Version: 1.0: 08.12

**General Certificate of Secondary Education**
**June 2012**

# Mathematics 43603H

# (Specification 4360)

# Unit 3: Geometry and Algebra (Higher)

# *Report on the Examination*

Further copies of this Report on the Examination are available from: aqa.org.uk



Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334).
Registered address: AQA, Devas Street, Manchester M15 6EX.

# Unit 3: Higher Tier

### General

This was the first unit 3 examination for this specification. The paper had a greater proportion of functional, problem solving and applications questions than module 5 papers in the previous modular specification. However, students generally performed well on questions with functional elements where familiar contexts allowed students to access the mathematics required. Responses to problem solving questions were more variable. Students generally had the opportunity to demonstrate their mathematical understanding without any literacy issues hindering progress. There was no evidence that students were short of time.

Topics that were well done included:

- setting up and solving a linear equation
- drawing a quadratic graph
- using scale factor to find area
- perimeter in a problem solving context
- Pythagoras' theorem
- transformation of a shape
- trigonometry in a right-angled triangle.

Topics which students found difficult included:

- bearings
- interpretation of ratio in a geometry problem
- use of quadratic formula
- proportion
- arc length
- multistep area problem in non-right-angled triangles.

### Question 1

This question was a good starter for almost all students. The question assessed quality of written communication and required students to follow an algebraic method. Although the majority of students complied, some used a numerical approach. A common error was to work out the value of $x$ but not state the size of the smallest angle.

### Question 2

This question was generally well answered with more smooth curves than in previous examinations. Many students gave coordinate pairs instead of the $x$-coordinates in part (d). Some misread from their graph, reading for example, –2.6 as –3.4.

### Question 3

Some good solutions were seen, although a significant proportion of students did not use the 55%, giving $30 \div 3.8 = 7.9$ and then rounding down to 7. Another common error was to omit the final step giving $5 \div 2.09$ or $6 \div 2.09$. A small number of students used $3.8^3$ or rounded up their final answer.

**Question 4**

Almost all students made some progress, with most students drawing the enlargement and working out the area from their diagram. A significant minority did not state the units.
$12 \times 2 = 24$ was the most common error.

**Question 5**

Many realised that all the sides were 5.2cm and scored full marks. However, some students treated the logo as a rectangle and answers of 31.2cm were quite common. Others attempted to work out the length of the sloping sides by using Pythagoras' theorem. A small minority used area instead of perimeter.

**Question 6**

Part (a) was quite well answered but a significant proportion ignored the formula given and wrote $180 - 55 = 125$. Others gave $360 - 55 = 305$.

Less than half of all students gave a suitable reason in part (b) and there were many who made no attempt. Common errors were to restate the question or state facts that, although true, did not answer the question: for example, angles on a straight line equal 180 or angles greater than 180° are reflex.

Part (c) tended to be either fully correct or fully incorrect with approximately equal numbers of students in each category. The most common error was to give $360 - 342 = 18$ and sometimes go on to give $18 + 90 = 108$ or $18 + 180 = 198$.

**Question 7**

This question was very well answered. The most common error was to subtract $7^2$ from $9^2$ or to give a final answer of 130. A few used trigonometry attempting to find angle $A$ first, but these students rarely completed the question successfully.

**Question 8**

A majority of students gave a fully correct well-presented solution. The most common error was to treat the triangle as isosceles: using either an angle of 64° twice leading to $t = 52°$or an angle of 72° twice leading to $t = 36°$. Less able students assumed that $2w$ was equal to 72° as their starting point.

**Question 9**

This question was very well answered. Common errors seen were 90° clockwise rotations about (0, 0) or (1, 0). The other common error was a 90° anticlockwise rotation about (0, 1).

**Question 10**

Approximately half of all students gave a fully correct solution to this question. Almost all students realised the answer had to be a whole number. Many solutions were clearly presented. A common error was to treat the stage as a circle. Other students used perimeter. A significant number of students prematurely approximated which led to an answer of 451.

**Question 11**

Parts (a) and (c) were not well answered. A small majority were successful in part (b). The common incorrect answer in part (a) was $5x = 2y$. However, many students gave $y = x + 3$ or $x + y = 7$. Other students gave products, for example, $xy = 10$ and a few gave expressions, for example, $5x + 2y$. Many did not attempt part (c) or gave an answer in terms of $x$ and $y$. Many students obtained the correct expression but did not simplify it.

**Question 12**

This question was quite well answered. A common error was to use Pythagoras' theorem to work out *QR* and then stop. Another common error was to use an incorrect trigonometrical ratio. Some solutions were very unclear as students did not state which angle they were using. Weaker attempts showed no recognition that this was a trigonometry question.

**Question 13**

Approximately half of the students gave a fully correct solution. Common errors in the linear equation included $5x + 1 - 2x + 3 = 7$ or $5x + 1 = 7(2x + 3)$. Some students equated one of the sides to 7 giving $2x + 3 = 7$ or $5x + 1 = 7$. Students who obtained a value for $x$ usually continued to a correct volume although $1 \times 9 \times 16$ was quite common.

**Question 14**

Part (a) was one of the most well answered questions on the paper. A final answer of 62° was the most common incorrect answer. However, in contrast, correct explanations in part (b) were rare with many unclear statements given; for example, they add up to 180°, with few students referring to the quadrilateral as cyclic.

**Question 15**

This question was a good discriminator, although many did not recognise that the quadratic formula was needed and many failed attempts at factorising were seen. Common errors when using the formula were to use $c = 10$ or $-b = +4$. Answers were often given to two decimal places.

**Question 16**

Many students appeared unprepared for this question. The most successful used a formal algebraic approach. Those using a ratio method often gave unclear solutions. Common errors in part (a) were to ignore the cube, to give 200 = 125k leading to k = 75, changing $r^3$ to $r^2$.

In part (b) 3125 ÷ 40 and working out the cube root of 3125 were quite common.

**Question 17**

Less than half of the students realised that an angle of 60° was needed to answer this question; with some only stating that the sides were equal. Common errors in finding the length of the arc were to use area, or to use $\pi r$ for the circumference.

**Question 18**

This question proved challenging to all but the most able students with many treating triangle *BCD* as right-angled. Presentation was often poor. Many worked out missing lengths and angles but did not work out the areas correctly or made no attempt at the areas. Some worked out the area of one triangle, usually *ABD* and did not attempt the other triangle. Those who divided the working space into two parts often were the most successful.

**Question 19**

Only a minority gave the correct answer in part (a).

Part (b) was the least attempted question on the paper, although there were many correct answers. The common error was to use $\mathbf{s} - \mathbf{t}$ with their answer to part (a) instead of using $-\mathbf{s} + \mathbf{t}$.

# Mark Range and Award of Grades

Grade boundaries are available on the Results statistics page of the AQA Website.

**UMS conversion calculator** www.aqa.org.uk/umsconversion