07	2c	The point $P(\pi, 0)$ lies on the curve $y = x \sin x$. Find the equation of the tangent to the curve at P.	3

Using product rule: $f'(x) = \frac{du}{dx}.v + \frac{dv}{dx}.u$ where $u = x$ $v = \sin x$

$\frac{du}{dx} = 1$ $\frac{dv}{dx} = \cos x$

$= 1 \times \sin x + \cos x \times x$

$= \sin x + x \cos x$

$f'(\pi) = \sin \pi + \pi \cos \pi$

$= 0 + \pi(-1)$

$= -\pi$

Using $y - y_1 = m(x - x_1)$ with $(\pi, 0)$ and gradient $-\pi$

$y - 0 = -\pi(x - \pi)$

$y = -\pi x + \pi^2$

* These solutions have been provided by *projectmaths* and are not supplied or endorsed by the Board of Studies

Board of Studies: Notes from the Marking Centre

This question required students to find the derivative of $x\sin x$, substitute $x = \pi$ to get a gradient and then write the equation of the tangent at $(\pi, 0)$. Common errors included not recognising $x\sin x$ as a product, incorrect signs in the derivative, failing to substitute into the derivative, and incorrectly evaluating the gradient. Many responses used degree mode on the calculator for the evaluation, while others mistakenly seemed to think that $\pi = 180$. Candidates need to clearly understand the difference between a gradient function and the gradient at a point, and should also realise that they must work in radians when applying calculus to trigonometric functions.

Source: http://www.boardofstudies.nsw.edu.au/hsc_exams/