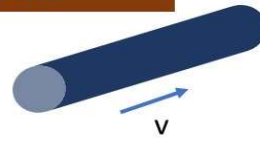# Drift velocity

Drift velocity is the average velocity with which electrons will move down a wire. How do we work it out?

Consider a wire of cross sectional area A and charge carrier density n, where each carrier has the charge q and they are moving with a drift speed of v.

v

1) Every second the volume of charge carriers that pass a point will be Av

2) Therefore the number of charge carriers that pass by every second is given by nAv

3) Therefore the charge that passes by every second will be nAvq

4) But charge per second IS current, so…

I = nAqv

Worked example using I=nAqv

Calculate the current down a 1mm^2 wire where the drift speed is 1mms^{-1} and the carrier density is 6.4 x 10^{28}m^{-3} (the charge on an electron is 1.6 x 10^{-19}C)

Solution:

$A = 1mm^2; v = 1mms^{-1}$

$n = 6.4 \times 10^{28}m^{-3}; q = 1.6 \times 10^{-19}C$

$I = ?$

According to drift speed equation

Remember to convert A and v to Metres n is number per m^3

$$I = nAqv$$

$$I = 6.4 \times 10^{28} \times 1 \times 10^{-6} \times 1.6 \times 10^{-19} \times 1 \times 10^{-3}$$

$$I = 10.24A$$