**Variable Acceleration in One Dimension**

Displacement ($s$)

Velocity ($v$)

Acceleration ($a$)

Differentiate

Integrate

Don’t forget the constant of integration for indefinite integrals

**Example**

A particle is moving in a straight line with acceleration at time $t$ seconds given by

$$a=\cos(2πt ms^{-2},    t\geq 0)$$

The velocity of the particle at time $t=0$ is $\frac{1}{2π}$ ms-1. Find:

1. an expression for the velocity at time $t$ seconds
2. the maximum speed
3. the distance travelled in the first 3 seconds.

**Test Your Understanding** *(Textbook p168 Example 6)*

Exercise 8C Page 168

A particle of mass 6kg is moving on the positive $x$-axis. At time $t$ seconds the displacement, $s$, of the particle from the origin is given by

$$s=2t^{\frac{3}{2}}+\frac{e^{-2t}}{3} m,    t\geq 0$$

1. Find the velocity of the particle when $t=1.5$.
2. Given that the particle is acted on by a single force of variable magnitude $F$ N which acts in the direction of the positive $x$-axis,
3. Find the value of $F$ when $t=2$