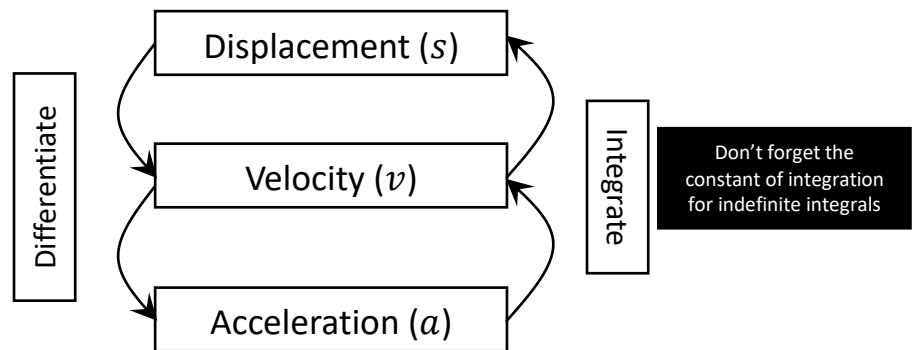


## Variable Acceleration in One Dimension



### Example

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

$$a = \cos 2\pi t \text{ ms}^{-2}, \quad t \geq 0$$

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

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

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

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

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

- a) Find the velocity of the particle when  $t = 1.5$ .
- b) 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,
- c) Find the value of  $F$  when  $t = 2$