# **ATAR Survival Guide’s Practice Product Rule Questions**

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**Question 1 (1 mark)**

Differentiate $y=4x^{5}$ using the product rule.

**Question 2 (2 marks)**

Differentiate $y=\left(x+5\right)\left(2x+6\right)$ using the product rule.

**Question 3 (3 marks)**

Differentiate $y=\left(4x^{2}+5x\right)\left(3x^{3}+9\right)$

**Question 4 (3 marks)**

Differentiate $y=f\left(x\right)\*g\left(x\right)$ if $f\left(x\right)= 2x+5$ and $g\left(x\right)=5x^{2}+3$

**Question 5 (4 marks)**

Differentiate $y=\left(4x^{3}+6x\right)\left(12x^{5}+4x^{9}\right)$

# **Answer Key**

**Question 1**

$y^{'}=4\*\left(5x^{4}\right)+x^{5}\*0$

$y^{'}=20x^{4}$ ✓(Given only if product rule is shown to be used)

**Question 2**

$y^{'}=\left(x+5\right)\left(2\right)+\left(2x+6\right)\left(1\right)$

$y^{'}=2x+10+2x+6$

$y^{'}=4x+16$✓✓

**Question 3**

$y^{'}=\left(4x^{2}+5x\right)\left(9x^{2}\right)+\left(3x^{3}+9\right)\left(8x+5\right)$

$y^{'}=36x^{4}+45x^{3}+24x^{4}+15x^{3}+72x+45$ ✓

$y^{'}=60x^{4}+60x^{3}+72x+45$✓✓

**Question 4**

$y=\left(2x+5\right)\left(5x^{2}+3\right)$

$y^{'}=\left(2x+5\right)\left(10x\right)+\left(5x^{2}+3\right)\left(2\right)$

$y^{'}=20x^{2}+50x+10x^{2}+6$ ✓

$y^{'}=30x^{2}+50x+6$✓✓

**Question 5**

$y'=\left(4x^{3}+6x\right)\left(60x^{4}+36x^{8}\right)+\left(12x^{5}+4x^{9}\right)\left(12x^{2}+6\right)$

$y^{'}=240x^{7}+144x^{11}+360x^{5}+216x^{9}+144x^{7}+72x^{5}+48x^{11}+24x^{9}$ ✓✓

$y^{'}=192x^{11}+240x^{9}+384x^{7}+432x^{5}$✓✓