2013 Mathematics

Standard Grade – General

Finalised Marking Instructions

Part One: General Marking Principles for Mathematics Standard Grade – General

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.

(a) Marks for each candidate response must <u>always</u> 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. For technical assistance, e-mail or phone the e-marker helpline.

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

GENERAL MARKING ADVICE: Mathematics Standard Grade – General

The marking schemes are written to assist in determining the "minimal acceptable answer" rather than listing every possible correct and incorrect answer. The following notes are offered to support Markers in making judgements on candidates' evidence.

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.

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 are 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 $\sin x^{\circ} = 0{\cdot}5 = 30^{\circ}$.

13   A transcription error, where a number has been erroneously transcribed from the examination question, is not normally penalised except where the question has been simplified as a result.

14   When multiple solutions are presented by the candidate and it is not clear which is intended to be the final one, mark all attempts and award the lowest mark.
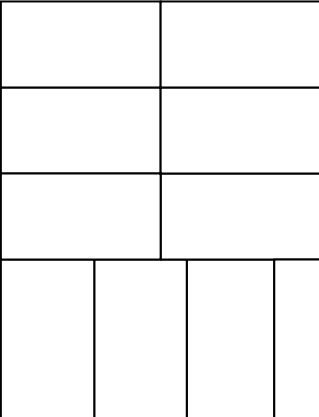
Part Two: Mathematics Standard Grade – General

Paper 1

Award marks in whole numbers only

Question			Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
1	a		Ans: **91·72** •^{1} correct subtraction	1 (KU)	•^{1} 91·72
1	b		Ans: **2859** •^{1} correct multiplication	1 (KU)	•^{1} 2 859
1	c		Ans: **0·645** •^{1} correct division	1 (KU)	•^{1} 0·645
1	d		Ans: **18·2** •^{1} find 10% (or equivalent) •^{2} correct multiplication	2 (KU)	•^{1} 26/10 (= 2·6) •^{2} (2.6 x 7 =)18·2
Notes:					
	(i)		In part (d), for a correct final answer without working – award 1/2		
2			Ans: **5/14** •^{1} correct number of choices •^{2} correct probability statement	2 (KU)	•^{1} 5 •^{2} 5/14
Notes:					
	(i)		Accept variations in language e.g. 5:14; 5 out of 14; 5 to 14		
	(ii)		Where 5 is used incorrectly in a probability statement – award 1/2		

Question			Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
3			**Ans: correct diagram** •^{1} correct reflection of one point •^{2} correct completion of diagram	2 **(RE)**	•^{1} see diagram •^{2} see diagram

Notes:

    (i)   Where candidates correctly reflect in a line other than the dotted line – award 1/2

    (ii)   Where candidates rotate shape - award 0/2

4			**Ans: (£) 512** •^{1} divide by 3 •^{2} correct division •^{3} correct subtraction	3 **(KU)**	•^{1} 768/3 •^{2} 256 •^{2} 512

Notes:

    (i)   Final Answers   with working   without working
             512   3/3   2/3
             537.60 (70% of 768)   2/3   0/3

5			**Ans: 1017, 1024, 1038** •^{1} correct time at Union •^{2} correct time at Telford •^{3} correct time at Ferry	3 **(RE)**	•^{1} 1017 •^{2} 1024 •^{3} 1038
6	a		**Ans: 8 (°C)** •^{1} correct solution	1 **(KU)**	•^{1} 8
6	b		**Ans: 2 (°C)** •^{1} correct solution	1 **(KU)**	•^{1} $-5 + 7 = 2$

Question			Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
7	**a**		**Ans: 7, 9, 11, 29** •^{1} any two correct number of lines •^{2} two further correct number of lines	**2** **(RE)**	•^{1} any two from 7, 9, 11, 29 •^{2} remaining two from 7, 9, 11, 29
7	**b**		**Ans: L = 2D + 1** •^{1}•^{2} correct formula	**2** **(RE)**	•^{1}•^{2} L = 2D + 1
7	**c**		**Ans: D = 38** •^{1} correct strategy to find D •^{2} correct answer	**2** **(RE)**	•^{1} 2D + 1 = 77 •^{2} D = 38

Notes:

In part (b)
        (i)   for an answer of (=) 2D + 1 – award 1/2
        (ii)   do not penalise bad form, eg L = D + D + 1
        (iii)   a formula in words is not acceptable
        (iv)   for D = 2L + 1 – award 0/2
In part (c)
        (v)   the solution can be obtained from extending the table
        (vi)   for 77/2 – 1 leading to 37.5, 38 or 37 – award 1/2
        (vii) for D = 2L + 1 in part (b) leading to an answer of 155 – award 1/2
        (viii) for a final answer of 38 without working – award 1/2

Question			Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
8	**a**		**Ans: 0·0105** •^{1} correct division by 500	**1** **(KU)**	•^{1} 0·0105
8	**b**		**Ans: 1·05 × 10^{-2}** •^{1} correct positioning of decimal point •^{2} correct power of ten in a valid expression	**2** **(KU)**	•^{1} 1·05 •^{2} × 10^{-2}

Notes:

In part (b)
        (i)   the second mark can be awarded for a consistent power of 10, eg 10.5 × 10^{-3}

Question			Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
9			**Ans: 59** (°) •[1] angle ABC identified as right angle •[2] calculate angle ABO •[3] calculate angle BAO	**3** **(RE)**	•[1] 90 •[2] $90 - 31 = 59$ •[3] 59

Notes:

(i) Alternative Strategies
•[1] calculate angle BOC
•[2] calculate angle BOA
•[3] calculate angle BAO

•[1] 118 (180 – 31 – 31)
•[2] 62   (180 – 118)
•[3] 59

•[1] know angle ABC is a right angle
•[2] strategy (using triangle ABC)
•[3] calculate angle BAO

•[1] 90
•[2] 180 – 90 – 31
•[3] 59

(ii) Final Answer   with working   without working
59   3/3   2/3

Question			Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
10			**Ans:** Diagram showing 9 rectangles fitted •[1] minimum six rectangles fitted •[2] two further rectangles fitted •[3] one further rectangle fitted.	**3** **(RE)**	•[1] 6 or 7 rectangles fitted •[2] 8 rectangles fitted •[3] 9 rectangles fitted

Notes:

(i) For candidates who get the correct final answer without drawing – award 1/3

KU 15
RE 17

[END OF PAPER 1 MARKING INSTRUCTIONS]

Paper 2

Award marks in whole numbers only

Question			Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
1			**Ans: (£) 479·25** •^{1} correct use or conversion of percentage •^{2} correct increase •^{3} correct total	**3** **(KU)**	•^{1} 0·065 or equivalent •^{2} $(0·065 \times 450 =)$ 29·25 •^{3} $(450 + 29·25 =)$ 479·25

Notes:

    (i)   Alternative Strategy
        •^{1} correct use or conversion of
                percentage
        •^{2} correct increase
        •^{3} correct total

                              •^{1} 0·065 or equivalent
                              •^{2} $1·065 \times 450$
                              •^{3} 479·25

    (ii)   Final Answer

	with working	without working
479·25	3/3	2/3
29·25	2/3	1/3
422·54 (450/1·065)	2/3	0/3
7373 (450/0·065 + 450)	2/3	0/3
6923 (450/0·065)	1/3	0/3
872·54 ((450 ÷ 106·5 × 100) + 450)	1/3	0/3

Question			Marking Scheme	Max Mark	Illustrations
2			**Ans:** **0** **5** **6** **8** **9** **1** **1** **2** **2** **5** **6** **6** **7** **7** **2** **4** **6** **3** **2** **2** **3** **5** **7** **4** **1** •^{1} stem correct •^{2} all leaves in correct rows •^{3} leaves correctly ordered	**3** **(KU)**	 •^{1} see diagram •^{2} see diagram •^{3} see diagram

Notes:

    (i)   accept the use of commas or decimal point as bad form

Question			Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
3			**Ans: (£) 217·50**	**3**	
			•^{1} know to add 75 and 795		•^{1} 75 + 795
			•^{2} know to divide new rent by 4		•^{2} 870/4
			•^{3} all calculations correct, must include a division and correct communication of money	**(RE)**	•^{3} 217·50
Notes:					

(i)	Final Answers		with working	without working
	217·50		3/3	2/3
	217·5		2/3	1/3
	290 (870/3)		2/3	0/3
	273·75 (795 + 4 × 75)/4		1/3	0/3
	1012·50 (795 × 5 + 75)/4		1/3	0/3
	292·50 (795 + 5 × 75)/4		1/3	0/3

Question			Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
4	**a**		**Ans:**	**3**	

<table>
<tr><th colspan="6">Selection</th><th></th></tr>
<tr><th>Potatoes</th><th>Carrots</th><th>Onions</th><th colspan="2">Turnips</th><th>Leeks</th><th>Cost (£)</th></tr>
<tr><td>✓</td><td>✓</td><td></td><td colspan="2">✓</td><td>✓</td><td>6·87</td></tr>
<tr><td>✓</td><td>✓</td><td>✓</td><td colspan="2"></td><td>✓</td><td>6·59</td></tr>
<tr><td>✓</td><td>✓</td><td>✓</td><td colspan="2">✓</td><td></td><td>6·4(0)</td></tr>
<tr><td>✓</td><td></td><td>✓</td><td colspan="2">✓</td><td>✓</td><td>6·09</td></tr>
<tr><td></td><td>✓</td><td>✓</td><td colspan="2">✓</td><td>✓</td><td>5·33</td></tr>
</table>

Question			Marking Scheme	Max Mark	Illustrations
			•[1] one selection correct		•[1] see table
			•[2] a further two selections correct		•[2] see table
			•[3] a further selection correct and all costs correct	**(RE)**	•[3] see table
4	**b**		**Ans: Carrots, onions, turnips, leeks**	**1**	
			•[1] correct selection	**(RE)**	•[1] carrots, onions, turnips, leeks
5			**Ans: 27·5(m)**	**4**	
			•[1] correctly use Pythagoras' theorem		•[1] $34^2 = x^2 + 20^2$ or equivalent
			•[2] correct Pythagoras calculation		•[2] $x^2 = 756$
			•[3] correct square root of above		•[3] $x = 27 \cdot 495$
			•[4] correct rounding to 1 decimal point	**(KU)**	•[4] $x = 27 \cdot 5$

Notes:

(i)   Alternative Strategy

•[1]   correct trig statement
•[2]   correct calculation of angle (54° or 36°)
•[3]   correct calculation of length
•[4]   correct rounding to 1 decimal place

(ii)   Final Answers   with working   without working
        27·5   4/4   3/4
        39·4 ($34^2 + 20^2$)   3/4   0/4

Question			Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
6			**Ans: Yes, 7·5 is less than 8**	**3**	
			•¹ know to use formula to find time		•¹ $T = 315/42$
			•² correct time calculation		•² $7·5$
			•³ correct comparison of time	**(RE)**	•³ Yes, 7·5 is less than 8

Notes:

    (i)   Alternative Strategies

        •¹ $D = 42 \times 8$
        •²   336
        •³   Yes, $336 > 315$

        •¹ $S = 315/8$
        •²   39.4
        •³   Yes, $39·4 < 42$

    (ii)   for a correct final answer and correct conclusion without working – award 1/3

    (iii)   the reason must include a comparison or an implied comparison eg 'only', 'more than' or 'less than'.

    (iv)   ignore variations in rounding

Question			Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
7	**a**		**Ans:** **12p – 3**	**2**	
			•^{1} correct multiplication of bracket		•^{1} 12p −8
			•^{2} correct gathering of terms	**(KU)**	•^{2} 12p – 3
7	**b**		**Ans:** **$t \leq 9$**	**2**	
			•^{1} correct gathering of terms		•^{1} $4t \leq 36$
			•^{2} correct solution	**(KU)**	•^{2} $t \leq 9$

Notes:

  (i)   Final Answers   with working   without working
       (a)   12p – 3   2/2   2/2
       (b)   3(4p – 1)   2/2   2/2
       (c)   4p – 1   1/2   1/2
       (d) $t \leq 9$ 2/2   1/2

  (ii)   in part (a), where a candidate creates then tries to solve an equation the 2nd mark cannot be
        awarded

  (iii) in part (b), for a final answer of eg ≤ 9; < 9; 9; $t < 9$; or $t = 9$ the 2nd mark cannot be awarded

  (iv) in part (b), a solution obtained by trial and error is **not** acceptable – award 0/2

Question			Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
8			**Ans: Brown's , 60p cheaper**	**3**	
			•^{1} knows to calculate cost of 6 litres at Brown's		•^{1} $(4 \times 1\cdot97 =)7\cdot88$
			•^{2} knows to calculate cost of 6 litres at Scott's		•^{2} $(4 \times 2\cdot12 =)8\cdot48$
			•^{3} correct calculation with reason	**(RE)**	•^{3} Brown's, 60p cheaper

Notes:

  (i)   the reason must include a price comparison or an implied price comparison eg 'only', 'more than' or
        'less than'.

Question			Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
9			**Ans: 835·(2) cm^2**	**2**	
			•^{1} correct substitution in CSA formula		•^{1} CSA $= 2 \times 3 \cdot 14 \times 7 \times 19$
			•^{2} correct calculation involving π	**(KU)**	•^{2} $835(\cdot 2)$

Notes:

   (i)   Final Answers   with working   without working

	with working	without working
835(·24)	2/2	2/2
835(·66) (using π)	2/2	2/2
836	2/2	2/2
417(·62)	1/2	0/2
2923(·34) (volume)	1/2	0/2
153(·86) (area of circle)	1/2	0/2
43(·96) (circumference)	1/2	0/2

Question			Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
10			**Ans: 600 (kg)**	**3**	
			•^{1} valid strategy		•^{1} $15\% = 90$
			•^{2} correct use of valid strategy		•^{2} $1\% = 6$ or equivalent
			•^{3} all calculations correct, must include a division	**(RE)**	•^{3} $(100\% =\,)\ 600$

Notes:

   (i)   Alternative Strategy

       •^{1} $15\% = 90$
       •^{2} $100/15 = 6 \cdot 66 \ldots$
       •^{3} $90 \times 6 \cdot 66 \ldots = 600$

   (ii)   Final Answers

	with working	without working
600	3/3	2/3
257 (35% = 90)	2/3	0/3
300 (30% = 90)	2/3	0/3
450 (20% = 90)	2/3	0/3

Question			Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
11			**Ans: (£) 898**	**3**	
			•¹ find cost of caravan in pounds		•¹ $(287 \cdot 5/1 \cdot 15 =)$ 250
			•² cost of caravan **or** flights		•² $(3 \times 250 =)$ 750 **or** $(2 \times 74 =)$ 148
			•³ total cost	**(KU)**	•³ $(148 + 750 =)$ 898

Notes:

(i)   Final Answers

	with working	without working
898	3/3	2/3
1139·88 $((287 \cdot 5 \times 1 \cdot 15) \times 3 + 2 \times 74)$	2/3	0/3
1010·50 $(3 \times 287 \cdot 5 + 2 \times 74)$	2/3	0/3
972 $((250 + 74) \times 3)$	2/3	0/3
878·70 $(1010.50 \div 1 \cdot 15)$	2/3	0/3
824 $(750 + 74)$	2/3	0/3
324 $(287 \cdot 5/1 \cdot 15 + 74)$	1/3	0/3
862·5 $(3 \times 287 \cdot 5)$	1/3	0/3

Question			Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
12			**Ans: 2·02** (°)	**3**	
			•¹ valid trig ratio		•¹ $\sin x^o = 4/113$
			•² correct value for $\sin x^o$		•² $\sin x^o = 0 \cdot 035\ldots$
			•³ correct angle	**(KU)**	•³ $x^o = 2 \cdot 02^o$

Notes:

(i)   Final Answers

	with working	without working
2(·02)	3/3	0/3
0·035 [RAD]	3/3	0/3
2·25 [GRAD]	3/3	0/3

(ii)   Where the final answer comes from $\cos x^o = 4/113$ leading to 88° or $\tan x^o = 4/113$ leading to 2·027 … the maximum mark available is 1/3

(iii)   candidates who use tan can also obtain a final answer of 2(·027) – award 1/3

(iv)   credit should be given where a more laborious method is used

(v)   ignore incorrect rounding

Question			Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
13			**Ans: 8 (hrs)**	**4**	
			•[1] know to calculate basic wage		•[1] $28 \times 5 \cdot 42 \ (= 151 \cdot 76)$
			•[2] know to find overtime pay		•[2] $216 \cdot 80 - 151 \cdot 76 = (65 \cdot 04)$
			•[3] know to find overtime rate		•[3] $1 \cdot 5 \times 5 \cdot 42 \ (=8 \cdot 13)$
			•[4] know to find number of overtime hours and all calculations correct (min 2 calculations, must include a division)		•[4] $(65 \cdot 04/8 \cdot 13 =) 8$
				(RE)	

Notes:

(i)   Alternative Strategy

•[1] know to calculate the number of hrs worked   •[1] $216 \cdot 80/5 \cdot 42 \ (= 40)$
•[2] know to subtract 28 from above   •[2] $40 - 28 \ (= 12)$
•[3] know to divide above by $1 \cdot 5$ •[3] $12/1 \cdot 5$
•[4] all calculations correct, must include a division   •[4] $= 8$

(ii)   Final Answers   with working   without working
        8   4/4   3/4
        12 (65·04/5·42)   3/4   0/4

Question			Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
14	a		**Ans: A(-6,4) and B (5,-1) correctly plotted**	**1**	
			•[1] points plotted correctly		•[1] A(-6,4) and B (5,-1) correctly plotted
				(KU)	
14	b		**Ans: $\dfrac{-5}{11}$**	**2**	
			•[1] evidence of 5 or 11		•[1] 5 or 11
			•[2] correct negative gradient		•[2] $\dfrac{-5}{11}$
				(KU)	

Notes:

(i)   for a final answer of $\dfrac{-5}{11}$ without working - award 2/2

Question			Marking Scheme Give 1 mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
15			**Ans: 376·8 (cm)**	**3**	
			•^{1} know to find diameter of small drum		•^{1} $d = 2 \times 30\ (= 60)$
			•^{2} know to find diameter of large drum		•^{2} $D = 2 \times 60\ (= 120)$
			•^{3} correct circumference of of large drum		•^{3} $(C = 3\cdot14 \times 120 =)\ 376\cdot8$
				(RE)	

Notes:

    (i)

Final Answers	with working	without working
376·8	3/3	2/3
377	3/3	2/3
188·5 (3·14 × 60)	2/3	0/3
94·2 (3·14 × 30)	1/3	0/3

    (ii)   candidates who calculate the area of the large drum can be awarded 1/3 for evidence of r = 60

KU 25
RE 23

OVERALL TOTAL MARKS
40 KU   40 RE

[END OF PAPER 2 MARKING INSTRUCTIONS]