

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

0580 MATHEMATICS

0580/22

Paper 22 (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.

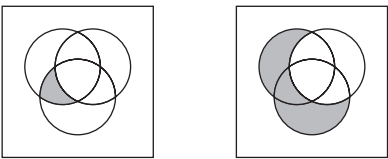
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Qu	Answers	Mark	Part Marks
1	(a) 6	1	
	(b) 0	1	
2	37, 41	2	B1, B1 independent
3	-0.577 or $\frac{-\sqrt{3}}{3}$ or $\frac{-1}{\sqrt{3}}$	2	B1 numerator 0.5 oe or B1 denominator $-0.866\dots$ or $\frac{-\sqrt{3}}{2}$
4	$1.25x^4$ (or $1\frac{1}{4}x^4$)	2	B1 1.25 B1 x^4
5	139	2	M1 $1.322 \times 10^9 / 9.5 \times 10^8$ ($\times 100$)
6	8	2	M1 $ A = 0 \times 12 - 1 \times -4$ or better or $ B = 3 \times -4 - 0 \times 4$ or better det symbol can be implied by the working
7		2	B1, B1
8	10 www	2	M1 $(-2 - -8)^2 + (10 - 2)^2$ 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	128	3	M1 $d = kv^2$ A1 $k = 2/25$ ($= 0.08$) or M1 $v^2 = kd$ A1 $k = 12.5$
11	198 cao	3	M1 12.5 and 20.5 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 $x \geq 4/5$ 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	\$12.92	3	M1 $249 \times r^3$ r can be anything dep M1 $r = 1.017$ and subtracting 249 SC2 261. <u>92</u> on answer line

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15	(a) (i) OQ	1	Allow $\frac{1}{2}\text{RP}$ B1, B1 correct position wrt each direction of the vector $\pm 1 \text{ mm}$
	(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 $(15.9128 - 15.2978)/15.9128 (\times 100)$ oe or $(\text{"261.48"} - 4000/15.9128) / \text{"261.48"}$
18	$m = 2 \quad c = -10$	4	B1 $B(5, 0)$ or $A(-4, 0)$ seen or used B1 $m = 2$ M1 substituting $(5,0)$ into $y = 2x + c$ or $\frac{0 - c}{5 - 0} = 2$
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	