$$\frac{d}{dx}(inside)^n = \frac{d}{dx} = (\text{outside the bracket}) \times \frac{d}{dx}(\text{inside the bracket})$$

$$\frac{d}{dx}(x^3 + 2x^5)^2 = 2(x^3 + 2x^5)(3x^2 + 10x^4)$$

Harder functions
Use Chain Rule

Trig

$$\frac{d}{dx}\sin ax = a\cos ax$$

$$\frac{d}{dx}\cos ax = -a\sin ax$$

$$\frac{d}{dx}x^n = nx^{n-1}$$

Simple Polynomials

Differentiations

Integration

$$\int \sin ax \, dx = -\frac{1}{a}\cos ax + c$$

Trig

$$\int \cos ax \, dx = \frac{1}{a}\sin ax + c$$

Simple Polynomials

$$\int x^n dx = \frac{x^{n+1}}{n+1} + c$$

Harder functions

$$\int (ax+b)^n dx = \frac{(ax+b)^{n+1}}{a(n+1)} + c$$

$$\int (2x+3)^6 dx = \frac{(2x+3)^7}{14} + c$$