edexcel

Jan 2016

4PM0 Further Pure Mathematics Paper 2

Mark Scheme

Question Number	Scheme	Marks
1.	$2^{2(x-2)} = 2^{3(3x-1)}$ $\Rightarrow 2(x-2) = 3(3x-1)$ $x = -\frac{1}{7}$	M1 dM1A1 A1cao (4)

M1 Attempt to change to powers of 2, 4 or 8 (both sides of equation)
dM1 Equate powers
A1 Correct linear equation - unsimplified
A1cao $x = -\frac{1}{7}$ (or equivalent fraction with integer numerator and denominator)
NB: $\log_4 8 = 1.5$ is exact and so allowed

Alternatives for no 1

ALT 1
Take logs base 4 each side M1
Change $\log_4 8$ to 1.5 dM1
Correct linear equation 1.5 and any other non-rounded decimals allowed A1
Correct solution $x = -\frac{1}{7}$ decimals may have been used in working, provided none have been rounded A1cao

ALT 2
$\log 4^{(x-2)} = \log 8^{(3x-1)}$ can be any base
$(x-2)\log 4 = (3x-1)\log 8$ M1
$(x-2)\times 2\log 2 = (3x-1)\times 3\log 2$
$2(x-2) = 3(3x-1)$ dM1A1
$x = -\frac{1}{7}$ A1cao

Question Number	Scheme	Marks
(1) Alt 3	$\frac{4^x}{4^2}=\frac{8^{3x}}{8}\Rightarrow\frac{4^x}{2}=8^{3x}$ $4^x\times\frac{1}{2}=\left(8^3\right)^x \quad \frac{1}{2}=\left(\frac{8^3}{4}\right)^x$ $\frac{1}{2}=128^x$ $x=\frac{\log\frac{1}{2}}{\log 128}=\frac{-\log 2}{7\log 2}$ (any base) $x=-\frac{1}{7}$	M1 dM1A1 A1cao
2.	(i) $48=\frac{1}{2}\theta r^2$, $8=\theta r$ or equivalent equations $\frac{\frac{\theta r^2}{2}}{\theta r}=\frac{48}{8}\Rightarrow r=12$ (ii) $\theta=\frac{8}{12},(=\frac{2}{3})$	B1B1 M1A1 A1 **(5)**
B1 B1 M1 A1 A1	B1B1 Two correct equations; B1B0 One correct equation Eliminate either variable and solve to obtain the other $r=12$ $\theta=\frac{8}{12}$ oe Accept 0.667 or better (NB: decimal may be ignored under isw rule.)	