SCOTTISH QUALIFICATIONS AUTHORITY

2004 Mathematics

Intermediate 2 – 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.

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
1. (a)	**Ans:** **frequency** / **cumulative frequency** 3 / 3 7 / 10 2 / 12 3 / 15 1 / 16 2 / 18 2 / 20 •[1] communicate: table with frequency column •[2] communicate: table with cumulative frequency column	 •[1] 3, 7, 2, 3, 1, 2, ,2 or correct tally marks •[2] 3, 10, 12, 15, 16, 18, 20 **2 marks**
NOTES: (i) Where the frequency column has been constructed incorrectly, the working must be followed through with the possibility of awarding 1/2. (ii) Where a grouped frequency table has been used, both marks are available.		
(b)	**Ans:** $\frac{\mathbf{5}}{\mathbf{20}}$ **or equivalent** •[1] process: finds probability	 •[1] $\frac{5}{20}$ **1 mark**

Question No	Marking Scheme Give 1 mark for each •		Illustrations of evidence for awarding a mark at each •
2.	**Ans:** $\mathbf{y = 2x + 1}$		
	$\bullet^1$ process:	find gradient	$\bullet^1$ $m = 2$
	$\bullet^2$ process:	state y intercept or c in $y = mx + c$	$\bullet^2$ $c = 1$
	$\bullet^3$ communicate:	state correct equation of straight line	$\bullet^3$ $y = 2x + 1$ **3 marks**

NOTES:

(i) For a correct answer without working award 3/3

(ii) For $y = 2x$ award 1/3

(iii) Where m and/or c are incorrect, the working must be followed through to give the possibility of awarding 1/3 or 2/3.

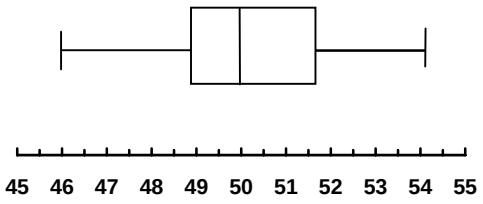
(iv) For an incorrect equation (ie both m and c incorrect), without working eg $y = 1x + 2$ award 0/3

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
3.	**Ans: 42°** •[1] process: calculate the size of angle OTQ •[2] process: calculate the size of angle TOQ or TQP •[3] process: calculate the size of angle OPT	•[1] 66° •[2] 48° or 114° •[3] 42° **3 marks**

NOTES:

(i) Angle OTQ, angle TOQ and angle TQP may not be explicitly stated, they may be marked in a diagram and can be awarded the first and second marks.

(ii) A 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 •
4. (a)	**Ans: (i) Q2 = 50** **(ii) Q1 = 49** **(iii) Q3 = 51 · 5** •[1] communicate: state Q2 •[2] communicate: state Q1 •[3] communicate: state Q3	 •[1] 50 •[2] 49 •[3] 51 · 5 **3 marks**
NOTES: An incorrect answer for the median must be followed through with the possibility of awarding full marks for (a) parts (ii) and (iii).		
(b)	**Ans:**  •[1] communicate: correct end points •[2] communicate: correct box	 •[1] end points at 46 and 54 •[2] box showing, Q1, Q2, Q3 **2 marks**
NOTES: Incorrect answers in (a) must be followed through to give the possibility of awarding 2/2.		

Question No	Marking Scheme Give 1 mark for each •		Illustrations of evidence for awarding a mark at each •
(c)	**Ans: The SIQR in first sample was $1 \cdot 25$ which is less than $1 \cdot 5$ so number of chocolates in each box in first sample is more consistent (or other valid comment)**		
	$\bullet^1$ strategy:	calculate SIQR for first sample	$\bullet^1$ SIQR $= 1 \cdot 25$
	$\bullet^2$ communicate:	valid comment about spread of samples	$\bullet^2$ comment **2 marks**

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
5. (a)	**Ans: P(– 2,–16)** •1 communicate: state clearly first co-ordinate •2 communicate: state clearly second co-ordinate	•1 –2 •2 –16 **2 marks**
NOTES: For a correct answer without working award 2/2		
(b)	**Ans: Q(6,–16)** •1 communicate: state co-ordinates of Q	•1 $(6,-16)$ **1 mark**
NOTES: An incorrect answer in part (a) must be followed through.		
(c)	**Ans: $y=(x-14)^2-16$** •1 communicate: state equation in correct form •2 communicate: complete equation	•1 $y=(x-a)^2-16$ •2 $y=(x-14)^2-16$ **2 marks**
NOTES: (i) An incorrect answer in part (a) or part (b) must be followed through. (ii) For $y=(x-14)-16$ award 1/2		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
6. (a)	**Ans: a = 3, b = 4** •[1] communicate: state value of a •[2] communicate: state value of b	•[1] a = 3 •[2] b = 4 **2 marks**
NOTES: For a = 4, and b=3		award 1/2
(b)	**Ans: $4\sqrt{3}$** •[1] process: simplify surd $\sqrt{12}$ •[2] process: simplify surd $\sqrt{27}$ •[3] process: state answer in simplest form	•[1] $2\sqrt{3}$ •[2] $3\sqrt{3}$ •[3] $4\sqrt{3}$ **3 marks**
NOTES: For $4\sqrt{3}$ without working		award 3/3

TOTAL MARKS FOR PAPER 1

26

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
1.	**Ans: £83 900** •1 strategy: know how to increase by $2 \cdot 5\%$ •2 strategy: know how to calculate expected price •3 process: carry out calculations within a valid strategy	•1 $1 \cdot 025$ •2 $77\,900 \times 1 \cdot 025^3$ •3 83 900 **3 marks**

NOTES:

(i) For an answer of 83 900 without working — award 3/3

(ii) For an answer of 83 889, 83 890 with or without working — award 2/3 (1st and 2nd marks)

(iii) Where an incorrect % is used, the working must be followed through to give the possibility of awarding 2/3. (For example an answer of £152 000, with working, can be awarded 2/3 – $77\,900 \times 1 \cdot 25^3$)

(iv) For an answer of 239 542 or 240 000, with working — award 1/3 ($1 \cdot 025 \times 77\,900 \times 3$)

(v) For an answer of £83 700 $[77900 + (77900 \times 0 \cdot 025 \times 3)]$ — award 0/3

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
2. (a)	**Ans: (i)** $\overline{x} = \mathbf{16 \cdot 5}$ **(ii)** $\mathbf{s = 1 \cdot 87}$ (i) $\bullet^1$ process: calculate the mean (ii) $\bullet^1$ process: calculate $(x - \overline{x})^2$ $\bullet^2$ process: substitute into formula $\bullet^3$ process: calculate standard deviation	 $\bullet^1$ $\overline{x} = 16 \cdot 5$ $\bullet^1$ $2 \cdot 25,\ 2 \cdot 25,\ 6 \cdot 25,\ 0 \cdot 25,\ 0 \cdot 25,\ 6 \cdot 25$ $\bullet^2$ $\sqrt{\frac{17 \cdot 5}{5}}$ $\bullet^3$ $1 \cdot 87$ **4 marks**
NOTES: Use of the alternative formula in part (ii): the first mark can be awarded for the correct calculation of $\Sigma x^2 = 1651$		
(b)	**Ans: (i)** $\overline{x} = \mathbf{20 \cdot 5}$ **(ii)** $\mathbf{s = 1 \cdot 87}$ $\bullet^1$ process: state new mean $\bullet^2$ communicate: state result	 $\bullet^1$ $\overline{x} = 16 \cdot 5 + 4 = 20 \cdot 5$ $\bullet^2$ $s = 1 \cdot 87$ **2 marks**
NOTES: Incorrect answers in part (a) must be followed through with the possibility of awarding 2/2		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
3. (a)	**Ans:** $3x^2 - 6x - 4$ •[1] process: start to multiply out brackets •[2] process: complete process of multiplying out brackets •[3] process: collect like terms which must include x^2 term	•[1] evidence of 2 correct terms (eg $3x^2 + x$) •[2] $3x^2 + x - 12x - 4$ •[3] $3x^2 - 6x - 4$ **3 marks**
NOTES:		
(b)	**Ans:** $(3x - 1)(x - 2)$ •[1] process: start to factorise trinomial •[2] process: complete factorisation	•[1] one correct factor •[2] $(3x - 1)(x - 2)$ **2 marks**
NOTES: For an answer of $(3x-2)(x-1)$, $(3x+2)(x+1)$, $(3x+1)(x+2)$ award 1/2		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
4.	**Ans: 39 · 1 cm**	
	•[1] strategy: know to find circumference	•[1] $C = 2 \times \pi \times 12$
	•[2] strategy : know how to find length of arc	•[2] $\frac{1}{5} \times 2 \times \pi \times 12$
	•[3] process: calculate perimeter	•[3] $39 \cdot 1$ **3 marks**

NOTES:

(i) Accept variation in π

(ii) For $\frac{1}{5} \times \pi \times 12^2$, $\frac{1}{5} \times \pi \times 12$
the second and third marks are available.

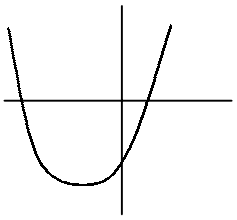
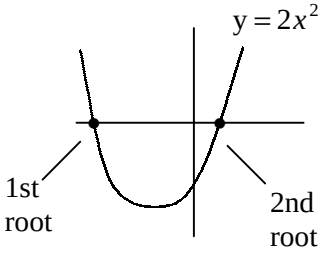
(iii) For the award of the final mark calculations must involve π .

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
5. (a)	**Ans:** $\mathbf{14}x + \mathbf{4}y = \mathbf{55 \cdot 00}$ •[1] interpret: interpret the text	•[1] $14x + 4y = 55 \cdot 00$ **1 mark**
NOTES:		
(b)	**Ans:** $\mathbf{13}x + \mathbf{6}y = \mathbf{54 \cdot 50}$ •[1] interpret: interpret the text	•[1] $13x + 6y = 54 \cdot 50$ **1 mark**
NOTES:		

Question No	Marking Scheme Give 1 mark for each •		Illustrations of evidence for awarding a mark at each •
(c)	**Ans: Entrance fee for adult is £3·50** **Entrance fee for child is £1·50**		
	•[1] strategy:	know to solve simultaneous equations	•[1] evidence
	•[2] process:	follow a valid strategy through to produce a value for x and y	•[2] a value for x and y
	•[3] process:	correct value for x and y	•[3] $x = 3 \cdot 5$ $y = 1 \cdot 5$
	•[4] communicate:	state result	•[4] Entrance fee for adult is £3·50 Entrance fee for child is £1·50 **4 marks**

NOTES:

(i) Incorrect answers in parts (a) and (b) must be followed through to give the possibility of awarding 4/4.
(ii) Any valid strategy must involve the use of 2 equations.
(iii) If values of x and y are obtained from correctly drawn graphs, accept reasonable variations in these answers.
(iv) For an answer of $x = 3 \cdot 5$ and $y = 1 \cdot 5$, award 3/4 (loses communication mark).
(v) For the award of the final mark, the cost of the entrance fee for an adult and the cost of the entrance fee for a child must be clearly stated.
(vi) For a wrong answer, without working or based on an invalid strategy, the final mark cannot be awarded.
(vii) For the correct answer, without working, award 0/4.

Question No	Marking Scheme Give 1 mark for each •		Illustrations of evidence for awarding a mark at each •
6.	**Ans:** $x = -3\cdot 9\,,\ x = 0\cdot 4$		
	Method 1		
	$\bullet^1$ strategy:	know to use quadratic formula	$\bullet^1$ evidence
	$\bullet^2$ process:	substitute correctly into quadratic formula	$\bullet^2$ $\dfrac{-7 \pm \sqrt{7^2 - 4(2)(-3)}}{2(2)}$
	$\bullet^3$ process:	calculates $b^2 - 4ac$	$\bullet^3$ 73
	$\bullet^4$ process:	states both values of x correctly to 1 decimal place	$\bullet^4$ $-3\cdot 9\,,\ 0\cdot 4$ **4 marks**
	Method 2 – possible graphical solution		
	$\bullet^1$ strategy:	know to graph $y = 2x^2 + 7x - 3$ or equivalent	$\bullet^1$ $y = 2x^2 + 7x - 3$ 
	$\bullet^2$ communicate:	indicate position of roots	$\bullet^2$ $y = 2x^2 + 7x - 3$ 
	$\bullet^3$ communicate:	state first root correct to 1 decimal place	$\bullet^3$ $-3\cdot 9$
	$\bullet^4$ communicate:	state second root correct to 1 decimal place	$\bullet^4$ $0\cdot 4$ **4 marks**

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •

NOTES:

(i) The third and fourth marks (Method 1): where $b^2 - 4ac$ is calculated incorrectly the fourth mark is available only when $b^2 - 4ac > 0$.

(ii) For a correct answer without working award 0/4

Question No	Marking Scheme Give 1 mark for each •		Illustrations of evidence for awarding a mark at each •
7. (a)	**Ans: $15 \cdot 6$ metres**		
	$\bullet^1$ strategy:	know to apply cosine rule to find BD	$\bullet^1$ evidence
	$\bullet^2$ process:	correct application of cosine rule	$\bullet^2$ $11 \cdot 1^2 + 7 \cdot 8^2 - 2 \times 11 \cdot 1 \times 7 \cdot 8 \times \cos 110$
	$\bullet^3$ process:	calculate BD	$\bullet^3$ $15 \cdot 6$
			3 marks
NOTES:			
(b)	**Ans: $111 \cdot 6$ square metres**		
	$\bullet^1$ strategy:	know to calculate area of Δ ABD and area of Δ BDC and add together	$\bullet^1$ evidence
	$\bullet^2$ process:	substitute correctly for Δ BAD	$\bullet^2$ $\frac{1}{2} \times 11 \cdot 1 \times 7 \cdot 8 \times \sin 110$
	$\bullet^3$ process:	substitute correctly for Δ BDC	$\bullet^3$ $\frac{1}{2} \times 9 \cdot 3 \times$ answer to part (a) $\times \sin 78$
	$\bullet^4$ process:	correctly calculate total area	$\bullet^4$ $111 \cdot 6$ sq m
			4 marks

NOTES:

(i) An incorrect answer for part (a) must be followed through to give the possibility of awarding 4/4.

(ii) Disregard errors due to premature rounding provided there is evidence.

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
8. (a)	**Ans: Proof** •[1] strategy: know how to find expression for area •[2] process: follow strategy through to produce expression for area	•[1] $2(x+2)+2x$ or $2x+2x+4$ or equivalent •[2] Area $=4x+4$ **2 marks**
NOTES: (i) For $(x+2)^2 = x^2+4x+4$ award 1/2 (ii) Where "L" shaped diagram is divided into 2 or 3 parts and the answer to one part is clearly indicated one mark is available.		
(b)	**Ans: $x = 3 \cdot 5$** •[1] process: calculate value of x	•[1] $3 \cdot 5$ **1 mark**
NOTES:		

Question No	Marking Scheme Give 1 mark for each •		Illustrations of evidence for awarding a mark at each •
9.	**Ans: The cone is better value because it contains more ice cream.**		
	$\bullet^1$ strategy:	know to calculate both volumes and compare	$\bullet^1$ evidence
	$\bullet^2$ process:	substitute correctly into formula for one container	$\bullet^2$ $V = \frac{1}{3} \times \pi \times 5 \cdot 2^2 \times 20$
	$\bullet^3$ process:	substitute correctly into formula for second container	$\bullet^3$ $V = \pi \times 5 \cdot 5^2 \times 5 \cdot 8$
	$\bullet^4$ process:	calculate both volumes correctly	$\bullet^4$ $566 \cdot 3\text{cm}^3$ $551 \cdot 2\text{cm}^3$
	$\bullet^5$ communicate:	state conclusion	$\bullet^5$ The cone is better value **5 marks**

NOTES:

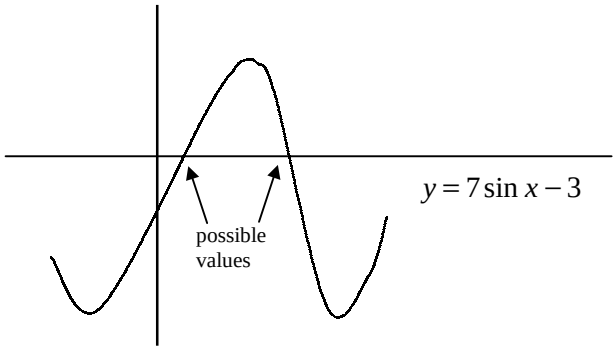
(i) Accept variations in the volume due to variations in the value of π, or premature rounding.
(ii) Mark 5 is available for comparing two volumes.

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
10.	**Ans:** $x = 25 \cdot 4^\circ$ **and** $154 \cdot 6$	
	•[1] process: solve equation for sin x°	•[1] $\sin x = \frac{3}{7}$ or equivalent
	•[2] process: find one value of x	•[2] $x = 25 \cdot 4$
	•[3] process: find second value of x	•[3] $x = 154 \cdot 6$
		3 marks

NOTES:

(i) Where sin x is calculated incorrectly the working must be followed through with the possibility of awarding 2/3.

(ii) Where a graphical solution is used, the first mark is available for indicating what graph was drawn and where the values occur eg



(iii) For a correct answer without working award 0/3

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
11. (a)	**Ans:** $\dfrac{\mathbf{7x+9}}{\mathbf{x(x+3)}}$ •[1] process: state a valid common denominator •[2] process: find correct numerator of equivalent fraction •[3] process: state answer in simplest form	•[1] any valid denominator •[2] both numerators correct •[3] $\dfrac{7x+9}{x(x+3)}$ **3 marks**
NOTES: For an answer of $\dfrac{7x+9}{x^2+3x}$ award 3/3		
(b)	**Ans:** $\boldsymbol{x=\dfrac{mp-2y}{3}}$ •[1] process: start to rearrange formula •[2] process: continue process •[3] process: make x the subject	•[1] $mp=3x+2y$ •[2] $3x=mp-2y$ •[3] $x=\dfrac{mp-2y}{3}$ **3 marks**
NOTES: (i) For a correct answer without working award 3/3 (ii) The first mark is available for 'removing' denominator. (iii) The third mark is available for division by 3.		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
(c)	**Ans: $6a^4$** $\bullet^1$ process: simplify powers in numerator $\bullet^2$ process: simplify constants $\bullet^3$ process: simplify powers in fraction	 $\bullet^1$ $\frac{3\times 2a^6}{a^2}$ $\bullet^2$ $\frac{6a^6}{a^2}$ $\bullet^3$ $6a^4$ **3 marks**
NOTES:		

TOTAL MARKS FOR PAPER 2

54

[END OF MARKING INSTRUCTIONS]