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# General Certificate of Secondary Education
# November 2010

**Mathematics** **43602H**

**Higher**

**Unit 2**

# Final

# *Mark Scheme*

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

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**The following abbreviations are used on the mark scheme:**

| | |
|---|---|
| **M** | Method marks awarded for a correct method. |
| **M dep** | A method mark which is dependent on a previous method mark being awarded. |
| **A** | Accuracy marks awarded when following on from a correct method.<br>It is not necessary always to see the method. This can be implied. |
| **B** | Marks awarded independent of method. |
| **Q** | Marks awarded for quality of written communication. |
| **ft** | Follow through marks. Marks awarded for correct working following a mistake in an earlier step. |
| **SC** | Special Case. Marks awarded for a common misinterpretation which has some mathematical worth. |
| **oe** | Or equivalent. |

**UNIT 2 HIGHER TIER 43602H**

| | | | |
|---|---|---|---|
| 1 | √100 or 10 **and** 2 | M1 | |
| | 5 | A1 | |

| | | | |
|---|---|---|---|
| 2a | 150.4 | B1 | |
| 2b | 2.35 | B1 | |
| 2c | 1504 + 23.5 | M1 | If long multiplication used … must have one row correct and a zero on the tens row (and two zeros on the hundreds row) |
| | 1527.5 | A1 | |

| | | | |
|---|---|---|---|
| 3 | Any correct pair eg 9 and –12, –9 and 8, 10 and –11, –3 and 28 30 and –5, –45 and 0, –2 and 43 | B2 | B1 for –90 seen in correct working or no working |

| | | | |
|---|---|---|---|
| 4 | 10 × 80(p) or 10 × (£)0.08 or (£)8 seen | M1 | oe |
| | $\frac{\text{their } 8}{20} \times 100$ | M1 | oe |
| | 40 | A1 | SC2 for 60% from correct working<br>SC2 for 4% from using 80p instead of £8<br>SC1 for $\frac{12}{20} \times 100 \neq 60$ |

| | | | |
|---|---|---|---|
| 5a | 3 | B1 | |
| 5b | $5x - 6 = x$ or $\frac{x + 6 = x}{5}$ | M1 | Trial and improvement … two trials, both correct |
| | $5x - x = 6$ or $4x = 6$ or $x - 5x = -6$ | M1 | Trial and improvement … improved correct third trial |
| | ($x$ =) 1.5 | A1 | oe |

| | | | |
|---|---|---|---|
| 6a | [49 - 50] | B1 | |
| 6b | [6.6 - 6.8] (– 5) | M1 | Numbers could be seen on graph |
| | [1.6 - 1.8] | A1 | SC1 [1.3 - 1.4] |

| | | | |
|---|---|---|---|
| 7 | 600 ÷ (9 + 6 + 5) (= 30) | M1 | |
| | their 30 × 9 or their 30 × 6<br>or their 30 × 5 | M1 dep | |
| | 270 : 180 : 150 | A1 | Accept any order |

| | | | |
|---|---|---|---|
| 8 | 50 × 3 or 150 | M1 | or 150 – 95 or 55 |
| | $\frac{60}{100}$ × 3 or 1.8(0) | M1 | oe eg $3 - \left(\frac{40}{100} \times 3\right)$ |
| | (30 × their 1.8(0) or 54)<br>+ their 150 – 95 | M1 | |
| | 109 | A1 | |
| | their 150 + their 54 – 95 with their 54 coming from 40%<br>or 60% correctly evaluated<br>**and**<br>a decision based on their answer | Q1 | Strand (iii)<br>SC4 for (£)91 and No (from using 40% = £120) |
| | Those who cannot work out 40% or 60% correctly<br>score a maximum of M1 M0 M1 A0 Q0 | | |
| | **Alternative method** | | |
| | 50 × 3 or 150 | M1 | or 150 – 95 or 55 |
| | $\frac{60}{100}$ × 3 or 1.8(0) | M1 | oe eg $3 - \left(\frac{40}{100} \times 3\right)$ |
| | 30 × their 1.8(0) – their 45 | M1 | Comparing 30 × their 1.8(0) with 45… the amount needed to make a profit of £100 |
| | 9 | A1 | Comparing 54 and 45 from correct working |
| | their 150 + their 54 – 95 with their 54 coming from 40%<br>or 60% correctly evaluated<br>**and**<br>a decision based on their answer | Q1 | Strand (iii) |

| | | | |
|---|---|---|---|
| 9a | –30 | B1 | |
| 9b | $4(t - 5)$ | B1 | Accept $4 \times (t - 5)$ |
| 9c | $6m - 12$ or $5m + 10$ | M1 | |
| | $11m - 2$ | A1 | |
| 9d | $8g^4k^5$ | B2 | B1 for two components correct |
| 9e | $5q(2q - 3r)$ | B2 | B1 for $5(2q^2 - 3qr)$ or $q(10q - 15r)$<br>or $10q(q - 1.5r)$ or $5q(2q - ?)$<br>or $5q(? - 3r)$ |

| | | | |
|---|---|---|---|
| 10 | $x^2 - 4x$ seen | B1 | oe |
| | their $(x^2 - 4x) + 4x$ | M1 | oe |
| | $4x + 6x - x^2$ | M1 | oe<br>$x^2 - 4x + 4x + 4x + 6x - x^2 = (kx)$<br>scores B1 M1 M1 |
| | $(k =)$ 10 or $10x$ seen | A1 | Accept substitution of a non-zero number leading to $k = 10$ |

| | | | |
|---|---|---|---|
| 11 | $\sqrt[3]{27}$ (= 3) or $27^2$ or 729 | M1 | Do not allow $\sqrt[3]{27}$ = 9 |
| | 9 | A1 | |

| | | | |
|---|---|---|---|
| 12 | 108 (kg) = 90% | M1 | oe |
| | 108 ÷ 90 × 100 | M1 | oe |
| | 120 (kg) | A1 | |

| | | | |
|---|---|---|---|
| 13 | $4(12 - a) = 52$ | M1 | Condone $12 - a \times 4 = 52$<br>$\frac{52}{4} + a = 12$<br>52 ÷ 4 = 13 then 12 – ? = 13<br>Trial and improvement 12 – ?<br>then ×4 followed by second attempt |
| | $a = -1$ | A1 | |
| | 1st term = 2 | A1 | |
| | Logical working with key steps clearly shown | Q1 | Strand (ii)<br>Do not award for Trial and improvement<br>Do not award for initial statement of $12 - a \times 4 = 52$ unless brackets subsequently used |

| | | | |
|---|---|---|---|
| 14a | $x^2 + 5x - 5x - 25$ | B1 | Must see full correct expansion |
| 14b | $(3x + p)(x + q)$ where $pq = \pm 20$ | M1 | |
| | $(3x - 4)(x - 5)$ in numerator | A1 | |
| | $\dfrac{3x-4}{x+5}$ | A1 | Do not ignore further working<br>ie max 2 marks if any further working |

| | | | |
|---|---|---|---|
| 15 | $3y - p = 2h + hy$ | M1 | |
| | $3y - hy = 2h + p$ | M1 | $-2h - p = hy - 3y$<br>This mark is for correct rearranging from an incorrect 4 term expansion in the first step |
| | $y(3 - h) = 2h + p$ | M1 dep | $-2h - p = y(h - 3)$<br>Dependent on first M mark |
| | $y = \frac{2h+p}{3-h}$ | A1 | $\frac{-2h-p}{h-3} = y$ |

| | | | |
|---|---|---|---|
| 16 | 7 + 6 or 1 + 12 | M1 | oe |
| | 13 | A1 | $B = (4, 13)$ or $C = (0, 13)$ seen is M1 A1 |
| | $y = 3x + 13$ | A1 | SC1 $y = 3x + c$<br>$c \neq 0$ and $c > 0$ but not $c = 1$<br>$C = 3x + c$ $c \neq 13$ scores no marks<br><br>SC2 for $C = 3x + 13$ |

| | | | |
|---|---|---|---|
| 17 | $\frac{6\sqrt{3}}{\sqrt{3}\sqrt{3}}$ or $\frac{6\sqrt{3}}{3}$ | M1 | |
| | $2\sqrt{3}$ | A1 | |
| | $\sqrt{(25 \times 3)}$ (= $5\sqrt{3}$) | M1 | |
| | $7\sqrt{3}$ | A1 | |

| | | | |
|---|---|---|---|
| 18 | $(n + 3)^2 - n^2$ | M1 | $n^2 - (n - 3)^2$ |
| | $n^2 + 3n + 3n + 9 - n^2$<br>(= $6n + 9$) | A1 | $n^2 - n^2 + 3n + 3n - 9$ (= $6n - 9$) |
| | $3[n + (n + 3)]$ | A1 | $3[n + (n - 3)]$ |
| | Complete solution with all stages clearly shown | Q1 | Strand (ii) |
| | **Alternative method** | | |
| | $x^2 - y^2 = (x + y)(x - y)$ | M1 | Must see difference of two squares factorisation |
| | $x - y = 3$ | M1 dep | |
| | $x^2 - y^2 = (x + y).3$ | A1 | |
| | Complete solution with all stages clearly shown | Q1 | Strand (ii) |