

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

0580/21	0580 MATHEMATICS Paper 21 (Extended), maximum raw mark 70
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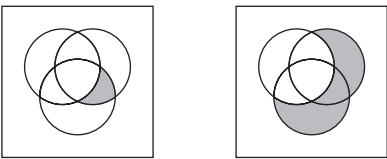
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Qu	Answers	Mark	Part Marks
1	(a) 6 (b) 0	1 1	
2	47, 53	2	B1, B1 independent
3	-0.577 or $\frac{-\sqrt{3}}{3}$ or $\frac{-1}{\sqrt{3}}$	2	B1 numerator 0.5 or B1 denominator $-0.866\dots$ or $\frac{-\sqrt{3}}{2}$
4	$1.25x^4$ (or $1\frac{1}{4}x^4$)	2	B1 1.25 B1 x^4
5	161	2	M1 $1.322 \times 10^9 / 8.2 \times 10^8$ ($\times 100$)
6	5	2	M1 $ A = 0 \times -4 - 1 \times -8$ or better or $ 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 \times and $-$ for y or consistent \times 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 $6 \times$ 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	$x \geq 0.8$ or $x \geq \frac{4}{5}$ cao	3	B1 $12 - 18x$ B1 $-4 + 8x$ these terms may be reversed if moved to the other side of the inequality allow $\geq =$
14	\$11.50	3	M1 $198 \times r^3$ r can be anything dep M1 $r = 1.019$ and subtracting 198 SC2 209. <u>50</u> on answer line

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

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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	