2007 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 $\sin x^0 = 0{\cdot}5 = 30^0$.

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

2007 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: 80·44** • knowing correct order of operations • carrying out both calculations	• 74·4 • 80·44 **2KU**

Notes:

(i) for 80·44 with or without working — award $\frac{2}{2}$

(ii) for 74·4 with or without working — award $\frac{1}{2}$

(iii) for 195·2 with or without working — award $\frac{1}{2}$

(iv) for 13·48 with or without working — award $\frac{1}{2}$

(v) for any other answer without working — award $\frac{0}{2}$

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
2	**Ans:** $\mathbf{\frac{19}{10}}$ • expressing as a multiplication • carrying out the multiplication	• $\times\frac{3}{5}$ • $\frac{19}{10}$ or equivalent **2KU**

Notes:

(i) for $\frac{19}{10}$ with or without working award $\frac{2}{2}$

(ii) for $\frac{95}{18}$ with or without working award $\frac{1}{2}$

(iii) for any other answer without working award $\frac{0}{2}$

(iv) for the second mark, the only acceptable multipliers are $\frac{3}{5}$ **or** $\frac{5}{3}$

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
3	**Ans: 250** • valid strategy • solution	• multiplication by $\frac{5}{8}$ • 250 **2RE**

Notes:

(i) for an answer of 250 without working — award $\frac{2}{2}$

(ii) for an answer of 50 $\left(\frac{400}{8}\right)$ **with** working — award $\frac{1}{2}$

(iii) for an answer of 2000 with or without working — award $\frac{0}{2}$

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
4	**Ans:** $\boldsymbol{m = \frac{3P+8}{2}}$ **or** $\boldsymbol{m = \frac{3P}{2}+4}$ **Method 1:** • dealing with denominator • dealing with constant • dealing with coefficient **Method 2:** • dealing with denominator • dealing with coefficient • dealing with constant	 • $3P$ • $3P+8=2m$ • $\frac{3P+8}{2}$ • $3P$ • $\frac{3P}{2}=m-4$ • $\frac{3P}{2}+4$ **3KU**
Notes:		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
5	**Ans:** $\boldsymbol{x^2 + 12x + 27}$ • expanding first bracket • expanding second bracket • collecting terms	• $4x^2 + 6x + 6x + 9$ • $-3x^2 + 18$ • $x^2 + 12x + 27$ **3KU**
Notes: (i) the third mark is available only when an x^2 term is involved		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
6	**Ans:** $\boldsymbol{f = \frac{4}{5}d + 2}$ • gradient • y-intercept • linear equation • equation in terms of d and f	 • $\frac{4}{5}$ • $+2$ • $y = \frac{4}{5}x + 2$ • $f = \frac{4}{5}d + 2$ **4KU**

Notes:

(i) for a correct equation without working award $\frac{4}{4}$

(ii) where the gradient and/or y-intercept are wrong, but explicitly stated, the 3rd and 4th marks are still available

(iii) for an answer of $f = \frac{4}{5}d$ award $\frac{2}{4}$

(unless the y-intercept has been explicitly stated as zero, in which case, award $\frac{3}{4}$)

(iv) for an answer of $f = \frac{4}{5}d + c$ award $\frac{2}{4}$

(v) an equation involving transposition of f and d may be awarded a maximum of $\frac{3}{4}$

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
7	**Ans:** $a - 2a^{\frac{1}{2}}$ • starting to expand bracket • completing expansion	• a or $-2a^{\frac{1}{2}}$ • $a - 2a^{\frac{1}{2}}$ **2KU**
Notes: (i) accept a^1 (ii) ignore any working subsequent to a correct answer		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
8	**Ans: yes, plus valid reason** • valid scale factor • applying scale factor • calculation and reason	• $\frac{75}{40}$ or $\frac{40}{75}$ • $\frac{48\times 75}{40}$ or $48\div\frac{40}{75}$ • yes, as 90 cm is greater than required length of 80 cm **3RE**
Notes: (i) reason must contain a numerical comparison within a valid strategy		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
9	**Ans: $3\sqrt{2}$** • forming equation • solution • simplification	 • $x^2 + x^2 = 6^2$ • $x = \sqrt{18}$ • $3\sqrt{2}$ **3RE**
Notes: (i) the third mark is obtained only for the simplification of a surd		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
10	**Ans: multiplied by $\frac{1}{8}$ (or divided by 8)** • effect on L^3 • effect on $\frac{k}{L^3}$	• $(2L)^3$ • $\times\frac{1}{8}$ or $\div 8$ **2RE**

Notes:

(i) finding values for T_1 and T_2 using a numerical value for L may be awarded the 1st mark

(ii) an explicit statement is necessary for the 2nd mark

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
11 (a)	**Ans:** $x + y = 300$ • equation	• $x + y = 300$ **1KU**
Notes:		
(b)	**Ans:** $4x + 6y = 1380$ • terms • equation	• $4x$ and $6y$ • $4x + 6y = 1380$ **2KU**
Notes:		
(c)	**Ans:** **210 standard and 90 deluxe** • evidence of scaling • value of x • value of y	• $4x + 4y = 1200$ or equivalent • 210 • 90 **3RE**
Notes: (i) for 90 and 210 without working — award $\frac{0}{3}$ (ii) for 90 and 210 verified in **both** equations — award $\frac{1}{3}$		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
12	**Ans: 2 cm** • valid strategy • method • process • solution	 • recognition of right angle at chord • correct use of Pythagoras • 3 • $d = 2$ **4RE**
Notes: (i) for using a radius of 10 to obtain $d = 10 - \sqrt{84}$, award a maximum of 3 marks (1^{st}, 3^{rd} and 4^{th})		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
13	**Ans:** $b = 2, c = 3$ • value of b • value of c	 • 2 • 3 **2KU**
Notes: (i) for 2, 3 — award $\frac{2}{2}$ (ii) for (b =) 3, (c =) 2 — award $\frac{0}{2}$		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
14 (a)	**Ans: 8** • solution	• 8 **1RE**
Notes:		
(b)	**Ans: 4** • substitution • solution	• $3^n - 1 = 80$ • 4 **2RE**
Notes: (i) for evidence of implicit substitution (eg 81) award the 1st mark (ii) for an answer of 4 with or without working award $\frac{2}{2}$		

KU 21 marks
RE 20 marks

[END OF PAPER 1 MARKING INSTRUCTIONS]

2007 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: £684·70** • multiplying factor • power of 3 • solution	 • 1·045 • $1 \cdot 045^3$ • £684·70 **3KU**

Notes:

(i) for £684.70, £684.69, £685 or £684 with or without working — award $\frac{3}{3}$

(ii) for multipliers **with working** of
0·955 → £522·59
1·45 → £1829·17/8
0·55 → £99·82/3 — award $\frac{2}{3}$

(iii) for a **final** answer of £627 from $(0 \cdot 045 \times 600) + 600$ — award $\frac{1}{3}$

(iv) for an answer of £681 from $(0 \cdot 045 \times 600 \times 3) + 600$ — award $\frac{0}{3}$

(v) for an incorrect answer without working — award $\frac{0}{3}$

(vi) for the final mark, the answer must be rounded appropriately

(vii) do not penalise premature rounding

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
2	**Ans: 2.2, -1.5** • method • processing • solution • rounding	• substitution into quadratic formula • $\sqrt{124}$ • 2·19, -1·52 • 2·2, -1·5 **4KU**

Notes:

alternative evidence for 3rd and 4th marks

(i) 3rd mark (one solution and rounding) 2·19 → 2·2
4th mark (another solution and rounding) -1·52 → -1·5

(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
3 (a)	**Ans: 24, 7** • mean • substitution into formula • processing • solution	• 24 • as far as 294 or 4326 • $\sqrt{49}$ • 7 **4KU**

Notes:

x	$x-\bar{x}$	$(x-\bar{x})^2$		x^2
28	4	16		784
32	8	64		1024
14	-10	100		196
19	-5	25		361
18	-6	36		324
26	2	4		676
31	7	49		961
		294		4326

$$s=\sqrt{\frac{\sum(x-\bar{x})^2}{n-1}} \qquad s=\sqrt{\frac{\sum x^2-\frac{(\sum x)^2}{n}}{n-1}}$$
$$=\sqrt{\frac{294}{6}} \qquad =\sqrt{\frac{4326-\frac{168^2}{7}}{6}}$$
$$=\sqrt{49} \qquad =\sqrt{49}$$
$$=7 \qquad =7$$

(b)	**Ans: valid comments** • comparing means • comparing standard deviations	• on average, more birds visit Erin's table • the number of birds visiting Luke's table varies more **2RE**

Notes:

(i) responses about mean must give a comparison of number of birds

(ii) responses about standard deviation must give a comparison of variation or spread

<u>unacceptable responses</u>

(a) … the average number of birds ….. is more / less.

(b) … the mean ……. is more / less.

(c) … the s.d….. is more/less.

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
4	**Ans: $x < 22$** • dealing with denominator or constant • solution	• $x - 2 < 20$ or $\frac{x}{4} < 5\frac{1}{2}$ • $x < 22$ **2KU**
Notes:		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
5	**Ans: £135** • valid strategy • processing • solution	• 110% = £148·50 • 1% = £1·35 • £135 **3KU**

Notes:

(i) for £135 with or without working — award $\frac{3}{3}$

(ii) for £133·65 (90% of £148·50) with or without working — award $\frac{0}{3}$

(iii) for £163·35 (110% of £148·50) with or without working — award $\frac{0}{3}$

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
6	**Ans: 27·2 km** • dealing with bearing • valid strategy • correct substitution • solution	 • $\angle ABC = 27°$ • third angle and use of sine rule • $\frac{a}{\sin 65^\circ} = \frac{30}{\sin 88^\circ}$ • 27·2 **4RE**

Notes:

(i) use of the sine rule is the only valid strategy

(ii) where the angle sum of triangle ABC is greater than 180º only the first mark is available

(iii) **beware**: **some candidates assume $\angle BCA = 90°$ and use $\sin 65^\circ = \frac{BC}{30}$ to give BC = 27·18 km: in this case, only the first mark is available**

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
7	**Ans: $55\cdot84\,\text{cm}^2$** • fraction of area • use of formula • all calculations correct	• $\frac{64}{360}$ • $\frac{64}{360}\times\pi\times5^2$ • $13\cdot96\times4=55\cdot84$ **3KU**
Notes: (i) for 55·84 with or without working award $\frac{3}{3}$ (ii) the 3rd mark is available only for a calculation involving π		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
8	**Ans: 10 cm** • valid strategy in triangle PQR • substitution • solution	 • $A = \frac{1}{2} pr \sin Q$ • $15 = \frac{1}{2} \times 6 \times r \times \sin 30^\circ$ • 10 **3RE**

Notes:

(i) evidence for the 1st mark may be implicit in the substitution

(ii) for 5·77 (using $\frac{1}{2} pr \cos Q$) award a maximum of $\frac{2}{3}$

(iii) for 5 (using $\frac{1}{2} pr$) award $\frac{0}{3}$

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
9	**Ans: 384g** **Method 1:** • valid strategy • processing • solution **Method 2:** • valid strategy • processing • solution	 • 32 and 35 • $32 \times 7 = 224$ • $160 + 224 = 384$ • building up in multiples of 5 and 7 eg (50, 70), (100, 140) etc • leading to 160 and 224 • $160 + 224 = 384$ **3RE**

Notes:

(i) for 384 with no working — award $\frac{2}{3}$

(ii) for an attempt to solve by dividing by 12 — award $\frac{0}{3}$

(iii) for a final answer of 67 (32 + 35) — award $\frac{1}{3}$

(iv) the 3rd mark is not available for a total greater than 405 (160 + 245)

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
10	**Ans:** $\mathbf{143\cdot1^\circ, 216\cdot9^\circ}$ • rearranging • first solution • solution	• $\cos x^\circ = -\frac{4}{5}$ • $143\cdot1^\circ$ • $216\cdot9^\circ$ **3KU**

Notes:

(i) for a wrong negative value of cos x^o, a maximum of $\frac{2}{3}$ is available (2nd and 3rd marks)

(ii) for a wrong positive value of cos x^o, a maximum of $\frac{1}{3}$ is available (3rd mark)

(iii) ignore any values outwith the given domain

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
11 (a)	**Ans: proof** • starting process • rearranging	• $A = (10-x)(6-x)$ or $A = 60-10x-x(6-x)$ • $A = x^2-16x+60$ **2RE**
Notes: (i) no marks are available for $A = (x-6)(x-10)$ $= x^2-16x+60$		
(b)	**Ans: 4 cm** • forming equation • factorising • solving equation • final solution	• $x^2-16x+60=12$ • $(x-4)(x-12)$ • 4, 12 • 4 **4RE**
Notes: (i) the 3rd mark is available only for **both** possible answers (ii) the 4th mark is for a rejection of the invalid solution (iii) for an answer of 4 without working award $\frac{0}{4}$		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
12 (a)	**Ans: $113\cdot1\,\text{cm}^2$** • formula • solution	 • $V = \pi \times 3^2 \times 4$ • 113·1 **2KU**
Notes: (i) 452·4 (using $\pi d^2 h$) may be awarded the 2nd mark (ii) 75·4 (using πdh) may be awarded the 2nd mark (ii) for the use of any other wrong formula award $\frac{0}{2}$		
(b)	**Ans: 3·78 cm** • forming equation • rearranging • solution	 • $\frac{2}{3}\pi \times r^3 = 113\cdot1$ • $r^3 = 54$ • 3·78 **3RE**
Notes: (i) for 452·4 → 216 → 6·0 award $\frac{3}{3}$ (ii) for 75·4 → 36 → 3·3 award $\frac{3}{3}$ (iii) the third mark is available only for the cube root of a number		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
13	**Ans: £19 600** • valid strategy • finding roots • finding midpoint • solution	 • $4x(140-x)=0$ • 0, 140 • 70 • 19 600 **4RE**

Notes:

(i) for the 1st mark, the equation need not be explicit, thus 0, 140 alone is awarded the 1st **and** 2nd marks

(ii) a statement of $x = 70$ leading to £19 600 may be awarded a maximum of $\frac{2}{4}$

(iii) any method involving trial and improvement receives no credit

KU 24 marks
RE 25 marks

[END OF PAPER 2 MARKING INSTRUCTIONS]

Final Totals	**KU 45** **RE 45**