2004 Higher Maths Paper 1

Unofficial Answers

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1. a. m = 3

b. Line 1 has gradient $-\frac{1}{3}$ Line 2 has gradient $-\frac{2}{5}$

Therefore line 1 IS perpendicular, line 2 is NOT.

2. a. i. Use synthetic division of f(x) by -1 to prove remainder = 0

ii. $f(x) = (x+1)(x+1)(x-3)$

b. Turning point occurs at (-1,0)

3. $x = Tan^{-1}\sqrt{3}$

$x = \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$

4. a. Reflect f(x) in the a-axis

b. Move y= -g(x) up 3 places

5. a. $\vec{AB} = 2\vec{BC}$

Parallel + common point ➔ collinear

b. D: (5,20,-9)

6. $\frac{dy}{dx} = 3\cos x - 2\sin 2x$

7. $\frac{26}{6}$ units^2 *or* $\frac{13}{3}$ units^2 *or* $4\frac{1}{3}$ units^2

8. a. $(x-5)^2 + 2$

b. $g'(x) = (x-5)^2 + 2 > 0$, so g(x) is always increasing

9. $x = 71$

$< DEA = 2x + 90°$

$\cos DEA = \cos(2x + 90)°$

$\cos DEA = \cos 2x° \cos 90° - \sin 2x° \sin 90°$

$\cos DEA = \cos 2x \times 0 - \sin 2x° \times 1$

$\cos DEA = -\sin 2x°$

$-\sin 2x° = -2 \sin x° \cos x°$

10. $-\sin 2x° = -2 \times \frac{1}{\sqrt{10}} \times \frac{3}{\sqrt{10}}$

$-\sin 2x° = \frac{-2 \times 1 \times 3}{10}$

$-\sin 2x° = -\frac{6}{10}$

$\Rightarrow -\frac{3}{5}$

11.a. a=6, b=2

$f'(x) = ax(x - b)$

$f'(x) = 6x(x - 2)$

$f'(x) = 6x^2 - 12x$

$f(x) = \int (6x^2 - 12x)dx$

$f(x) = \left[\frac{6x^3}{3} - \frac{12x^2}{2} + c \right]$

$f(x) = 2x^3 - 6x^2 + c$

b. $f(1) = 4$

$4 = 2 \times 1^3 - 6 \times 1^2 + c$

$4 = 2 - 6 + c$

$c = 4 + 6 - 2$

$c = 8$

$f(x) = 2x^3 - 6x^2 + c$

$f(x) = 2x^3 - 6x^2 + 8$

[END OF ANSWERS TO 2004 HIGHER MATHS PAPER 1]

By David Brooks