SCOTTISH QUALIFICATIONS AUTHORITY

2004 Mathematics SG Credit
Paper 1 & Paper 2
Finalised Marking Instructions

Strictly Confidential

These instructions are **strictly confidential** and, in common with the scripts entrusted to you for marking, they must never form the subject of remark of any kind, except to Scottish Qualifications Authority staff. Similarly, the contents of these instructions must not be copied, lent or divulged in any way now, or at any future time, to any other persons or body.

Marking

The utmost care must be taken when entering and totalling marks. Where appropriate, all summations for totals must be carefully checked and confirmed.

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

Recording of Marks

Where papers assess more than one element, care must be taken to ensure that marks are entered in the correct column.

The **Total** mark for each paper or element should be entered (in red ink) in the box provided in the top-right corner of the front cover of the answer book (or question/answer book).

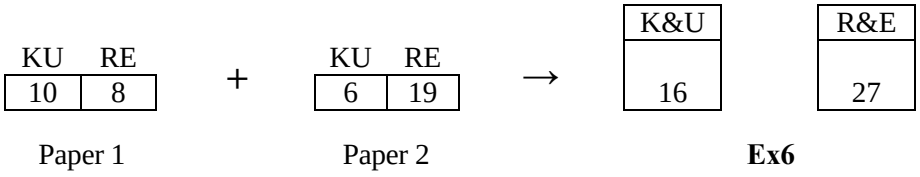
Always enter the **Total** mark as a **whole number**, where necessary by the process of rounding up.

The transcription of marks, within booklets and on to the Mark Sheet, should always be checked.

Form Ex6

- Add together KU totals from Paper 1 and 2
- Enter this final total in K & U column on Form Ex6
- Do the same for RE

Example:



Markers are reminded that they must not write comments, words or acronyms on scripts. Please use ticks, crosses, lines or numbers.

7 May 2004

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.

Care should be taken to ensure that the mark for any question or part question is entered in the correct column, as indicated by the horizontal line.

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

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 Do not penalise insignificant errors. An insignificant error is one which is significantly below the level of attainment being assessed.

eg An error in the calculation of 16 + 15 would not be penalised at Credit Level.

4 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.

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

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

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

8 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.**

9 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.

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

11 Accept legitimate variations in numerical/algebraic questions.

12 Do not penalise bad form eg $\sin x^0 = 0{\cdot}5 = 30^0$.

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

2004 Mathematics SG – Credit Level - Paper 1

Marking Instructions

Award marks in whole numbers only

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark •
1	**Ans: 2·77** • carrying out a first calculation • carrying out <u>both</u> calculations	 • 3·43 or 1·67 • 2·77 2 KU
Notes: (i) 2·77 without working — award 2/2 (ii) 0·57 with/without working — award 1/2 (iii) 2·83 with/without working — award 1/2		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark •
2	**Ans:** $\frac{11}{5}$ • knowing correct order of operations • first calculation • second calculation	 • $\frac{2}{5}\times\frac{7}{2}$ • $\frac{7}{5}$ • $\frac{11}{5}$ 3 KU

Notes:

(i) $\frac{11}{5}$ without working — award 3/3

(ii) $\frac{43}{25}$ or equivalent with/without working — award 2/3

(iii) $\frac{43}{10}$ or equivalent with/without working — award 1/3

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark •
3	**Ans: 2** • first calculation • correct use of signs	• 18 • -16 2 KU

Notes:

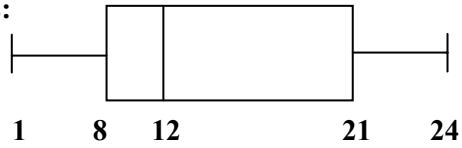
(i)	2 with/without working	award 2/2
(ii)	34 with/without working	award 1/2
(iii)	20 with/without working	award 1/2
(iv)	52 with/without working	award 0/2

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark •
4	**Ans:** $\dfrac{\mathbf{7m+3}}{\mathbf{m(m+1)}}$ • common denominator • numerator • simplification	 • $m(m+1)$ • $3(m+1)+4m$ • $\dfrac{7m+3}{m(m+1)}$ 3 KU

Notes:

(i) Wrong simplification beyond correct answer loses last mark

(ii) An answer of $7m+3$ with no denominator award 0/3

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark •
5	**Ans:** **Average Monthly Temperature**  **1 8 12 21 24** • choosing suitable diagram • median • quartiles • correctly labelled diagram	• box plot • $Q_2 = 12$ • $Q_1 = 8$ $Q_3 = 21$ • as answer 4 RE

Notes:

(i) Last mark is awarded only if all data has been correctly inserted

(ii) The median and quartiles must be explicitly stated or shown on diagram

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark •
6	**Ans: 400 g** • recognition of 112½% • unitary value • whole value	• 112½% or $\frac{9}{8} = 450$ • 1% = 4 or $\frac{1}{8} = 50$ • 100% or $\frac{8}{8} = 400$ 3 KU

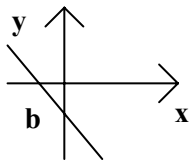
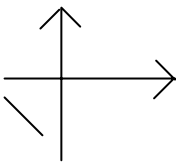
Notes:

(i)	400 g with/without working	award 3/3
(ii)	112½% of 450 (506·25)	award 0/3
	87½% of 450 (393·75)	award 0/3

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark •
7	**Ans: School raffle** • two probabilities • strategy to compare • correct response	• $\frac{15}{1200}$ $\frac{20}{1800}$ • $\frac{1}{80}/\frac{1}{90}$ or $\frac{45}{3600}/\frac{40}{3600}$ or $1\cdot25\%/1\cdot11\%$ • school raffle 3 RE
Notes:		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark •
8 (a)	**Ans: Proof** • correct third term • proof	• $x + y$ • $2x + 3y = 5$ 2 RE
Notes: (i) The omission of addition signs in the sequence should be considered as 'bad form' provided the equation is then stated correctly. (ii) The second mark requires an explicit 4th term.		
(b)	**Ans: $3y + 5x = 17$** • correct fourth term • equation	• $y + 2x$ • $3y + 5x = 17$ 2 RE
Notes: (i) As in part (a). (ii) $3y + 5x = 17$ with/without working award 2/2		
(c)	**Ans: $x = 4, y = -1$** • knowing to solve simultaneously • value for x • consistent value for y	• start • $x = 4$ • $y = -1$ 3 RE
Notes:		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark •
9	**Ans: a = 2** **b = 4** • first value • second value	• a = 2 • b = 4 2 KU
Notes: (i) For a = 4 and b = 2 award 1/2		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark •
10	**Ans:**  • starting graph • appropriate gradient • appropriate intercept	• minimum of x, y axes plus a straight line • correct direction $a < 0$ • $b < 0$ 3 RE
Notes: (i) intercept need not be explicitly shown for third mark 		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark •
11 (a)	**Ans: $10\sqrt{3}$** • initial simplification of surd • further simplification	• $2\times5\sqrt{3}$ or $2\sqrt{25\times3}$ or $2\sqrt{5\times5\times3}$ • $10\sqrt{3}$ 2 KU
Notes: (i) $10\sqrt{3}$ with/without working		award 2/2
(b)	**Ans: $1\frac{1}{3}$** • evaluation of 0 index • evaluation of negative index	• 1 • $\frac{1}{3}$ 2 KU
Notes: (i) Do not penalise for $1+\frac{1}{3}$		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark •
12	**Ans: Proof** • valid strategy • expression for radius or diameter • substitution into area formula • proof	• $10 = 2\pi r$ or $10 = \pi d$ • $r = \frac{5}{\pi}$ or $d = \frac{10}{\pi}$ • $A = \pi \times \left(\frac{5}{\pi}\right)^2$ • $A = \frac{25}{\pi}$ 4 RE

Notes:

(i) $A = \frac{25}{\pi}$ without working — award 0/4

(ii) $r = \frac{5}{\pi}$ or $d = \frac{10}{\pi}$ with/without working — award 2/4

(iii) The last mark can be awarded only if an attempt to expand $\left(\frac{5}{\pi}\right)^2$ has been made

(iv) Take care! Radius does not equal 5

KU	RE
19	21

2004 Mathematics SG – Credit Level - Paper 2

Marking Instructions

Award marks in whole numbers only

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark •
1	**Ans: $8{\cdot}64 \times 10^{12}$**	
	• conversion of time	• $\times 60 \times 60$
	• expression for distance	• $3 \times 10^8 \times 60 \times 60 \times 8$
	• evaluation of distance	• 86400×10^8
	• scientific notification	• $8{\cdot}64 \times 10^{12}$ 4 KU

Notes:

<u>For answers without any working</u>

For $8{\cdot}64 \times 10^{12}$ award 4/4

For $8{\cdot}64^{12}$ award 2/4

For $2{\cdot}4 \times 10^9$ award 3/4

For $1{\cdot}44 \times 10^{11}$ award 3/4

For $1{\cdot}0416 \times 10^4$ award 3/4

For $3{\cdot}75 \times 10^7$ award 2/4

For $6{\cdot}25 \times 10^5$ award 1/4

<u>For answers with working</u>

$8{\cdot}64^{12}$ award 3/4

The final mark can be awarded only if scientific notation is the result of an explicitly stated distance

eg Distance $= 3 \times 10^8 \times 60 \times 60 \times 8$
$= 8{\cdot}64 \times 10^{10}$ award 2/4

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark •
2(a)	**Ans:** $\mathbf{v = -\frac{2}{3}t + 100}$ • intercept • gradient • consistent equation	• $(0,100)$ • $m = -\frac{2}{3}$ • $v = -\frac{2}{3}t + 100$ 3 KU
Notes: (i) The intercept and gradient need not be explicitly stated (ii) The last mark is awarded only if: (a) given in terms of v and t (b) consistent with first two marks (iii) A completely wrong equation without working award 0/3		
(b)	**Ans: 45 minutes** • comprehension • substitution • solution of equation	• $v = 70$ • $70 = -\frac{2}{3}t + 100$ • $t = 45$ 3 RE
Notes: (i) An incorrect equation from (a) correctly followed through to a value of t can be awarded 3/3 (ii) $t = 45$ without any working award 2/3 (iii) $t = 105$ without any working award 1/3 (iv) A 'proportion' method is awarded: • strategy • ratio of $\frac{150}{100}$ • $t = 45$		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark •
3	**Ans:** $\bar{x} = 51$ $s.d = 1 \cdot 41$ • mean • processing • continuing process • standard deviation	• $\bar{x} = 51$ • $\sum (x - \bar{x})^2 = 12$ or $\sum x^2 - \frac{(\sum x)^2}{n} = 12$ • $\sqrt{2}$ • $1 \cdot 41$ 4 KU
Notes:		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark •
4	**Ans: 128** • reduction factor • time recognition • calculation	• $(0 \cdot 8)$ • $(0 \cdot 8)^3$ • 128 3 KU
Notes: (i) 128 with/without working		award 3/3

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark •
5	**Ans: 1190m**	
	• understanding	• HB
	• strategy	• $H = 75^\circ$ *and* $\frac{h}{\sin H} = \frac{a}{\sin A}$
	• appropriate substitution	• $\frac{1500}{\sin 75^\circ} = \frac{HB}{\sin 50^\circ}$
	• calculation	• $HB = 1190\text{m}$
		4 RE

Notes:

(i) 1190 without working — award 0/4

(ii) 1272 (HA) with relevant working — award 3/4

(iii) Candidates who take the perpendicular from H and 'bisect' either AB or angle AHB cannot receive any marks unless, angle AHB/or ½ angle AHB is explicitly stated. In this case, only the first mark is available

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark •
6	**Ans: $18 \cdot 4^{\circ}$** • strategy • process • strategy • process • solution	• PQ = 10 • PB = 20 • correct use of valid trig ratio • $63 \cdot 4^{\circ}$ • $18 \cdot 4^{\circ}$ 5 RE
Notes:		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark •
7	**Ans: 80** • strategy • process • calculation • rounding OR • strategy • continuation • continuation • rounding	 • correct substitution into cosine rule • $r^2 = 6451 \cdot 69$ • $r = 80 \cdot 32$ • 80 4 KU • perpendicular height $= 77 \cdot 6$cm • base $= 19 \cdot 4 + 20 \cdot 6$ • $r = 80 \cdot 31$ • 80 4KU
Notes:		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark •
8	**Ans: 800mm** • strategy • calculation • strategy • calculation • calculation	 • chord/radius property $\Rightarrow$ right angle • 300mm • use of Pythagoras in correct triangle • correct use of Pythagoras to find 400 • width = 800 5 RE
Notes: (i) 800 with no working		award 0/5

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark •
9	**Ans: 1902cm^3**	
	• centre angle	• 72°
	• area of triangle	• $\frac{1}{2}\times 10\times 10\times \sin 72^\circ$
	• calculation	• $47\cdot 6\text{cm}^2$
	• area of pentagon	• $237\cdot 76\text{cm}^2$
	• volume of prism	• 1902cm^3 5 KU

Notes:

(i) Candidates who assume triangle AOB is equilateral and calculate the area as $43\cdot 3$ can be awarded a <u>maximum</u> of 4/5

(ii) Candidates who find the area of triangle AOB to be 50 $\left(\frac{1}{2}\times 10\times 10\right)$ can be awarded a <u>maximum</u> of 2/5 (marks 4 and 5)

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark •
10	**Ans:** $\mathbf{228 \cdot 6^\circ}$ $\mathbf{311 \cdot 4^\circ}$ • simplifying equation • first angle • second angle	• $\sin x^\circ = -\frac{3}{4}$ • $228 \cdot 6^\circ$ • $311 \cdot 4^\circ$ 3 KU

Notes:

(i) The second mark is awarded only if $\sin x^\circ$ is a negative value: thus candidates who have $\sin x^\circ$ as a positive value can only be awarded a maximum of 1/3 (last mark)

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark •
11(a)	**Ans: Proof** • area of lawn • area of path • equation	• $3x^2$ • $5x + 2$ • $3x^2 = 5x + 2$ $\Rightarrow 3x^2 - 5x - 2 = 0$ 3 RE
Notes: (i)	Both areas must be equated explicitly to gain the last mark	
(b)	**Ans: 6m** •• factorisation (see notes) • breadth • length	•• $(3x+1)(x-2)$ • $b = 2$ • $\ell = 6$ 4 RE
Notes: (i)	For $(3x+1)(x-2)$ award the first two marks	
(ii)	For $(3x-1)(x+2)$ or $(3x+2)(x-1)$ or $(3x-2)(x+1)$ award one of the first two marks	
(iii)	For any other combination of factors award none of the first two marks The third and fourth marks may still be awarded	
(iv)	For the use of quadratic formula mark accordingly • for use of valid strategy • correct substitution • leading to $b = 2$ • $\ell = 6$	
(v)	Answer to part (b) may appear in part (a)	

KU	RE
26	24

FINAL	**KU 45**
TOTALS	**RE 45**

[END OF MARKING INSTRUCTIONS]