UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2009 question paper for the guidance of teachers

0581 MATHEMATICS

0581/21 Paper 21 (Extended), maximum raw mark 70

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

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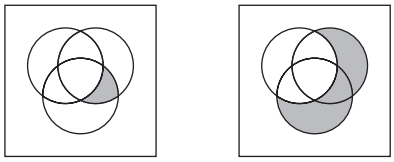
Qu	Answers	Mark	Part Marks
1	**(a)** 6 **(b)** 0	1 1	
2	47, 53	2	**B1, B1** independent
3	–0.577 or $\frac{-\sqrt{3}}{3}$ or $\frac{-1}{\sqrt{3}}$	2	**B1** numerator 0.5 **or B1** denominator –0.866……or $\frac{-\sqrt{3}}{2}$
4	$1.25\,x^4$ (or $1\frac{1}{4}x^4$)	2	**B1** 1.25 **B1** x^4
5	161	2	**M1** 1.322×10^9 / 8.2×10^8 (× 100)
6	5	2	**M1** $\|\mathbf{A}\| = 0 \times -4 - 1 \times -8$ or better **or** $\|\mathbf{B}\| = 7 \times -5 - 0 \times 1$ or better det symbol can be implied by the working
7		2	**B1, B1**
8	5 **www**	2	**M1** $(-4 - -1)^2 + (8 - 4)^2$ or better
9	$x = 0.5$ $y = 3$ **www**	3	**M1** consistent × and – for y or consistent × and + for x **A1** one correct provided M1 scored
10	245	3	**M1** $d = kv^2$ **A1** k = 1/20 or **M1** $v^2 = kd$ **A1** k = 20
11	258 cao	3	**M1** 18.5 or 24.5 seen **M1** 6 × sum of their two upper bounds
12	$-36x^2 + 48x$ or $12x(4 - 3x)$ oe or other partly factorised versions	3	**M1** squaring to "$9x^2 - 12x + 4$" algebraic **M1** multiplying by –4 terms **M1** adding 16 only
13	$x \geqslant 0.8$ or $x \geqslant \frac{4}{5}$ cao	3	**B1** $12 - 18x$ **B1** $-4 + 8x$ these terms may be reversed if moved to the other side of the inequality allow >=
14	\$11.50	3	**M1** $198 \times r^3$ r can be anything **dep M1** r = 1.019 and subtracting 198 **SC2** 209.50 on answer line

15	**(a) (i) OQ** **(ii) RM** or **MP** **(b)** 	1 1 2	 Allow ½**RP** **B1, B1** correct position wrt each direction of the vector ± 1 mm
16	**(a)** (0)810 or 8:10 etc. **(b)** 4 **(c)** 265	1 2 1	 **M1** (3 + 3)/(1 + 0.5)
17	**(a)** 261.48 cao **(b)** (±)3.86(48…) or 3.865	2 2	**M1** 4000 / 15.2978 **M1** (15.9128 – 15.2978)/15.9128 (× 100) or ("261.48 – 4000/15.9128) / "261.48"
18	$m = 2 \quad c = -8$	4	**B1** $B(4, 0)$ or $A(-2, 0)$ seen or used **B1** $m = 2$ **M1** substituting (4, 0) into $y = 2x + c$ or $\frac{0-c}{4-0} = 2$
19	**(a)** 44 **(b)** 158	2 2	**M1** $OCB = 68$
20	**(a)** 38 **(b)** 45 to 46 **(c)** 15 to 16 **(d)** 10 or 11	1 1 1 2	 **SC1** 70 on answer line
21	**(a)** 0.8 or 4/5 cao **(b)** 960 **www**	2 3	**M1** speed/time **M1** 30 × (12 + 36)/2 **M1** 10 × (12 + 36)/2 **M1** 12 × 40 **M1** ½ × 40 × 24

22	**(a)** 2	2	**M1** f(0) = 1
	(b) $4x^3 + 5$	2	**M1** $4(x^3 + 1) + 1$
	(c) $\frac{(3x-1)}{2}$	2	**M1** rearranging $y = (2x + 1)/3$ to make x the subject and interchanging x and y. Allow any **one** error in the working
		70	