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	GCE A/AS LEVEL – October/November 2010	9709	23

- 1 EITHER** State or imply non-modular inequality $(3x + 1)^2 > 8^2$, or corresponding equation or pair of linear equations M1
- Obtain critical values $\frac{7}{3}$ or -3 A1
- State correct answer $x < -3$ or $x > \frac{7}{3}$ A1
- OR** State one critical value, e.g. $x = -3$, by solving a linear equation (or inequality) or from a graphical method or by inspection B1
- State the other critical value correctly B1
- State correct answer $x < -3$ or $x > \frac{7}{3}$ B1 [3]
- 2 (i)** Use the iterative formula correctly at least once M1
- Obtain final answer 1.82 A1
- Show sufficient iterations to justify its accuracy to 2 d.p. or show there is a sign change in the interval (1.815, 1.825) B1 [3]
- (ii)** State equation $x = \frac{7x}{8} + \frac{5}{2x^4}$, or equivalent B1
- Derive the exact answer α (or x) = $\sqrt[5]{20}$ B1 [2]
- 3 (i)** Substitute $x = -1$ **OR** $x = 2$ correctly M1
- Equate remainders to obtain correct equation $5 - a = 26 + 2a$ or equivalent A1
- Obtain $a = -7$ A1 [3]
- (ii)** Attempt division by $x - 1$ and reach a partial quotient of $x^2 + kx$ M1
- Obtain quotient $x^2 + 5x - 2$ A1
- EITHER** Show remainder is zero **OR** substitute $x = 1$ to obtain zero B1 [3]
- 4 (a)** Obtain integral of the form ke^{1-2x} with any non-zero k M1
- Correct integral A1 [2]
- (b)** Attempt to use double angle formula to expand $\cos(3x + 3x)$ M1
- State correct expression $\frac{1}{2} - \frac{1}{2} \cos 6x$ or equivalent A1
- Integrate an expression of the form $a + b \cos 6x$, where $ab \neq 0$, correctly M1
- State correct integral $\frac{1}{2}x - \frac{1}{12} \sin 6x$, or equivalent A1 [4]
- 5** State or imply $\ln y = \ln A + x \ln b$ B1
- Form a numerical expression for the gradient of the line M1
- Obtain $b = 1.65$ A1
- Use gradient and one point correctly to find $\ln A$ M1
- Obtain $\ln A = 0.1$ A1
- Obtain $A = 1.11$ A1 [6]

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- 6
- (i) State $R = \sqrt{5}$ B1
 Use trig formula to find α M1
 Obtain $\alpha = 26.57^\circ$ with no errors seen A1 [3]
- (ii) Carry out evaluation of $\sin^{-1}\left(\frac{\pm 0.4}{\sqrt{5}}\right)$ ($\approx \pm 10.3048^\circ$) M1
 Obtain answer 16.3° A1
 Carry out correct method for second answer M1
 Obtain answer 216.9° and no others in the range A1 [4]
- 7
- (i) Use product or quotient rule M1*
 Obtain correct derivative in any form A1
 Equate derivative to zero and solve for x M1*(dep)
 Obtain $x = e^{0.5}$ or \sqrt{e} A1
 Obtain $\frac{1}{2e}$, or equivalent A1 [5]
- (ii) State or imply correct ordinates 0, 0.17328..., 0.12206..., 0.08664... B1
 Use correct formula, or equivalent, correctly with $h = 1$ and four ordinates M1
 Obtain answer 0.34 with no errors seen A1 [3]
- 8
- (i) State $2y \frac{dy}{dx}$ as derivative of y^2 , or equivalent B1
 State $2y + 2x \frac{dy}{dx}$ as derivative of $2xy$, or equivalent B1
 Substitute $x = -2$ and $y = 2$ and evaluate $\frac{dy}{dx}$ M1
 Obtain zero correctly and make correct conclusion A1 [4]
- (ii) Substitute $x = -2$ into given equation and solve M1
 Obtain $y = -6$ correctly A1
 Obtain $\frac{dy}{dx} = 2$ correctly B1
 Form the equation of the tangent at $(-2, -6)$ M1
 Obtain answer $y = 2x - 2$ A1 [5]