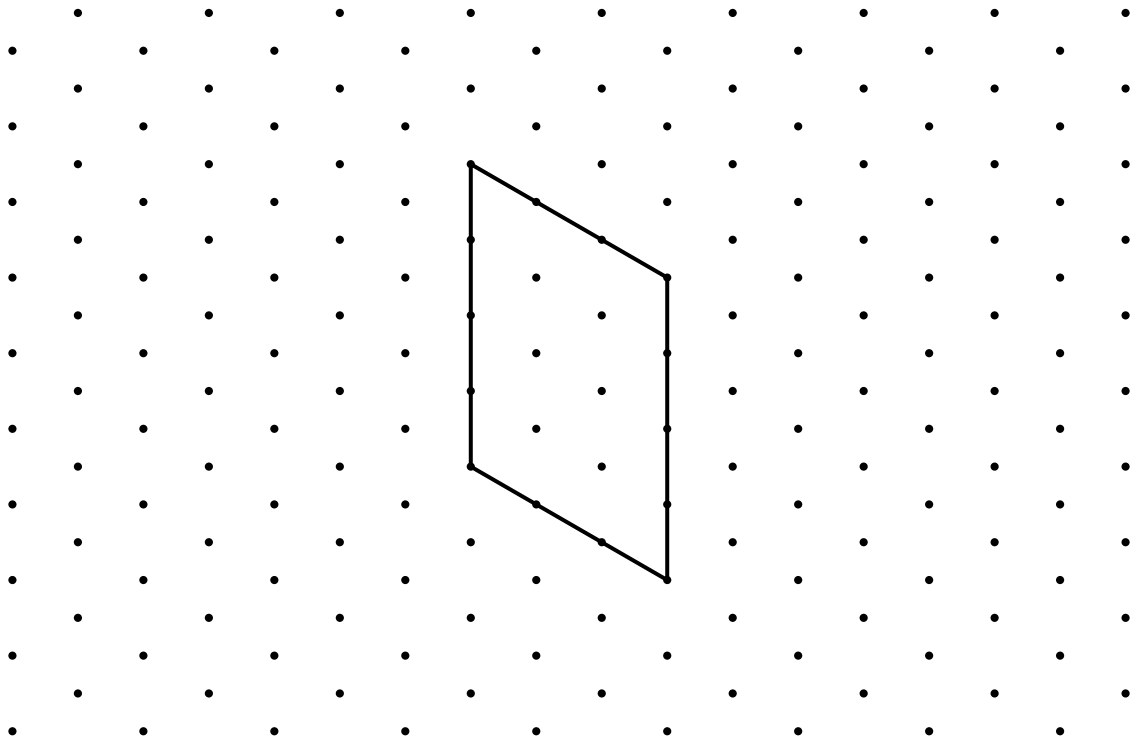
Answer c = ... *(4 marks)*

10

11 One face of a cuboid is drawn on this isometric grid.
This face measures 3 cm by 4 cm.



(a) The volume of the cuboid is 24 cm^3.
Complete the drawing of the cuboid.

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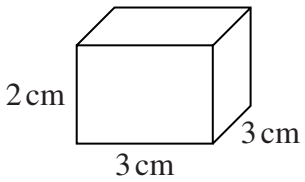
(3 marks)

(b) Work out the surface area of this cuboid.
State the units of your answer.



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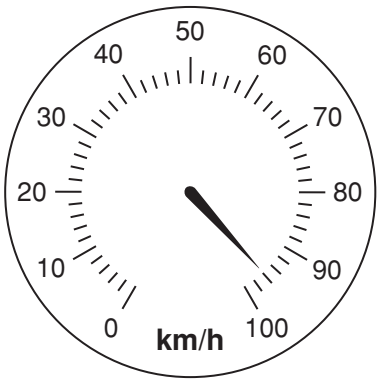
Answer ..... *(3 marks)*

12 The diagram shows a speedometer in a car.



The car travels at the speed shown on the speedometer for 15 minutes.
How many kilometres has the car travelled in this time?

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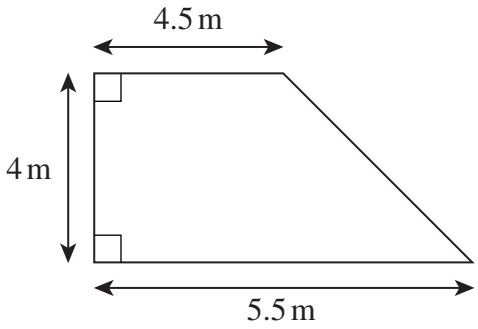
Answer ..... km *(3 marks)*

13 The diagram shows a trapezium.



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Work out the area of the trapezium.

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

11

14 (a) Calculate $6 + \frac{a}{2}$ when $a = -8$

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

(b) Calculate $\frac{6 + a}{2}$ when $a = -8$

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

15 Work out $21 \div 2\frac{1}{3}$

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

16 $P = x(y + 2)$

$Q = xy + 2$

Show clearly that $P - Q = 2(x - 1)$

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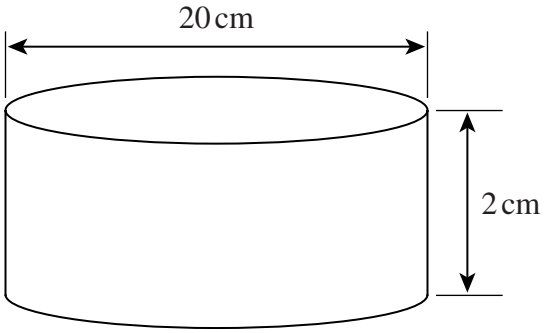
(3 marks)

17 The diagram shows a cylinder.
The diameter of the cylinder is 20 cm.
The height of the cylinder is 2 cm.



Not drawn accurately

Work out the volume of the cylinder.
Use $\pi = 3.14$

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

13

18 (a) Complete this table of the powers of 5.

5^0	5^1	5^2	5^3	5^4	5^5	5^6	5^7
1	5	25		625	3125	15 625	78 125

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(1 mark)

(b) You are given that $15\,625 \times 78\,125 = 5^x$
Use the table to find the value of x.

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

(c) Use the table to work out $\dfrac{78\,125}{625 \times 5}$

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

19 (a) Complete the table of values of $y = x^2 - 4x + 1$

x	–1	0	1	2	3	4	5
y	6	1		–3	–2		6

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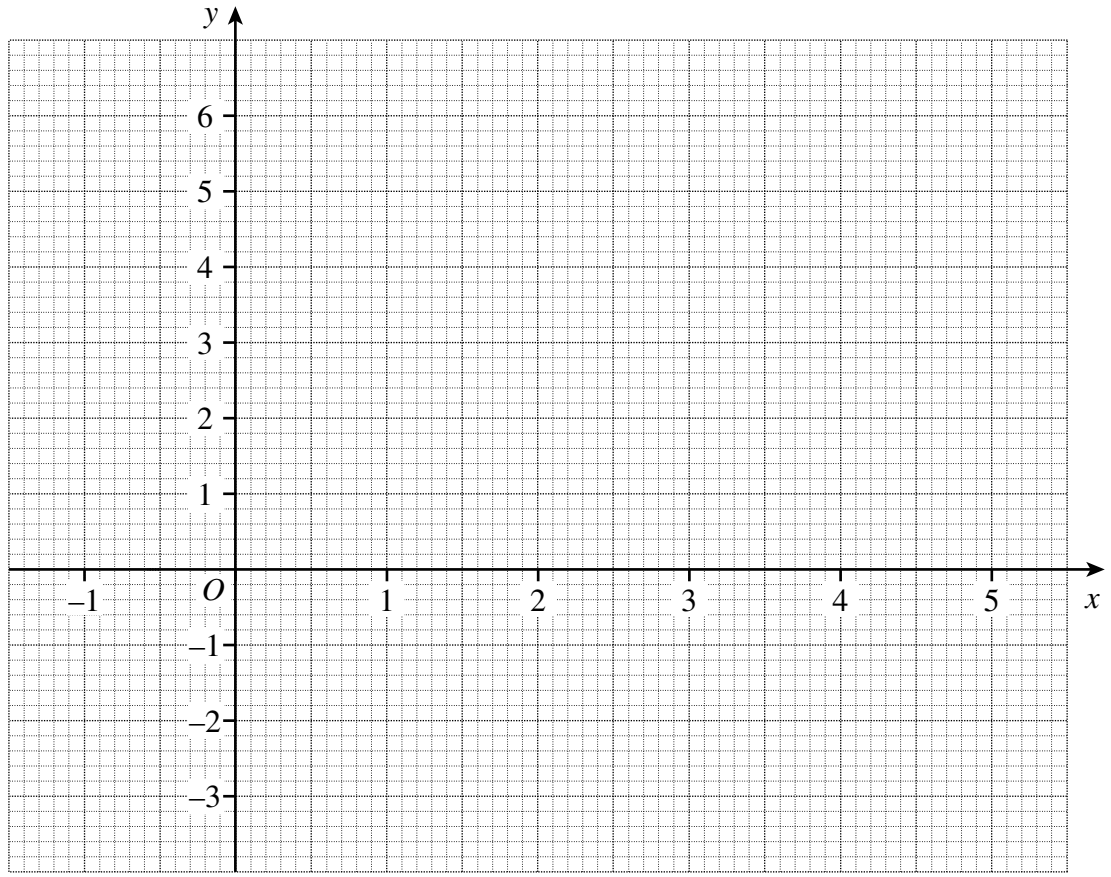
(1 mark)

(b) On the grid below, draw the graph of $y = x^2 - 4x + 1$ for values of x from –1 to +5.



(2 marks)

(c) Explain how the graph shows that the equation $x^2 - 4x + 1 = 0$ has two solutions.

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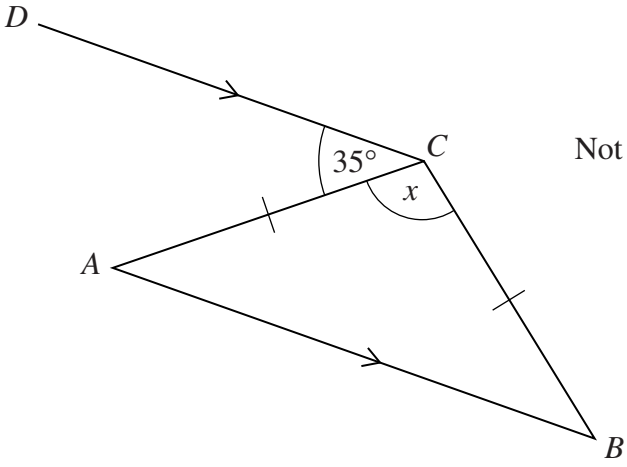
(1 mark)

9

20 (a) *ABC* is an isosceles triangle.
DC is parallel to *AB*.
Angle *ACD* = 35°



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Work out the size of angle *x*.

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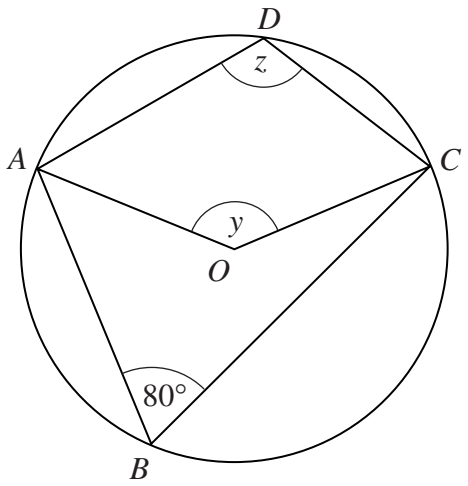
Answer ..... degrees *(3 marks)*

(b) A, B, C and D are four points on the circumference of a circle, centre O.
Angle $ABC = 80°$



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(i) Work out the size of angle y.

.....

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

(ii) Work out the size of angle z.

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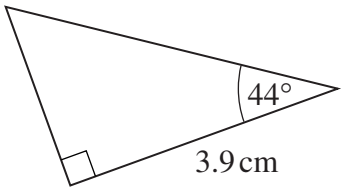
Answer ..... degrees *(1 mark)*

Turn over for the next question

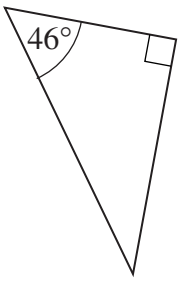
5

21 (a) *A*, *B* and *C* are congruent triangles.

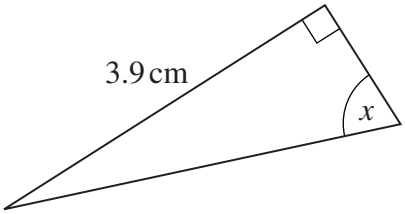
A



B



C



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What is the size of angle *x* in triangle *C*?

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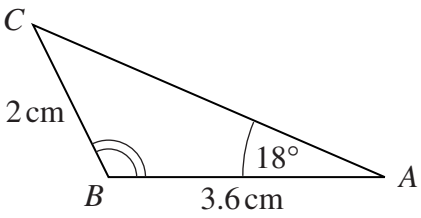
Answer ..... degrees *(1 mark)*

(b) Triangles *ABC* and *XYZ* are similar.
Angle *ABC* = angle *XYZ*



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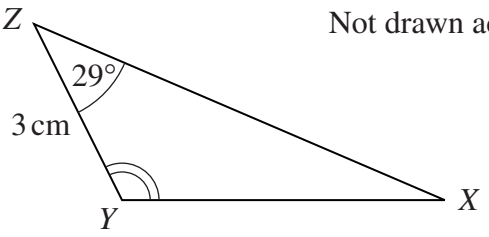

(i) Work out the size of angle *XYZ*.

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

(ii) Calculate the length of *XY*.

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

22 The probability that a boy is left-handed is 0.2
The probability that a girl is left-handed is 0.3
A school has 480 boys and 520 girls.

(a) Estimate the number of left-handed students in the school.

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

(b) A student is picked at random from the whole school.
Estimate the probability that the student is left-handed.

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

Turn over for the next question

10

23 (a) Solve the simultaneous equations

$$4x - 3y = 13$$
$$2x + y = 4$$

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

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Answer $x =$ ..... , $y =$ ..... *(3 marks)*

(b) Factorise $x^2 - 13x + 30$

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

24 You are given that $p = 3 \times 10^2$ and $q = 3 \times 10^{-2}$

(a) Calculate the value of $p + q$

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

(b) Calculate the value of $p \div q$

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

25 The table shows Peter's electricity bills from December 2004 to March 2006.

Date	**Dec 2004**	**Mar 2005**	**Jun 2005**	**Sep 2005**	**Dec 2005**	**Mar 2006**
Bill (£)	33.50	27.00	19.20	16.30	27.50	23.00

(a) Show that the first four-point moving average is £24.

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(1 mark)

(b) Calculate the second four-point moving average.

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Answer £ ..... *(2 marks)*

END OF QUESTIONS

12

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