C(72)   D(58)   E(45)   F(32)   G(19)

F

GENERAL CERTIFICATE OF SECONDARY EDUCATION

MATHEMATICS SYLLABUS A   **J512/02**
Paper 2
(Foundation Tier)

Solutions ·

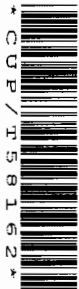Candidates answer on the question paper

OCR Supplied Materials:
None

Other Materials Required:
*   Electronic calculator
*   Geometrical instruments
*   Tracing paper (optional)

Wednesday 14 January 2009
Afternoon

Duration: 2 hours

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

INSTRUCTIONS TO CANDIDATES

*   Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
*   Use black ink. Pencil may be used for graphs and diagrams only.
*   Read each question carefully and make sure that you know what you have to do before starting your answer.
*   Show your working. Marks may be given for a correct method even if the answer is incorrect.
*   Answer **all** the questions.
*   Do **not** write in the bar codes.
*   Write your answer to each question in the space provided, however additional paper may be used if necessary.

INFORMATION FOR CANDIDATES

*   The number of marks is given in brackets [ ] at the end of each question or part question.
*   You are expected to use an electronic calculator for this paper.
*   Use the π button on your calculator or take π to be 3.142 unless the question says otherwise.
*   The total number of marks for this paper is **100**.
*   This document consists of **16** pages. Any blank pages are indicated.
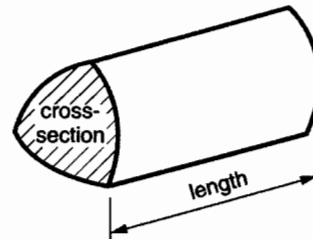
FOR EXAMINER'S USE

Turn over

Area of trapezium $= \frac{1}{2}(a+b)h$
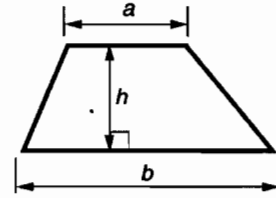
Volume of prism = (area of cross-section) × length

PLEASE DO NOT WRITE ON THIS PAGE

1 **(a)** Write 4028 in words.

Four thousand and twenty eight [1]

(b) Write thirty five thousand and four in figures.

(b) _5004_ [1]

(c) Write 6814 correct to

    (i) the nearest ten,

(c)(i) _6810_ [1]

    (ii) the nearest thousand.

(ii) _7000_ [1]

(d) In the number 32 745, the 3 has a value of 30 000.
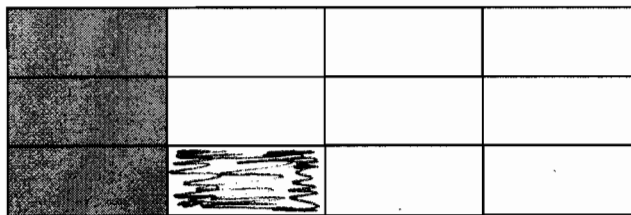
    What is the value of

    (i) the 4 in the number 32 745,

(d)(i) _40_ [1]

    (ii) the 7 in the number 32 745?

(ii) _700_ [1]

2 **(a)** What percentage of the diagram has been shaded?

$\frac{1}{4} = 25\%$

(a) _25_ % [1]

(b) Shade in one more of the small rectangles.

What **fraction** of the diagram has now been shaded altogether? $\frac{4}{12} = \frac{1}{3}$
Give your answer in its lowest terms.

(b) _$\frac{1}{3}$_ [2]

(c) Write $\frac{3}{4}$ as a decimal.

(c) _0·75_ [1]

Turn over

3

| Millimetres	Grams	Kilometres	Centimetres
Kilograms	Metres	Litres	Millilitres

Which of these metric units is best to use for measuring

(a) the length of a pen,

(or millimetres)

(a) _____Centimetres_____ [1]

(b) the weight of an egg,

(b) _____Grams_____ [1]

(c) the capacity of a small drinking glass,

(c) _____Millilitres_____ [1]

(d) the distance from Chesterfield to Dover,

(d) _____Kilometres_____ [1]

(e) the weight of a large bag of potatoes?

(e) _____kilograms_____ [1]

4 Anya is throwing darts at this target.

Here are her scores.

9 3 2 3 6 8 7 2 3 4 9 4 5
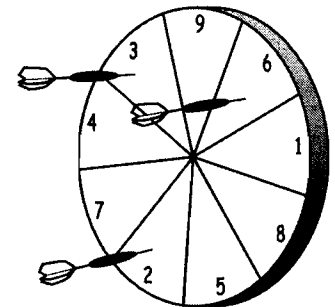
Mode· occurs most often

(a) Find the mode.

(a) _____3_____ [1]

(b) **Describe** how you would find the median. (You do not need to work it out.)

Put them in order of size and choose the middle
item. If there is not a middle item choose the
average of the middle two items [2]

5 **(a)** **(i)**

Sally buys two magazines, one costing £1.25 and the other costing £1.99.
She pays with a £5 note.

Work out how much change she should get.

$£1.25 + £1.99 = £3.24$

$£5.00 - £3.24 = £1.76$

(a)(i) £ __1.76__ [2]

(ii) Sally likes reading Romance books.
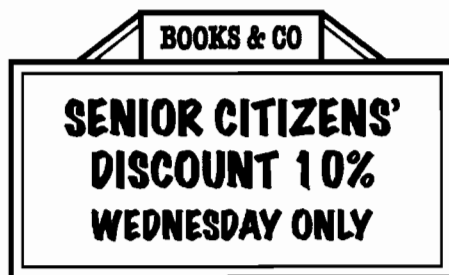They cost £1.45 each.

Work out the largest number of Romance books that she could buy for £10.

$£10 ÷ £1.45 = 6.89655$

So could buy only 6

(ii) ____6____ [2]

(b)

BOOKS & CO

**SENIOR CITIZENS'
DISCOUNT 10%
WEDNESDAY ONLY**

On Wednesdays, Mr Green can get 10% discount at the bookshop.

Work out how much discount he should get if he bought a book priced at £12.00.
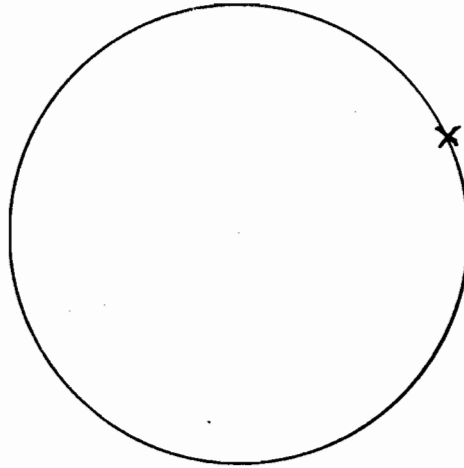
$10\% \ of \ £12.00 = £1.20$

(b) £ __1.20__ [2]

　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　Turn over

6 **(a)** Measure the line GH.

G ———————————————— H

(a) _____ **7·3** _____ cm **[1]**

(b) Draw a circle, radius 3 cm.
Mark, with a cross, a point on the circumference of the circle. **[2]**
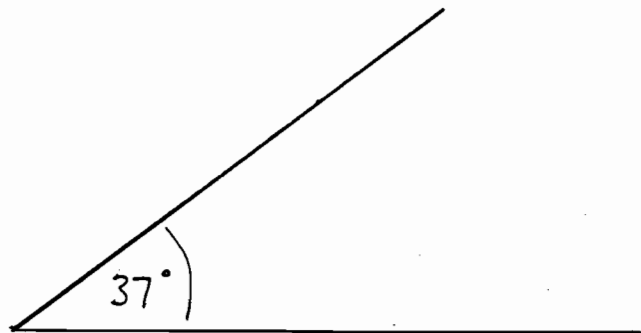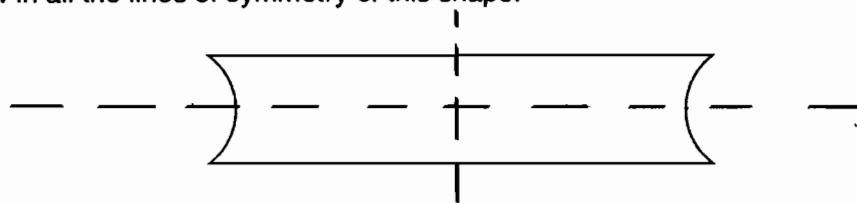
*Any point
on the circle
is on its
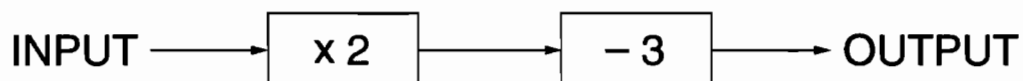circumference*

(c) Draw and label an angle of 37°. **[2]**

37°

(d) Draw in all the lines of symmetry of this shape. **[2]**

7 Here is a number machine.

INPUT ⟶ ☐ x 2 ⟶ ☐ − 3 ⟶ OUTPUT

(a) (i) Work out the output when the input is 2.

$2 \times 2 = 4$ $4 - 3 = 1$

(a)(i) _____ 1 _____ **[1]**

(ii) Work out the output when the input is −4.

$2 \times (-4) = -8$ $-8 - 3 = -11$

(ii) _____ −11 _____ **[1]**

(iii) Work out the **input** when the output is 5.

$\div 2$ $+3$
⟵   ⟵

Reverse operations and reverse their order $5 + 3 = 8$ $8 \div 2 = 4$

(iii) _____ 4 _____ **[2]**

(b) Complete these number machines.

3 ⟶ ☐ x 2 ⟶ 6 ⟶ ☐ + 4 ⟶ 10

3 ⟶ ☐ + 2 ⟶ 5 ⟶ ☐ x 2 ⟶ 10

[2]

Turn over
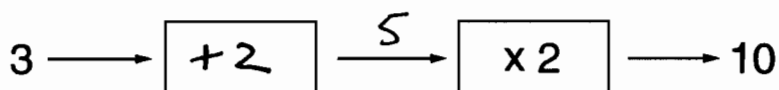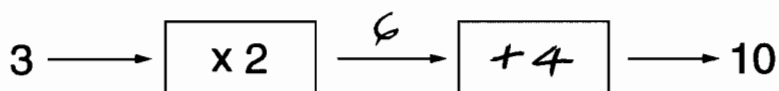
8 **(a)** Simplify.

(i) $y + 6y + 2y$

(a)(i) _____ $9y$ _____ [1]

(ii) $5x - 2x + 4x$

(ii) _____ $7x$ _____ [1]

(b) When $f = 2$ and $g = 5$, work out the value of

$3f + 2g$. $3(2) + 2(5) = 6 + 10 = 16$

(b) _____ 16 _____ [2]

(c) **(i)** Write an expression for the total cost, in pence, of x pencils costing 40p each.

(c)(i) _____ $40x$ pence [1]

(ii) Jayne has y pens. She buys 12 more.

Write an expression for the total number of pens she has now.

(ii) _____ $y + 12$ _____ [1]

9 **(a)** Find the value of $\sqrt{2.25}$.

(a) _____ 1.5 _____ [1]

(b) Change $\frac{17}{100}$ into a decimal.

(b) _____ 0.17 _____ [1]

(c) Work out $\frac{3}{5}$ of 145. $145 \div 5 \times 3 = 87$
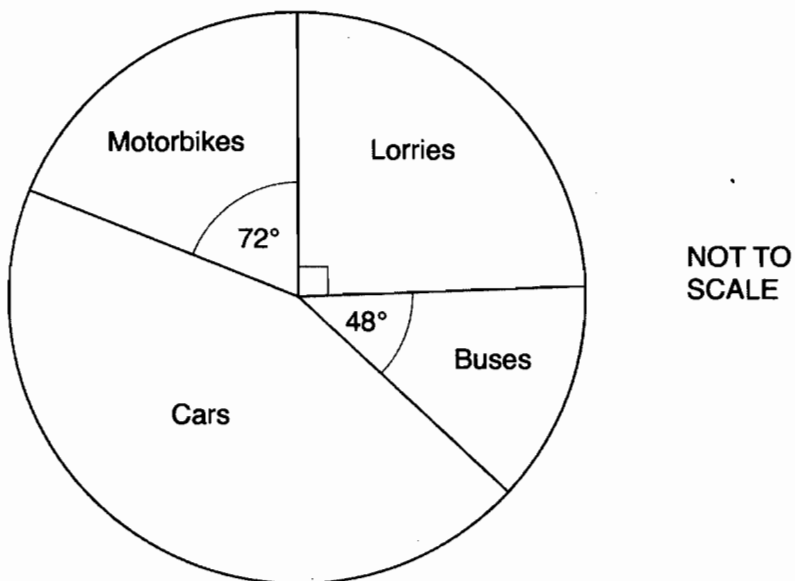
(c) _____ 87 _____ [2]

(d) Work out 29% of £4.35.

$£4.35 \times 0.29 = £1.2615$

$= £1.26$ to nearest penny

(d) £ _____ $£1.26$ _____ [3]

10 Ravi did a survey of the types of vehicles that travel on the road outside his house.
    Altogether, 180 vehicles passed in the time that he was watching.
    The pie chart represents the results.

Motorbikes   Lorries

72°

48°

Buses

Cars

NOT TO
SCALE

(a) What fraction of the vehicles were Lorries?

(a) $\frac{1}{4}$ [1]

(b) Work out the size of the angle for Cars.

NOT TO SCALE SO DO NOT USE PROTRACTOR

Angles add up to 360°

90 + 72 + 48 = 210°   360 − 210 = 150°

(b) $150°$ °[2]

(c) (i) How many of the 180 vehicles were Buses?

180 vehicles = 360°
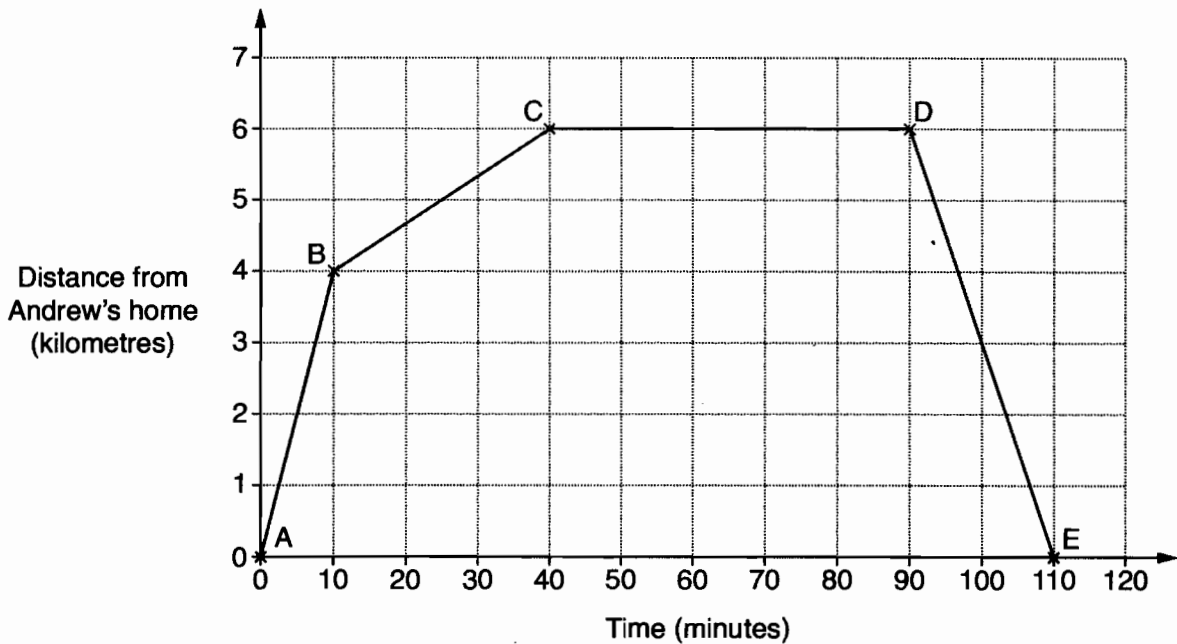
$\frac{48}{2}$ = 24 buses

so   1 vehicle = $\frac{360}{180}$ = 2°

(c)(i) 24 [1]

(ii) Work out the probability that one of these vehicles, chosen at random, is a Bus.

$\frac{48}{360}$ = $\frac{24}{180}$ = $\frac{4}{30}$ = $\frac{2}{15}$

(ii) $\frac{2}{15}$ [1]

Turn over

11 The distance / time graph represents Andrew's bike journey when he visited his Aunt.

(a) How long did Andrew stay at his Aunt's house? $90 - 40 = 50$

(a) _____ 50 _____ mins [1]

(b) Andrew was travelling fastest between points A and B.

Explain how you can tell this from your graph.

Slope of graph is steepest

_____ [1]

(c) Explain what happened at B.

He slowed down to a lower speed

_____ [1]

(d) Explain what happened at E.

He arrived home

_____ [1]

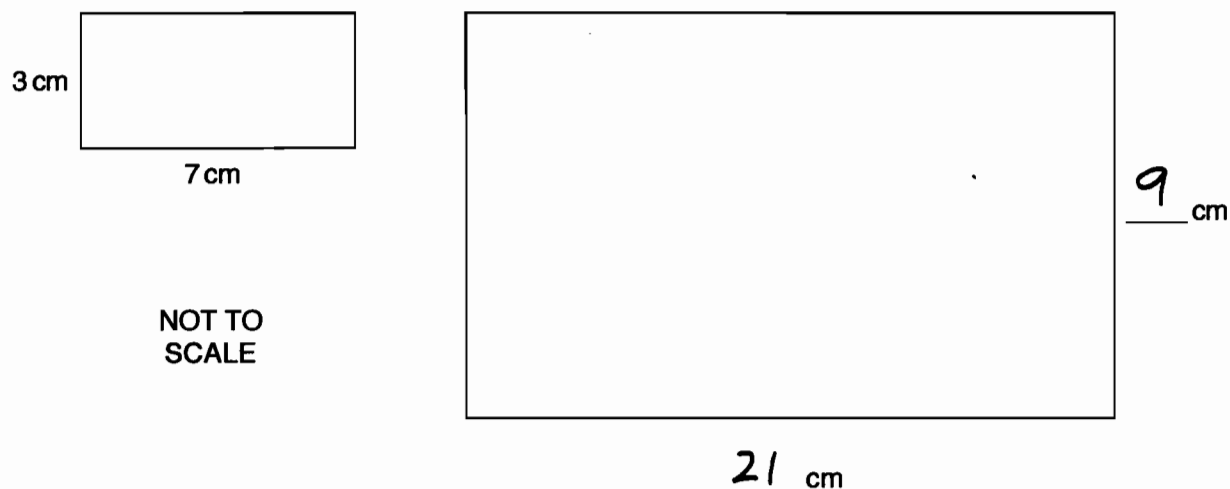(e) Work out the total distance that Andrew travelled.

6 km to Aunt's house, 6km back home

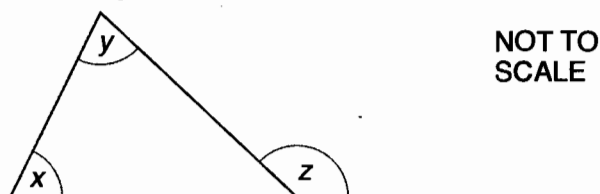6 + 6 = 12 km

(e) _____ 12 _____ km [1]

12 (a) The smaller rectangle is 7cm long and 3cm wide.
The larger rectangle is an enlargement of the smaller one using scale factor 3.

Write down the length and width of the larger rectangle.

3 cm

7 cm

NOT TO
SCALE

9 cm

21 cm

[2]

(b) Winston thinks: "In this diagram, $x + y = z$."

y

NOT TO
SCALE

x z

Here is another diagram.

NOT TO
SCALE

72°

37° t r
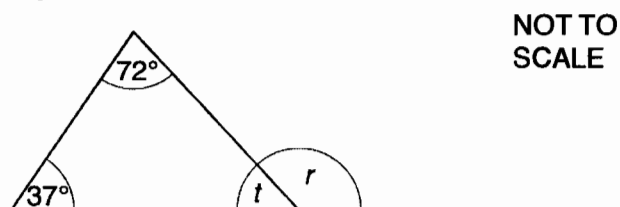
(i) Work out the size of angle t. $180 - (37 + 72)$
................$=180 - 109 = 71°$................

(b)(i) _____ **71°** _____ ° **[1]**

(ii) Work out the size of angle r.

$180 - 71° = 109°$

(ii) _____ **109°** _____ ° **[1]**

(iii) Use your answer to part **(ii)** to see if Winston is right or wrong.

_____ Winston is right $r = 109 = 37 + 72$ _____

_____ **[2]**

Turn over

13 **(a)** Sophie hires a mini digger to landscape her garden.
It costs £75.50 for the first day and £52.50 for each day after that.
Sophie pays £285.50 altogether.

For how many days does she hire the mini digger?

$£285.50 - £75.50$
$= £210$

$£210 ÷ £52.50 = 4$ so 1st day + 4 extra days

(a) _____5_____ days **[3]**

(b) Tony won £800 in a competition.

He gave $\frac{1}{4}$ of it to his wife, $\frac{1}{5}$ of it to his daughter and kept the rest.

What **fraction** of the £800 did he keep for himself?

$\frac{1}{4} + \frac{1}{5} = \frac{5+4}{20} = \frac{9}{20}$

$1 - \frac{9}{20} = \frac{11}{20}$

(b) _____$\frac{11}{20}$_____ **[4]**

14 Josh painted his bedroom.

Complete his paint bill by working out the three missing values.

....

....

....

....

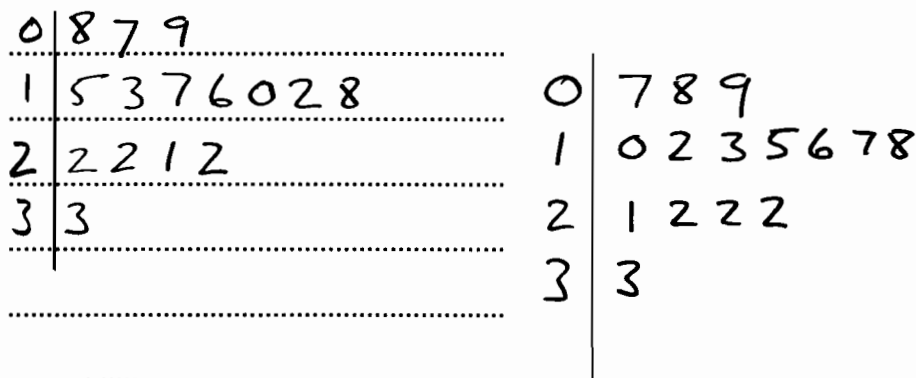| Paint Bill		
3 tins silk emulsion	@ £17.99 per tin	£ 53.97
2 tins gloss	@ £11.99 per tin	£23.98
Total cost		£ 77.95

[4]

$77.95 - 53.97 = 23.98$

$23.98 ÷ 11.99 = 2$

15 15 women each changed a car wheel.
These are the times taken, in minutes.

22	15	13	17	22
8	16	21	7	10
12	33	9	18	22

(a) Draw an ordered stem and leaf diagram to show these times.

```
0 | 8 7 9
1 | 5 3 7 6 0 2 8
2 | 2 2 1 2
3 | 3
```

```
0 | 7 8 9
1 | 0 2 3 5 6 7 8
2 | 1 2 2 2
3 | 3
```

Key: 1|6 = 16 minutes   **[3]**

(b) Work out the median and range of these times.

median = $\frac{15+1}{2}$ = 8th item = 16

range = 33 − 7 = 26

(b) Median = _____16_____ minutes

Range = _____26_____ minutes **[2]**

15 men each changed a car wheel.
The median time taken by these men was 16 minutes.
The range of their times was 33 minutes.

(c) Write down one comparison between the times taken by these men and women.

The men had the same median time as the women

OR The men had a greater range of times
than the women.   **[1]**

Turn over

16 (a) The *n*th term of a sequence is $n^2 + 2$.

Write down the first three terms of this sequence.

$1^2 + 2 = 1 + 2 = 3$

$2^2 + 2 = 4 + 2 = 6$

$3^2 + 2 = 9 + 2 = 11$

(a) __3__ , __6__ , __11__ [2]

(b) Another sequence begins

7,   11,   15,   19,   __23__
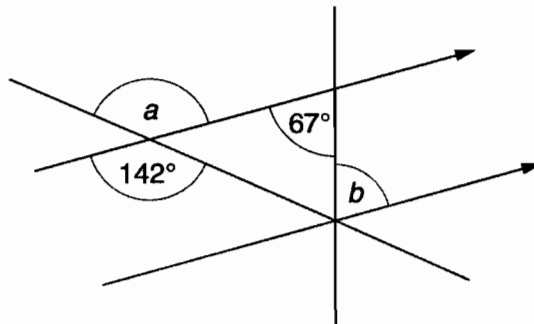
Write down the *n*th term of this sequence.   Adding on 4

$n^{th} \text{ term} = 4n + 3$

(4n gives 4×table 4, 8, 12, 16 etc, adjustment needed of +3)

(b) __$4n + 3$__ [2]

17 (a) Find the sizes of angle *a* and angle *b*.
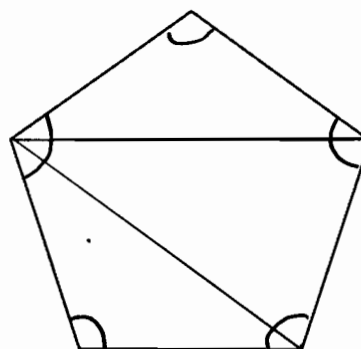Write down a reason for each answer.

NOT TO SCALE

a = __142__ ° Reason __Vertically opposite angles are equal__

b = __67__ ° Reason __alternate angles are equal__ [4]

(b) (i) The sum of the interior angles of a regular pentagon is 540°.
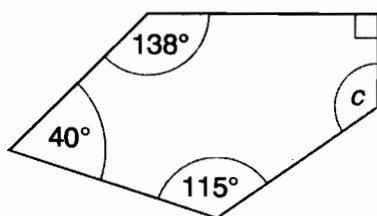
Without measuring any angles, explain why this is true.

Interior Angles of pentagon add up to the angles of 3 triangles
$$= 3 \times 180 = 540°$$

[3]

(ii) This is an irregular pentagon.
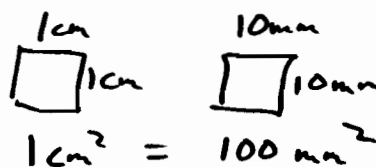
138°

c

40°

115°

NOT TO SCALE

Work out angle *c*.

$$90 + 138 + 115 + 40 = 383°$$
$$540 - 383 = 157$$

(b)(ii) _____157_____ ° [2]

(iii) The area of another pentagon is 4.5 cm^2.

Change 4.5 cm^2 into mm^2.

1cm   10mm

1cm   10mm

$$1 cm^2 = 100 mm^2$$

$$4.5 \times 100 = 450$$

(iii) _____450_____ mm^2 [2]

TURN OVER FOR QUESTION 18

18 Simplify.

(a) $t^2 \times t^7$ $= t^{2+7} = t^9$

(a) _____ t^9 _____ [1]

(b) $\dfrac{p^6}{p^2}$ $= p^{6-2} = p^4$

(b) _____ p^4 _____ [1]