Version 1.0

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Mathematics 4301

Specification A

Paper 2 Higher

Examiners' Report

2008 examination – June series

Further copies of this Examiner's Report are available to download from the AQA Website: www.aqa.org.uk

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

Specification A

Paper 2: Higher Tier

General

This is the first assessment of the new 2-tier examination. The cohort was of a wider ability range than previously and the paper had 50% of the questions targeted at the lower two grades D and C. At the top end 30% of the paper was aimed at the two highest grades A and A*. Overall the paper performed as would be expected given these new parameters. The D and C questions were well done on the whole and there were clearly large areas of the specification that many of the candidates had not met. The latter questions, therefore, were often blank or not well done. Comparisons with previous years are therefore not valid in terms of which topics were well done overall although there are pleasing indications that some topics were well done by the vast majority.

Topics that were done well included:

- distance-time graphs
- comparison of compound measures
- use of a calculator
- rounding to appropriate accuracy
- area of a trapezium
- frequency diagrams
- loci.

Topics that were done well by the more able candidates included:

- transformations
- basic algebra
- Pythagoras' theorem
- compound interest
- trigonometry
- 3D geometry.

Topics that the majority of candidates found difficult included:

- geometrical reasoning
- factorisation
- comparison of distributions
- gradients of lines and perpendicular gradients
- recurring decimals
- surface area of cones and cylinders
- comparison and cancelling of algebraic expressions
- limits
- algebraic proof.

Question 1

This question was rarely incorrect. In part (c) a common error was to take the time of the overall journey as 170 minutes, obviously thinking that the 10 minute stop did not count for the overall average speed.

Question 2

This question was well done by the vast majority of candidates. The method described above was the most common but there were several other equally valid methods. The main error was to assume that Alice had the better mileage, presumably because the lower value suggested a 'best buy'.

Question 3

This question was well done. There were some common wrong answers due to incorrect use of a calculator for which follow through in part (b) was allowed. The vast majority of candidates now know that 'give your answer to a suitable degree of accuracy' means to give their answer to the same degree of accuracy as in the question, although 3sf is always an acceptable accuracy.

Question 4

Part (a) was well done and part (b) slightly less well done but overall this question was a source of marks for the majority. The main error in part (b) was to miscalculate the side equal to $3y - 2$ as 20 not 10.

Question 5

There was a varied response to this question. Some candidates seemed to have little understanding of transformations. Of those who had some grasp of the topic, many scored full marks but there were common errors which lost one or more marks. In part (a) the common errors were to give a combination of transformations rather than a single transformation and/or to fail to name the transformation, give an incorrect angle/direction or not give the centre. In part (b) the common errors were to reflect in $x = -1$, or to draw $y = -1$ and put the reflected shape 1 unit below this.

Question 6

This was well done overall. Parts (a) and (b) were usually correct. Part (c) was less successful as the wrong denominator, 140 for example, was often used.

Question 7

Factorisation remains a topic that even more able candidates find difficult. There were a majority of answers that scored zero on both parts. Part (b) was often only awarded 1 mark as a partial factorisation was seen.

Question 8

The first two parts were well done by the majority of candidates. Part (a) was almost always correct. Part (b) was usually correct. The main error was to use the formula wrongly, working out $a \times b$ for example. Many candidates successfully split the trapezium into a rectangle and two triangles which suggests that they may not be aware of the given formula. Part (c) was not well done. 5 could be guessed so some justification, using either exterior or interior angles, needed to be seen. Of those candidates who scored marks on this, the majority used the exterior angle of 72 and showed that $360 \div 72 = 5$. Those candidates who used the interior angle of 108 often failed to give a justification why the interior angles of a pentagon were 540 and so lost a mark.

Question 9

Overall this question was well done. Part (a) was usually successful with sign and arithmetic errors being the main cause of lost marks. Part (b) was less well done as many candidates did not know how to start. Of those candidates that did, the majority found $5y$ and attempted to set up an equation. The most common error was to solve $9y = 6$ as $y = 1.5$.

Question 10

This was quite well done. Part marks were rare as there was no standard method. However, ratios of 6:12 leading to 1:2 were given 1 mark if seen.

Question 11

This was quite well done with the majority scoring at least one mark. It may be that expanding two brackets causes some confusion as to the arithmetical operation required but over a quarter of answers that showed the ability to expand two brackets to get four terms lost a mark due to an arithmetic or sign error. For example $-3 \times 4 = 1$ or -7, $-3x + 4x = -7x$ or $-x$.

Question 12

This was well done. The vast majority of candidates know how to use Pythagoras' theorem.

Question 13

Despite the answer being given, many candidates still added the x values and divided by 5. Some candidates even going so far as to suggest that the question was wrong. Of those that did know the method the most common error was not to show the values of xf and consequently lost a mark. Part (b)(i) was well done but the connection with part (a) was not seen, so part (b)(ii) was not well done. Part (c)(i) was very well done but as usual candidates' inability to explain in straightforward, mathematical terms let them down in (c)(ii). The distributions were made virtually identical and 10 cm apart to encourage a simple statement that 'on average boys were 10 cm taller than girls' and that 'the distributions or spread were the same'. The majority of answers just stated a fact from the diagram, for example, 'there are 15 boys with heights between 160 and 170 cm but only 6 girls'.

Question 14

Part (a) was fairly well done, although many candidates who drew triangles on the graph to find the gradient did not use sensible points and gave answers of 1.4 or 1.6, for example. Part (b) could follow through from part (a) and usually did but m and c were often confused. Part (c) was very badly done. –1.5 was a common wrong answer, or the reciprocal missing the minus sign. Part (d) could follow through from part (c) only if it was the negative reciprocal of the answer in part (a) and the vast majority of candidates who got a mark in (c) also got the mark in part (d).

Question 15

This question was not well done overall. Part (a) often scored 1 but the inequality was often then written the wrong way round. There were the usual errors of using an equals sign and not recovering the inequality. This method is not recommended. In part (b) the common error, apart from nonsense answers, was to write $x > -3$. Although the dashed line implies a strict inequality, the answer of $y \geq -3$ was also given the mark. There were some good answers in part (c) explaining the use of a point (0, 0) say to test the inequality or rearranging the equation to $y \geq \frac{2}{3}x - 4$, although this method was rare. The majority shaded below the line due to the 'less than' inequality.

Question 16

Most candidates picked up at least one mark on this question. The difficulties came when they used a 'build up' method instead of using a multiplier and the formula $250\,000 \times 0.89^n$. This led to lengthy calculations that often ran out of steam or contained errors. Candidates who use a multiplier method normally pick up full marks but those that use conventional methods normally drop at least one mark.

Question 17

This was generally full marks or zero marks. A slight majority of candidates can do trigonometry. As this question required a division it was less well done than normal. Many candidates recognised this as a sine problem but calculated $13 \times \sin 73$.

Question 18

This question was a source of marks for many candidates. Those that knew the basic requirements often scored 3 with the main errors being poor measuring skills.

Question 19

With the new generation of calculators this is the last time recurring decimals will occur on paper 2, although the majority of candidates scored zero. There are many methods of approach and candidates who are schooled in one of them usually scored 3.

Question 20

This is a standard quadratic formula question and candidates who recognised this usually scored some marks. The main errors being use of an incorrect formula, for example, dividing just the square root by $2a$, or calculating $-4ac$ as –56. Many candidates attempted to factorise not heeding the hint to give answers to 2 dp. A handful attempted to complete the square but with little success due to the coefficient of 2 for x^2.

Question 21

This is a standard cosine rule question and candidates who recognised this usually scored some marks. The main error was to evaluate the formula as 4cos78. Many candidates had little idea and used standard trigonometric formulae for right-angled triangles.

Question 22

This question was not well done. In part (a) 3 marks were rare. 1 mark was given for calculating the frequency densities. Some candidates have clearly been taught a 'scaling' method. This is acceptable but not recommended. The second mark was for a correct histogram. Many candidates misread the scale. The final mark was for labelling the side axis. This was rarely done or it was labelled as 'frequency'. Part (b) was usually incorrect.

Question 23

This question was not well done. Few candidates could write down the total surface area of a cone or a cylinder in terms of r. Those that did and managed to equate the two, then could not cope with the collection of terms and cancelling. There were some special cases allowed where the bases were ignored but these occurred infrequently.

Question 24

This question was quite well done, probably due to the structure. Fully correct answers were common and many candidates managed to score some marks on this question. Common errors were to misinterpret the diagram and find the wrong length in part (a). This could be carried through to part (b) and the majority who could interpret the diagram correctly often scored full marks in part (b).

Question 25

Part (a) was intended to focus candidates' minds on the upper limit. This seems to have had the desired effect as there was more success than is usual with a limits question. There were two common errors in (b). Incorrect upper limits, which was to be expected and incorrect use of the given formula, which was not. For example $(\frac{1}{2}at)^2$ or $\frac{1}{2}(at)^2$ were common.

Question 26

This question was not well done overall. Part (a) was often correct but the proof defeated the majority in part (b), although there were many complete and well structured answers showing good algebraic skills. Of the candidates who made a correct start by writing the difference of two consecutive fractions, few could then combine them together with a common denominator. Of those that managed this step the subsequent algebra was often not convincing to show the collection of terms in the numerator to 1.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on http://www.aqa.org.uk/over/stat.html page of the AQA Website.

Mark Schemes

Mark Schemes are available on http://www.aqa.org.uk/qual/gcse/newmath_a_assess.php page of the AQA Website.