

Candidate forename						Candidate surname					
Centre number						Candidate number					

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GENERAL CERTIFICATE OF SECONDARY EDUCATION

A502/02

MATHEMATICS A

Unit B (Higher Tier)

WEDNESDAY 9 NOVEMBER 2011: Afternoon

DURATION: 1 hour

SUITABLE FOR VISUALLY IMPAIRED CANDIDATES

Candidates answer on the question paper.

OCR SUPPLIED MATERIALS:

None

OTHER MATERIALS REQUIRED:

Geometrical instruments

Tracing paper (optional)

<p>WARNING No calculator can be used for this paper</p>
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This paper has been pre modified for carrier language

READ INSTRUCTIONS OVERLEAF

INSTRUCTIONS TO CANDIDATES

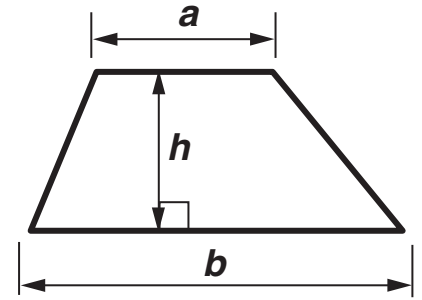
- **Write your name, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.**
- **Use black ink. Pencil may be used for graphs and diagrams only.**
- **Read each question carefully. Make sure you know what you have to do before starting your answer.**
- **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.**

INFORMATION FOR CANDIDATES

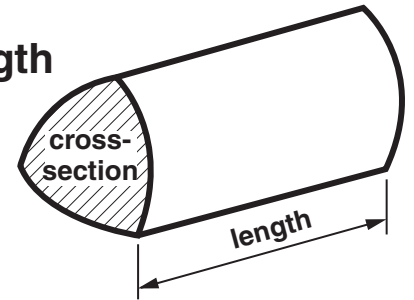
- **The number of marks is given in brackets [] at the end of each question or part question.**
- **Your Quality of Written Communication is assessed in questions marked with an asterisk (*).**
- **The total number of marks for this paper is 60.**

FORMULAE SHEET: HIGHER TIER

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



Volume of prism = (area of cross-section) \times length

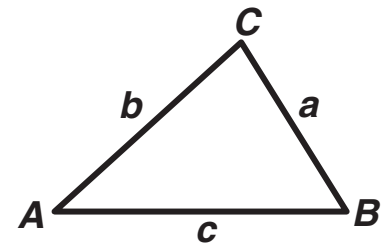


In any triangle ABC

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

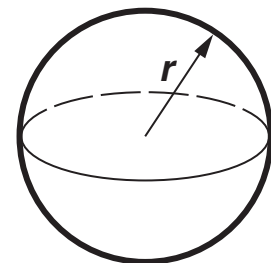
Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$

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



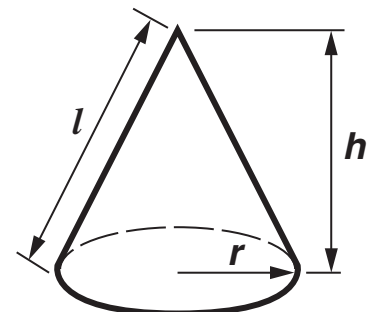
Volume of sphere = $\frac{4}{3} \pi r^3$

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

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

- 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.

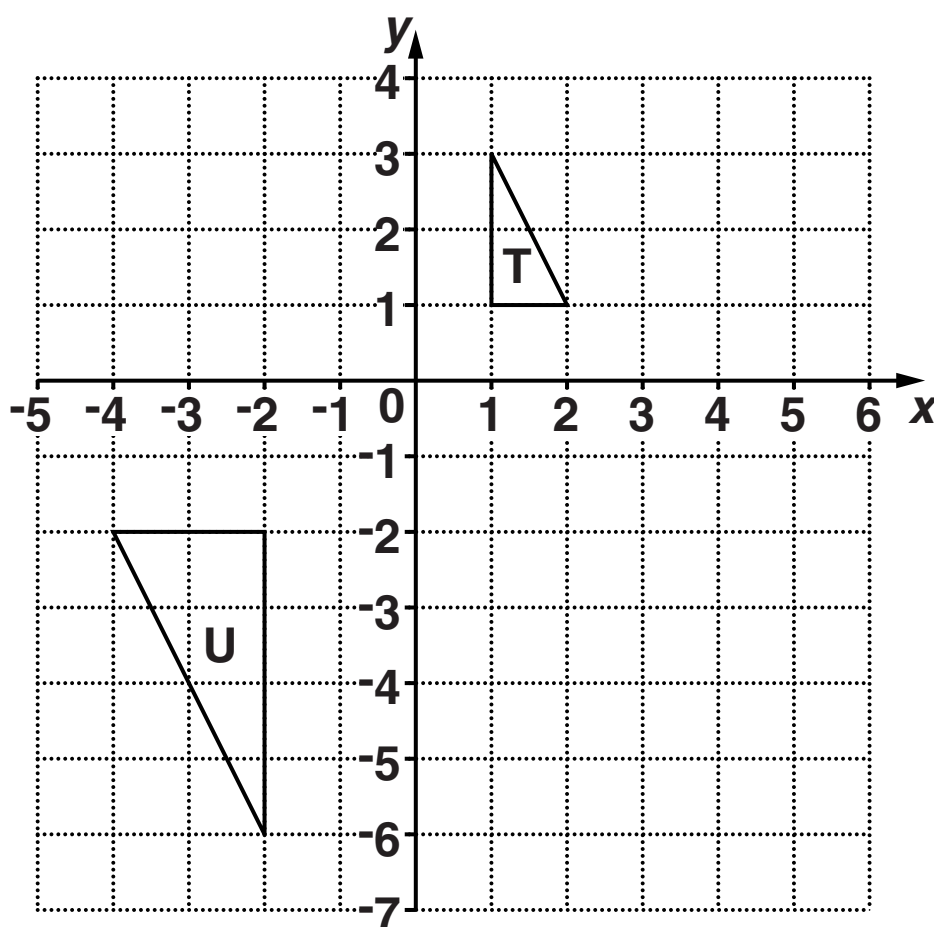
(a) _____ [3]
most

- (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 Use the grid below to answer the questions which follow.



- (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.

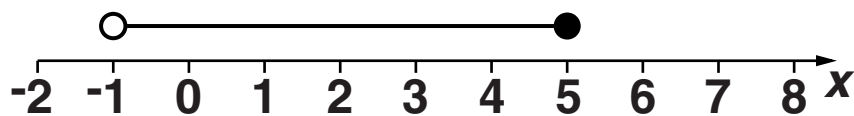
 [2]

3 (a) Solve this inequality.

$$5x - 2 < 18$$

(a) _____ [2]

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



Find the integers p and q .

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

- 4 Marcus has the calculation $4.648 \div 0.28$ to do for his homework.

Fill in the boxes to complete his method.

The numbers in boxes A and B are identical.

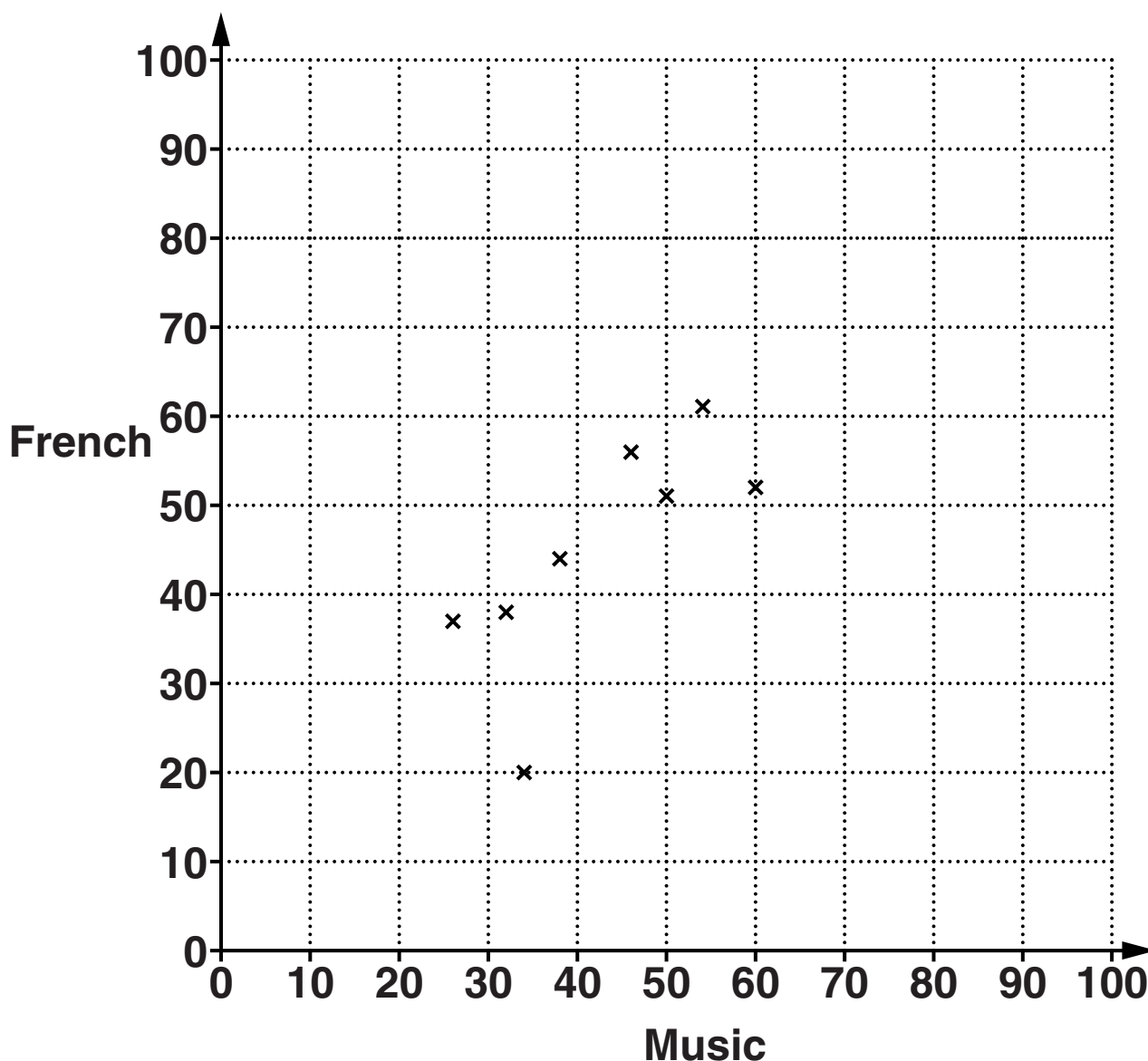
$$\begin{aligned} 4.648 \div 0.28 &= \overset{\text{A}}{\boxed{}} \div 28 \\ &= \overset{\text{B}}{\boxed{}} \div \overset{\text{C}}{\boxed{}} \div 7 \\ &= \overset{\text{D}}{\boxed{}} \div 7 \\ &= \overset{\text{E}}{\boxed{}} \end{aligned}$$

[4]

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- 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.

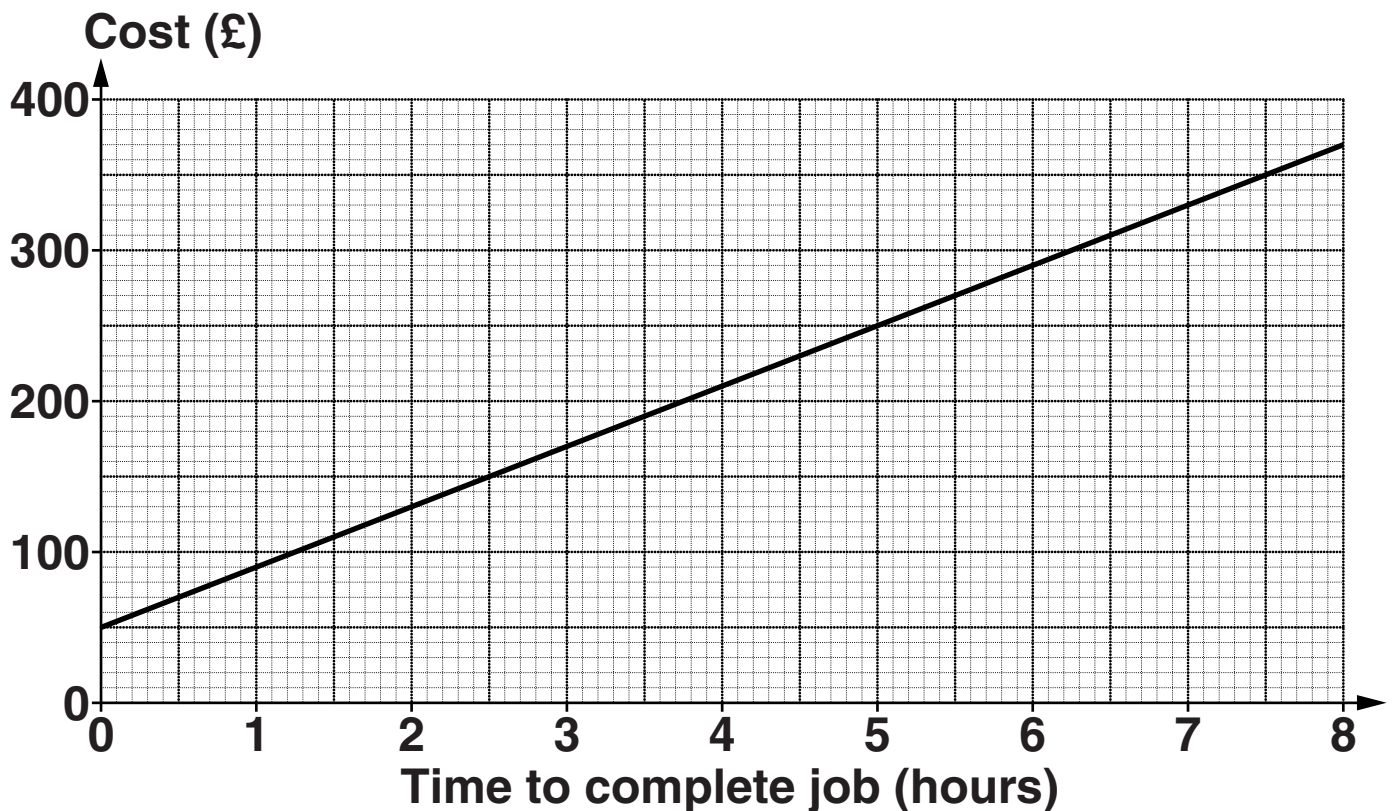
(c) _____ [1]

(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]

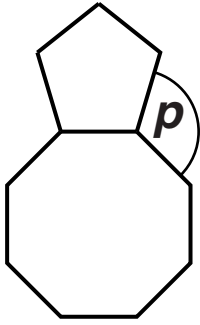
(iii) $8^{\frac{4}{3}} \times 8^{-1}$

(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.

$$\begin{aligned}4x + y &= 1 \\ 2x - 3y &= 18\end{aligned}$$

$$x = \underline{\hspace{2cm}}$$

$$y = \underline{\hspace{2cm}} \quad \mathbf{[3]}$$

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

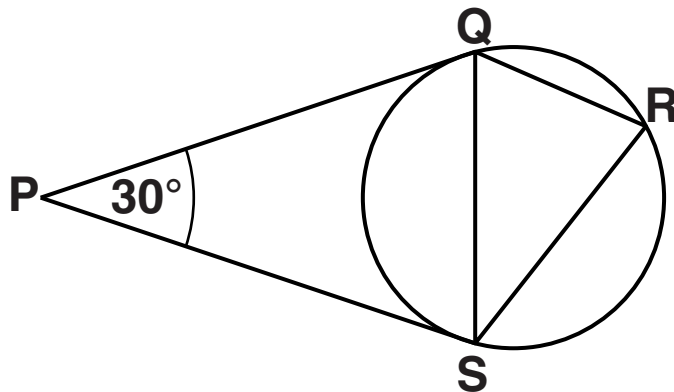
Give your answer in the form $a\sqrt{b}$, where a and b are integers and b is as small as possible.

(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.

_____ $^\circ$ [4]

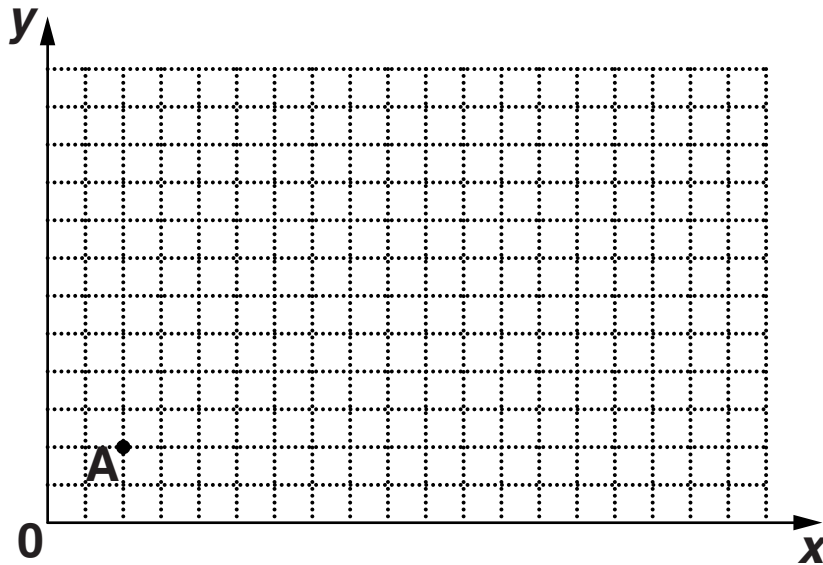
12 Four points A, B, C and D are such that

$$\overrightarrow{AB} = \begin{pmatrix} 5 \\ 3 \end{pmatrix}, \overrightarrow{BC} = \begin{pmatrix} 4 \\ -2 \end{pmatrix} \text{ and } \overrightarrow{CD} = \begin{pmatrix} m \\ m \end{pmatrix}.$$

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

Find the vector \overrightarrow{AD} .

You may use the grid to help you.



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

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