2009 Mathematics

Standard Grade Credit

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.

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 $\sin x^\circ = 0.5 = 30^\circ$.

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

2009 Mathematics SG – Credit Level – Paper 1

Draft Marking Instructions

Award marks in whole numbers only

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
1	**Ans: 27.11** • division • subtraction	• 28.2 • 27.11 **2KU**
NOTES:		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
2	**Ans:** $\mathbf{2\frac{5}{6}}$ • common denominator • fraction	• $4\frac{2}{6}-1\frac{3}{6}$ • $\frac{17}{6}$ **2KU**
NOTES:		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
3 (a)	**Ans: 19** • substitution • evaluation	• $(-4)^2 + 3$ • 19 **2KU**
NOTES: (i) for 19, with or without working — award 2/2		
(b)	**Ans: $t = \pm 7$** • substitution • evaluation	• $t^2 + 3 = 52$ • $t = \pm 7$ **2RE**
NOTES: (i) for ± 7, with or without working — award 2/2 (ii) for 7 or -7, with or without working — award 1/2		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
4 (a)	**Ans:** $(x-2y)(x+2y)$ • factorising	• $(x-2y)(x+2y)$ **1KU**
NOTES:		
(b)	**Ans:** $2x^2+7x-4$ • expansion	• $2x^2+7x-4$ **1KU**
NOTES:		
(c)	**Ans:** $3x^{\frac{3}{2}}+x^{-\frac{3}{2}}$ • a correct term • a second correct term with no further 'simplification'	• $3x^{\frac{3}{2}}$ or $x^{-\frac{3}{2}}$ • $3x^{\frac{3}{2}}$ or $x^{-\frac{3}{2}}$ **2KU**
NOTES: (i) accept indices in decimal form (ii) a further 'simplification' could be $3x^{\frac{3}{2}}+x^{-\frac{3}{2}}=3x^0$		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
5	**Ans:** $\mathbf{4\sqrt{3}}$ • method • processing • simplification	• $BC^2 = 8^2 - 4^2$ • $\sqrt{48}$ • $4\sqrt{3}$ **3KU**
NOTES:		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
6	**Ans: P(female) plus justification** • probability (female) • probability (5) • communication	• $\frac{4}{18}$ • $\frac{1}{6}$ • female (with justification) **3RE**

NOTES:

(i) for the 3rd mark, justification must show

(a) both probabilities with same numerator or denominator

and

(b) a consistent decision

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
7	**Ans: £200** • valid strategy • processing • solution	• 130% = 260 • $100\% = \frac{260}{1.3}$ • 200 **3KU**

NOTES:

(i) for £200, with or without working — award 3/3

(ii) for £371.43 (70% = £260), with working — award 2/3

(iii) for £338 (130% of £260), with or without working — award 0/3

(iv) for £182 (70% of £260), with or without working — award 0/3

(v) caution: some candidates state 130% = £260 and follow this as note (iii) or (iv); in these cases, the 1st mark is still available

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
8 (a)	**Ans:** $\mathbf{6x + 2y = 42}$ • starting to form equation • equation	• $x + 5x + 2y$ • $x + 5x + 2y = 42$ **2KU**
NOTES:		
(b)	**Ans:** $\mathbf{5x - 2y = 2}$ • starting to form equation • equation	• an equation containing only the terms $5x$, $2y$ and 2 • $5x - 2y = 2$ **2RE**
NOTES:		
(c)	**Ans:** $\mathbf{x = 4, y = 9}$ • method • processing • processing	• $11x = 44$ or equivalent • $x = 4$ • $y = 9$ **3RE**
NOTES: (i) for 4 and 9 verified in **both** equations award 1/3		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
9	**Ans:** $\boldsymbol{d = \sqrt{\frac{20f}{k}}}$ • beginning to rearrange • continuing rearrangement • completed rearrangement	 • $kd^2 = 20f$ • $d^2 = \frac{20f}{k}$ • $d = \sqrt{\frac{20f}{k}}$ **3KU**

NOTES:

(i) for $d = \sqrt{\frac{20f}{k}}$, with or without working — award 3/3

(ii) for $d = \frac{\sqrt{20f}}{k}$, with or without working — award 2/3

(iii) the 3rd mark is for the square root of the candidate's expression for d^2

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
10 (a)	**Ans: 14 seconds** • strategy • solution	• $-2t(t-14)=0$ • 14 **2RE**
NOTES: (i) for an answer of 14 with **no** working — award 2/2 (ii) caution: an answer of 14 may be the result of incorrect working: ensure that working is valid		
(b)	**Ans: 98 metres** • method • solution	• $(x=)7$ • 98 **2RE**
NOTES:		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
11	**Ans: 0.3** • correct use of sine rule • rearranging • simplification	• $\frac{10}{\sin 30^\circ} = \frac{6}{\sin A}$ • $\sin A = \frac{6 \sin 30^\circ}{10}$ • 0.3 **3RE**
NOTES: (i) candidates who assume that $\sin A = 0.3$ may be awarded a maximum of $\frac{1}{3}$ (1^{st} mark)		

KU 21 marks
RE 17 marks

[END OF PAPER 1 MARKING INSTRUCTIONS]

2009 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:** 3.1×10^{24} • method • processing • rounding	• $\frac{1000}{3.27\times10^{-22}}$ • 3.058×10^{24} • 3.1×10^{24} **3KU**

NOTES:

(i) 3.1×10^{24} with or without working — award 3/3

(ii) 3.06×10^{24} with or without working — award 2/3

(iii) $3.058\times10^{24} \rightarrow 3.05\times10^{24}$ — award 2/3

(iv) 3.05×10^{24} without working — award 1/3

(v) $1000\times3.27\times10^{-22} \rightarrow 3.3\times10^{-19}$ — award 1/3

(vi) 3.1×10^{n} $[n = 21, 22, 23]$ without working — award 1/3

(vii) 3.3×10^{-19} without working — award 0/3

(viii) for any other final answer, an unrounded solution must be stated to access the 3rd mark

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
2	**Ans: 8** • valid strategy • processing • processing a division • solution	 • knows to use $\pi r^2 h$ • $\pi \times 3^2 \times 8 \left(= 226.19\right)$ • $\frac{2000}{72\pi} \left(= 8.84\right)$ • 8 (rounding down) **4RE**

NOTES:

(i) the second mark is available only for a calculation involving π **and** h

(ii) the 3rd mark is available for

either: explicit evidence of division of 2000

or: implicit evidence (unrounded consistent value)

(iii) the final mark is available for an answer consistent with the division (unrounded answer need not be stated)

(iv) if no rounding is required, the final mark cannot be awarded

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
3	**Ans: - 1.2, 5.2** • method • processing • solution • rounding	 • substitution into quadratic formula • $\sqrt{40}$ • -1.162, 5.162 • - 1.2, 5.2 **4KU**

NOTES:

alternative evidence for 3rd and 4th marks

(i) 3rd mark (one solution and rounding) -1.162 → -1.2
4th mark (another solution and rounding) 5.162 → 5.2

(ii) only the first mark is available for candidates who process to a negative discriminant

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
4	**Ans: 112.5 cm^2** • linear scale factor • area scale factor • solution	 • $\frac{10}{4}$ or $\frac{4}{10}$ • $\left(\frac{5}{2}\right)^2$ or $\left(\frac{2}{5}\right)^2$ • 112.5 **3KU**

NOTES:

(i) for 112.5 with or without working — award 3/3

(ii) for 45 with or without working — award 1/3

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
5	**Ans: £372, £74** • mean • standard deviation	• 372 • 74 **2RE**
NOTES:		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
6 (a)	**Ans:** $y = 2x + 3$ • gradient • y-intercept • gradient or intercept in equation • linear equation	 • 2 • $(c =)3$ • $y = 2x \cdots$ or $y = \cdots + 3$ • $y = 2x + 3$ **4KU**
Notes: (i) for a correct equation without working award 4/4 (ii) where the gradient and/or y-intercept are wrong, but explicitly stated, the 3rd and 4th marks are still available		
(b)	**Ans: 43** • substitution • evaluation	 • $2 \times 20 + 3$ • 43 **2RE**
Notes: (i) for 43 with or without working award 2/2		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
7 (a)	**Ans:** $t = \frac{k}{d^2}$ • statement of variation • formula	• $t \propto \frac{1}{d^2}$ • $t = \frac{k}{d^2}$ **2KU**
Notes: (i) evidence for the 2nd mark may appear in part (b) (ii) for any wrong variation, the 2nd mark may still be available		
(b)	**Ans:** **8°C** • substitution • evaluating k • processing	• $50 = \frac{k}{2^2}$ • $k = 200$ • 8 **3KU**
Notes: (i) a maximum of $\frac{2}{3}$ is available for (a) direct variation (b) $t \propto \frac{1}{d}$		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark	
8	**Ans: no, plus justification** • multiplying factor • power of 3 • process • communication	or • 0.8 • 0.8^3 • 0.512 • no, because 51.2% > 50%	20% 3 years 46.08 no, because 46.08 > 45 **4RE**
NOTES: (i) for 'simple' depreciation, only the final mark is available			

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
9 (a)	**Ans: 20°** • solution	• 20° **1KU**
NOTES:		
(b)	**Ans: 55.6 m** • strategy • substitution/processing • solution	• use of sine rule cosine rule median and right angled triangle • correct application of valid strategy • 55.6 **3 RE**
NOTES: (i) accept solutions in radians or gradians (ii) for any attempt involving right angled trigonometry in ΔABC award 0/3		
(c)	**Ans: 312°** • strategy • process	• one of $180^\circ + 80^\circ$ $180^\circ + 52^\circ$ $52^\circ + 80^\circ$ • 312° **2RE**
NOTES:		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
10	**Ans: 10 years** • substitution • process • factorisation • solution	 • $83 = \cdots$ • $M^2 - 4M - 60 = 0$ • $(M - 10)(M + 6) = 0$ • 10 **4RE**

NOTES:

(i) if -6 is included in the final solution, the 4th mark cannot be awarded

(ii) for an answer of 10 without working award 1/4

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
11(a)	**Ans:** $2042\ \text{cm}^2$ • strategy • processing • solution	 • $\frac{260}{360}$ • $\frac{260}{360}\times\pi\times30^2$ • 2042 **3KU**
Notes: (i) $\frac{100}{360}$ can be awarded the 1st mark only within the strategy $\pi r^2-\frac{100}{360}\pi r^2$		
(b)	**Ans: 136.1 cm** • strategy • process • process	 • circumference of base = length of arc • $C=\frac{260}{360}\times\pi\times60$ • 136.1 **3RE**
Notes: (i) calculating **only** $C=\pi\times60$ award 0/3		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
12 (a)	**Ans: 210** • value	• 210 **1KU**
NOTES:		
(b)	**Ans: proof** • method • proof	• $\frac{1}{2}(n+1)(n+2)$ • $\frac{1}{2}(n^2+3n+2)$ **2RE**
Notes: (i) for verifying formula for specific values		award 0/2
(c)	**Ans: proof** • strategy • factorising	• $\frac{1}{2}n(n+1)+\frac{1}{2}(n^2+3n+2)$ • $(n+1)(n+1)$ **2RE**
Notes: (i) for verifying formulae for specific values		award 0/2

KU 24 marks
RE 28 marks

[END OF PAPER 2 MARKING INSTRUCTIONS]

Final KU 45
Totals RE 45