2011 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: 40·9948** • multiplying factor • power of 4 • solution	• $1{\cdot}1$ • $1{\cdot}1^4$ • 40·9948 or 40·995 or 40·99 **3KU**

NOTES:

(i) for 40·9948, with or without working — award 3/3

(ii) for 40 or 41 $(28 \times (1{\cdot}1)^4)$ — award 3/3

(iii) for 18·3708 $\left(28 \times 0{\cdot}9^4\right)$, with or without working — award 2/3

(iv) for 39·2 $(28 \times 1{\cdot}4)$, with or without working — award 0/3

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
2	**Ans:** $\mathbf{3x^3 - 14x^2 + 7x + 4}$ • starting to expand • completed expansion • simplification	• any 3 correct terms • $3x^3 - 15x^2 + 12x + x^2 - 5x + 4$ • $3x^3 - 14x^2 + 7x + 4$ **3KU**
NOTES: Caution: Error(s) in the completed expansion may result in a significant easing of the simplification. The final mark may not be available.		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
3	**Ans: – 2·8, 1·3** • method • processing • solution • rounding	• substitution into quadratic formula • $\sqrt{65}$ • -2·765, 1·265 • - 2·8, 1·3 **4KU**

NOTES:

alternative evidence for 3rd and 4th marks

(i) 3rd mark (one solution and rounding) -2·765 → -2·8
4th mark (another solution and rounding) 1·265 → 1·3

(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: £4500** • valid strategy • processing • solution	• 84% = £3780 • $100\% = \frac{3780}{0.84}$ • 4500 **3KU**

NOTES:

(i) for £4500, with or without working — award 3/3

(ii) for £3258·62 (116% = £3780), with working — award 2/3

(iii) for £3175·20 (84% of £3780), with or without working — award 0/3

(iv) for £4384·80 (116% of £3780), with or without working — award 0/3

(v) caution: some candidates state 84% = £3780 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
5	**Ans: no, plus justification** • strategy • processing • processing • communication	• $\frac{42}{360}$ • $\frac{42}{360} \times \pi \times 2{\cdot}4$ • 0·879 • no, as 0·879 < 0·9 **4RE**

NOTES:

(i) $\frac{42}{360} \times \pi \times 1{\cdot}2 = 0 \cdot 439$ → no etc award 3/4

(ii) $\frac{42}{360} \times \pi \times 1{\cdot}2^2 = 0 \cdot 527$ → no etc award 2/4

(iii) $\frac{42}{360} \times \pi \times 2{\cdot}4^2 = 2 \cdot 11$ → yes etc award 2/4

(iv) the communication must include reference to both values, the difference between them or the use of comparative language

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
6	**Ans: no, plus justification** • linear scale factor • area scale factor • multiplying by area scale factor • communication	• $\frac{125}{90}$ • $\left(\frac{125}{90}\right)^2$ • 7754·6 • no, as 7754·6 $\neq$ 8040 (8040 must be explicit) **4RE**

NOTES:

(i) for using a linear factor throughout, only the 1st and 4th marks are available

eg $\frac{125}{90} \times 4020 = 5583$

No, as $5583 \neq 8040$ award 2/4

(ii) Alternative strategy

• linear scale factor	$\frac{125}{90}$
• area scale factor	$\left(\frac{125}{90}\right)^2$
• evaluate area scale factor	1·929
• communication	No, as $1{\cdot}929 \neq 2$ (2 must be explicit)

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
7 (a)	**Ans: 108°** • solution	• 108° **1KU**
(b)	**Ans: 1·62 cm** • strategy • substitution/processing • solution	• use of appropriate trigonometry • correct application of valid strategy • 1·62 **3KU**

NOTES:

(i) chosen triangle must lead to calculation of AC
eg use $\triangle$CDE → CE → AC

(ii) use of invalid triangle (eg angle sum ≠ 180°) award 0/3

(iii) accept solutions in radians or gradians

(iv) evidence for ∠ABC=108° may appear in part(b)

(v)

part(a)	part(b)	
angle = x°	angle = x°	max 3/3
angle = 90°	angle = 90°	max 2/3
angle = x°	angle = y°	max 2/3
angle = x°	angle = 90°	max 1/3

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
8	**Ans: 10·6 cm** • strategy • correct use of Pythagoras • solution	• recognition of right angle at chord • $r^2 = (r - 5)^2 + 9^2$ • 10·6 **3RE**

NOTES:

(i) recognition of right angle may appear on a diagram

(ii) Caution:

The use of the wrong triangle leading to $\sqrt{106} \rightarrow 10{\cdot}3$ can only receive 1/3

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
9 (a)	**Ans: 1200 cm^2** • calculation of 1 area • composite area	• 216, 432, 768 or 1632 • 1200 **2KU**
NOTES: (i) the second mark must involve the addition/subtraction of at least 2 areas		
(b)	**Ans: 130 cm** • strategy • consistent units • solution	• $V = 1200 \times l$ • $156\,000 = 1200 \times l$ • 130 **3 RE**
NOTES: (i) consistent units (156 →156000 or 1200→1·2) may occur at any stage (ii) candidates who use $l \times b \times h$ in part (b) may still be awarded the last 2 marks		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
10	**Ans: £165**	
	• Valid strategy involving $\frac{1}{3}$	• $12 + \frac{1}{3}(12)$ or $x + \frac{1}{3}x$
	• Creating an equation	• $15 + 8 + 16 = 39$ Or • $15x + 8x + 12\left(\frac{4}{3}x\right) = 39x$
	• solution	• $\frac{429}{39} \times 15 = £165$ **3KU**

NOTES:

(i) the final mark is for obtaining an hourly rate × 15

eg $15 + 8 + 12 = 35$

$\frac{429}{35} \times 15 = £183{\cdot}86$ award 1/3

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
11	**Ans: 4·55 cm** • strategy • processing breadth • linking breadth with circumference • solution	• $l = \frac{3000}{70} (= 42{\cdot}86)$ • $b = \frac{42{\cdot}86}{3} (= 14{\cdot}29)$ • $b = \pi d$ • d = 4·55 **4RE**

NOTES:

Using $C = \pi d$

(i)	for d = 13·6	[no ÷ 3]	award 3/4
(ii)	for d = 318·5	[no ÷ 70]	award 3/4
(iii)	for d = 955·4	[no ÷ 70 and no ÷ 3]	award 1/4

Using $C = \pi r^2$

(i)	for d = 4·26		award 3/4
(ii)	for d = 7·4	[no ÷ 3]	award 2/4
(iii)	for d = 35·68	[no ÷ 70]	award 2/4
(iv)	for d = 61·8	[no ÷ 3 and no ÷ 70]	award 0/4

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
12 (a)	**Ans:** $(90, 1)$ • coordinates	• $(90, 1)$ **1RE**
(b)	**Ans:** **$48{\cdot}6^\circ$, $131{\cdot}4^\circ$** • strategy • processing • first solution • second solution	• $4\sin x^\circ - 3 = 0$ • $\sin x^\circ = \frac{3}{4}$ • $48{\cdot}6^\circ$ • $131{\cdot}4^\circ$ **4RE**
NOTES: (i) for an answer of 45° and 135°		award 1/4

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
13	**Ans: 12 seconds** • strategy • factorisation • roots • solution	• $48+8t-t^2=0$ • $(4+t)(12-t)=0$ • -4 , 12 • 12 **4RE**
NOTES: (i) if due to error both roots are positive/negative, the last mark cannot be awarded (ii) for an answer of 12 without working award 1/4		

KU 22 marks
RE 27 marks

[END OF PAPER 2 MARKING INSTRUCTIONS]

Final KU 45
Totals RE 45