EDEXCEL FOUNDATION

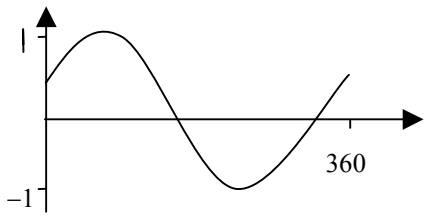
Stewart House 32 Russell Square London WC1B 5DN

January 2003

Advanced Subsidiary / Advanced Level

General Certificate of Education

Subject **PURE MATHEMATICS 6671** Paper No. **P1**

Question number	Scheme	Marks
1.	(a) $\frac{\mathrm{d}y}{\mathrm{d}x} = 10 \times \frac{3}{2}x^{\frac{1}{2}}$ $\left(= 15x^{\frac{1}{2}}\right)$	M1 A1
	(b) $7x + 4x^{\frac{5}{2}} + C$	M1 A2(1,0)
2.	(a)  Scales (−1, 1 and 360)	B1
	Shape, position	B1
	(b) (0, 0.5) (150, 0) (330, 0)	B1 B1 B1
	(c) $(x + 30 =)$ 210° or 330° One of these	B1
	$x = 180°, 300°$ M: Subtract 30, A: Both	M1 A1
3.	(a) $3^x = 3^{2(y-1)}$ $x = 2(y-1)$ (*)	M1 A1
	(b) $(2y-2)^2 = y^2 + 7$, $3y^2 - 8y - 3 = 0$	M1, A1
	$(3y+1)(y-3) = 0$, $y = \ldots$ (or correct substitution in formula)	M1
	$y = -\frac{1}{3}$, $y = 3$	A1
	$x = -\frac{8}{3}$, $x = 4$	M1 A1ft

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4.	(a) $\frac{a}{1-r} = \frac{1200}{1-r} = 960$	M1 A1
	$960\,(1-r) = 1200 \qquad r = -\frac{1}{4}$ (*)	A1
	(b) $T_9 = 1200 \times (-0.25)^8$ (or T_{10})	M1
	Difference $= T_9 - T_{10} = 0.0183105\ldots - (-0.0045776\ldots)$	M1
	$= 0.023$ (or -0.023)	A1
	(c) $S_n = \frac{1200\left(1-(-0.25)^n\right)}{1-(-0.25)}$	M1 A1
	(d) Since n is odd, $(-0.25)^n$ is negative,	M1
	so $S_n = 960\,(1 + 0.25^n)$ (*)	A1

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5.	(a) $\frac{\mathrm{d}C}{\mathrm{d}v} = -160v^{-2} + \frac{2v}{100}$	M1 A1
	$-160v^{-2} + \frac{2v}{100} = 0$	M1
	$v^3 = 8\,000 \qquad v = 20$	M1 A1
	(b) $\frac{\mathrm{d}^2C}{\mathrm{d}v^2} = 320v^{-3} + \frac{1}{50}$	M1
	> 0, therefore minimum	A1
	(c) $v = 20 : C = \frac{160}{20} + \frac{400}{100} = 12$	B1ft
	Cost $= 250 \times 12 = £30$	M1 A1

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6.	(a) P: $x = 0$ $y = -2$	B1
	Mid-point: $\left(\frac{(0+5)}{2}, \frac{(-2-3)}{2}\right) = \left(\frac{5}{2}, -\frac{5}{2}\right)$	M1 A1ft
	(b) Gradient of l_1 is $\frac{3}{2}$, so gradient of l_2 is $-\frac{2}{3}$	B1
	l_2: $y - (-3) = -\frac{2}{3}(x - 5)$	M1 A1ft
	$2x + 3y = 1$	A1
	(c) Solving: $3x - 2y = 4$	
	$2x + 3y = 1$ $x = \frac{14}{13}$	M1 A1
	$y = \frac{-5}{13}$	M1 A1ft

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7.	(a) $BM = \sqrt{(7^2 + 24^2)} = 25$ (*)	B1
	(b) $\tan\alpha = \frac{7}{24}$ or equiv. and $\angle BMC = 2\alpha$, or cosine rule	M1 A1
	$\angle BMC = 0.568$ radians (*)	A1
	(c) ΔABM: $\frac{1}{2}(14 \times 24)$ $(= 168\ \text{mm}^2)$ (or other appropriate Δ)	B1
	Sector: $\frac{1}{2}(25^2 \times 0.568)$	M1 A1
	Total: "168 + 168 + 177.5" = 513 mm^2 (or 514, or 510)	M1 A1
	(d) Volume = "513" × 85 mm^3 (M requires unit conversion)	M1
	$= 44\ \text{cm}^3$	A1

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8.	(a) $A: y = 1$ $B: y = 4$	B1
	(b) $\frac{dy}{dx} = \frac{2x}{25}$ $= \frac{2}{5}$ where $x = 5$	M1 A1
	Tangent: $y - 1 = \frac{2}{5}(x - 5)$ $(5y = 2x - 5)$	M1 A1
	(c) $x = 5y^{\frac{1}{2}}$	B1 B1
	(d) Integrate: $\frac{5y^{3/2}}{3/2}$ $\left(= \frac{10y^{3/2}}{3}\right)$	M1 A1ft
	$[\ ]^4 - [\ ]_1 = \left(\frac{10 \times 4^{3/2}}{3}\right) - \left(\frac{10 \times 1^{3/2}}{3}\right), = \frac{70}{3}$ $(23\frac{1}{3}, 23.3)$	M1 A1, A1
	Alternative for (d): Integrate: $\frac{x^3}{75}$	M1 A1
	Area $= (10\times4) - (5\times1) - \left(\frac{1000}{75} - \frac{125}{75}\right), = \frac{70}{3}$ $(23\frac{1}{3}, 23.3)$	M1 A1, A1
	In both (d) schemes, final M is scored using candidate's "4" and "1".	