06	2a	Differentiate with respect to x: (i) $x \tan x$ (ii) $\frac{\sin x}{x+1}$.	2 2

(i) $f(x) = x \tan x$

Using product rule: $f'(x) = u'v + v'u$, where $u = x$, $v = \tan x$, $u' = 1$, $v' = \sec^2 x$

$= 1.\ \tan x + \sec^2 x\ .x$

$= \tan x + x \sec^2 x$

(ii) $f(x) = \frac{\sin x}{x+1}$

Using quotient rule: $f'(x) = \frac{v\frac{du}{dx} - u\frac{dv}{dx}}{v^2}$, where $u = \sin x$, $v = x + 1$, $\frac{du}{dx} = \cos x$, $\frac{dv}{dx} = 1$

$= \frac{(x+1).\cos x - \sin x.1}{(x+1)^2}$

$= \frac{(x+1).\cos x - \sin x}{(x+1)^2}$

* 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

(i) This part of the question required an application of the product rule and a knowledge of the derivative of $\tan x$. Better responses demonstrated knowledge of the product rule either by writing the rule down explicitly or by setting the answer out in the correct form before writing down the final answer. Candidates are reminded that the derivative of $\tan x$ can be found by using the standard integrals sheet provided as part of the examination paper.

(ii) The majority of candidates attempted this part by using the quotient rule rather than rewriting the integrand as a product and applying the product rule. Again, better responses demonstrated knowledge of the quotient rule before attempting to write down a final answer. A large number of candidates made errors in trying to simplify the expression that they had obtained from substitution into the quotient rule.

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