

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

<b>0580/22</b>	<b>0580 MATHEMATICS</b> Paper 22 (Extended), maximum raw mark 70
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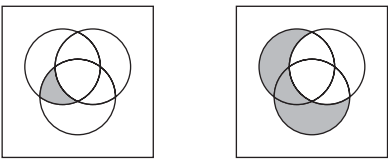
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Qu	Answers	Mark	Part Marks
1	(a) 6	1	
	(b) 0	1	
2	37, 41	2	<b>B1, B1</b> independent
3	$-0.577$ or $\frac{-\sqrt{3}}{3}$ or $\frac{-1}{\sqrt{3}}$	2	<b>B1</b> numerator 0.5 oe or <b>B1</b> denominator $-0.866\dots$ or $\frac{-\sqrt{3}}{2}$
4	$1.25x^4$ (or $1\frac{1}{4}x^4$ )	2	<b>B1</b> 1.25 <b>B1</b> $x^4$
5	139	2	<b>M1</b> $1.322 \times 10^9 / 9.5 \times 10^8$ ( $\times 100$ )
6	8	2	<b>M1</b> $ 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	<b>B1, B1</b>
8	10 <b>www</b>	2	<b>M1</b> $(-2 - -8)^2 + (10 - 2)^2$ or better
9	$x = 0.5$ $y = 3$ <b>www</b>	3	<b>M1</b> consistent $\times$ and $-$ for $y$ or consistent $\times$ and $+$ for $x$ <b>A1</b> one correct provided M1 scored
10	128	3	<b>M1</b> $d = kv^2$ <b>A1</b> $k = 2/25$ ( $= 0.08$ ) or <b>M1</b> $v^2 = kd$ <b>A1</b> $k = 12.5$
11	198 <b>cao</b>	3	<b>M1</b> 12.5 and 20.5 seen <b>M1</b> $6 \times$ sum of their two upper bounds
12	$-36x^2 + 48x$ or $12x(4 - 3x)$ oe or other partly factorised versions	3	<b>M1</b> squaring to " $9x^2 - 12x + 4$ " algebraic <b>M1</b> multiplying by $-4$ terms <b>M1</b> adding 16 only
13	$x \geq 0.8$ or $x \geq 4/5$ <b>cao</b>	3	<b>B1</b> $12 - 18x$ <b>B1</b> $-4 + 8x$ these terms may be reversed if moved to the other side of the inequality allow $\geq$
14	\$12.92	3	<b>M1</b> $249 \times r^3$ $r$ can be anything <b>dep M1</b> $r = 1.017$ and subtracting 249 <b>SC2</b> 261. <u>92</u> on answer line

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

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