OCR
RECOGNISING ACHIEVEMENT

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Tuesday 11 June 2013 – Morning

GCSE MATHEMATICS A

A502/02 Unit B (Higher Tier)

A517000613

Candidates answer on the Question Paper.

OCR supplied materials:
None

Other materials required:
- Geometrical instruments
- Tracing paper (optional)

Duration: 1 hour

A502/02

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. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Your answers should be supported with appropriate 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).
- 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.
- Your Quality of Written Communication is assessed in questions marked with an asterisk (*).
- The total number of marks for this paper is **60**.
- This document consists of **16** pages. Any blank pages are indicated.

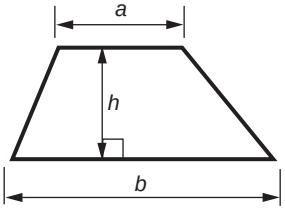
WARNING
No calculator can be used for this paper

This paper has been pre modified for carrier language

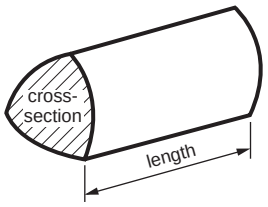
OCR is an exempt Charity

Formulae Sheet: Higher Tier

Area of trapezium = $\frac{1}{2}(a + b)h$



Volume of prism = (area of cross-section) × length

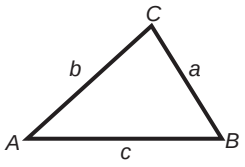


In any triangle *ABC*

Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

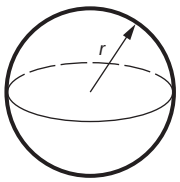
Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle = $\frac{1}{2}ab\sin C$



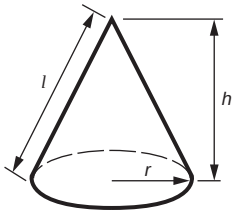
Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$



Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$,
where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

PLEASE DO NOT WRITE ON THIS PAGE

1 Here is a list of ingredients for a fruit cake.
1 pound (lb) = 16 ounces (oz)

Fruit Cake

Dried fruit		Other ingredients	
- Currants	$1\frac{1}{4}$ lb	- Flour	10 oz
- Sultanas	$\frac{1}{2}$ lb	- Brown sugar	10 oz
- Raisins	$\frac{1}{2}$ lb	- Butter	10 oz
- Glace cherries	$2\frac{1}{2}$ oz	- Eggs	5
- Mixed peel	$2\frac{1}{2}$ oz		

(a) Find the total weight, **in ounces (oz)**, of all the dried fruit.

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

(b) A baker plans to make 25 of these fruit cakes.

(i) How many pounds of currants will she need altogether?
Give your answer as a mixed number.

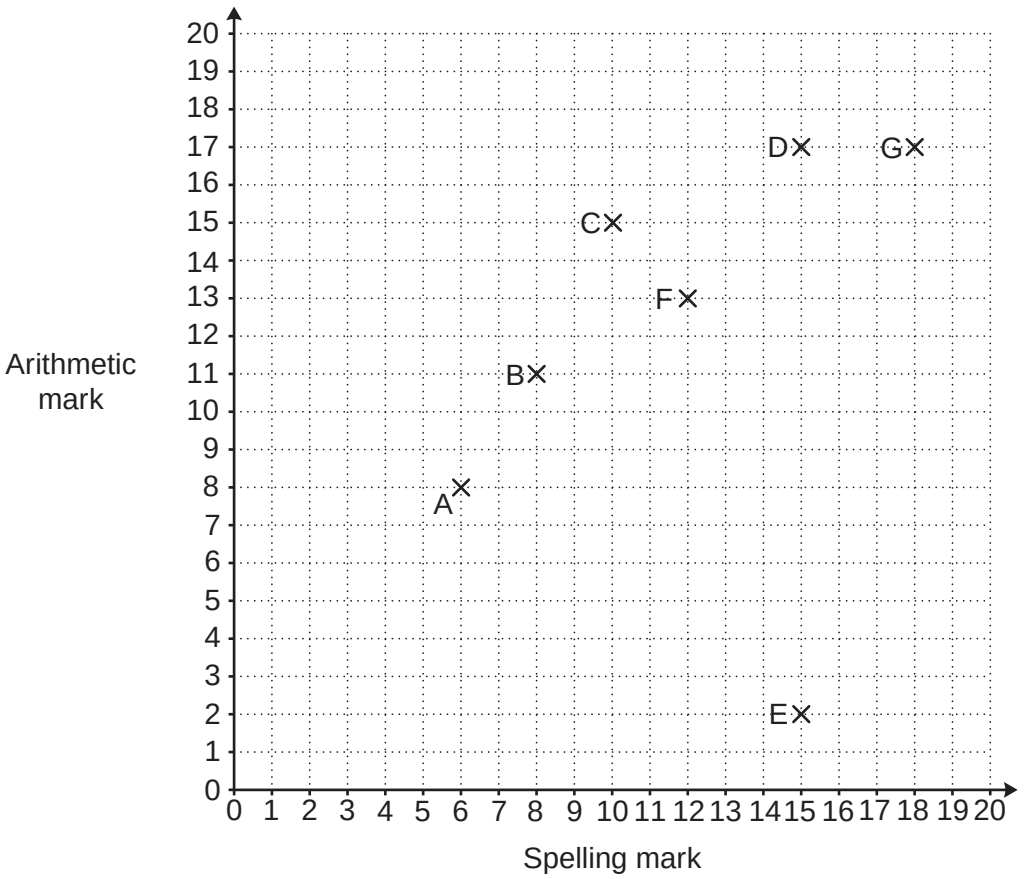
(b)(i) _____ lb **[2]**

(ii) She buys eggs in boxes of 12.

How many boxes of eggs will she need?

(ii) _____ **[2]**

2 Ten primary school children each did a spelling test and an arithmetic test.
Each test was marked out of 20.
The marks of seven of the children (A to G) are shown on the scatter graph.



(a) The marks of the other three children are given below.

Child	Spelling mark	Arithmetic mark
H	11	14
J	18	19
K	10	12

Plot and label these values on the scatter graph. **[2]**

(b) (i) Describe the type of correlation shown in your diagram.

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

(ii) Give a reason why it is difficult to be sure of the strength of the correlation.

_____ **[1]**

(c) Suki scored exactly 50% more marks in her arithmetic test than in her spelling test.

Which letter represents Suki?

(c) _____ **[1]**

(d) Pedro learnt his spellings but not his arithmetic.
His arithmetic score was much worse than his spelling score.

Which letter represents Pedro?

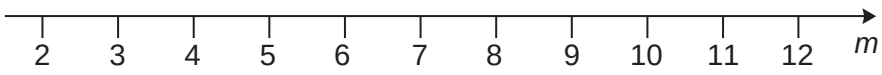
(d) _____ **[1]**

3 **(a)** Solve this inequality.

$5m + 8 < 43$

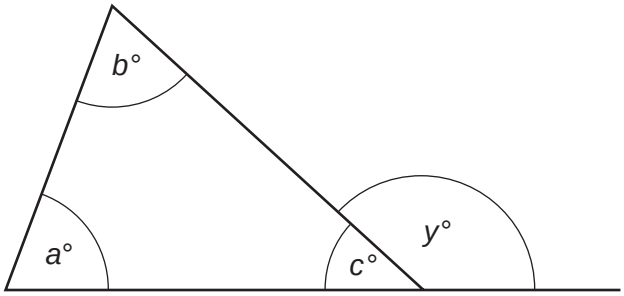
(a) _____ **[2]**

(b) Represent your solution to part **(a)** on this number line.



[1]

4 The diagram shows a triangle with one of its sides extended.



Complete these statements to show that $y = a + b$.

$a + b + c =$ _____ because _____

_____

Therefore $a + b = 180 - c$.

Also $y = 180 - c$ because _____

_____

Therefore $y = a + b$.

This proves that the exterior angle of a triangle is equal to the sum of the two _____ opposite angles. **[4]**

5* This table shows information about two brands of cereal, *Corny Flakes* and *Super Fibre*.

	Corny Flakes (per 30 g)	*Super Fibre* (per 100 g)
Energy	180 kcal	357 kcal
Sugar	6.3 g	27.7 g
Fat	0.9 g	9.4 g
Fibre	0.9 g	8.4 g
Salt	0.3 g	0.1 g

The makers of *Super Fibre* claim that it is healthier than other cereals because it contains more fibre, less sugar, less fat and less salt than other cereals.

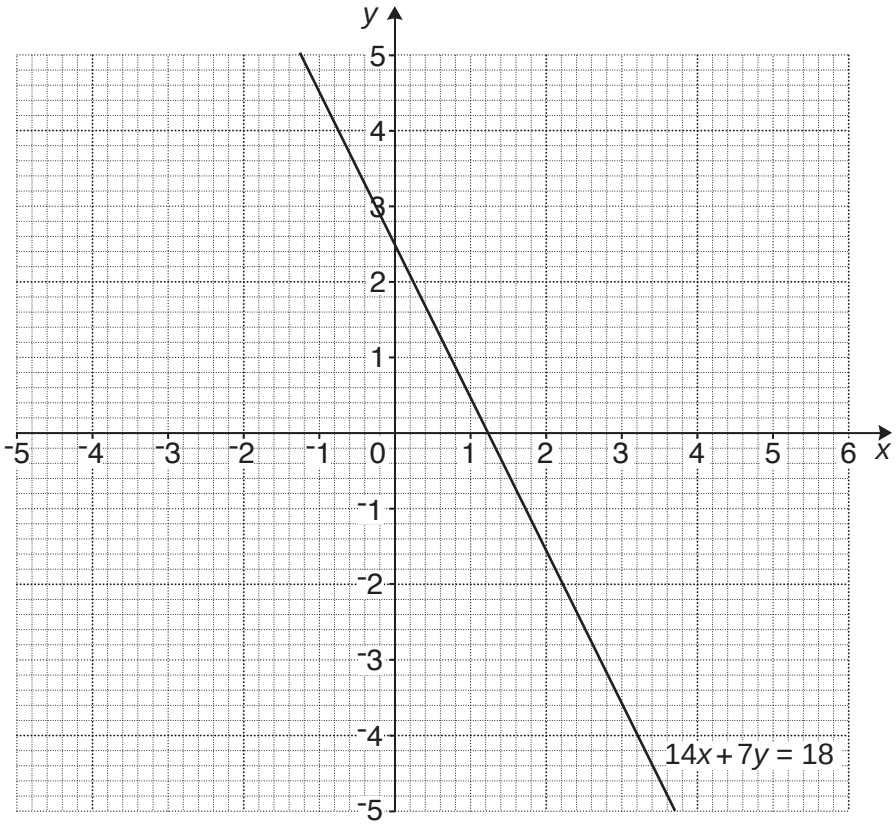
Use the information in the table to check if the claims are true.

_____

_____

_____ **[5]**

6 **(a)** The grid shows the graph of $14x + 7y = 18$.



(i) Complete this table of values for $y = 2x + 2$.

x	-3	0	1
y			

[2]

(ii) On the grid, draw the straight line graph of $y = 2x + 2$. **[2]**

(iii) Use your graph to find the approximate solution of these simultaneous equations.

$$14x + 7y = 18$$

$$y = 2x + 2$$

(a)(iii) $x =$ _____

$y =$ _____ **[1]**

(b) (i) Use **algebra** to find the **exact** solution of these simultaneous equations.

$$14x + 7y = 18$$

$$y = 2x + 2$$

(b)(i) $x =$ _____

$y =$ _____ **[4]**

(ii) Explain why reading off the graph did not give the **exact** solution to these simultaneous equations.

_____

_____ **[1]**

7 **(a)** Write $\frac{4}{9}$ as a recurring decimal.

(a) _____ **[1]**

(b) Tick the appropriate box to indicate whether each fraction can be represented by a recurring or a terminating decimal.
You do not have to find the decimal values.
The first two are done for you.

Fraction	Recurring decimal	Terminating decimal
$\frac{1}{2}$		✓
$\frac{4}{9}$	✓	
$\frac{3}{20}$		
$\frac{17}{60}$		
$\frac{73}{400}$		

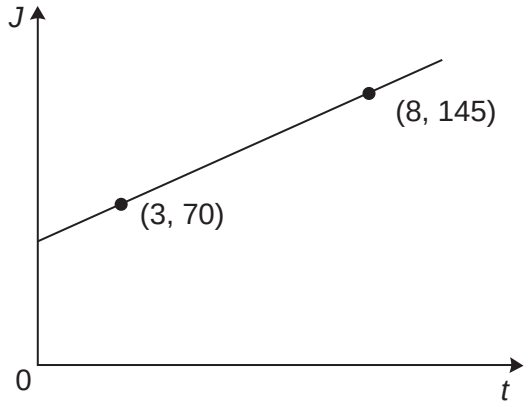
[2]

(c) Express $0.\dot{2}\dot{7}$ as a fraction in its lowest terms.

(c) _____ **[3]**

8 This graph shows how much a gardener charges for jobs taking different lengths of time.

J is the charge, in £, for a job and *t* is the number of hours the job takes.
For a job that lasts 3 hours, the charge is £70.
For a job that lasts 8 hours, the charge is £145.



Not to scale

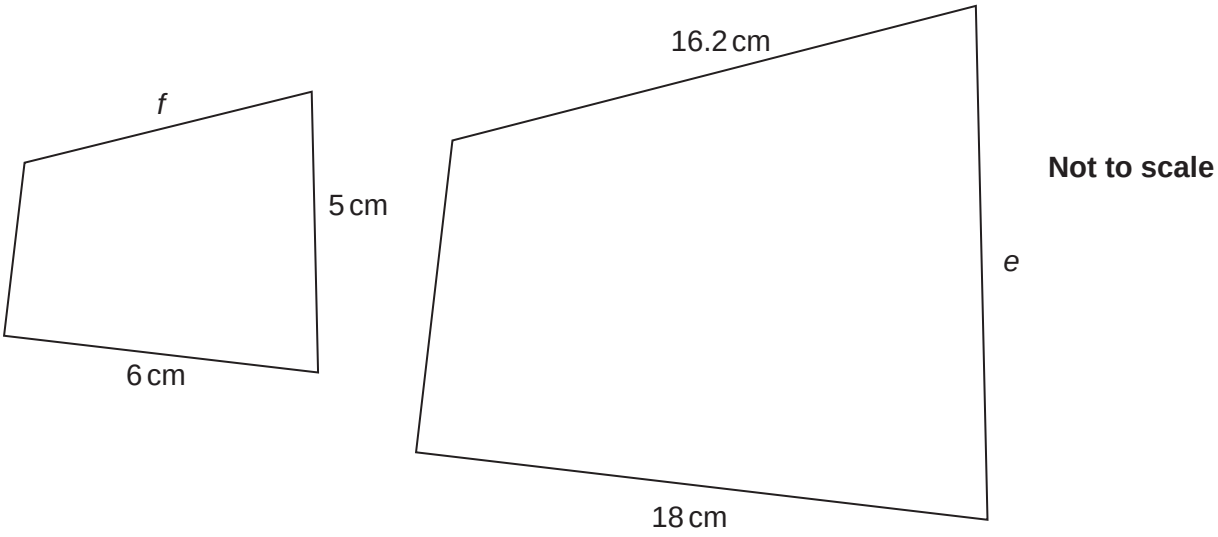
(a) Find the gradient of the line.

(a) _____ **[2]**

(b) Work out the equation of the line to give a formula for *J* in terms of *t*.

(b) _____ **[3]**

9 These two shapes are mathematically similar.



(a) Calculate the length *e*.

(a) _____ cm **[3]**

(b) Calculate the length *f*.

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

10 Simplify fully.

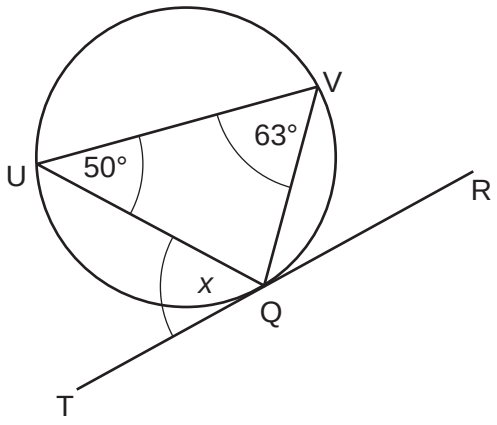
(a) $4\sqrt{7} + 8\sqrt{7} - 5\sqrt{7}$

(a) _____ **[1]**

(b) $(\sqrt{8})^4$

(b) _____ **[2]**

11 TQR is a tangent to the circle.
Q, V and U are points on the circle.
Angle QVU = 63° and angle QUV = 50°.



Not to scale

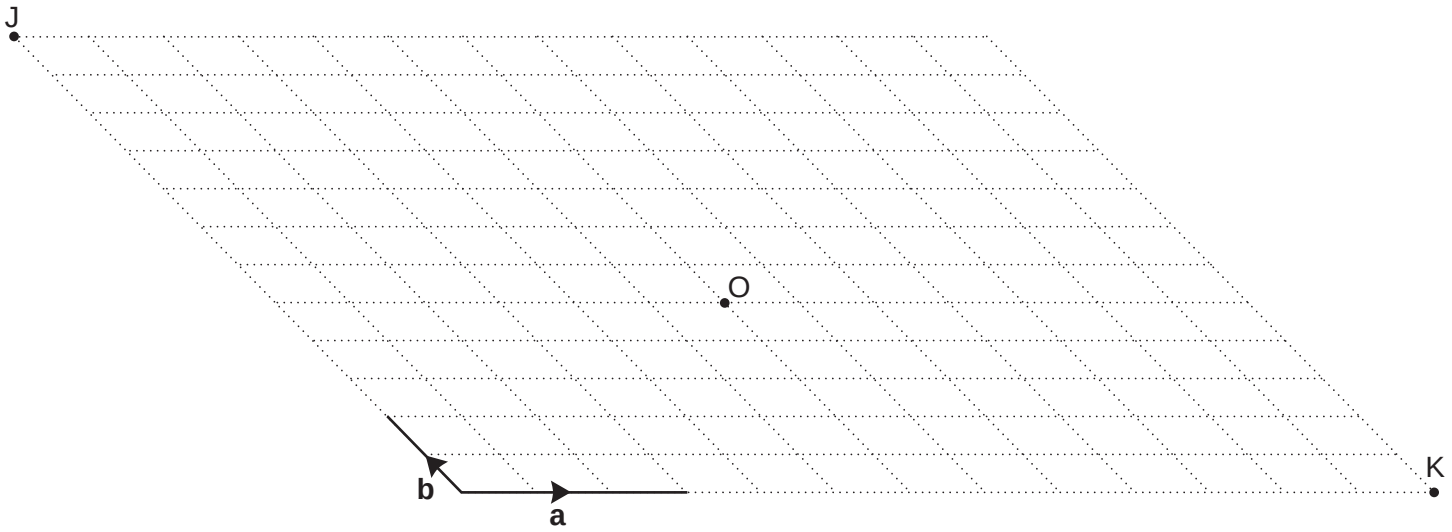
What is the size of angle *x*?
Give a reason for your answer.

x = _____ ° because _____

_____ **[2]**

12 A wallpaper designer uses this grid to plan the translations of wallpaper designs.

He uses multiples and sums of vectors **a** and **b** to describe the translations.



(a) The centre of a design is translated from O by the vector $2\mathbf{a} + 3\mathbf{b}$.

Mark the image of O with a cross (X) and label it A. **[1]**

(b) The centre of another design is translated from O by the vector $\frac{5}{2}\mathbf{b} - \mathbf{a}$.

Mark this image of O with a cross (X) and label it B. **[1]**

(c) Find the combination of vectors **a** and **b** that would translate the centre of a design from point J to point K.

(c) _____ **[3]**

END OF QUESTION PAPER

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