

## Derivatives of Trigonometric Functions

### Starter

1. **(Review of last lesson)** Find the equation of the tangent of the curve  $y = 8e^x$  at the point where  $x = 2$ . Give your answer exactly.

**Working:**  $\frac{dy}{dx} = 8e^x$

When  $x = 2$ ,  $\frac{dy}{dx} = 8e^2$  and  $y = 8e^2$

Using  $y - y_1 = m(x - x_1)$ :  $y - 8e^2 = 8e^2(x - 2)$   
 $y = 8e^2x - 8e^2 = 8e^2(x - 1)$

**E.g. 1** Differentiate the following:

(a)  $y = 5 \sin x$  (b)  $f(x) = -8 \cos x$  (c)  $f(x) = 7 \tan x - 2 \sin x$

**Working:** (a)  $\frac{dy}{dx} = 5 \cos x$

(b)  $f'(x) = 8 \sin x$

(c)  $f'(x) = 7 \sec^2 x - 2 \cos x$

**E.g. 2** Find the equation of the tangent to the curve  $f(x) = 4 \sin x$  where  $x = \frac{\pi}{3}$ . Give your answer exactly.

**Working:**  $f'(x) = 4 \cos x$

$f'\left(\frac{\pi}{3}\right) = 4 \cos\left(\frac{\pi}{3}\right) = 4 \times \frac{1}{2} = 2$  – this is the gradient of the tangent

$f\left(\frac{\pi}{3}\right) = 4 \sin\left(\frac{\pi}{3}\right) = 4 \times \frac{\sqrt{3}}{2} = 2\sqrt{3}$

Using  $y - y_1 = m(x - x_1)$ :  $y - 2\sqrt{3} = 2\left(x - \frac{\pi}{3}\right)$

$y = 2x + 2\sqrt{3} - \frac{2\pi}{3}$

**Video:** [Derivatives of sin/cos/tan](#)

[Solutions to Starter and E.g.s](#)

### Exercise

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