THIS IS A NEW SPECIFICATION

OCR
RECOGNISING ACHIEVEMENT

H

GENERAL CERTIFICATE OF SECONDARY EDUCATION

MATHEMATICS A

A502/02

Unit B (Higher Tier)

Candidates answer on the question paper.

OCR supplied materials:
None

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

Wednesday 9 November 2011
Afternoon

Duration: 1 hour

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.
- 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).
- 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.
- 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.

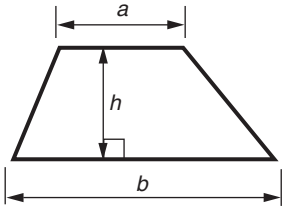
WARNING

No calculator can be used for this paper

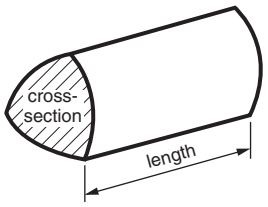
This paper has been pre modified for carrier language

Formulae Sheet: Higher Tier

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



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

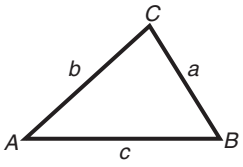


In any triangle *ABC*

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

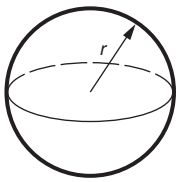
Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

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



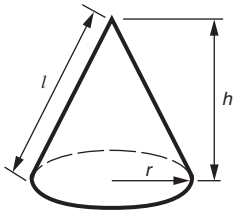
Volume of sphere $= \frac{4}{3}\pi r^3$

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



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

Curved surface area of cone $= \pi rl$



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 **(a)** Four students sell ice creams to raise money for charity.
They decide to share the money raised between their four charities as follows.

Andrea's charity	$\frac{1}{4}$
Bill's charity	$\frac{1}{3}$
Callum's charity	$\frac{3}{16}$
Davinder's charity	$\frac{5}{24}$

Put these fractions in order of size to show whose charity gets the most, second most and so on.
You must show your working.

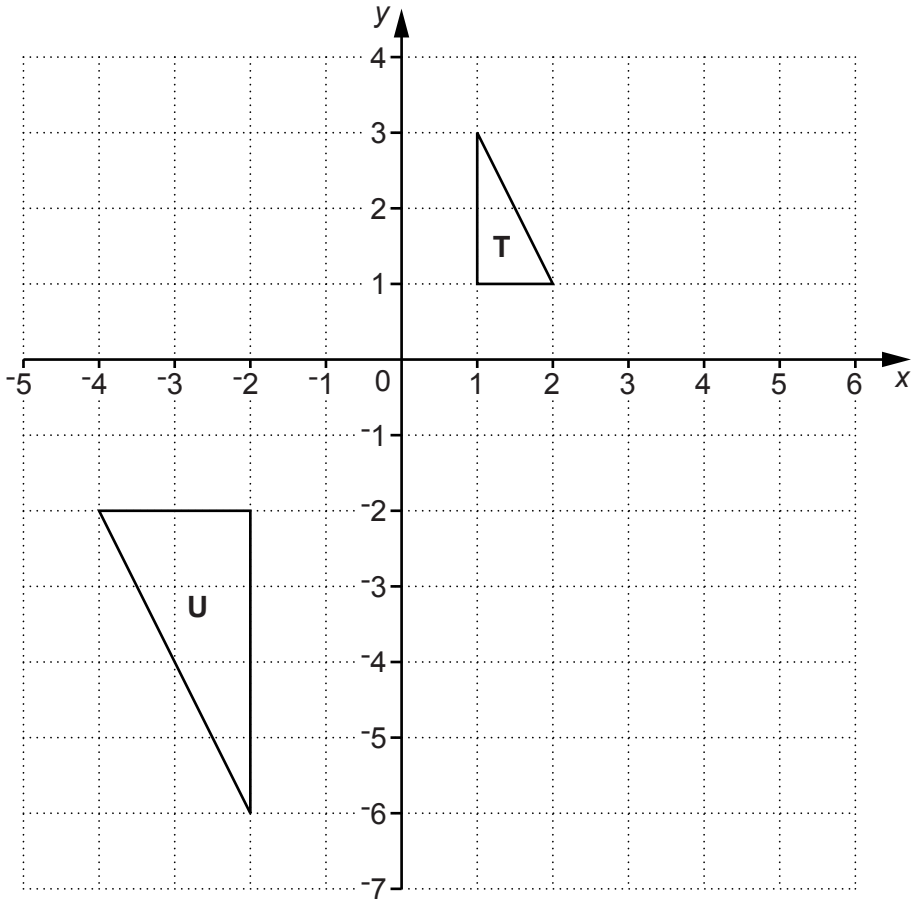
(a) _____ _____ _____ _____ **[3]**
most

(b) Find the **sum** of the four fractions and identify an error the students have made.
Change **one** of the fractions to remove the error.

Error _____

Change fraction _____ to _____ **[2]**

2



(a) Rotate triangle **T** 90° clockwise about the origin.
Label your image **A**. **[3]**

(b) Reflect triangle **T** in the line $y = -1$.
Label your image **B**. **[2]**

(c) Describe fully the enlargement that maps triangle **T** onto triangle **U**.

_____

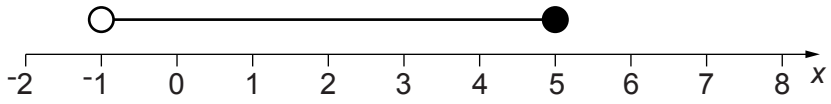
_____ **[2]**

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

$$5x - 2 < 18$$

(a) _____ **[2]**

(b) This diagram represents the solution of $p < 2x + 7 \leqslant q$.



Find the integers p and q.

(b) p = _____ q = _____ **[3]**

4 Marcus has the calculation 4.648 ÷ 0.28 to do for his homework.

Fill in the boxes to complete his method.

The numbers in boxes A and B are identical.

$$4.648 \div 0.28 = \boxed{\text{A}\ \ } \div 28$$

$$= \boxed{\text{B}\ \ } \div \boxed{\text{C}\ \ } \div 7$$

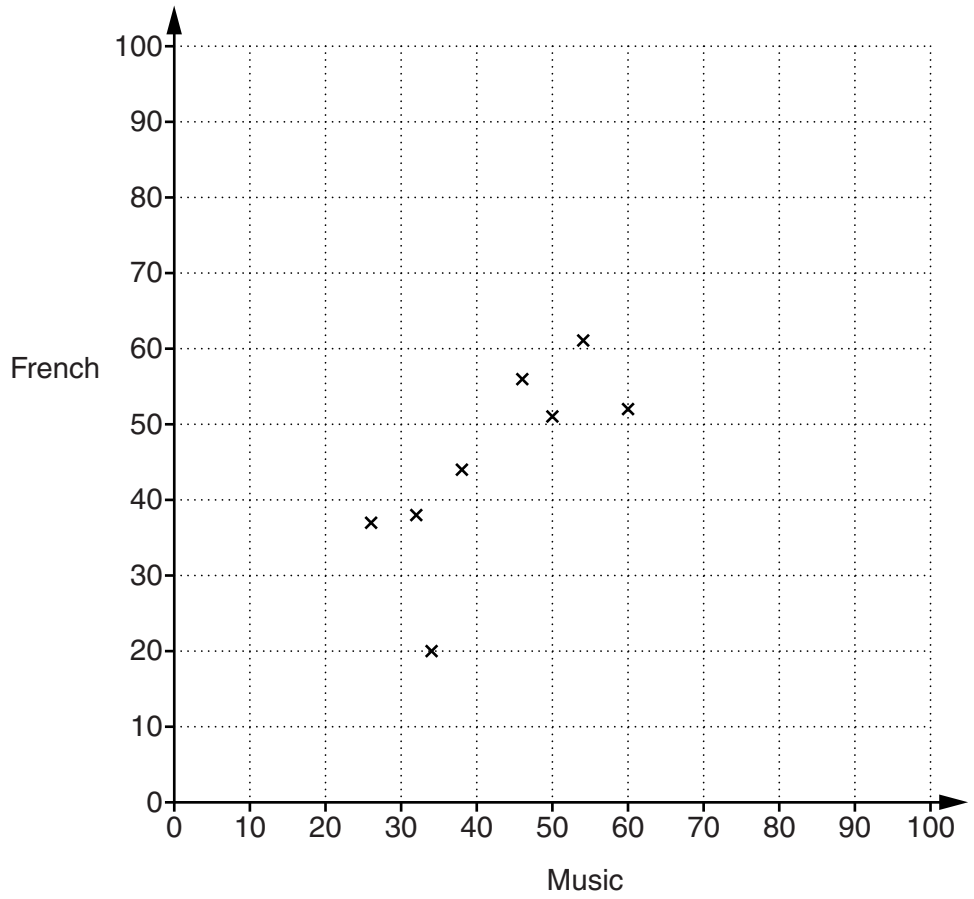
$$= \boxed{\text{D}\ \ } \div 7$$

$$= \boxed{\text{E}\ \ }$$

[4]

5 A group of students did tests in Music and French.
Their results were as follows.

Music	34	54	32	46	50	60	26	38	68	77	45	70	62
French	20	61	38	56	51	52	37	44	74	83	89	72	71



(a) Complete the scatter graph to show these results.
The first eight points have been plotted for you. **[2]**

(b) Draw a line of best fit on your scatter graph. **[1]**

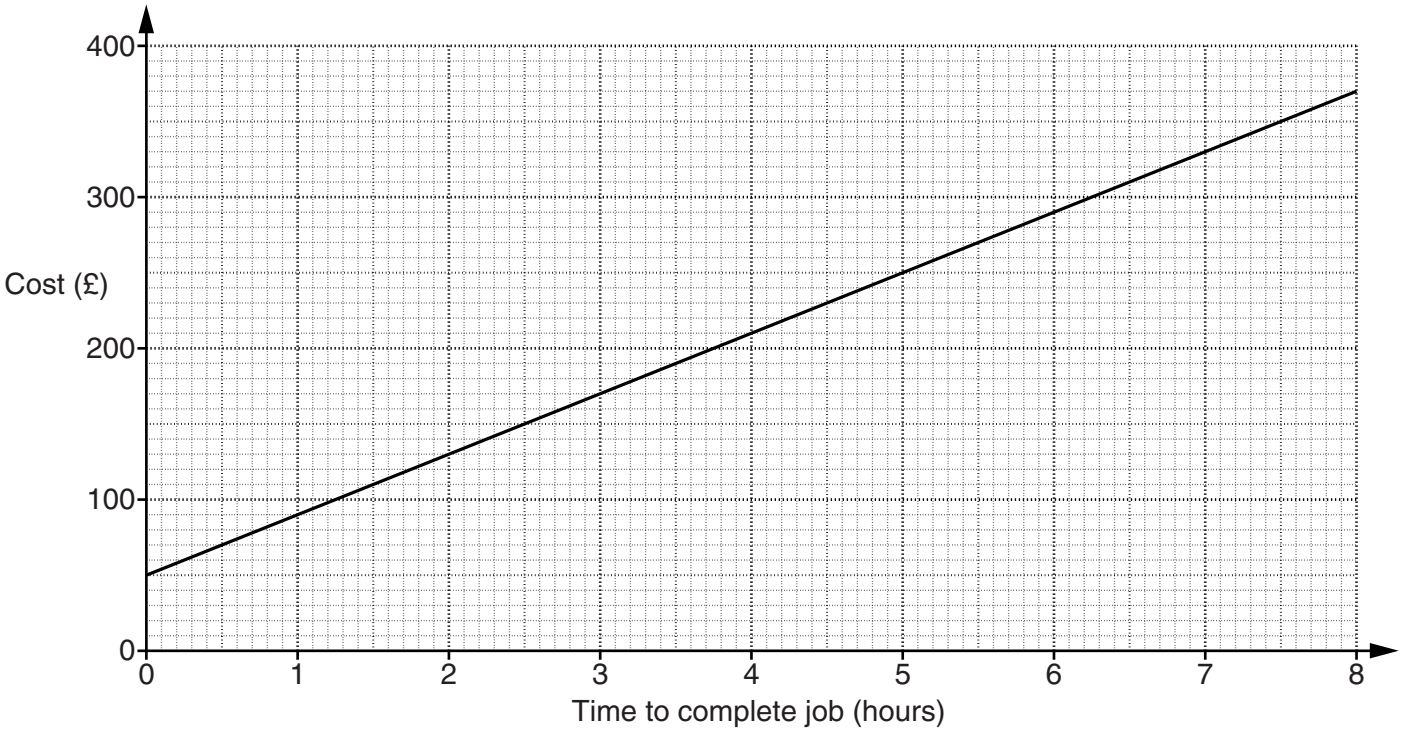
(c) Describe the correlation shown by the graph.

(c) _____ **[1]**

(d) One of the students in the group, Guillaume, is French and always does much better in French than Music.

Draw a ring round the cross that represents Guillaume's results. **[1]**

6 The graph shows the cost for a plumber from *A1 Plumbing Services* to complete a job.



(a) The cost (£) is made up of a fixed call-out charge and an hourly rate.

Complete these sentences.

(i) The fixed call-out charge is £ _____ . **[1]**

(ii) The hourly rate is £ _____ per hour. **[1]**

(b) A different plumbing company, *Gibbo Plumbers*, has an hourly rate of £55 but no call-out charge.

On the axes above, draw the graph to show the cost for a plumber from *Gibbo Plumbers* to complete a job. **[2]**

(c) For a job lasting 6 hours, find which company is cheaper and by how much.

(c) _____ is cheaper by £ _____ **[2]**

(d) Use the graphs to find the job time for which *A1 Plumbing Services* and *Gibbo Plumbers* cost the same.

(d) _____ **[1]**

7 **(a)** Evaluate, writing each answer as a whole number.

(i) $4^{17} \div 4^{14}$

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

(ii) 12^0

(ii) _____ **[1]**

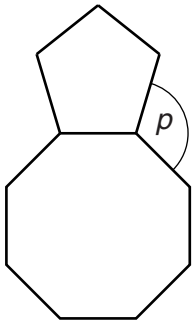
(iii) $8^{\frac{4}{3}} \times 8^{-1}$

(iii) _____ **[3]**

(b) Given that $f(x) = x^2 - 3x$, work out f(5).

(b) _____ **[1]**

8* This shape is made from a regular pentagon and a regular octagon each with sides of the same length.



Not to scale

Prove that angle p is 117°. **[5]**

9 Solve these simultaneous equations.

$$4x + y = 1$$
$$2x - 3y = 18$$

$x =$ _____

$y =$ _____ **[3]**

10 **(a)** Simplify $\sqrt{80}$.

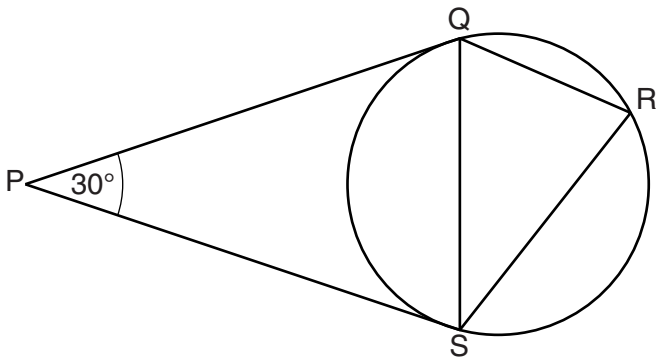
Give your answer in the form $a\sqrt{b}$, where a and b are integers and b is as small as possible.

(a) _____ **[2]**

(b) Rationalise the denominator and simplify $\frac{12}{\sqrt{3}}$.

(b) _____ **[3]**

11 Q, R and S are points on a circle.
PQ and PS are tangents to the circle.
Angle QPS = 30°.



Not to scale

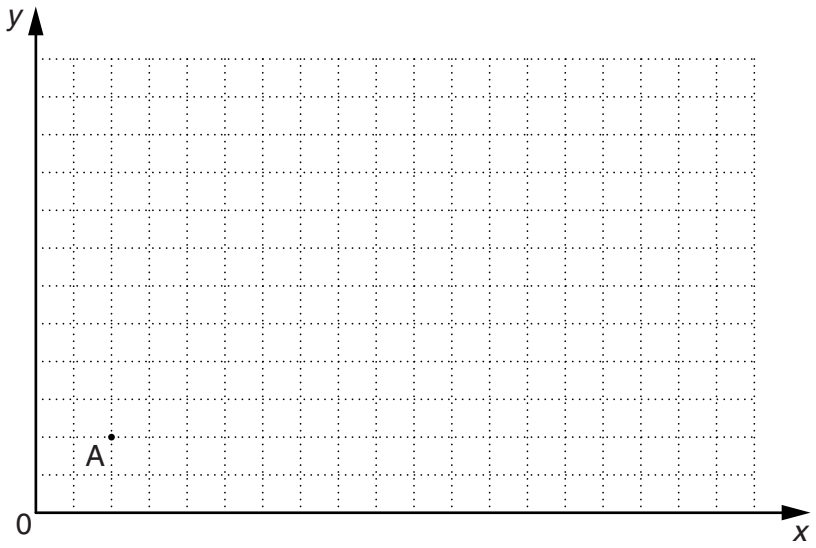
Calculate the size of angle QRS.
Give a reason for each stage of your working.

_____° **[4]**

12 Four points A, B, C and D are such that $\overrightarrow{AB} = \begin{pmatrix} 5 \\ 3 \end{pmatrix}$, $\overrightarrow{BC} = \begin{pmatrix} 4 \\ -2 \end{pmatrix}$ and $\overrightarrow{CD} = \begin{pmatrix} m \\ m \end{pmatrix}$.

$\overrightarrow{AD}$ is parallel to the *x*-axis.

Find the vector $\overrightarrow{AD}$.
You may use the grid to help you.



$\overrightarrow{AD} = \begin{pmatrix} \quad \\ \quad \end{pmatrix}$ **[3]**

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