ASSESSMENT and QUALIFICATIONS ALLIANCE

## General Certificate of Secondary Education

# Mathematics (Modular) 4302

*Specification B*

## Module 5 Paper 1 Higher Tier 43005/1H

# Report on the Examination

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## General

This paper, the first two-tier for this module, proved accessible to most candidates with no evidence of a lack of time. There were some issues regarding the level of entry of some of the weaker candidates who appeared unprepared for some of the more challenging questions. Poor presentation when attempting the longer questions was also a cause of some concern.

Many candidates still appear underprepared for the different demands that a non-calculator paper presents, for example when dealing with fractions, approximations, mental arithmetic or leaving answers in terms of $\pi$.

Topics that were well done included:

- plan and elevation
- area of a circle and a compound shape
- expressions
- forming and solving a linear equation
- square numbers
- Pythagoras' theorem.

Topics which candidates found difficult included:

- solving a quadratic equation
- changing the subject of a formula
- naming the alternate segment theorem
- perimeter of a major sector of a circle
- algebraic proof.

## Question 1

This proved to be a good starter for many candidates. The style of the question ensured that the equivalent fractions were done more successful than previously. Most candidates realised that $\frac{36}{48}$ was equivalent to $\frac{3}{4}$ although some candidates then went on from this to state that Emma was not correct. The factorisation was reasonably well answered although many did not understand the meaning of "factorise" often giving $77x$ as their answer.

## Question 2

This topic was generally well understood with most candidates scoring well. The most common error was to draw the sides 1 cm too long.

## Question 3

This question was well answered. Almost all candidates used the value of $\pi$ as instructed, but a significant minority confused radius with diameter. The usual error of mixing the formulae for circumference and area was less evident. In part (b)(ii) many candidates did unnecessary working dividing the area of the circle by 2 and then multiplying the result by 2 or restarting the question as a consequence of not using the link with part (i). A common error was to give $20 \times 30 = 60$.

## Question 4

There was a high success rate on this question. In part (a) some candidates gave $x = x - 3$ or $x + 3$. The most common mistake in part (b) was to add $x$ and $x + 3$ leading to $2x = 88$. Many went on to answer part (c) in part (b). Significant numbers restarted the question in part (c), using trial and error to find the solution.

**Question 5**

Part (a) was very well answered. In part (b) very few candidates realised the link with part (a) which would lead to 27 × 10. Almost all candidates attempted 27 × 3 and 27 × 7 and usually arrived at 270, but inevitably some made errors in the multiplications, although it was not uncommon to see 81 + 189 incorrectly worked out.

**Question 6**

This question was well answered. In part (b) most candidates stated the correct answer for $14^2$ and a few explained about the units digit. The most common incorrect response was to state that 14 × 14 = 116.

**Question 7**

In both parts of this question there were many fully correct answers with very few failing to score marks. In part (a) most of the errors were sign errors, although some candidates attempted to simplify further the correct answer. In part (b) $32e - 36 + 8e$ was seen frequently and others gave $70e$ or $-2e$ as their final answer.

**Question 8**

This question appeared to confuse many candidates. A surprising number failed to recognise the straightforward nature of the question and proceeded to expand the brackets and then solve the equation, sometimes using the quadratic formula without success.

**Question 9**

Part (a) of this question was generally well done. A significant minority used $10^2 + 3^2$ and it was also common to see candidates unable to manipulate $10^2 - 3^2$. 100 – 9 = 81 was quite common. Candidates who understood the idea of scale factor in part (b) tended to score full marks. The most common error was to add 5 to 3. A few thought the link with part (a) was to use Pythagoras' theorem again in part (b).

**Question 10**

Very few candidates gained full marks on this question. In part (a) weaker candidates simply swapped the letters $x$ and $y$ to get $x^2 = \frac{y-49}{5}$. Some candidates tried to do two steps at once giving, for example, $x^2 = 5(y + 49)$ or $x^2 = y + 49 \times 5$. Significant numbers of candidates, having arrived at the correct answer of $x = \sqrt{5y+49}$ went on to give $\sqrt{5y} + 7$. Although part (b) was reasonably well answered, many candidates used their incorrect answer from part (a) and then wanted to work out the square root of a negative number, for example –94. Very few then realised that their previous work must contains errors.

**Question 11**

Responses to this question were disappointing. Many candidates did not appear to know the meaning of "integer" and were unable to read from the diagram. Many candidates only gave two numbers in their answer to part (a). Regrettably many candidates changed this question to an equation and then either made no attempt or an incorrect attempt to change it back to an inequality. Weaker candidates tried substituting numbers. $2 \le 4x$ and $26 \le 2x$ were fairly common. Very few correct answers were seen in part (c).

**Question 12**

Much of the work for this question was presented on the diagram. Part (a) was quite well done. The common errors were to work out (180° – 86°) ÷ 2 = 47° or simply give 86° by assuming that the angles were equal. In part (b) most candidates worked with the isosceles triangle but many then assumed that *AC* was a diameter, even though the centre was shown on the diagram. They then subtracted 47° from 90° to give 43° as their answer. Very few correct answers were given to part (b)(ii). More common was “Pythagoras”, “trigonometry”, “tangent” or “quadratic”.

**Question 13**

This question was a good discriminator for the more able candidates. Some candidates were unable to find the circumference correctly, $18\pi$ being quite common. Of those who correctly obtained $36\pi$, many then failed to find the length of the major arc. Others, having obtained a correct expression, were unable to simplify it. Some candidates failed to add on 36 to their arc length. Despite this many fully correct answers were seen although some went on to give $60\pi$ as their final answer.

**Question 14**

Again this question was a good discriminator. It was evident that candidates who attempted to show their method clearly scored heaviest on this question. There were many good attempts seen which only lost marks as a consequence of poor arithmetic. $\frac{1}{3} \times 25 \times 5$ often became $0.3 \times 25 \times 5$ or $75 \times 5$. Many treated the solid as if it was a pyramid of height 15 cm. Most candidates realised that the edges were of length 5 cm. Some candidates had difficulty multiplying the volume by 9 to find the mass, whilst many stopped after finding the volume.

**Question 15**

Most candidates attempted this question but very few of them achieved full marks, due to a lack of rigour in the proof. Presentation in this question was often poor with numerous crossings out making the work difficult to follow. Weaker candidates attempted to substitute numbers in both sides of the identity in order to prove it. Other candidates attempted to algebraically manipulate the left hand side of the identity but with most simply working with the numerator. There were a number of attempts which tried to work with both sides of the identity. It was quite common to see $(x - 3)(x - 2) - x\,(x + 2)$. A minority proved the identity by using elegant algebra to get full marks for this question.