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OCR
RECOGNISING ACHIEVEMENT

GENERAL CERTIFICATE OF SECONDARY EDUCATION

MATHEMATICS SYLLABUS A **J512/01**

Paper 1 (Foundation Tier)

Candidates answer on the question paper.	**Tuesday 11 January 2011**
OCR supplied materials: None	**Morning**
Other materials required: • Geometrical instruments • Tracing paper (optional)	**Duration:** 2 hours

Candidate forename		Candidate surname	

Centre number					Candidate number				

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure 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.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Answer **all** the questions.
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- The total number of marks for this paper is **100**.
- This document consists of **24** pages. Any blank pages are indicated.

WARNING

No calculator can be used for this paper

OCR is an exempt Charity

Turn over

Formulae Sheet: Foundation Tier

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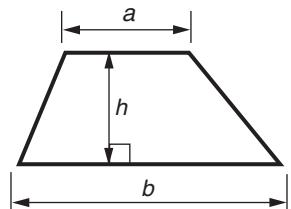
Volume of prism = (area of cross-section) × length

PLEASE DO NOT WRITE ON THIS PAGE

1 This pictogram shows the favourite sport of each person at a youth club.

Sport	Frequency
Football	◯ ◯ ◯ ◯ ◯
Hockey	◯ ◗
Cricket	◯ ◯ ◯
Athletics	◯ ◯ ◯
Swimming	
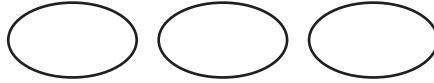
Key: ◯ represents _____ people

(a) Football is the favourite sport of 20 of the people at the youth club.

Use this information to complete the key below the pictogram. **[1]**

(b) How many people chose Cricket?

(b) _____ **[1]**

(c) 2 people chose Swimming.

Show this on the pictogram. **[1]**

The pictogram is now complete.

(d) How many more people chose Football than Hockey?

(d) _____ **[1]**

(e) Which is the most popular sport?

(e) _____ **[1]**

(f) How many people are there altogether in the youth club?

(f) _____ **[2]**

Turn over

2 In October 2008 India sent a spacecraft, *Chandrayaan 1*, to the moon.

(a) The spacecraft weighed one thousand three hundred and four kilograms.

Write one thousand three hundred and four using figures.
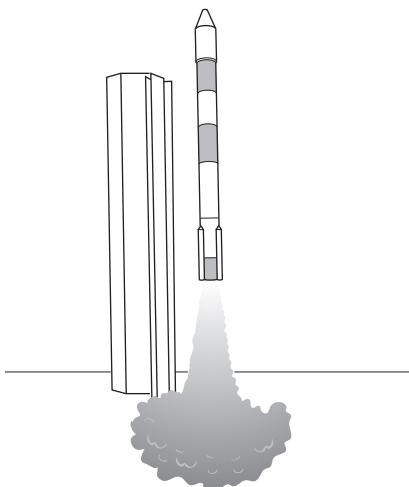
(a) _____ **[1]**

(b) The rocket was 143 feet high.

What is the value of the 4 in the number 143?

(b) _____ **[1]**

(c) The rocket weighed 294 000 kilograms.

Write 294 000 using words.

_____

_____ **[1]**

(d) The rocket fired for 771 seconds.

    (i) Write 771 correct to the nearest 100.

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

    (ii) Write 771 seconds in minutes and seconds.

            ....

            ....

            ....

            ....

                    (ii) _____ minutes and _____ seconds **[2]**

(e) The development of the rocket took 2 years.

    How many weeks are there in 2 years?

    ....

                                                (e) _____ **[1]**

(f) The first manned flight to the moon was in 1969.

    How many years is it from 1969 to 2011?

    ....

    ....

                                                (f) _____ **[1]**

3 Gemma works part-time in a car showroom.
Her pay, in £, is worked out by multiplying the number of hours she works by 8 and then adding 50 for each car she sells.

(a) Last week Gemma worked 11 hours but sold no cars.

How much was her pay?

....

(a) £ _____ **[1]**

(b) This week Gemma worked 7 hours and sold 2 cars.

How much is her pay?

....

....

(b) £ _____ **[2]**

(c) One week Gemma earned exactly £330. She worked a whole number of hours.

Work out how many hours she worked and how many cars she sold.

....

....

....

....

....

(c) Hours worked _____ Cars sold _____ **[3]**

4 Write down the correct **metric unit** to complete these sentences.

(a) A door is 2 _____ tall. **[1]**

(b) My finger is 72 _____ long. **[1]**

(c) A dinner plate weighs 800 _____ . **[1]**

(d) The area of a postage stamp is 4.8 _____ . **[1]**

5 (a)
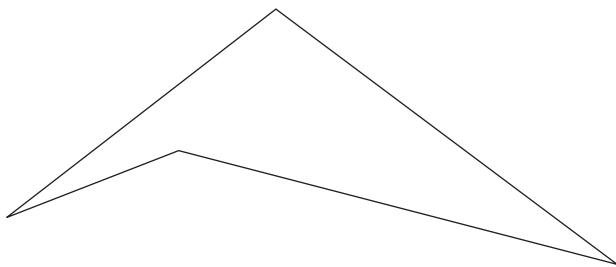
(i) What is the mathematical name for the shape above?
Underline the correct word in this list.

Rhombus   Quadrilateral   Trapezium   Pentagon [1]

(ii) Mark an obtuse angle on the shape above. Label it O. **[1]**

(iii) Mark an acute angle on the shape above. Label it A. **[1]**

(b) Put a tick (✓) inside each of the two triangles that are **congruent**.
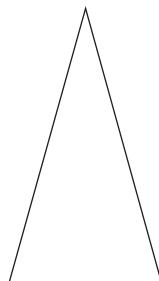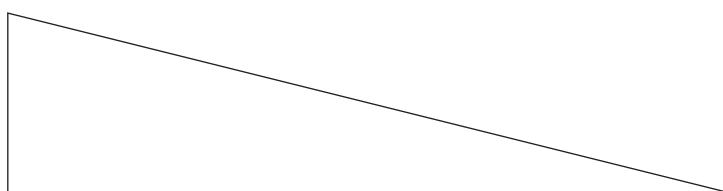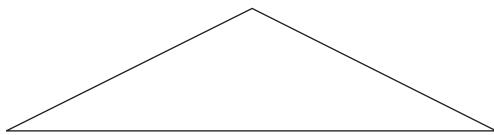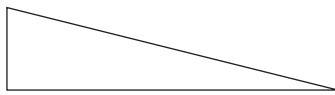
[1]

(c) This is a net of a shape.

What is the mathematical name of the solid shape?

(c) _____ [1]

Turn over
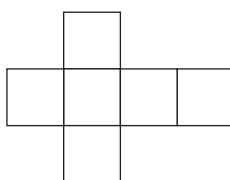
6 **(a)** A minibus can hold a maximum of 14 passengers.

What is the largest number of passengers that can travel in 8 of these minibuses?

....

....

....

....

(a) _____ passengers **[2]**

(b) On a roller coaster, 6 people travel in each carriage.

If 102 people went on the roller coaster at the same time, how many carriages would be filled?

....

....

....

....

(b) _____ carriages **[2]**

7 A, B, C, D and E are five events.

Show the probability of each event by writing its letter above the correct arrow on the probability scale.
The first one is done for you. You will not need all the arrows.
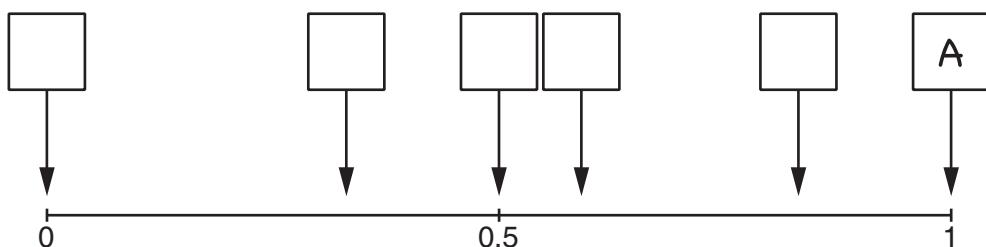
A Getting 1, 2, 3, 4, 5 or 6 when you roll a fair 6-sided dice.

B Getting a head when you spin a fair coin.

C Getting 1, 2, 3, 4 or 5 when you roll a fair 6-sided dice.

D My maths teacher growing to a height of 23 metres.

E Getting blue when you spin this fair spinner.

[4]
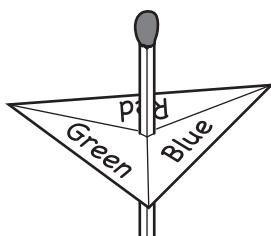
8 (a) Draw all the lines of symmetry on this shape.
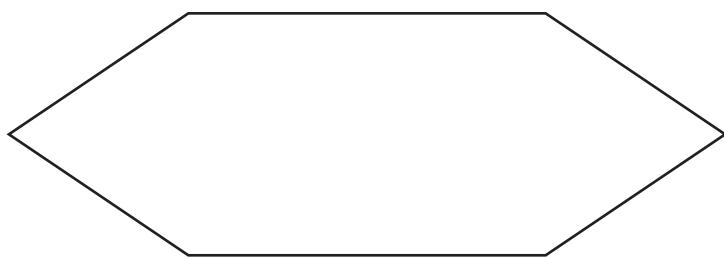
[2]

(b) Complete this diagram so that the dashed line is a line of symmetry.
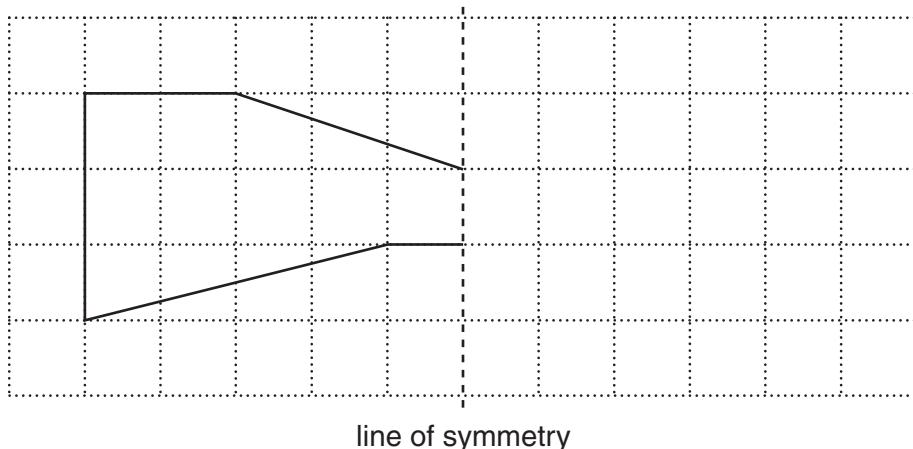
line of symmetry

[2]

(c)

35°

NOT TO
SCALE

105°

e
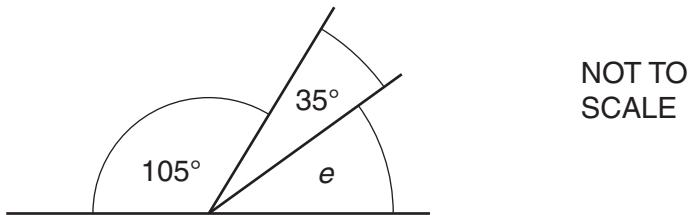
Work out angle *e*.
Give a reason for your answer.

e = _____ ° because _____

_____ **[2]**

(d) Complete these sentences with reasons.

(i)
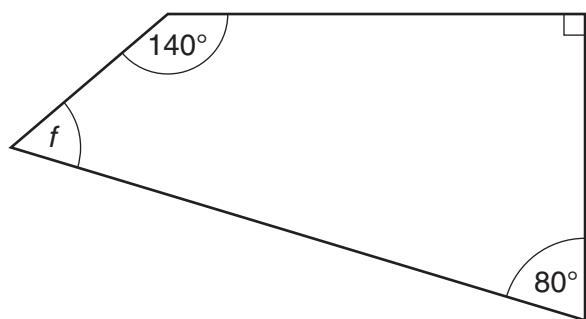
NOT TO
SCALE

f = 50° because _____

_____ **[1]**

(ii)
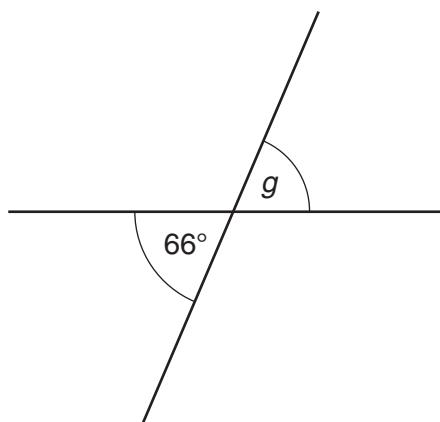
NOT TO
SCALE

g = 66° because _____

_____ **[1]**

Turn over

9 In a survey, 180 police officers had their weight and height measured.
This pie chart represents the number of police officers in each of the four categories.

Key:	
U	Underweight
N	Normal weight
W	Overweight
B	Obese
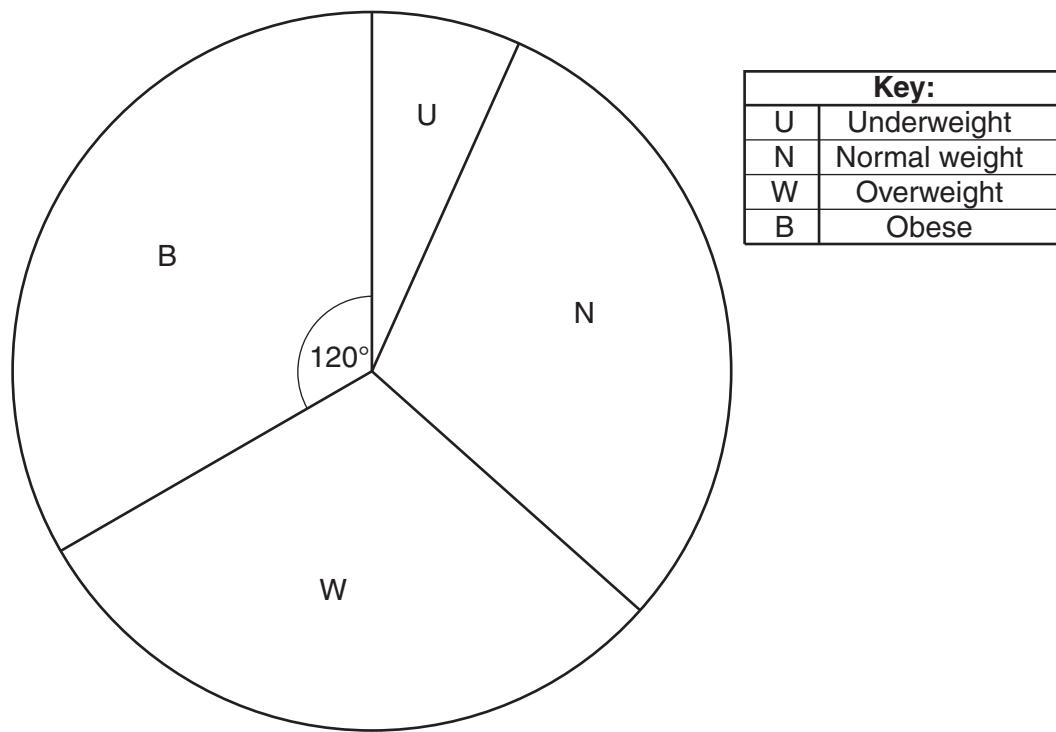
(a) The angle marked for Obese (B) is 120°.

(i) What **fraction** of the police officers in the survey were Obese?
Give your answer in its lowest terms.

....

....

(a)(i) _____ **[2]**

(ii) How many of the 180 police officers were Obese?

....

....

(ii) _____ **[1]**

(b) Measure the angle for Normal weight (N).

(b) _____ ° **[1]**

(c) Four of the Overweight (W) police officers lost weight so that they became Normal weight (N). Maureen calculated that the angle for Normal weight (N) would increase by 7°.

Explain why the angle cannot change by 7°.

_____

_____ **[1]**

10 Work out.

(a) $-3 + 8$

....

(a) _____ **[1]**

(b) -3×-4

....

(b) _____ **[1]**

(c) $-50 \div 5$

....

(c) _____ **[1]**

Turn over

11 Work out.

(a) 11^2

....

(a) _____ **[1]**

(b) the cube root of 125

....

(b) _____ **[1]**

(c) 2^5

....

(c) _____ **[1]**

12 This shape is an ellipse.
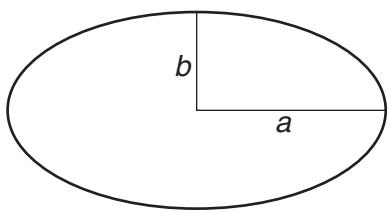
The formula $E = 3ab$ can be used to find the approximate area, E, of an ellipse.

(a) Use this formula to

    (i) find E when $a = 5\,cm$ and $b = 4\,cm$,

....

(a)(i) _____ cm² **[1]**

    (ii) find b when $E = 150\,cm^2$ and $a = 25\,cm$.

....

(ii) _____ cm **[2]**

(b) When a and b are equal the ellipse becomes a circle with radius r.
The formula would then become $E = 3rr$.

Write $3rr$ more simply.

(b) _____ **[1]**

Turn over

13 (a) Complete this table for $y = 2x - 3$.

....

....

x	-1	1	3	5
y				7

[2]

(b) On the grid, draw the straight line graph of $y = 2x - 3$ for x from -1 to 5.
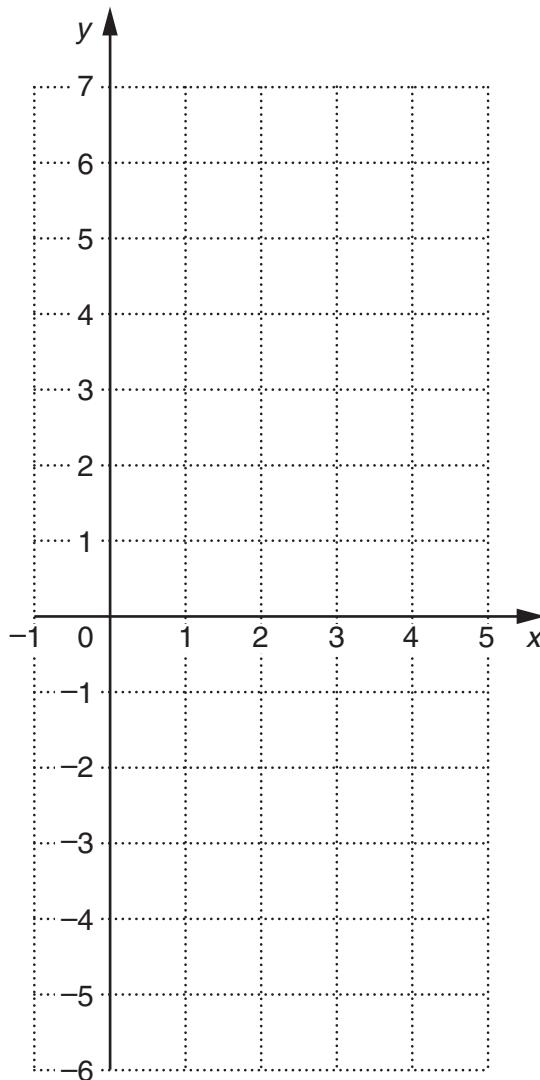
[2]

(c) Use your graph to find the value of x when $y = 0$.

(c) _____ [1]

14 Steve wins £600 in a competition.

He gives $\frac{1}{4}$ of the money to Lizzie and $\frac{1}{5}$ of the money to Sam.

Of the **remaining** money he gives 10% to charity.

How much money does Steve have left?

....

....

....

....

....

....

....

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....

....

£ _____ **[5]**

Turn over

15 (a) Write each of these ratios in its simplest form.

   (i) 30 : 12

   ....

   ....

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

   (ii) 75p : £2

   ....

   ....

   (ii) _____ : _____ **[1]**

   (iii) $3\frac{1}{2} : 5$

   ....

   ....

   (iii) _____ : _____ **[1]**

(b) Andy, Karen and Phil share £1600 in the ratio 2 : 5 : 3.

   Work out how much money each of them gets.

   ....

   ....

   ....

   ....

   ....

   ....

   (b) Andy £ _____ Karen £ _____ Phil £ _____ **[3]**

16 Elaine sets off on a journey at 2:15 pm.
She travels 150 miles at an average speed of 60 mph.

At what time does she complete the journey?

....

....

....

....

....

....

_____ pm **[3]**

Turn over

17 Faisal carries out a survey of 100 students in Year 11.
He asks each student how many cars there are at their household.
The results are shown in the table.

Number of cars	Frequency
0	8
1	17
2	52
3	20
4	3
Total	100

Work out the mean number of cars at each household.

....

....

....

....

....

....

_____ **[3]**

18
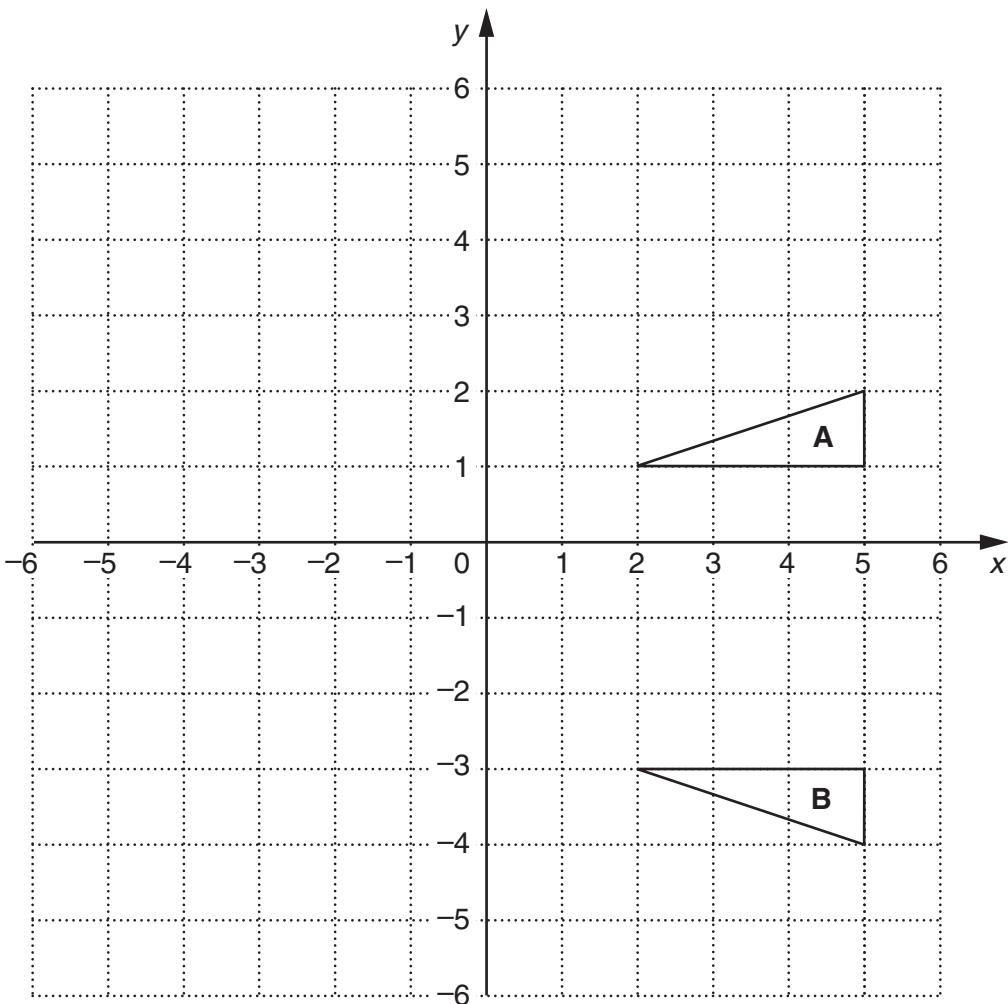
(a) Describe the **single** transformation which maps triangle **A** onto triangle **B**.

_____

_____ **[2]**

(b) Rotate triangle **A** 90° anticlockwise about (0,0).
Label the image **P**. **[3]**

19 (a) Factorise this expression.

$$3x - 9$$

....

....

(a) _____ **[1]**

(b) Multiply out the brackets and simplify your answer.

$$2(3x + 1) + 5(2x - 3)$$

....

....

....

....

(b) _____ **[2]**

20 (a) The nth term of a sequence of numbers is given by $n^2 + 3$.

Work out the first two terms of this sequence.

....

....

....

....

(a) _____   _____ **[2]**

(b) Here are the first four terms of another sequence.

$$2 \qquad 6 \qquad 10 \qquad 14$$

Work out the formula for the nth term of this sequence.

....

....

....

....

(b) _____ **[2]**

(c) Here is the formula for the nth term, T, of a different sequence.

$$T = 2n + 5$$

Rearrange this formula to make n the subject.

....

....

....

....

(c) $n =$ _____ **[2]**

TURN OVER FOR QUESTION 21

21 An eraser is a prism with a parallelogram as its cross-section.
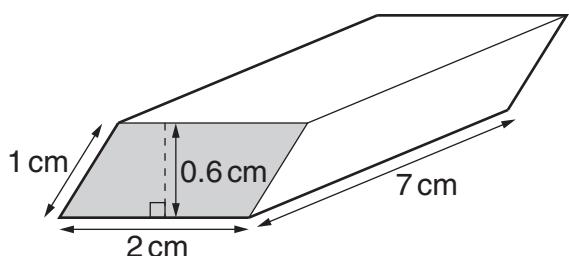
Work out the volume of the eraser.
Give the units of your answer.

....

....

....

....

_____ **[3]**