SCOTTISH QUALIFICATIONS AUTHORITY

2003 Mathematics

Intermediate 1 – Units 1, 2 and 3

Finalised Marking Instructions

Special Instructions

1 The main principle in marking scripts is to give credit for the skills which have been demonstrated. Failure to have the correct method may not preclude a pupil gaining credit for the calculations involved or for the communication of the answer.

Where a candidate has scored zero marks for any question attempted, "0" should be shown against the answer in the place in the margin.

It is of great importance that the utmost care should be exercised in adding up the marks. Where appropriate, all summations for totals and grand totals must be carefully checked.

2 The answer to one part, correct or incorrect must be accepted as a basis for subsequent dependent parts of a question. Full marks in the dependent part is possible if it is of equivalent difficulty.

3 Working after a correct answer should only be taken into account if it provides **firm** evidence that the requirements of the question have not been met.

4 In certain cases an error will ease subsequent working. **Full** credit cannot be given for this subsequent work but **partial** credit may be given.

5 Accept answers arrived at by inspection or mentally, where it is possible for the answer to have been so obtained.

6 Do not penalise omission or misuse of units unless marks have been specifically allocated to units.

7 A wrong answer without working receives no credit unless specifically mentioned in the marking scheme.

The rubric on the outside of the papers emphasises that working must be shown. In general markers will only be able to give credit to partial answers if working is shown. However there may be a few questions where partially correct answers unsupported by working can still be given some credit. **Any such instances will be stated in the marking scheme.**

8 Acceptable alternative methods of solution can only be given the marks specified, ie a more sophisticated method cannot be given more marks.

Note that for some questions a method will be specified.

9 In general do not penalise the same error twice in the one question.

10 Accept legitimate variations in numerical/algebraic questions.

11 Do not penalise bad form eg $\sin x^\circ = 0.5 = 30^\circ$.

12 A transcription error is not normally penalised except where the question has been simplified as a result.

13 Do not penalise inadvertent use of radians in trigonometry questions, provided its use is consistent within the question.

Mathematics – Intermediate 1: Paper 1, Units 1, 2 and 3 (non-calc)

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
1. (a)	**Ans: 2·53** •[1] process: calculate 6·23 – 3·7	•[1] 2·53 **1 mark**
NOTES:		
1. (b)	**Ans: £7** •[1] process: calculate 5% of 140	•[1] 7 **1 mark**
NOTES:		
1. (c)	**Ans: -25** •[1] process: calculate - 40 + 15	•[1] -25 **1 mark**
NOTES:		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
2.	**Ans: 61** •[1] strategy: know to multiply 600 by 0·07 and then add 19 •[2] process: evaluate formula	•[1] 600 × 0·07 + 19 •[2] 61 **2 marks**

NOTES:

1. Final answer — with working
   - 61 — 2/2
   - 42 (600 × 0·07) — 1/2
   - 43·33 ([19 + 600] × 0·07) — 1/2

3.	(a)	**Ans: 2h 45m** •[1] process: calculate number of hours and minutes from 10.40am to 1.25pm	•[1] 2h 45m **1 mark**

NOTES:

3.	(b)	**Ans: 110 miles** •[1] strategy: know how to find distance •[2] process: express time in form suitable for calculation •[3] process: calculate distance	•[1] D = ST •[2] 2·75 or 2 ¾ •[3] 110 **3 marks**

NOTES:

1. Final answer — with working
   - 110 — 3/3
   - 98 (2·45 × 40) — 2/3

2. 3rd mark not available for correct multiplication of two whole numbers
   eg 40 × 165 = 6600 — award 1/3

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
4.	**Ans: c = 4** •[1] process: collect terms in c •[2] process: collect constants •[3] process: solve equation for c	 •[1] 7c •[2] 28 •[3] c = 4 **3 marks**

NOTES:

1. For answers without valid working award 0/3
   eg (i) c = 4 without working
   (ii) $8 \times 4 + 3 = 31 + 4 \rightarrow c = 4$

2. For the award of the 3rd mark an answer of the form c = is required

3. Answers acceptable for partial credit (valid working must be shown)
   (i) $7c = 28 \rightarrow 4$
   (ii) $7c = 34 \rightarrow c = 4{\cdot}8\ldots$ } Award 2/3
   (iii) $9c = 28 \rightarrow c = 3{\cdot}1\ldots$ }
   (iv) $9c = 34 \rightarrow c = 3{\cdot}7\ldots$ Award 1/3
   (Disregard incorrect rounding)

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each
5. (a)	**Ans: 1200** •[1] strategy/process: find total number of sheets	•[1] 1200 **1 mark**
NOTES:		
5. (b)	**Ans: 3** •[1] strategy: know how to find number of packets •[2] process: find number of packets	•[1] 500 + 500 + 200 or 1200 ÷ 500 •[2] 3 **2 marks**

NOTES:

1. Correct answer with or without working — award 2/2
2. 2·4, 2 *r* 200 (1200 ÷ 500) (no working necessary) — award 1/2

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each
6.	**Ans: m > 8** •[1] process: collect constants •[2] process: solve inequality for m	 •[1] 9 m > 72 •[2] m > 8 **2 marks**

NOTES:

1. For answers without valid working award 0/2
   eg (i) m > 8 without working
   (ii) $9 \times 8 - 2 > 72 \rightarrow m > 8$

2. Answers acceptable for partial credit (valid working must be shown)
   (i) $9m > 72 \rightarrow > 8$
   (ii) $9m > 72 \rightarrow m = 8$ or $9m = 72 \rightarrow m = 8$
   (iii) $9m > 68 \rightarrow m > 7{\cdot}5$….(disregard incorrect rounding)
   } award 1/2

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
7. (a)	**Ans: -4, -1, 8** •[1] process: calculate y •[2] process: complete table of values	•[1] -4 or –1 or 8 •[2] -4, -1 and 8 **2 marks**
7. (b)	**Ans: straight line graph of y = 1·5 × - 1** •[1] communicate: prepare to draw line •[2] communicate: draw the line y = 1·5 × - 1	•[1] all three points from table plotted correctly •[2] draw straight line through the three points (see note 2) **2 marks**

NOTES:

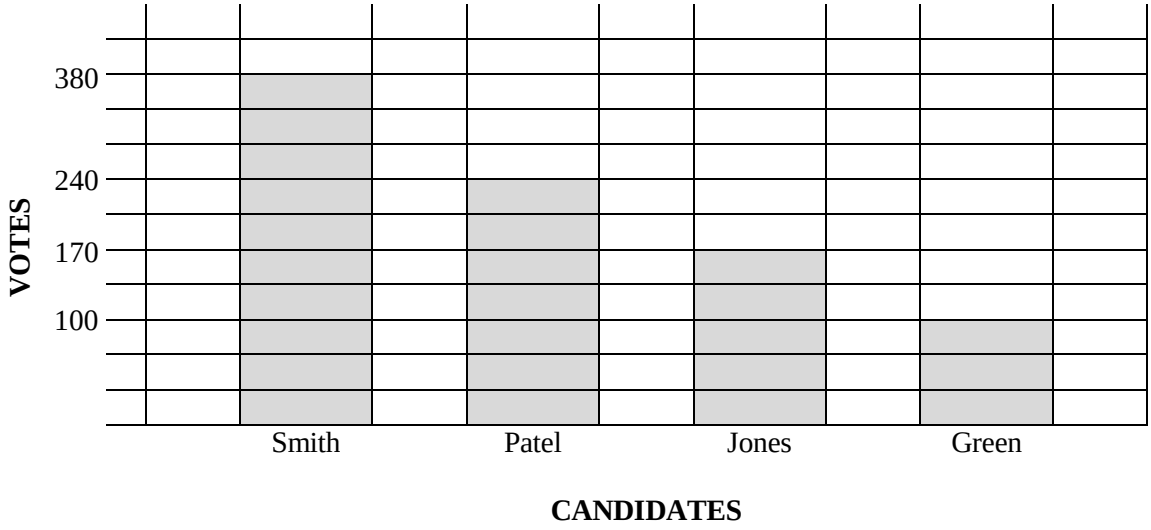
1. If the line y = 1·5 × – 1 is drawn award 2/2
2. Where the three points plotted are consistent with table and are not collinear, the second mark is unavailable

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
8.	**Ans: correct bar graph** •[1] strategy: use suitable scale •[2] process: bars correct height •[3] process: bars correct height •[4] communicate: correct labelling	 •[1] 20 votes ≤ each box ≤ 50 votes and starting at 0 (0 need not be written) •[2] 2 bars correct height •[3] other 2 bars at correct height •[4] numbers and "votes" on one axis names and "Candidate" on other axis **4 marks**

NOTES:

1. Accept graph with or without spaces between bars

2. award 1/4 x x x ✓



Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
9.	**Ans: 60%** •[1] strategy: know how to express females as fraction of staff •[2] strategy: know to multiply fraction by 100 •[3] process: multiply and divide correctly	•[1] $\frac{3}{5}$ or 0·6 •[2] $\frac{3}{5} \times 100$ •[3] 60 **3 marks**
NOTES: 1. Correct answer without working award 3/3		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
10. (a)	**Ans:** |				| |---|---|---|---|---| |				-21 | |	▒		▒	| |				-5 | |	▒		▒	| | -3		-35		105 | •[1] interpret/process: multiply positive integer by negative integer •[2] interpret/process: multiply negative integer by negative integer	•[1] any three of -21, -5, -3 or -35 correct •[2] all entries correct **2 marks**
10. (b)	**Ans:** |				| |---|---|---|---|---| |		-2		10 | |	▒		▒	| | -3		4		| |	▒		▒	| | 15				| •[1]strategy/process: calculate –120 ÷ -12 or –120 ÷ -8 •[2] strategy/process: calculate another two values •[3] strategy/process: complete square	•[1] 10 or 15 •[2] follow through to "correctly" find another two values •[3] square correctly completed **3 marks**

NOTES:

1.

		2		-10
	▒		▒	
3		-4		
	▒		▒	
-15				

award 1/3 x ✓x

TOTAL MARKS FOR PAPER 1
33

Mathematics – Intermediate 1: Paper 2, Units 1, 2 and 3

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
1.	**Ans:** $\frac{4}{31}$ $\bullet^1$ process: find probability	$\bullet^1$ $\frac{4}{31}$ **1 mark**
NOTES: 1. Accept 4:31, 4 out of 31, 4 in 31, 4 – 31, 0·129		
2.	**Ans:** 0·0005 $\bullet^1$ process: write number expressed in standard form in full $\bullet^2$ process: write number expressed in standard form in full	$\bullet^1$ $\bullet^2$ 0·0005 **2 marks**
NOTES: (i) For an answer of 5 × 0·0001 or 50000, award 1/2 (ii) All other incorrect answers, award 0/2		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
3. (a)	**Ans: 5a + 7b** •[1] process: multiply out brackets •[2] process: collect like terms	 •[1] 5a + 10b – 3b or 5a + 10b •[2] 5a + 7b **2 marks**
NOTES:		
3. (b)	**Ans: 6 (n + 5)** •[1] process: identify common factor •[2] process: factorise	 •[1] 6 or n + 5 •[2] 6 (n + 5) **2 marks**
NOTES: 1. 2(3n + 15), 3(2n + 10) award 1/2		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each
4. (a)	**Ans: £16000** •[1] process: find mode	 •[1] 16000 **1 mark**
4. (b)	**Ans: £15200** •[1] communicate: 5 or 6 correct entries in table •[2] strategy: know how to find mean •[3] process: correct answer	 •[1] 20000 36000 70000 128000 126000 380000 •[2] 380 000 ÷ 25 •[3] 15 200 **3 marks**

NOTES:

1. For an answer of 76 000 (380 000 ÷ 5) award 2/3 if criterion for 1st mark has also been met. Otherwise award 0/3

2. For an answer of 14 000 (∑ Income ÷ 5) only the 1st mark is available

3. When candidate calculates mean in (a) and mode in (b) then award 0/1 for (a) and all 3 marks for (b) are available for calculating the mean.

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each
5. (a)	**Ans: £82·27 or £82·28** •[1] strategy: know how to convert euros to pounds •[2] process: carry out calculation •[3] process: express answer in pounds and pence	•[1] 130 ÷ 1·58 •[2] 82·278 ..... •[3] 82·27 or 82·28 **3 marks**

NOTES:

1. Correct answer with or without working award 3/3
2. 205·4 (130 × 1·58) x✓ x award 1/3

5. (b)	**Ans: £364·81 or £364·84** •[1] strategy: know how to find total cost •[2] process: find total cost	•[1] 3 × (a) + 2 × 59 •[2] 364·81 or 364·84 **2 marks**

NOTES:

1. Correct answer with or without working award 2/2
2. Correct answer to 3(a) + 59, 3(a) + 236 or 6(a) + 118 (working must be shown) award 1/2
   Some examples of answers

(a)	3(a) + 118 award 2/2	3(a) + 59 award 1/2	3(a) + 236 award 1/2	6(a) + 118 award 1/2
82·27 82·28 205·4	364·81 364·84 734·2	305·81 305·84 675·2	482·81 482·84 852·2	611·62 611·68 1350·4

3. For any other combination of m(a) + 59n award 0/2
4. For correct answers to 3(a) and 2 × 59 but no total award 1/2

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
6. (a)	**Ans: 844 000** •[1] interpret/strategy: know how to find number of people •[2] process: carry out valid calculations •[3] process: round to nearest thousand	•[1] $\frac{60}{360} \times 5\,062\,000$ •[2] 843 666·..... •[3] 844 000 **3 marks**

NOTES:

1. Correct answer without working award 2/3
2. 2nd mark can only be awarded for
   (a) $\frac{60}{360} \times 5\,062\,000 = 843\,666\cdot\ldots\ldots$
   (b) 60% of 5 062 000 = 3 037 200
   (c) $\frac{1}{360} \times 5\,062\,000 = 14\,061\cdot\ldots$
   (d) $\frac{60}{360} = 0\cdot16\ldots$ Or 16·6%

6. (b)	**Ans: In 2001 Less under 20** **More 45-64 and over 64** **About the same 20-44** •[1] interpret/communicate: state one valid difference •[2] interpret/communicate: state another valid difference	•[1] •[2] Any <u>two</u> of: In 2001 (i) Less under 20 (ii) More 45-64 (iii) More over 64 (iv) About the same 20-44 or equivalent [give 1 for any <u>one</u> of the above] **2 marks**

NOTES:

1. It must be clear from candidate's answer which year is being referred to
   eg (i) There are less over 64's and more under 20's award 0/2
   (ii) More people over 64 and between 45 – 64 are living longer award 2/2
   (iii) More people died young in those days award 1/2
2. Disregard invalid statements

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
7. (a)	**Ans: 100 cm^3** •^{1} strategy/process: find volume of cuboid	 •^{1} $8 \times 5 \times 2{\cdot}5 = 100$ **1 mark**
7. (b)	**Ans: 0·6p** •^{1} strategy/process: find cost per cm^3	 •^{1} $60 \div 100 = 0{\cdot}6$ **1 mark**
NOTES: 1. Accept $0{\cdot}60 \div 100 = 0{\cdot}006$ (working must be shown)		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
7. (c)	**Ans: Large bar** **It costs 0·5 pence per cm^3** **and the small bar costs 0·6 pence per cm^3**	
	•^{1} strategy: know how to find volume of large bar	•^{1} $10 \times 6 \times 3$
	•^{2} strategy: know how to compare costs	•^{2} $90 \div 180$
	•^{3} process/communicate: carry out all calculations correctly, state correct conclusion and valid reason	•^{3} Large bar. It costs 0.5p per cm^3 and the small bar costs 0.6p per cm^3 **3 marks**

NOTES:

1. Accept valid alternative strategies for award of 2nd mark

   eg $180 \times 0{\cdot}6 = 108$ pence, $\frac{90}{60} \times 100 = 150\text{cm}^3$, $\frac{60}{90} \times 180 = 120\text{cm}^3$

2. Do not accept "Large bar" without working/reason. Award 0/3.

3. Numbers need not be stated in reason provided that it is consistent with previous working
   eg Correct working followed by
   (a) Large bar. It's cheaper per cm^3 award 3/3
   (b) Large bar. It's cheaper award 2/3

4. Where there is no working accept numerical evidence of correct strategies given in reason.

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
8.	**Ans: 4·8** •[1] process substitute into formula •[2] process start to evaluate •[3] process complete evaluation	•[1] $\frac{180}{7\cdot5\times5}$ •[2] 7·5 × 5 = 37·5 or $\frac{180}{7\cdot5}$ = 24 or $\frac{180}{5}$ = 36 •[3] 4·8 **3 marks**

NOTES:

1. Correct answer with or without working award 3/3

2. 37·5, 24, 36 (a) with evidence of $\frac{180}{7\cdot5\times5}$ award 2/3

   (b) without evidence of $\frac{180}{7\cdot5\times5}$ award 1/3

3. 14·4 (180 ÷ [7·5 + 5]) (working must be shown) award 2/3

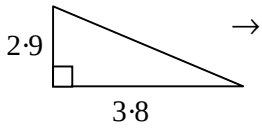
4. 23·8…. (180 ÷ 7·55) (working must be shown) award 1/3
   (Disregard incorrect rounding)

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
9.	**Ans: 3·9m** •[1] strategy: know to use right angled triangle •[2] strategy: correct form of Pythagoras Theorem •[3] process: calculate square root of sum of two squares	•[1] use 3·8 and 0·9 in right angled triangle diagram or right angled triangle formula •[2] $3{\cdot}8^2 + 0{\cdot}9^2$ •[3] 3·9 **3 marks**

NOTES:

1. Correct answer without working award 2/3

2. Disregard incorrect rounding

3. (a) 

$\rightarrow$ $3{\cdot}8^2 + 2{\cdot}9^2$ $\rightarrow$ 4·7…. award 2/3 x ✓✓

   (b) $3{\cdot}8^2 + 2{\cdot}9^2$ $\rightarrow$ 4·7…with no obvious right angled triangle indicated award 1/3 x x ✓

4. If candidate uses trigonometry then requirement for award of 2nd mark is
$\tan x^o = \frac{0{\cdot}9}{3{\cdot}8}$ $\rightarrow$ roof = $\frac{0{\cdot}9}{\text{Sin } x^\circ}$ or $\frac{3{\cdot}8}{\text{Cos } x^\circ}$

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
10. (a)	**Ans: £30** •[1] strategy: know how to find annual premium •[2] process: correctly divide by 100 and multiply by 1·25 or 2400	 •[1] $\frac{2400}{100} \times 1{\cdot}25$ •[2] 30 **2 marks**

NOTES:

1. Correct answer with or without working — award 2/2
2. For an answer of 30 followed by subsequent inappropriate working — award 1/2

10. (b)	**Ans: £2·60** •[1]•[2] strategy: correct method •[3] process: carry out all calculations correctly (must include finding 4% of a quantity and either a division by 12 or an addition)	 •[1]•[2] [30 + (4% of 30)] ÷ 12 OR (30 ÷ 12) + 4% of (30 ÷ 12) (award 1 for an otherwise correct method with one missing or incorrect step) •[3] 2·60 **3 marks**

NOTES:

1.

Final answer	with working
2·60	3/3
31·20 (30 + 4% of 30)	2/3
3·70 (2·50 + 4% of 30)	2/3
1·20 (4% of 30)	0/3

2. 3rd mark not available if trailing zero is missing

eg

Final answer	with working
2·6	2/3
31·2	1/3

Question No	Marking Scheme Give 1 mark for each •		Illustrations of evidence for awarding a mark at each •
11.	**Ans: 89m**		
	$\bullet^1$ strategy:	know how to use sin ratio	$\bullet^1$ $\sin 59^o = \frac{h}{80}$
	$\bullet^2$ process:	know how to solve equation	$\bullet^2$ $h = 80 \sin 59^o$
	$\bullet^3$ process:	carry out trigonometric calculation	$\bullet^3$ 68·5…..
	$\bullet^4$ process:	round to nearest metre	$\bullet^4$ 69
	$\bullet^5$ strategy:	add 20 to previously calculated value	$\bullet^5$ 89 **5 marks**

NOTES:

1. Correct answer without working award 4/5

		with working	without working
2.	71 (radians used)	5/5	4/5

3. Where an incorrect trig ratio is used, working should be followed through with the possibility of awarding 4/5.

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
12.	**Ans: 4·17m^2**	
	•^{1} strategy: know to calculate area of semi-circle	•^{1} $A = \frac{1}{2}\pi r^2$
	•^{2} strategy: substitute correct radius into area formula	•^{2} $\frac{1}{2} \times \pi \times 0{\cdot}6^2$
	•^{3} strategy: know to add area of rectangle	•^{3} $\frac{1}{2} \times \pi \times 0{\cdot}6^2 + 3 \times 1{\cdot}2$
	•^{4} process: carry out all calculations correctly (must include a circle calculation and either the squaring of a number or a division by 2)	•^{4} 4·165 .....
	•^{5} process: round to 2 decimal places	•^{5} 4·17 **5 marks**

NOTES:

1. First 2 marks not available if $C = \pi d$ is used

	Final answers	with working	without working
(i)	4·17	5/5	4/5
(ii)	4·16.....	4/5	3/5
(iii)	4·73 ($\pi r^2 + 3{\cdot}6$)	4/5	0/5
(iv)	5·86 ($\frac{1}{2}\pi d^2 + 3{\cdot}6$)	4/5	0/5
(v)	8·12 ($\pi d^2 + 3{\cdot}6$)	3/5	0/5
(vi)	5·48 ($\frac{1}{2}\pi d + 3{\cdot}6$)	3/5	0/5
(vii)	7·37 ($\pi d + 3{\cdot}6$)	2/5	0/5

2. Unrounded or incorrectly rounded versions of answers (iii) – (vii) should be awarded 1 mark less than those shown above.

3. 5th mark only available where candidate is required to round final answer to 2 decimal places.

TOTAL MARKS FOR PAPER 2
47

TOTAL MARKS FOR PAPER 1 AND 2
80

[END OF MARKING INSTRUCTIONS]