2007 Mathematics

Intermediate 1 Units 1, 2 & 3 Paper 2

Finalised Marking Instructions

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General Marking Principles

These principles describe the approach to be taken when marking Intermediate 1 Mathematics papers. For more detailed guidance please refer to the notes which are included with the Marking Instructions.

1. Marks must be assigned in accordance with the Marking Instructions. The main principle in marking scripts is to give credit for the skills demonstrated and the criteria met. Failure to have the correct method may not preclude a candidate gaining credit for the calculations involved or for the communication of the answer.

2. 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 is not simplified.

3. 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 scheme)
   - bad form, eg $\sin x^{o} = 0.5 = 30^{o}$
   - legitimate variation in numerical values/algebraic expressions.

4. 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 mark(s).

5. 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.

6. In general markers will only be able to 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 the outside of the question papers emphasises that working must be shown.

7. 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.

8. 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.

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

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

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

Practical Details

The Marking Instructions should be regarded as a working document and have been developed and expanded on the basis of candidates' responses to a particular paper. While the guiding principles of assessment remain constant, details can change depending on the content of a particular examination paper in a given year.

1. Each mark awarded in a question is referenced to one criterion in the marking scheme by means of a bullet point.

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

3. Where a marker wishes to indicate how s/he has awarded full marks, the following should be used:

   (a) Correct working should be ticked, ✓ .

   (b) Where working subsequent to an error is followed through, if otherwise correct and can be awarded marks, it should be marked with a crossed tick, ✗.

   (c) Each error should be underlined at the point in the working where it first occurs.

4. **Do not write any comments, words or acronyms on the scripts.**

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 (a)	**Ans: 16** •[1] interpret: interpret bar graph	•[1] 16 **1 mark**
(b)	**Ans: B** •[1] interpret: identify mode	•[1] B **1 mark**
NOTES:		
2	**Ans: $1{\cdot}5 \times 10^8$** •[1] process: express in standard form •[2] process: express in standard form	•[1] •[2] $1{\cdot}5(0) \times 10^8$ (award 1 for $1{\cdot}5(0) \times 10^n$ [$n \geq 2$] 150×10^6, $15(\cdot 0) \times 10^7$, $1{\cdot}5(0) \times 10^8$) **2 marks**
NOTES:		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
3	**Ans: 236 mph** •[1] strategy: know how to find speed •[2] process: find time •[3] process: find speed	•[1] $S = \frac{D}{T}$ •[2] 1h 15m •[3] $295 \div 1{\cdot}25 = 236$ **3 marks**

NOTES:

1.

Final answer		With working		Without working
236		3/3		3/3
257, 256 (...)	$(295 \div 1{\cdot}15)$	2/3	disregard incorrect rounding	1/3
3·9 (...)	$(295 \div 75)$	2/3		1/3
369, 368 (·75)	$(295 \times 1{\cdot}25)$	2/3		0/3
339 (·25)	$(295 \times 1{\cdot}15)$	1/3		0/3
22125	(295×75)	1/3		0/3

2. 3rd mark is not available for division by whole number of hours.

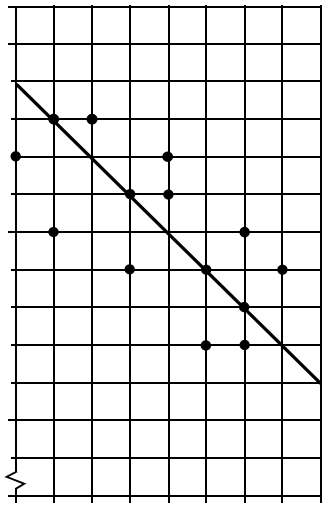
4	**Ans: $y = 4$** •[1] process: start to collect like terms •[2] process: collect like terms **and** equate •[3] process: solve equation for y	•[1] $14y$ or 56 •[2] $14y = 56$ •[3] $y = 4$ **3 marks**

NOTES:

1. For answers without valid working award 1/3
   eg (i) $y = 4$ without working
   (ii) $17 \times 4 - 12 = 3 \times 4 + 44 \rightarrow y = 4$

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

3. Answers acceptable for partial credit (valid working must be shown)
   (i) $14y = 56 \rightarrow 4$
   (ii) $14y = 32 \rightarrow y = 2{\cdot}2$ ... (disregard incorrect rounding)
   (iii) $20y = 56 \rightarrow y = 2{\cdot}8$ … } award 2/3
   (iv) $20y = 32 \rightarrow y = 1{\cdot}6$ award 1/3

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
5 (a)	**Ans: line of best fit drawn**  •[1] communicate: draw line of best fit	•[1] line of best fit drawn **1 mark**

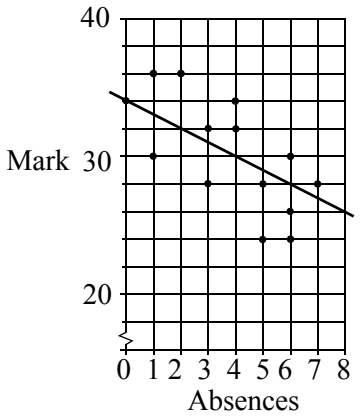
NOTES:

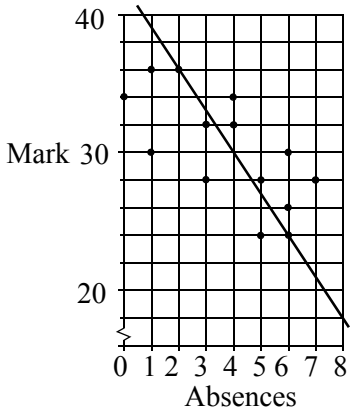
1. Accept straight lines with
   $-\frac{3}{2} \leq$ gradient $\leq -\frac{1}{2}$ and
   $|$(points above line) – (points below line)$| \leq 2$

   eg

   $|$(points above line) – (points below line)$| \leq 2$

   eg





(b)	**Ans: consistent with line of best fit** •[1] interpret: interpret scattergraph	•[1] consistent with line of best fit **1 mark**

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
6 (a)	**Ans: $13p + 9$** •[1] process: multiply out brackets •[2] process: collect like terms	•[1] $15p + 9 - 2p$ or $15p + 9$ •[2] $13p + 9$ **2 marks**
NOTES: 1. Do not award 1st mark for 15p + 9 − 6p		
(b)	**Ans: $7(3 - 2m)$** •[1] process: identify common factor •[2] process: factorise	•[1] 7 or $3 - 2m$ •[2] $7(3 - 2m)$ **2 marks**
NOTES: 1. $2(10 \cdot 5 - 7m)$, $14(1 \cdot 5 - m)$		award 1/2

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
7 (a)	**Ans: 72kg** •[1] strategy: know to order numbers •[2] process: find median	 •[1] 64 66 69 71 71 73 75 76 77 78 •[2] 72 **2 marks**

NOTES:

1.

Answer	with valid working	without valid working
72	2/2	1/2
73·5 (numbers not ordered)	1/2	0/2
14 (range)	1/2	0/2

2. If "correct" median is found from ordered list with one missing (or one extra) number award 1/2

(b)	**Ans: 14kg** •[1] strategy: select largest and smallest values •[2] process: find range	 •[1] 78, 64 •[2] 14 **2 marks**

NOTES:

1.

Answer	with valid working	without valid working
14	2/2	2/2
7 (numbers not ordered)	1/2	0/2
72 (mean or median)	1/2	0/2

(c)	**Ans: Group B heavier and weights vary more** •[1] interpret/communicate: interpret calculated statistics •[2] interpret/communicate: interpret calculated statistics	 •[1] Group B heavier •[2] Group B weights vary more **2 marks**

NOTES:

1. Answer must be consistent with answers to parts (a) and (b)

2. Do not accept
   eg Group B has a larger median than Group A
   Group B has a larger range of weights than Group A

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
8	**Ans: £291·84** •[1] strategy/process: calculate gross interest •[2] •[3] strategy/process: calculate net interest	•[1] 364·8(0) •[2] •[3] 291·84 (award 1 for calculating savings tax or for correct method for calculating net interest) **3 marks**

NOTES:

1.

Answer	with valid working	without valid working
291·84	3/3	0/3
7891·84 (7600 + 291·84)	3/3	0/3
6371·84 $(1\cdot048\times7600-20\%)$	2/3	0/3
3·84(%) (80% of 4·8%)	2/3	0/3

2. For $0\cdot2\times7600=1520\rightarrow(7600-1520)\times0\cdot048=291\cdot84$ award 0/3

3. Division or multiplication by 12 is invalid
   eg (a) Do not award 1st mark for gross interest = $364\cdot80\div12=30\cdot40$
   (b) Do not award final mark for net interest = $291\cdot84\times12=3502\cdot08$

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
9	**Ans: Yes, since 217cm < 220cm**	
	•[1] strategy: correct form of Pythagoras Theorem	•[1] $195^2 + 95^2$
	•[2] process: calculate $195^2 + 95^2$	•[2] 47050
	•[3] process: calculate $\sqrt{47050}$	•[3] 216(·91 .....) (rounded or truncated)
	•[4] communicate: state conclusion and valid reason	•[4] Yes. The diagonal is less than 220cm or the wood is more than 2·17m **4 marks**

NOTES:

1. Final answer

		With working	Without working
(a)	Yes. The diagonal is less than 220cm.	4/4	0/4
(b)	Yes. The wood is more than 2·17m.	4/4	3/4
(c)	Diagonal = 2·17 followed by Yes.	4/4	3/4
(d)	Diagonal = 217 followed by		
	(i) Yes. The diagonal is less than 2·2m	3/4	2/4
	(ii) Yes. The wood is more than 217cm	3/4	2/4

2. 4th mark is only available for comparing 2·2m with the result of a calculation

eg	195 + 95 = 290 = 2·9m, No	award 1/4
	195 + 95 = 290, No	award 0/4
	195 + 95 = 290, No since 290 > 220	award 1/4

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
10	**Ans: €207** •1 strategy/process: convert \$1400 into pounds •2 strategy/process: subtract 650 from answer to above •3 strategy/process: convert answer to above into euros	•1 $1400 \div 1 \cdot 75 = 800$ •2 $800 - 650 = 150$ •3 $150 \times 1 \cdot 38 = 207$ **3 marks**

NOTES:

			No working necessary
1.	(a)	207	3/3
	(b)	1304·34,1304·35 $\left(\left[1400 \times 1 \cdot 75 - 650\right] \div 1 \cdot 38\right)$	2/3
	(c)	2484 $\left(\left[1400 \times 1 \cdot 75\right] - 650\right) \times 1 \cdot 38$	2/3
	(d)	$1800\left(1400 \times 1 \cdot 75 - 650\right)$	1/3
	(e)	1035 $\left(1400 - 650\right) \times 1 \cdot 38$	1/3

11	**Ans: 31·8°** •1 strategy: use cosine ratio •2 strategy/process: correct cos value or $\cos^{-1}$ statement •3 process: find angle •4 process: round to one decimal place	•1 $\cos x° = \frac{170}{200}$ •2 $\cos x° = 0{\cdot}85$ or $x° = \cos^{-1}(170/200)$ •3 31·78 ... •4 31·8 **4 marks**

NOTES:

1. Correct answer without working award 3/4

		With working	Without working
2.	0·6, 0·5 (...) (radians used)	4/4	3/4
	35·3 (grad used)	4/4	3/4

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

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
12	**Ans: 35%**	
	•[1] strategy: find loss	•[1] 14
	•[2] strategy: know to express loss as a fraction of 40	•[2] $\frac{14}{40}$
	•[3] strategy: know to multiply fraction by 100	•[3] $\frac{14}{40}\times 100$
	•[4] process: carry out all calculations correctly	•[4] 35 **4 marks**

NOTES:

	Final answer	With working	Without working
1.	35	4/4	4/4
	65 $\left(\frac{26}{40}\times 100\right)$	3/4	0/4
	$53(\cdot\ldots)$ or $54\left(\frac{14}{26}\times 100\right)$	3/4	0/4
	$285(\cdot\ldots)$ $\left(\frac{40}{14}\times 100\right)$	3/4	0/4
	$153(\cdot\ldots)$ $\left(\frac{40}{26}\times 100\right)$	2/4	0/4
	$5(\cdot 6\ldots)$ or $6\left(\frac{14}{100}\times 40\right)$	2/4	0/4
	$10(\cdot 4)$ $\left(\frac{26}{100}\times 40\right)$ or $\left(\frac{40}{100}\times 26\right)$	1/4	0/4

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
13	**Ans: 51cm**	
	•[1] strategy: know to calculate circumference of semi-circle	•[1] ½πd
	•[2] strategy: substitute correct diameter into circumference formula	•[2] ½ × π × 12
	•[3] strategy: know to add ½πd + 32	•[3] ½ × π × 12 + 10 + 12 + 10
	•[4] process: carry out all calculations correctly (must include a circle calculation followed by an addition)	•[4] 50·8 ...
	•[5] process: round to nearest whole number	•[5] 51
		5 marks

NOTES:

		Final answer	With working	Without working
1.	(a)	51	5/5	4/5
	(b)	70 (πd +32)	4/5	0/5
	(c)	139 (½πd + 120)	4/5	0/5
	(d)	158 (πd + 120)	3/5	0/5
	(e)	89 ($\frac{1}{2}\pi r^2$ + 32)	3/5	0/5
	(f)	145 (πr^2 + 32)	3/5	0/5
	(g)	177 ($\frac{1}{2}\pi r^2$ + 120)	2/5	0/5
	(h)	233 (πr^2 + 120)	2/5	0/5

2. Unrounded or incorrectly rounded versions of the above answers should be awarded 1 mark less than those shown above.

3. 5th mark only available where candidate is required to round final answer to nearest whole number.

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
14 (a)	**Ans: (i) £28 (ii) £30** •[1] strategy/process: calculate Pay As You Go cost •[2] strategy/process: calculate Monthly Contract cost	•[1] 28 or 2800p •[2] 30 or 3000p **2 marks**
NOTES: 1. 2800 <u>and</u> 3000		award 1/2
(b)	**Ans: 225 minutes** •[1] strategy/process: compare costs for any number of minutes ≠ 200 •[2] strategy/process: compare costs for another number of minutes ≠ 200 •[3] strategy/process: continue until correct answer is found	•[1] •[2] •[3] 225 minutes and 31·50 (award 2 for eg 210 mins Nick = 29·40 Amy = 30·60 220 mins Nick = 30·80 Amy = 31·20) (award 1 for eg 210 mins Nick = 29·40 Amy = 210 × 6p = 12·60 + 18) **3 marks**

NOTES:

1. minimum evidence required for 3/3 225 and 31·50
2. minimum evidence required for award of each mark
   EITHER both costs correct
   OR one cost correct and correct method for other cost
3. Alternative Method

   •[1] $14x = 6x + 1800$
   •[2] $8x = 1800$
   •[3] $x = 225$

4. when the Monthly Contract rental is omitted in (a)(ii) and (b) then a maximum of one mark is available for correctly comparing costs for a minimum of two cases
   eg 210 mins Nick = 29·40 Amy = 12·60
   220 mins Nick = 30·80 Amy = 13·20 — award 1/3

TOTAL MARKS FOR PAPER 2
50

TOTAL MARKS FOR PAPER 1 & 2
80

[END OF MARKING INSTRUCTIONS]