2015 Mathematics

Intermediate 1 Units 1, 2 and 3 Paper 1

Finalised Marking Instructions

Part Two: General Marking Principles for Mathematics Intermediate 1 Units 1, 2 and 3 Paper 1

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14. Where more than one solution is given, mark them all and award the least mark.

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Part Three: Mathematics Intermediate 1: Units 1, 2 and 3 Paper 1,

Question			Expected Answer/s	Max Mark	Additional Guidance
1	**a**		**Ans: 1·184** •[1] calculate 1·564 – 0·38: 1·184	**1**	
1	**b**		**Ans: 21 980** •[1] calculate 3·14 × 7000: 21980	**1**	
1	**c**		**Ans: 70** •[1] calculate $^5/_6$ of 84: 70	**1**	
2			**Ans: $^3/_8$** •[1] find probability: $^9/_{24}$ •[2] simplify fraction: $^3/_8$	**2**	1. Correct answer without working award 2/2 2. 3/5 (no working necessary) award 1/2 ×✓ 3. Final answer must be a fraction 9:24, 3:8, 9 out of 24, 3 out of 8, 9 in 24, 3 in 8, 9−24, 3−8, 0·375, 37·5% award 1/2 ✓×
3			**Ans: 39°C** •[1] correct method: 16 – (–23) •[2] correct answer: 39	**2**	1. Correct answer without working award 2/2 2. For −39°C award 1/2 3. Accept number line from −23 to 16 as evidence of correct method award 1/2

Question			Expected Answer/s	Max Mark	Additional Guidance
4	**a**		**Ans:** x | -4 | 0 | 2 y | **-5** | **3** | **7** •[1] calculate y when $x = -4$: -5 •[2] calculate y when $x = 0$ **and** 2: 3 **and** 7	**2**	
4	**b**		**Ans: straight line graph of $y = 3 + 2x$** •[1] correctly plot all three points from the table •[2] draw straight line through the three points shown in the table	**2**	1. If the line $y = 3 + 2x$ is drawn (even if this is not consistent with the points in the table) award 2/2 [minimum acceptable length: line joining $(-2,-1)$ to $(2,7)$] 2. Where the three points plotted are consistent with the table and are not collinear, the 2nd mark is unavailable **[check gradients]** 3. Where (y,x) is consistently plotted, answer should be followed through with the possibility of awarding the 2nd mark
5			**Ans: 27 minutes** •[1] find volume: $6 \times 6 \times 6 = 216$ •[2] know how to find time: volume $\div 8$ •[3] correctly divide by 8: (volume) $\div 8 = 27$	**3**	1. Correct answer without working award 3/3

Question			Expected Answer/s	Max Mark	Additional Guidance
6			**Ans: 9** •[1] calculate –5 + 2 correctly: –3 •[2] know how to square (g + 2): -3×-3 •[3] square (g + 2) correctly: 9	**3**	1. Correct answer without working award 0/3 2. Final mark only available for squaring a negative number. 3. Answers acceptable for partial credit (valid working must be shown) (i) $-5 + 2^2 = -5 + 4 = -1$ award 1/3 (ii) $-7^2 = -49$ award 1/3 ×✓× (iii) $-3^2 = -9$ award 2/3 ✓✓× (iv) $(-5 + 2)^2 = 7^2 = 49$ award 0/3
7	**a**		**Ans: 25 litres** •[1] state mode: 25	**1**	
7	**b**		**Ans: 390** **245** **1645** •[1] complete table: 390 245 1645	**1**	
7	**c**		**Ans: 23·5 litres** •[1] know to divide Σfx by 70: $1645 \div 70$ •[2] correctly divide Σfx by 70: $1645 \div 70 = 23{\cdot}5$	**2**	1. Correct answer without working subsequent to part (a) award 2/2 2. 1st mark may only be awarded for attempting $\sum fx \div 70$ 3. Award 0/2 for eg $1645 \div 5 = 329$, $70 \div 7 = 10$ 4. Accept $\Sigma fx \div 10 \times 7$ as evidence of **knowing** to divide Σfx by 70

Question			Expected Answer/s	Max Mark	Additional Guidance
8			**Ans: $a = 16$** •^{1} start to collect like terms: $\pm 2a$ or ± 32 •^{2} collect like terms **and** equate: $2a = 32$ or $-2a = -32$ •^{3} solve equation for a: $a = 16$	**3**	1. For answers without valid working award 1/3 eg (i) $a = 16$ without working (ii) $16 + 42 = 3 \times 16 + 10 \rightarrow a = 16$ 2. For the award of the third mark an answer of the form $a =$ is required Special case : accept $16 = a$ 3. Answers acceptable for partial credit (valid working must be shown) eg (i) $2a = 32 \rightarrow 16$ (ii) $2a = 52 \rightarrow a = 26$ } award 2/3 (iii) $4a = 32 \rightarrow a = 8$ (iv) $4a = 52 \rightarrow a = 13$ award 1/3
9			**Ans: £222·3(0)** •^{1} find basic premium: $26 \times 9 = 234$ •^{2} find discount: $234 \div 10 \div 2 = 11{\cdot}70$ •^{3} find net premium: $234 - 11{\cdot}70 = 222{\cdot}30$	**3**	1. Correct answer without working award 3/3 2. Alternate Strategy •^{1} find discount $26 \div 10 \div 2 = 1{\cdot}30$ •^{2} find net: $26 - 1{\cdot}30 = 24{\cdot}70$ •^{3} find premium $24{\cdot}70 \times 9 = 222{\cdot}30$ or •^{1} find discount $26 \div 10 \div 2 = 1{\cdot}30$ •^{2} find total discount $1{\cdot}30 \times 9 = 11{\cdot}70$ •^{3} find premium $26 \times 9 - 11{\cdot}70 = 222{\cdot}30$
10			**Ans: 0·3** •^{1} find $\sqrt{t}$ correctly: $\sqrt{16} = 4$ •^{2} know to divide 120 by $100 \times \sqrt{16}$: $120 \div (100 \times 4)$ •^{3} multiply and divide correctly: 0·3	**3**	1. Correct answer without working award 3/3 2. Accept $^3/_{10}$ award 3/3 3. (a) $(120 \div 100) \times \sqrt{16} = 4{\cdot}8$ award 2/3 ✓×✓ (b) $120 \div (100 \times 8) = 0{\cdot}15$ award 2/3 ×✓✓ (c) $^{12}/_{40}$ award 2/3 ✓✓× (d) $^{120}/_{400}$ award 1/3 ✓×× (e) $^{12}/_{(10\sqrt{16})}$ award 1/3 ×✓× (f) $^{120}/_{(100\sqrt{16})}$ award 0/3 (g) $120 \div 100 = 1{\cdot}2$ award 0/3

TOTAL MARKS FOR PAPER 1

30

[END OF MARKING INSTRUCTIONS]

2015 Mathematics

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Part Three: Mathematics Intermediate 1: Units 1, 2 and 3 Paper 2

Question			Expected Answer/s	Max Mark	Additional Guidance
1			**Ans: 1·5 g** •[1] find number of grams per ml: $0{\cdot}6 \div 100 = 0{\cdot}006$ •[2] find number of grams in 250 ml: $0{\cdot}006 \times 250 = 1{\cdot}5$	**2**	1. Correct answer without working award 2/2 2. Alternative strategies (a) •[1] find scale factor: $250 \div 100 = 2{\cdot}5$ •[2] find number of grams in 250 ml: $2{\cdot}5 \times 0{\cdot}6 = 1{\cdot}5$ (b) •[1] $250 \div (100 \div 0{\cdot}6)$ •[2] 1·5 [$100 \div 0{\cdot}6$ is not enough for the 1st mark] 3. Common answer $0{\cdot}6 \times 250 = 150$g award 0/2
2			**Ans: $9{\cdot}7 \times 10^8$** •[1] correct coefficient: 9·7 •[2] correct power of ten: $9{\cdot}7 \times 10^8$	**2**	1. The second mark can be awarded for a consistent power of ten eg 97×10^7
3			**Ans: $m < 9$** •[1] collect constants: $7m < 63$ •[2] solve inequality for m: $m < 9$	**2**	1. For answers without valid working award 1/2 eg (a) $m < 9$ without working ×✓ (b) $7 \times 9 + 5 < 68 \rightarrow m < 9$ ×✓ (c) $7m = 63 \rightarrow m < 9$ ×✓ 2. Answers acceptable for partial credit (valid working must be shown) award 1/2 (a) $7m < 63 \rightarrow < 9$ ✓× (b) $7m < 63 \rightarrow m = 9$ ✓× (c) $7m = 63 \rightarrow m = 9$ ✓× (d) $7m < 73 \rightarrow m < 10{\cdot}4(28\ldots)$ ×✓

Question			Expected Answer/s	Max Mark	Additional Guidance
4			**Ans: 0610 or 6·10am (on Tuesday)** •[1] correct method: 0945 + 13h25m + 7h •[2] correct answer: 0610 or 6·10am	**2**	1. Correct answer without working award 2/2 2. Accept 6·10 3. (a) 6·10pm or 1810 award 1/2 (b) 3010 or 2970 award 1/2 (c) 0945 + 13h + 7h = 0545 award 1/2 (d) 0945 + 13h25m − 7h = 1610/4·10pm award 1/2 (e) 0945 + 13h 25 mins = 2310 award 0/2
5	**a**		**Ans: line of best fit drawn** •[1] draw line of best fit:	**1**	1. Accept straight lines with $-{}^{5\cdot8}/_{1000} \leq$ gradient $\leq -{}^{7\cdot7}/_{1000}$ and |(points above line) – (points below line)| ≤ 2
5	**b**		**Ans: consistent with line of best fit** •[1] consistent with line of best fit:	**1**	1. You may have to extend candidate's line to check answer

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6	**a**		**Ans: $14u + 47$** •[1] multiply out first bracket: $20u + 44$ •[2] multiply out second bracket: $3 - 6u$ •[3] collect like terms: $14u + 47$	**3**	1. Correct answer without working award 3/3 2. **Special case**: only first term in each bracket is multiplied (working must be shown) $20u + 11 + 3 - 2u = 18u + 14$ award 2/3 3. Some common answers (valid working must be shown) (a) $26u + 47$ award 2/3 ✓✓× (b) $20u + 44 + 3 - 2u$ award 1/3 ✓×× (c) 3rd mark is not available if there is invalid subsequent working eg $14u + 47 \rightarrow 61u$ award 2/3 $14u + 47 \rightarrow 47/14$ award 2/3
6	**b**		**Ans: $6(2w + 3)$** •[1] identify common factor: 6 or $2w + 3$ •[2] factorise: $6(2w + 3)$	**2**	1. eg $2(6w + 9)$, $3(4w + 6)$, $12(w + 1{\cdot}5)$ award 1/2

Question			Expected Answer/s	Max Mark	Additional Guidance
7	**a**		**Ans: 30 minutes** •[1] interpret graph: 30 minutes or equivalent	**1**	
7	**b**		**Ans: 48 mph** •[1] know how to find speed: $S = {}^{D}/_{T}$ •[2] interpret graph: D = 180, T = 3h45m •[3] find speed: 180 ÷ 3·75 = 48	**3**	1. Correct answer without working award 3/3 2. Some common answers (working must be shown, rounding or truncation is acceptable) (a) 180 ÷ 225 = 0·8 **miles/minute** award 3/3 (b) 180 ÷ 225 = 0·8 award 2/3 ✓✓× (c) 180 ÷ 3·45 = 52(·1…) award 2/3 ✓✓× (d) 180 × 3·75 = 675 award 2/3 ×✓✓ (e) 180 × 3·45 = 621 award 1/3 ×✓× (f) 180 × 225 = 40500 award 1/3 ×✓× 3. Where **time is only given in decimal form** then 3rd mark is only available for division (or multiplication) by: 3·75, 5·75 (total journey time) or 1·75 (time from Dumfries to Glasgow). eg 260 ÷ 5·75 = 45(·2…) ✓×✓ 80 × 1·75 = 140 ××✓ 4. 3rd mark is not available for division by a whole number.

Question			Expected Answer/s	Max Mark	Additional Guidance
8			**Ans:**	**3**	

T-shirt £12	Signed Photograph £8	Baseball Cap £6	Poster £5	Fluorescent Stick £2	Total Cost £
	✓		✓	✓	15
	✓	✓		✓	16
	✓	✓	✓		19
✓			✓	✓	19
✓		✓		✓	20

	•[1] one correct row: •[2] two more correct rows: •[3] final two correct rows:	1. Where there are missing totals a maximum of 2 marks is available (a) 5 rows otherwise "correct" award 2/3 (b) 2 rows otherwise "correct" award 1/3
9 **a**	**Ans: 59** •[1] order numbers: 37 39 42 48 57 61 64 72 73 81 •[2] find median: 59	**2** 1. Correct answer without working award 2/2 2. 77 [numbers not ordered] award 1/2 3. If 'correct' median is found from ordered list with one missing or one extra number award 1/2
9 **b**	**Ans: 44** •[1] find range: 81 – 37 = 44	**1**
9 **c**	**Ans:** **On average Lido shoppers spent less.** **Lido shoppers' spending varied more.** •[1] interpret statistics: Lido was less •[2] interpret statistics: Lido varied more	**2** 1. Answer must be consistent with answers to parts (a) and (b) 2. Do **not** accept eg Lido has a smaller median Lido has a larger range

Question			Expected Answer/s	Max Mark	Additional Guidance
10			**Ans: 264 cm** •[1] correct form of Pythagoras' Theorem: $27^2 + 19^2$ •[2] calculate sum (or difference) of two squares: 1090 •[3] calculate the square root of a calculated value: 33 (·0151…) •[4] calculate length: $8 \times 33(\cdot 0151\ldots) = 264(\cdot 1211\ldots)$	**4**	1. Correct answer without working award 4/4 2. A common answer (working must be shown) $\sqrt{(27^2 - 19^2)} = 19(\cdot 18\ldots) \rightarrow 19 \times 8 = 152$ [or 19·18…×8 = 153·46….] award 3/4 ×✓✓✓ 3. Final mark is not available if there is invalid subsequent working. 4. Alternate strategy •[1] $27 \times 8 = 216$ **and** $19 \times 8 = 152$ •[2] correct form of Pythagoras' Theorem $216^2 + 152^2$ •[3] calculate sum (or difference) of two squares: 69760 •[4] calculate the square root of a calculated value: 264(·1211..) 5. Note 4th mark available for correctly calculating 8 × previously calculated value.
11			**Ans: 468 swiss francs** •[1] convert €1500 into pounds: $1500 \div 1{\cdot}25 = 1200$ •[2] subtract 875 from answer to above: $1200 - 875 = 325$ •[3] convert answer to above into Swiss francs: $325 \times 1{\cdot}44 = 468$	**3**	1. Correct answer without working award 3/3 2. Some common answers (working must be shown) (a) 694·44 [(1500 × 1·25–875) ÷ 1·44] award 2/3 (b) 1440 [(1500 × 1·25–875) × 1·44] award 2/3 (c) 1728 [(1500 ÷ 1·25) × 1·44] award 2/3 (d) 1000 [1500 × 1·25 – 875] award 1/3 (e) 900 [(1500 – 875) × 1·44] award 1/3 (f) 1260 [875 × 1·44] award 1/3 (g) 2160 [1500 × 1·44] award 0/3

Question			Expected Answer/s	Max Mark	Additional Guidance
12			**Ans: 8 cm** •[1] use correct cosine ratio: $\cos 55^\circ = {}^{r}/_{7}$ •[2] know how to solve equation: $r = 7\cos 55^\circ$ •[3] carry out trigonometric calculation: 4(·015…) •[4] find diameter: $2 \times 4(\cdot 015\ldots) = 8(\cdot 03\ldots)$	**4**	1. Correct answer without working award 0/4 2. Do not penalize inadvertent use of radians or grads 0·3(097…) (radian used) award 4/4 9(·092…) (grads used) award 4/4 3. Where an incorrect trig ratio is used, working should be followed through with the possibility of awarding 3/4. (a) 11(·46…) [2 × 7 sin55º] award 3/4 ×✓✓✓ (b) 20, 19·9(94…) [2 × 7 tan55º] award 3/4 ×✓✓✓ 4. In awarding the 4th mark, the trig. ratio should not be rounded to any less than 2 decimal places, eg (a) 2 × 7cos 55º = 14 × 0·57 = 7·98 award 4/4 (b) 2 × 7cos 55º = 14 × 0·6 = 8·4 award 3/4 ✓✓✓× 5. Do **not** award the 4th mark if there is invalid subsequent working eg 2 × 7cos 55º = 8 → √8 = 2·8 award 3/4 ✓✓✓×

Question			Expected Answer/s	Max Mark	Additional Guidance
13			**Ans: £321·75**	**3**	
			$\bullet^1\bullet^2$ know how to calculate interest: $^{7·8}/_{100} \times 4500 \times {}^{11}/_{12}$ (award 1 for $^{7·8}/_{100} \times 4500$ or $^{11}/_{12} \times {}^{7·8}/_{100}$ or $^{11}/_{12} \times 4500$) $\bullet^3$ carry out percentage and fraction calculations correctly: 321·75		1. Correct answer without working award 3/3 2. If answer is 4821·75 [4500 + 321·75] (no working necessary) (a) award 3/3 if candidate **states** that interest is 321·75 (b) award 2/3 if candidate does **not state** that interest is 321·75 3. Acceptable answers for partial credit (no working necessary) (a) 351 [7·8% of 4500] award 1/3 (b) 0·0715 [$^{11}/_{12} \times {}^{7·8}/_{100}$] award 1/3 (c) 7·15 [$^{11}/_{12} \times 7.8$] award 1/3 (d) 4125 [$^{11}/_{12} \times 4500$] award 1/3 (e) 3861 [351 × 11] award 1/3 4. Premature rounding leading to an incorrect answer eg $^{11}/_{12}$ = 0·916…. = 0·92 $\rightarrow {}^{7·8}/_{100} \times 4500 \times 0·92 = 322·92$ award 2/3 ✓✓× 5. The following common wrong answers illustrate where the 3rd mark is available to candidates, working must be shown. (note: answer must be rounded or truncated to nearest penny) (a) $4500 \times {}^{100}/_{7·8} \times {}^{11}/_{12} = 52884·62$ or 52884·61 × ✓✓ (b) $4500 \div 7·8 \times {}^{11}/_{12} = 528·85$ or 528·84 ×✓× (c) $4500 \times {}^{7·8}/_{100} \times {}^{12}/_{11} = 382·91$ or 382·90 ✓×✓ (d) $4500 \times 0·78 \times {}^{12}/_{11} = 3829·09$ ××✓

Question			Expected Answer/s	Max Mark	Additional Guidance
14			**Ans: 24%** •[1] find reduction: 1·26 •[2] know to express reduction as a fraction of 5·25: $^{1\cdot26}/_{5\cdot25}$ •[3] know to multiply fraction by 100: $^{1\cdot26}/_{5\cdot25} \times 100$ •[4] carry out all calculations correctly: 24	**4**	1. Correct answer without working award 4/4 2. 4th mark is only available for calculations of the form $^{a}/_{b} \times c$ where a,b,c = reduction or 3·99 or 5·25 or 100. 3. Some common answers (working must be shown) (a) 32, 31(·57…) $[^{1\cdot26}/_{3\cdot99} \times 100]$ award 3/4 ✓×✓✓ (b) 76 $[^{3\cdot99}/_{5\cdot25} \times 100]$ award 3/4 ×✓✓✓ (c) 132, 131(·57..) $[^{5\cdot25}/_{3\cdot99} \times 100]$ award 2/4 ××✓✓ (d) 0·21, 0·2(09475) $[^{3\cdot99}/_{100} \times 5\cdot25$ or $^{5\cdot25}/_{100} \times 3\cdot99]$ award 1/4 × ××✓

Question			Expected Answer/s	Max Mark	Additional Guidance
15			**Ans: 548 m^2** •^{1} know how to calculate area of semi-circle: ½ πr^2 •^{2} substitute correct radius into formula: ½ × π × 14^2 •^{3} know to add area of rectangle to previously calculated value: previously calculated value + 20 × 12 •^{4} carry out all calculations correctly: 307·876… + 240 = 547·876…. [½ × 3·14 × 14^2 = 307·72] (must include a circle calculation **followed by** an addition or subtraction) •^{5} round to nearest whole number: 548	**5**	1. Correct answer without working award 0/5 2. Where no formula is stated accept (a) ½ × π × 14^2 or 308 or 307·876…. as evidence of ½πr^2 being used (b) ½ × π × 28 or 44 or 43·98… as evidence of ½πd being used 3. **Some** common answers (working must be shown) (a) 856 or 855 [π×14^2 + 240] award 4/5 ×✓✓✓✓ (b) 360 [½ × π × 14^2 + 4 + 12 + 20 + 12 + 4] award 4/5 ✓✓×✓✓ (c) 1472 or 1471 [½ × π × 28^2 + 240] award 4/5 ×✓✓✓✓ **or** ✓×✓✓✓ (d) 284 [½ × π × 28 + 240] award 4/5 ×✓✓✓✓ (e) 262 [½ × π × 14 + 240] award 3/5 ××✓✓✓ (f) 308 [½ × π × 14^2] award 3/5 ✓✓××✓ (g) 616 or 615 [π × 14^2] award 2/5 ×✓××✓ (h) 44 [½ × π × 28] award 2/5 ×✓××✓ (i) 88 [π × 28] award 2/5 ×✓××✓ 4. (a) 5th mark is only available where the answer to circle calculation requires rounding. (b) Where premature rounding leads to incorrect answer, a maximum of 4/5 is available.

TOTAL MARKS FOR PAPER 2
50

TOTAL MARKS FOR PAPER 1 & 2
80

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- bad form, eg sin $x° = 0{\cdot}5 = 30°$
- legitimate variation in numerical values/algebraic expressions.

7. Full credit should only be given where the solution contains appropriate working. Where the correct answer may be obtained by inspection or mentally, credit may be given, but reference to this will be made in the Marking Instructions.

8. In general only give credit for answers if working is shown. A wrong answer without working receives no credit unless specifically mentioned in the Marking Instructions. The rubric on page one of the question paper states that 'full credit will be given only where the solution contains appropriate working'.

9. Sometimes the method to be used in a particular question is explicitly stated; no credit should be given where a candidate obtains the correct answer by an alternative method.

10. Where the method to be used in a particular question is not explicitly stated, full credit must be given for alternative methods which produce the correct answer.

11. Do not penalise the same error twice in the same question.

12. Do not penalise a transcription error unless the question has been simplified as a result.

13. Where a solution has been scored out and not replaced then provided the solution is legible marks should be awarded in line with the Marking Instructions for that question.

14. Where more than one solution is given, mark them all and award the least mark.

15. The symbols ✓ and × are used in the Marking Instructions to give guidance regarding the awarding of marks for specific candidate responses to some questions, eg 'award 2/4 ✓××✓' indicates that the 1st & 4th marks should be awarded but the 2nd & 3rd marks should not.

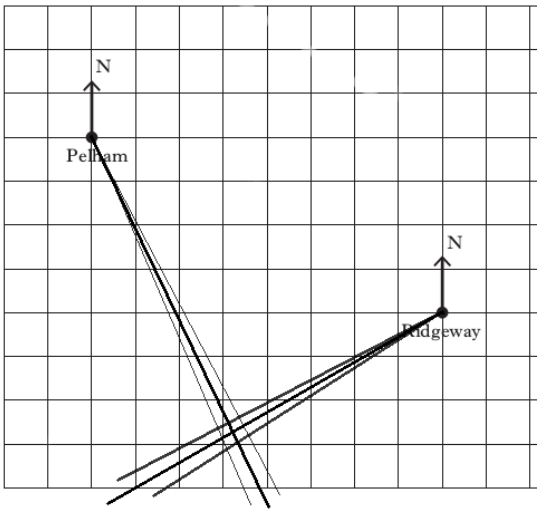
Part Three: Mathematics Intermediate 1: Units 1, 2 and Applications Paper 1

Question			Expected Answer/s	Max Mark	Additional Guidance
1	**a**		**Ans: 1·184** •[1] calculate 1·564 – 0·38: 1·184	**1**	
1	**b**		**Ans: 21 980** •[1] calculate 3·14 × 7000: 21980	**1**	
1	**c**		**Ans: 70** •[1] calculate $^5/_6$ of 84: 70	**1**	
2			**Ans: $^3/_8$** •[1] find probability: $^9/_{24}$ •[2] simplify fraction: $^3/_8$	**2**	1. Correct answer without working award 2/2 2. 3/5 (no working necessary) award 1/2 ×✓ 3. Final answer must be a fraction 9:24, 3:8, 9 out of 24, 3 out of 8, 9 in 24, 3 in 8, 9−24, 3−8, 0·375, 37·5% award 1/2 ✓×
3			**Ans: 39°C** •[1] correct method: 16 – (–23) •[2] correct answer: 39	**2**	1. Correct answer without working award 2/2 2. For −39°C award 1/2 3. Accept number line from −23 to 16 as evidence of correct method award 1/2

Question			Expected Answer/s	Max Mark	Additional Guidance
4	**a**		**Ans: 66** •[1] evaluate formula: 66	**1**	
4	**b**		**Ans: =AVERAGE(F3..F7)** •[1] state formula: AVERAGE(F3..F7) or equivalent	**1**	1. Accept any punctuation mark or space between F3 and F7 2. Accept abbreviations for AVERAGE eg AV(F3..F7) 3. Accept (F3+F4+F5+F6+F7)/5 or SUM(F3..F7)/5 [must be / **not** ÷]
5			**Ans: 27 minutes** •[1] find volume: $6 \times 6 \times 6 = 216$ •[2] know how to find time: volume ÷ 8 •[3] correctly divide by 8: (volume) ÷ 8 = 27	**3**	1. Correct answer without working award 3/3
6			**Ans: 9** •[1] calculate $-5 + 2$ correctly: -3 •[2] know how to square $(g + 2)$: -3×-3 •[3] square $(g + 2)$ correctly: 9	**3**	1. Correct answer without working award 0/3 2. Final mark only available for squaring a negative number. 3. Answers acceptable for partial credit (valid working must be shown) (i) $-5 + 2^2 = -5 + 4 = -1$ award 1/3 (ii) $-7^2 = -49$ award 1/3 ×✓× (iii) $-3^2 = -9$ award 2/3 ✓✓× (iv) $(-5 + 2)^2 = 7^2 = 49$ award 0/3

Question			Expected Answer/s	Max Mark	Additional Guidance
7	**a**		**Ans: 25 litres** •[1] state mode: 25	**1**	
7	**b**		**Ans: 390** **<u>245</u>** **<u>1645</u>** •[1] complete table: 390 <u>245</u> <u>1645</u>	**1**	
7	**c**		**Ans: 23·5 litres** •[1] know to divide Σfx by 70: $1645 \div 70$ •[2] correctly divide Σfx by 70: $1645 \div 70 = 23{\cdot}5$	**2**	1. Correct answer without working subsequent to part (a) award 2/2 2. 1st mark may only be awarded for attempting $\sum fx \div 70$ 3. Award 0/2 for eg $1645 \div 5 = 329$, $70 \div 7 = 10$ 4. Accept $\Sigma fx \div 10 \times 7$ as evidence of **knowing** to divide Σfx by 70

Question			Expected Answer/s	Max Mark	Additional Guidance
8			**Ans: $Q_1 = 65$, $Q_2 = 82$, max = 97** •[1] arrange numbers in order: 53 59 61 65 68 76 80 84 86 87 87 93 94 97 •[2] show maximum in correct place: 97 •[3] show median in correct place: 82 •[4] show lower quartile in correct place: 65	**4**	1. The only acceptable answer for the maximum is 97, even where candidate does not order list. 2. Where there is no working but answers appear in the boxplot and (a) $Q_1 = 65$ or $Q_2 = 82$ [evidence of ordered list] maximum available mark is 4/4 (b) $Q_1 = 61$ or $Q_2 = 73$ [evidence of unordered list] 1st mark is not available eg (i) $Q_1 = 61$, $Q_2 = 73$, max = 97 award 3/4 (ii) $Q_2 = 61$, $Q_3 = 73$, max = 80 award 2/4 3. If Q_1, Q_2 and maximum are not shown on boxplot a maximum of 3/4 is available 4. Where there are missing or extra numbers in an ordered list follow through working with the possibility of awarding (a) a maximum of 3 marks (2nd, 3rd & 4th) is available where there is one missing or extra number (b) a maximum of 2 marks (2nd & 3rd) is available where there are two missing or extra numbers 5. If Q_2 is incorrect, working should be followed through with the possibility of awarding the 4th mark.
9			**Ans: £222·3(0)** •[1] find basic premium: 26 × 9 = 234 •[2] find discount: 234 ÷ 10 ÷ 2 = 11·70 •[3] find net premium: 234 – 11·70 = 222·30	**3**	1. Correct answer without working award 3/3 2. Alternate Strategy •[1] find discount 26 ÷ 10 ÷ 2 = 1·30 •[2] find net: 26 – 1·30 = 24·70 •[3] find premium 24·70 × 9 = 222·30 **or** •[1] find discount 26 ÷ 10 ÷ 2 = 1·30 •[2] find total discount 1·30 × 9 = 11·70 •[3] find premium 26 × 9 – 11·70 = 222·30

Question			Expected Answer/s	Max Mark	Additional Guidance
10	**a**		**Ans: 360 km** •[1] find distance: $9 \times 40 = 360$	**1**	
10	**b**		**Ans: Bearings 150° from Pelham, 240° from Ridgeway and point of intersection shown** •[1] interpret/communicate: one bearing shown correctly ($\pm 2^\circ$) •[2] interpret/communicate: second bearing shown correctly ($\pm 2^\circ$) •[3] strategy/process: find point of intersection of two bearings	**3**	1. Diagram below shows the acceptable limits for the position of the aeroplane 2. If the bearings are not drawn on the diagram: (i) aeroplane in correct position award 3/3 (ii) aeroplane on correct bearing from either A or B award 1/3 3. Where two incorrect lines are drawn the 3rd mark is only available if one line originates at Pelham and the other originates at Ridgeway 

TOTAL MARKS FOR PAPER 1

30

[END OF MARKING INSTRUCTIONS]

2015 Mathematics

Intermediate 1 Units 1, 2 and Applications Paper 2

Finalised Marking Instructions

Part Two: General Marking Principles for Mathematics Intermediate 1 Units 1, 2 and Applications Paper 2

This information is provided to help you understand the general principles you must apply when marking candidate responses to questions in this Paper. These principles must be read in conjunction with the specific Marking Instructions for each question.

1. Marks for each candidate response must always be assigned in line with these general marking principles and the specific Marking Instructions for the relevant question. If a specific candidate response does not seem to be covered by either the principles or detailed Marking Instructions, and you are uncertain how to assess it, you must seek guidance from your Team Leader.

2. Marking should always be positive ie, marks should be awarded for what is correct and not deducted for errors or omissions.

3. Award one mark for each 'bullet' point shown in the Marking Instructions.

4. Working subsequent to an error must be followed through with the possibility of awarding all remaining marks for the subsequent working, provided the question has not been not simplified as a result of the error. In particular, the answer to one part of a question, even if incorrect, must be accepted as a basis for subsequent dependent parts of the question. Full marks in the dependent part(s) may be awarded provided the question has not been not simplified.

5. Solutions which seem unlikely to include anything of relevance must nevertheless be followed through. Candidates still have the opportunity of gaining one mark or more provided the solution satisfies the criteria for the marks.

6. The following should not be penalised:

- working subsequent to a correct answer (unless it provides firm evidence that the requirements of the question have not been met)
- omission or misuse of units (unless marks have been specifically allocated for the purpose in the Marking Instructions)
- bad form, eg sin $x° = 0{\cdot}5 = 30°$
- legitimate variation in numerical values/algebraic expressions

7. Full credit should only be given where the solution contains appropriate working. Where the correct answer may be obtained by inspection or mentally, credit may be given, but reference to this will be made in the Marking Instructions.

8. In general only give credit for answers if working is shown. A wrong answer without working receives no credit unless specifically mentioned in the Marking Instructions. The rubric on page one of the question paper states that 'full credit will be given only where the solution contains appropriate working'.

9. Sometimes the method to be used in a particular question is explicitly stated; no credit should be given where a candidate obtains the correct answer by an alternative method.

10. Where the method to be used in a particular question is not explicitly stated, full credit must be given for alternative methods which produce the correct answer.

11. Do not penalise the same error twice in the same question.

12. Do not penalise a transcription error unless the question has been simplified as a result.

13. Where a solution has been scored out and not replaced then provided the solution is legible marks should be awarded in line with the Marking Instructions for that question.

14. Where more than one solution is given, mark them all and award the least mark.

15. The symbols ✓ and × are used in the Marking Instructions to give guidance regarding the awarding of marks for specific candidate responses to some questions, eg 'award 2/4 ✓××✓' indicates that the 1st & 4th marks should be awarded but the 2nd & 3rd marks should not.

Part Three: Mathematics Intermediate 1: Units 1, 2 and Applications Paper 2

Question			Expected Answer/s	Max Mark	Additional Guidance
1			**Ans: 1·5 g** •[1] find number of grams per ml: 0·6 ÷ 100 = 0·006 •[2] find number of grams in 250 ml: 0·006 × 250 = 1·5	**2**	1. Correct answer without working award 2/2 2. Alternative strategies (a) •[1] find scale factor: 250 ÷ 100 = 2·5 •[2] find number of grams in 250 ml: 2·5 × 0·6 = 1·5 (b) •[1] 250 ÷ (100 ÷ 0·6) •[2] 1·5 [100 ÷ 0·6 is not enough for the 1st mark] 3. Common answer 0·6 × 250 = 150g award 0/2
2	**a**		**Ans: 21** •[1] interpret table: 21	**1**	
2	**b**		**Ans: £7350** •[1] find total payments: 7350	**1**	
2	**c**		**Ans: £1350** •[1] subtract 6000 from total payments: 1350	**1**	
3			**Ans: £214·24** •[1] find number of free teachers: 2 •[2] find total cost excluding surcharge: 23 × 8 + 2 × 12 = 208 •[3] find total cost: $208 + {}^{3}/_{100} \times 208 =$ 214·24	**3**	1. Correct answer without working award 3/3

Question			Expected Answer/s	Max Mark	Additional Guidance
4			**Ans: 0610 or 6.10am (on Tuesday)** •[1] correct method: 0945 + 13h25m + 7h •[2] correct answer: 0610 or 6·10am	**2**	1. Correct answer without working award 2/2 2. Accept 6·10 3. (a) 6·10pm or 1810 award 1/2 (b) 3010 or 2970 award 1/2 (c) 0945 + 13h + 7h = 0545 award 1/2 (d) 0945 + 13h25m − 7h = 1610/4·10pm award 1/2 (e) 0945 + 13h 25 mins = 2310 award 0/2
5	**a**		**Ans: line of best fit drawn** •[1] draw line of best fit:	**1**	1. Accept straight lines with $-\frac{5\cdot8}{1000} \leq$ gradient $\leq -\frac{7\cdot7}{1000}$ and |(points above line) – (points below line)| ≤ 2
5	**b**		**Ans: consistent with line of best fit** •[1] consistent with line of best fit:	**1**	1. You may have to extend candidate's line to check answer
6			**Ans: £255** •[1] find number of basic hours and number of overtime hours: 24 hours basic; 4 hours overtime •[2] find basic pay: 24 × 8·50 = 204 •[3] find overtime pay: 4 × 12·75 = 51 •[4] find total pay: 204 + 51 = 255	**4**	1. Correct answer without working award 4/4

Question			Expected Answer/s	Max Mark	Additional Guidance
7	**a**		**Ans: 30 minutes** •[1] interpret graph: 30 minutes or equivalent	**1**	
7	**b**		**Ans: 48 mph** •[1] know how to find speed: $S = {}^{D}/_{T}$ •[2] interpret graph: D = 180, T = 3h45m •[3] find speed: 180 ÷ 3·75 = 48	**3**	1. Correct answer without working award 3/3 2. Some common answers (working must be shown, rounding or truncation is acceptable) (a) 180 ÷ 225 = 0·8 **miles/minute** award 3/3 (b) 180 ÷ 225 = 0·8 award 2/3 ✓✓× (c) 180 ÷ 3·45 = 52(·1…) award 2/3 ✓✓× (d) 180 × 3·75 = 675 award 2/3 ×✓✓ (e) 180 × 3·45 = 621 award 1/3 ×✓× (f) 180 × 225 = 40500 award 1/3 ×✓× 3. Where **time is only given in decimal form** then 3rd mark is only available for division (or multiplication) by: 3·75, 5·75 (total journey time) or 1·75 (time from Dumfries to Glasgow). ie 260 ÷ 5·75 = 45(·2…) ✓×✓ 80 × 1·75 = 140 ××✓ 4. 3rd mark is not available for division by a whole number.

Question			Expected Answer/s	Max Mark	Additional Guidance
8			**Ans:**	**3**	

T-shirt £12	Signed Photograph £8	Baseball Cap £6	Poster £5	Fluorescent Stick £2	Total Cost £
	✓		✓	✓	15
	✓	✓		✓	16
	✓	✓	✓		19
✓			✓	✓	19
✓		✓		✓	20

	• [1] one correct row: • [2] two more correct rows: • [3] final two correct rows:		1. Where there are missing totals a maximum of 2 marks is available (a) 5 rows otherwise "correct" award 2/3 (b) 2 rows otherwise "correct" award 1/3
9	**a**	**Ans: 59** • [1] order numbers: 37 39 42 48 57 61 64 72 73 81 • [2] find median: 59	**2**	1. Correct answer without working award 2/2 2. 77 [numbers not ordered] award 1/2 3. If 'correct' median is found from ordered list with one missing or one extra number award 1/2
9	**b**	**Ans: 44** • [1] find range: 81 – 37 = 44	**1**	
9	**c**	**Ans:** **On average Lido shoppers spent less.** **Lido shoppers' spending varied more.** • [1] interpret statistics: Lido was less • [2] interpret statistics: Lido varied more	**2**	1. Answer must be consistent with answers to parts (a) and (b) 2. Do **not** accept eg Lido has a smaller median Lido has a larger range

Question	Expected Answer/s	Max Mark	Additional Guidance
10	**Ans: 264 cm** •[1] correct form of Pythagoras' Theorem: $27^2 + 19^2$ •[2] calculate sum (or difference) of two squares: 1090 •[3] calculate the square root of a calculated value: 33 (·0151…) •[4] calculate length: $8 \times 33(\cdot 0151\ldots) = 264(\cdot 1211\ldots)$	**4**	1. Correct answer without working award 4/4 2. A common answer (working must be shown) $\sqrt{(27^2 - 19^2)} = 19(\cdot 18\ldots) \rightarrow 19 \times 8 = 152$ [or $19\cdot 18\ldots \times 8 = 153\cdot 46\ldots$.] award 3/4 ×✓✓✓ 3. Final mark is not available if there is invalid subsequent working. 4. Alternate strategy •[1] $27 \times 8 = 216$ **and** $19 \times 8 = 152$ •[2] correct form of Pythagoras' Theorem $216^2 + 152^2$ •[3] calculate sum (or difference) of two squares: 69760 •[4] calculate the square root of a calculated value: 264(·1211..) 5. Note 4th mark available for correctly calculating 8 × previously calculated value.
11	**Ans: 468 swiss francs** •[1] convert €1500 into pounds: $1500 \div 1\cdot 25 = 1200$ •[2] subtract 875 from answer to above: $1200 - 875 = 325$ •[3] convert answer to above into Swiss francs: $325 \times 1\cdot 44 = 468$	**3**	1. Correct answer without working award 3/3 2. Some common answers (working must be shown) (a) 694·44 [$(1500 \times 1\cdot 25 - 875) \div 1\cdot 44$] award 2/3 (b) 1440 [$(1500 \times 1\cdot 25 - 875) \times 1\cdot 44$] award 2/3 (c) 1728 [$(1500 \div 1\cdot 25) \times 1\cdot 44$] award 2/3 (d) 1000 [$1500 \times 1\cdot 25 - 875$] award 1/3 (e) 900 [$(1500 - 875) \times 1\cdot 44$] award 1/3 (f) 1260 [$875 \times 1\cdot 44$] award 1/3 (g) 2160 [$1500 \times 1\cdot 44$] award 0/3

Question			Expected Answer/s	Max Mark	Additional Guidance
12			**Ans: 320 cm^2** •^{1} know how to find curved surface area: $2\pi rh$ or πdh •^{2} substitute correct radius (or diameter) and height into formula involving π: $2 \times \pi \times 3 \times 17$ or $\pi \times 6 \times 17$ •^{3} carry out all calculations correctly (must involve π): 320(·44…) [π] 320(·28) [3·14]	**3**	1. Correct answer without working award 3/3 2. If an incorrect formula is used then the 2nd mark is only available for correctly substituting radius (or diameter) **and** height into a **previously stated** formula eg (a) $\pi rh = \pi \times 3 \times 17 = 160(\cdot 22\ldots)$ ×✓✓ (b) $\pi \times 3 \times 17 = 160(\cdot 22\ldots)$ ××✓ [no formula stated] (c) $\pi r^2 = \pi \times 3^2 = 28(\cdot 27\ldots)$ ××✓ [no height in formula] (d) $\pi d = \pi \times 6 = 19, 18\cdot 8(49...)$ ××✓ [no height in formula] 3. The 3rd mark is only available for calculations of equivalent difficulty to the intended one eg (a) $\pi r = \pi \times 3 = 9\cdot(42\ldots)$ ××× [calculation eased] (b) $\pi \times 3^2 + 6 \times 17$ $= 28(\cdot 27\ldots) + 420 = 448(\cdot 27\ldots)$ ××× noting that 420 is not 6×17 [not **all** calculations correct]

Question			Expected Answer/s	Max Mark	Additional Guidance
13			**Ans: £321·75**	**3**	
			$\bullet^1\bullet^2$ know how to calculate interest: $^{7·8}/_{100} \times 4500 \times {}^{11}/_{12}$ (award 1 for $^{7·8}/_{100} \times 4500$ or $^{11}/_{12} \times {}^{7·8}/_{100}$ or $^{11}/_{12} \times 4500$) $\bullet^3$ carry out percentage and fraction calculations correctly: 321·75		1. Correct answer without working award 3/3 2. If answer is 4821·75 [4500 + 321·75] (no working necessary) (a) award 3/3 if candidate **states** that interest is 321·75 (b) award 2/3 if candidate does **not state** that interest is 321·75 3. Acceptable answers for partial credit (no working necessary) (a) 351 [7·8% of 4500] award 1/3 (b) 0·0715 [$^{11}/_{12} \times {}^{7·8}/_{100}$] award 1/3 (c) 7·15 [$^{11}/_{12} \times 7·8$] award 1/3 (d) 4125 [$^{11}/_{12} \times 4500$] award 1/3 (e) 3861 [351 × 11] award 1/3 4. Premature rounding leading to an incorrect answer eg $^{11}/_{12} = 0·916\ldots = 0·92$ $\rightarrow {}^{7·8}/_{100} \times 4500 \times 0·92 = 322·92$ award 2/3 ✓✓× 5. The following common wrong answers illustrate where the 3rd mark is available to candidates, working must be shown. (note: answer must be rounded or truncated to nearest penny) (a) $4500 \times {}^{100}/_{7·8} \times {}^{11}/_{12} = 52884·62$ or 52884·61 × ✓✓ (b) $4500 \div 7·8 \times {}^{11}/_{12} = 528·85$ or 528·84 ×✓× (c) $4500 \times {}^{7·8}/_{100} \times {}^{12}/_{11} = 382·91$ or 382·90 ✓×✓ (d) $4500 \times 0·78 \times {}^{12}/_{11} = 3829·09$ ××✓

Question			Expected Answer/s	Max Mark	Additional Guidance
14			**Ans: 24%** •[1] find reduction: 1·26 •[2] know to express reduction as a fraction of 5·25: $^{1\cdot26}/_{5\cdot25}$ •[3] know to multiply fraction by 100: $^{1\cdot26}/_{5\cdot25} \times 100$ •[4] carry out all calculations correctly: 24	**4**	1. Correct answer without working award 4/4 2. 4th mark is only available for calculations of the form $^{a}/_{b} \times c$ where a,b,c = reduction or 3·99 or 5·25 or 100. 3. Some common answers (working must be shown) (a) 32, 31(·57…) $[^{1\cdot26}/_{3\cdot99} \times 100]$ award 3/4 ✓×✓✓ (b) 76 $[^{3\cdot99}/_{5\cdot25} \times 100]$ award 3/4 ×✓✓✓ (c) 132, 131(·57..) $[^{5\cdot25}/_{3\cdot99} \times 100]$ award 2/4 ××✓✓ (d) 0·21, 0·2(09475) $[^{3\cdot99}/_{100} \times 5\cdot25$ or $^{5\cdot25}/_{100} \times 3\cdot99]$ award 1/4 × ××✓

Question			Expected Answer/s	Max Mark	Additional Guidance
15			**Ans: 548 m^2** •[1] know how to calculate area of semi-circle: $\frac{1}{2}\pi r^2$ •[2] substitute correct radius into formula: $\frac{1}{2} \times \pi \times 14^2$ •[3] know to add area of rectangle to previously calculated value: previously calculated value + 20×12 •[4] carry out all calculations correctly: $307{\cdot}876\ldots + 240 = 547{\cdot}876\ldots$. $[\frac{1}{2} \times 3{\cdot}14 \times 14^2 = 307{\cdot}72]$ (must include a circle calculation **followed by** an addition or subtraction) •[5] round to nearest whole number: 548	**5**	1. Correct answer without working award 0/5 2. Where no formula is stated accept (a) $\frac{1}{2} \times \pi \times 14^2$ or 308 or $307{\cdot}876\ldots$. as evidence of $\frac{1}{2}\pi r^2$ being used (b) $\frac{1}{2} \times \pi \times 28$ or 44 or $43{\cdot}98\ldots$ as evidence of $\frac{1}{2}\pi d$ being used 3. **Some** common answers (working must be shown) (a) 856 or 855 $[\pi \times 14^2 + 240]$ award 4/5 ×✓✓✓✓ (b) 360 $[\frac{1}{2} \times \pi \times 14^2 + 4 + 12 + 20 + 12 + 4]$ award 4/5 ✓✓×✓✓ (c) 1472 or 1471 $[\frac{1}{2} \times \pi \times 28^2 + 240]$ award 4/5 ×✓✓✓✓ or ✓×✓✓✓ (d) 284 $[\frac{1}{2} \times \pi \times 28 + 240]$ award 4/5 ×✓✓✓✓ (e) 262 $[\frac{1}{2} \times \pi \times 14 + 240]$ award 3/5 ××✓✓✓ (f) 308 $[\frac{1}{2} \times \pi \times 14^2]$ award 3/5 ✓✓××✓ (g) 616 or 615 $[\pi \times 14^2]$ award 2/5 ×✓××✓ (h) 44 $[\frac{1}{2} \times \pi \times 28]$ award 2/5 ×✓××✓ (i) 88 $[\pi \times 28]$ award 2/5 ×✓××✓ 4. (a) 5^{th} mark is only available where the answer to circle calculation requires rounding. (b) Where premature rounding leads to incorrect answer, a maximum of 4/5 is available.

TOTAL MARKS FOR PAPER 2
50

TOTAL MARKS FOR PAPER 1 & 2
80

[END OF MARKING INSTRUCTIONS]