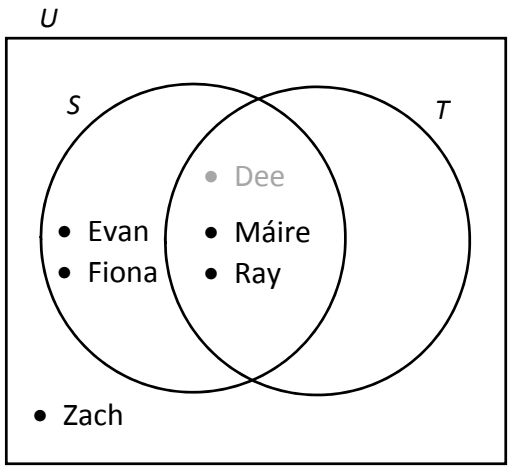
Model Solutions and Marking Notes

Note: The model solutions for each question are not intended to be exhaustive – there may be other correct solutions. Any Examiner unsure of the validity of the approach adopted by a particular candidate to a particular question should contact his / her Advising Examiner.

Q1	Model Solution – 30 Marks	Marking Notes
(a)(i)&(ii)	(i) 999 999 (ii) 100 000	**Scale 10C (0, 4, 8, 10)** Accept correct answers without work *Low Partial Credit* • Any 6-digit number *High Partial Credit* • One part correct • 6-digit numbers with correct first digit in (i) **and** (ii)
(b)(i)-(iv)	(i) 11 (ii) 25 (iii) 32 (iv) 7	**Scale 20D (0, 6, 11, 16, 20)** Accept correct answers without work *Low Partial Credit* • One part correct • Work of merit, e.g. finds 1st difference *Mid Partial Credit* • Two parts correct *High Partial Credit* • Three parts correct

<table>
<tr><th>Q2</th><th>Model Solution – 30 Marks</th><th>Marking Notes</th></tr>
<tr><td>(a)</td><td> 
</td><td>Scale 10C (0, 4, 8, 10)
Accept correct answer without work
Low Partial Credit
• One or two correct entries
High Partial Credit
• Three correct entries</td></tr>
<tr><td>(b)(i)&(ii)</td><td>(i) Dee, Máire, Ray

(ii) Zach</td><td>Scale 10C (0, 4, 8, 10)
Accept correct answers without work
Low Partial Credit
• One correct element
High Partial Credit
• One part correct</td></tr>
<tr><td>(c)</td><td><table>
<tr><th>Statement</th><th>True</th><th>False</th></tr>
<tr><td>$\#S = 3$</td><td></td><td>✓</td></tr>
<tr><td>$\text{Dee} \in T$</td><td>✓</td><td></td></tr>
<tr><td>$S \cup T = T \cup S$</td><td>✓</td><td></td></tr>
<tr><td>$T \subset S$</td><td>✓</td><td></td></tr>
<tr><td>$S \setminus T = \{\}$</td><td></td><td>✓</td></tr>
</table></td><td>Scale 10D (0, 4, 6, 8, 10)
Accept correct answer without work
If a candidate ticks both True and False for a statement without clearly indicating which is the final answer, consider it to be incorrect
Low Partial Credit
• 1 part correct
Mid Partial Credit
• 3 parts correct
High Partial Credit
• 4 parts correct</td></tr>
</table>

Q3	Model Solution – 20 Marks	Marking Notes
(a)&(b)	(a)(i) 3 (a)(ii) 2 (b) right-hand box: 4 (b) left-hand box: 8	**Scale 20D (0, 6, 11, 16, 20)** Accept correct answers without work *Low Partial Credit* • Work of merit in (a) **or** (b) E.g. finds a value with *x* and *y* swapped (i.e. (a)(i) = 6, (a)(ii) = 0, (b) right-hand box = 10, or (b) left-hand box = 3·5); or indicates relevant point on graph (i.e. (4,3), (2,1), (6,4), or (8,5)) *Mid Partial Credit* • 1 value correct (out of the 4) • Work of merit in (a) **and** (b) *High Partial Credit* • 2 values correct (out of the 4)

Q4	Model Solution – 20 Marks	Marking Notes
(a)&(b)	(a) $0{\cdot}2 \times 2450 = €490$ (b) $2450 - (490 - 275)$ $= 2450 - 215$ $= €2235$	**Scale 20D (0, 6, 11, 16, 20)** Accept correct answers without work *Low Partial Credit* • Work of merit in one part E.g. in (a) mentions 100, 0·2, or similar E.g. in (b) subtracts tax credit, or subtracts some figure from gross income *Mid Partial Credit* • Work of merit in both parts • One part correct *High Partial Credit* • One part correct **and** work of merit in other part

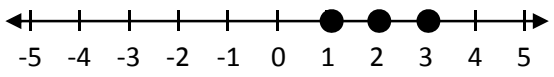
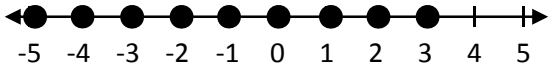
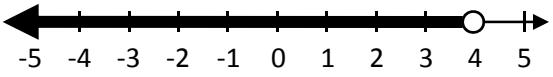
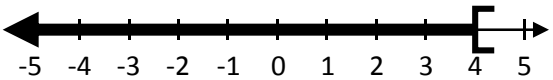
Q5	Model Solution – 30 Marks	Marking Notes
(a)	$40 + (3 \times 30)$ = €130	**Scale 10C (0, 4, 8, 10)** Accept correct answer without work Accept correct answer without € sign *Low Partial Credit* • Mentions 3 hours • Adds €40 to something • Multiplies €30 by something *High Partial Credit* • Mostly correct but uses incorrect time (eg. 2:45) **or** swops 30 and 40
(b)	$24{\cdot}83 \div 0{\cdot}71$ = $34{\cdot}9718...$ = €34·97 (2 DP)	**Scale 10B (0, 5, 10)** Accept correct answer without work Accept correct answer without € sign *Partial Credit* • Multiplies by 0·71 or divides by 24·83 *Full Credit –1* • Correct answer with incorrect or no rounding
(c)	$\frac{75{\cdot}90}{330} \times 100 = 23\%$	**Scale 10C (0, 4, 8, 10)** Accept correct answer without work *Low Partial Credit* • Some relevant work, e.g. uses 100, inverted fraction, adds VAT to €330, etc. *High Partial Credit* • $\frac{75{\cdot}90}{330}$ or 0·23 or equivalent • 77%

Q6	Model Solution – 20 Marks	Marking Notes
(a)&(b)	(a) 3·60 ÷ 2 = €1·80 (b) Brand A is cheaper per litre *Calculation*: B: 1·50 ÷ 0·75 = €2 **OR** A: 1·80 × 0·75 = €1·35 **or** *any other valid calculation(s) that allow a price per litre comparison*	**Scale 15D (0, 5, 9, 12, 15)** In (a), accept correct answer without work In (b), correct answer without supporting work is considered work of merit (**not** correct). *Low Partial Credit* • Work of merit in one part *Mid Partial Credit* • Work of merit in both parts • One part correct *High Partial Credit* • One part correct **and** work of merit in the other part *Full Credit – 1* • Calculations fully correct but cheaper brand not clearly indicated
(c)	Lowest price = €9·60 Combination 1: 3 × 2L = 3 × 3·60 = €10·80 Combination 2: (2 × 2L) + (2 × 0·75L) = (2 × 3·60) + (2 × 1·50) = €10·20 Combination 3: (1 × 2L) + (4 × 0·75L) = (1 × 3·60) + (4 × 1·50) = €9·60 Combination 4: 7 × 0·75L = 7 × 1·50 = €10·50	**Scale 5C (0, 2, 4, 5)** *Low Partial Credit* • Some attempt at combining quantities to make up at least 5 litres • Uses price per litre from (a) or (b) *High Partial Credit* • Correct total for any combination making up at least 5 litres • Correct answer with no work *Full Credit –1* • €9·60 as answer, with price of 1 other relevant combination calculated • All 4 possible totals calculated, cheapest not selected

Q7	Model Solution – 10 Marks	Marking Notes
(a)-(c)	(a) 89 270 (b) 89 000 (c) $8{\cdot}93 \times 10^4$	**Scale 10D (0, 4, 6, 8, 10)** Accept correct answer without work *Low Partial Credit* • Work of merit in 1 part: In (a): answers 89 260, 89 300, or 89 000 In (b): answers 90 000 or 89 300 In (c): incorrect relevant answer in the correct format *Mid Partial Credit* • 1 part correct • Work of merit in 2 parts *High Partial Credit* • 2 parts correct • 1 part correct **and** work of merit in other 2 parts

Q8	Model Solution – 15 Marks	Marking Notes
(a)&(b)	(a) $x(2x-1)+9(2x-1)$ $= 2x^2 - x + 18x - 9$ $= 2x^2 + 17x - 9$ (b) $a(3x+y)+c(3x+y)$ $= (3x+y)(a+c)$ **OR** $3x(a+c)+y(a+c)$ $= (a+c)(3x+y)$	**Scale 15D (0, 5, 9, 12, 15)** In (a), accept correct answer without work In (b), correct answer without supporting work is considered substantial work (**not** correct) *Low Partial Credit* • Work of merit in one part, e.g. in (a) sets up multiplication (including 2 arrows), or any correct relevant multiplication (including sign); in (b) indication of grouping of relevant terms *Mid Partial Credit* • Work of merit in **both** parts • Substantial work in (a) **or** (b), e.g. in (a) 3 terms correctly multiplied with correct signs, or all 4 terms correct in absolute value; in (b) one common factor correctly taken out of each pair, or correct answer with no supporting work *High Partial Credit* • One part correct • Substantial work in one part **and** work of merit in the other

Q9	Model Solution – 25 Marks	Marking Notes
(a)&(b)	(a) 30 m (b) 25 m	**Scale 10B (0, 5, 10)** Accept correct answer without work *Partial Credit* • (a) **or** (b) correct *Full Credit –1* • Correct answers for (a) & (b) swapped
(c)&(d)	(c) 10 seconds (d) $\frac{\text{Distance}}{\text{Time}} = \frac{25}{10} = 2{\cdot}5$ m/s **or** $\frac{5}{2}$ m/s	**Scale 10C (0, 4, 8, 10)** Accept correct answer without work Accept correct answer without unit in (d) *Low Partial Credit* • Part (c) correct • Work of merit in part (d) *High Partial Credit* • Part (d) correct • Part (c) correct **and** work of merit in (d) *Full Credit –1* • $\frac{25}{10}$
(e)	*Answer*: No *Reason*: The graph does not go in a straight line **or** *any other valid reason*	**Scale 5B (0, 2, 5)** *Partial Credit* • Correct answer, incorrect or no reason • Incorrect or no answer, correct reason

Q10	Model Solution – 5 Marks	Marking Notes
(a)-(c)	(a)  (b)  (c)  **OR**  	**Scale 5D (0, 2, 3, 4, 5)** Accept 0 as an element in (a) Accept correct answer without work *Low Partial Credit* • Any correct element in any part *Mid Partial Credit* • One part correct *High Partial Credit* • Two parts correct *Full Credit – 1* • 4 included in one or more solutions, otherwise fully correct

Q11	Model Solution – 15 Marks	Marking Notes
	Row 2: 2^5 *Row 3*: 2^6 *Row 4*: $2^{7+10} = 2^{17}$ *Row 5*: $2^{4\times 6} = 2^{24}$	**Scale 15D (0, 5, 9, 12, 15)** Accept correct answer without work *Low Partial Credit* • Work of merit in one part e.g. expansion such as 32 = 2x2x2x2x2, or one relevant formula *Mid Partial Credit* • Two parts correct • Work of merit in three parts *High Partial Credit* • Three parts correct *Full Credit –1* • Misreading: Correct powers given instead of numbers in form 2^p, i.e. 5, 6, 17, 24

Q12	Model Solution – 30 Marks	Marking Notes
(a)	*Row 3*: $J + 5$ *Row 4*: $J - 4$ *Row 5*: $2 \times J$ **OR** $2J$ *Row 6*: $\frac{1}{3} \times J$ **OR** $J \div 3$ **OR** $\frac{J}{3}$	**Scale 15D (0, 5, 9, 12, 15)** Accept correct answer without work *Low Partial Credit* • One part correct • Work of merit in one part, e.g. shows operation described (+5, –4, etc.) *Mid Partial Credit* • Two parts correct • Work of merit in 3 parts *High Partial Credit* • Three parts correct • Work of merit in all 4 parts
(b)	$5M - 2M = 35 - 2$ $\Rightarrow \quad 3M = 33$ $\Rightarrow \quad M = 11$	**Scale 15C (0, 5, 10, 15)** Note: 5 operations are needed to complete the question algebraically: 2 transpositions, 2 subtractions, and 1 division. *Low Partial Credit* • 1 correct relevant operation • Substitutes a value in for M *High Partial Credit* • 3 correct relevant operations • Correct answer with no supporting work • Substitutes a number of values in for M, including 11, but answer not indicated, or both sides not fully worked out in case of $M = 11$

Q13	Model Solution – 20 Marks	Marking Notes
(a)&(b)	(a) $f(x)$ is the straight line. $h(x)$ is the curve. (b) *Function*: $f(x)$ *Reason*: There's no x^2 term **or** *any other valid reason* **OR** *Function*: $h(x)$ *Reason*: It has an x^2 term **or** *any other valid reason*	**Scale 10C (0, 4, 8, 10)** *Low Partial Credit* • Work of merit in (a) or (b), e.g. in (a): 1 answer correct in (b): mentions linear, straight, curved and/or quadratic, or similar *High Partial Credit* • (a) **or** (b) correct. In (b), accept answer of $f(x)$ and reference to e.g. it being straight / linear, or to point on line; or answer of $h(x)$ and reference to e.g. it being quadratic / curved, or to point on curve
(c)&(d)	(c) – 0·45 (d) $8^2 - 24 - 1$ $= 64 - 24 - 1 = 39$	**Scale 10C (0, 4, 8, 10)** Accept correct answer without work In (c), accept answer from -0·3 to -0·5, inclusive *Low Partial Credit* • Work of merit in (c) **or** (d), e.g. in (c): indicates correct point on graph, or indicates answer from y-axis; in (d): any correct substitution *High Partial Credit* • (c) correct **and** work of merit in (d) • (d) correct

Q14	Model Solution – 30 Marks	Marking Notes
(a) (i)&(ii)	(i) $(x+7)(x-1)$ (ii) $x+7=0$ $\Rightarrow x=-7$ **AND** $x-1=0$ $\Rightarrow x=1$	**Scale 15D (0, 5, 9, 12, 15)** Accept correct answers without additional supporting work *Low Partial Credit* • Work of merit in (i) **or** (ii), e.g. In (i): Correct factorising of x^2 or 7, ignoring signs In (ii): Puts answer(s) from (i) = 0, **or** substitutes in a value for x, or quadratic formula. *Mid Partial Credit* • (i) **or** (ii) correct • Work of merit in **both** parts *High Partial Credit* • One part correct **and** work of merit in the other part
(b)	Equation 1 – Equation 2: $2x=14$ $\Rightarrow x=7$ Equation 2: $7+2y=25$ $\Rightarrow 2y=25-7=18$ $\Rightarrow y=9$	**Scale 15C (0, 5, 10, 15)** Accept solution by inspection, or by trial and improvement, if it is verified for both equations *Low Partial Credit* • One correct operation • Substitution of incorrect solution into both equations *High Partial Credit* • One correct solution for x or y, by algebra • x and y correct, with no supporting work • Finds x incorrectly by algebra, finishes correctly to find y