

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

<b>0580/21</b>	<b>0580 MATHEMATICS</b> Paper 21 (Extended), maximum raw mark 70
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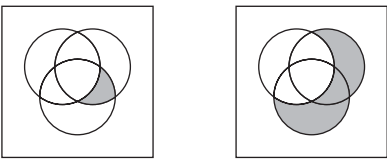
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<b>Page 2</b>	<b>Mark Scheme: Teachers' version</b>	<b>Syllabus</b>	<b>Paper</b>
	<b>IGCSE – October/November 2009</b>	<b>0580</b>	<b>21</b>

<b>Qu</b>	<b>Answers</b>	<b>Mark</b>	<b>Part Marks</b>
<b>1</b>	<b>(a)</b> 6  <b>(b)</b> 0	1  1	
<b>2</b>	47, 53	2	<b>B1, B1</b> independent
<b>3</b>	$-0.577$ or $\frac{-\sqrt{3}}{3}$ or $\frac{-1}{\sqrt{3}}$	2	<b>B1</b> numerator 0.5 or <b>B1</b> denominator $-0.866\dots$ or $\frac{-\sqrt{3}}{2}$
<b>4</b>	$1.25x^4$ (or $1\frac{1}{4}x^4$ )	2	<b>B1</b> 1.25 <b>B1</b> $x^4$
<b>5</b>	161	2	<b>M1</b> $1.322 \times 10^9 / 8.2 \times 10^8$ ( $\times 100$ )
<b>6</b>	5	2	<b>M1</b> $ 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
<b>7</b>		2	<b>B1, B1</b>
<b>8</b>	5 <b>www</b>	2	<b>M1</b> $(-4 - -1)^2 + (8 - 4)^2$ or better
<b>9</b>	$x = 0.5$ $y = 3$ <b>www</b>	3	<b>M1</b> consistent $\times$ and $-$ for $y$ or consistent $\times$ and $+$ for $x$ <b>A1</b> one correct provided <b>M1</b> scored
<b>10</b>	245	3	<b>M1</b> $d = kv^2$ <b>A1</b> $k = 1/20$ or <b>M1</b> $v^2 = kd$ <b>A1</b> $k = 20$
<b>11</b>	258 <b>cao</b>	3	<b>M1</b> 18.5 or 24.5 seen <b>M1</b> $6 \times$ sum of their two upper bounds
<b>12</b>	$-36x^2 + 48x$ 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
<b>13</b>	$x \geq 0.8$ or $x \geq \frac{4}{5}$ <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 $\geq$
<b>14</b>	\$11.50	3	<b>M1</b> $198 \times r^3$ $r$ can be anything <b>dep M1</b> $r = 1.019$ and subtracting 198 <b>SC2</b> 209. <u>50</u> on answer line

<b>Page 3</b>	<b>Mark Scheme: Teachers' version</b>	<b>Syllabus</b>	<b>Paper</b>
	<b>IGCSE – October/November 2009</b>	<b>0580</b>	<b>21</b>

<b>15</b>	<b>(a) (i) OQ</b>	1	Allow $\frac{1}{2}$ RP
	<b>(ii) RM or MP</b>	1	
	<b>(b)</b> 	2	
<b>16</b>	<b>(a) (0)810 or 8:10 etc.</b>	1	<b>M1</b> $(3 + 3)/(1 + 0.5)$
	<b>(b) 4</b>	2	
	<b>(c) 265</b>	1	
<b>17</b>	<b>(a) 261.48 cao</b>	2	<b>M1</b> 4000 / 15.2978
	<b>(b) (<math>\pm</math>)3.86(48...) or 3.865</b>	2	<b>M1</b> $(15.9128 - 15.2978)/15.9128 (\times 100)$ or $(“261.48 - 4000/15.9128”) / “261.48”$
<b>18</b>	$m = 2 \quad c = -8$	4	<b>B1</b> $B(4, 0)$ or $A(-2, 0)$ seen or used <b>B1</b> $m = 2$ <b>M1</b> substituting $(4, 0)$ into $y = 2x + c$ or $\frac{0 - c}{4 - 0} = 2$
<b>19</b>	<b>(a) 44</b>	2	<b>M1</b> $OCB = 68$
	<b>(b) 158</b>	2	
<b>20</b>	<b>(a) 38</b>	1	<b>SC1</b> 70 on answer line
	<b>(b) 45 to 46</b>	1	
	<b>(c) 15 to 16</b>	1	
	<b>(d) 10 or 11</b>	2	
<b>21</b>	<b>(a) 0.8 or 4/5 cao</b>	2	<b>M1</b> speed/time
	<b>(b) 960 www</b>	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>IGCSE – October/November 2009</b>	<b>0580</b>	<b>21</b>

<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
		70	