1) Calculate the momentum of each of the following objects:

 a) a 0.5 kg ball thrown **upward** with a velocity of 30 m/s.

Momentum p= m x v = 0.5 kg x 30 m/s = 15 kg . m/s [**upwards**]

b) a 2000 kg railway car moving **south** at 10 m/s
Momentum = m x v = 2000 kg x 10 m/s = 20000 kg . m/s [**south**]

c) What is the momentum of an electron of mass 9.1×10^{-31} kg moving at the a velocity of 1.0×10^7 m/s

Momentum =   m   x   v

$$= 9.1 \times 10^{-31} \times 1.0 \times 10^7$$

$$= (9.1 \times 1.0) \times (10^7 \times 10^{-31})$$

$$= 9.1 (10^{7-31})$$

$$= 9.1 (10^{-24}) \text{ kg. m/s [forwards])}$$

d) The momentum of the Earth, of mass 6.0×10^{24} kg, moving along its solar orbit with a velocity of 3.0×10^4 m/s.

$$\text{Momentum} = m \times v$$

$$= 6.0 \times 10^{24} \times 3.0 \times 10^4$$

$$= (6.0 \times 3.0) \times (10^4 \times 10^{24})$$

$$= 18 \times (10^{4 + 24})$$

$$= 18 \times 10^{28}$$

(Answer: 18×10^{28} kg. m/s [forwards])

2) The momentum of 7.3 kg shot is 22 kg .m/s [forward]. What is its velocity?

Momentum = m   x   v

22 =   7.3 x   v

$\dfrac{22}{7.3}$ = $\dfrac{7.3}{7.3}$ x   v

3.01 = v

V = 3.01 m/s [forwards]

3) A bullet is traveling at 900 m/s has a momentum of 4.5 kg. m/s. What is its mass?

Momentum = m x v

$$4.5 = m \times 900$$

$$\frac{4.5}{900} = m \times \frac{900}{900}$$

$$0.005 \text{ kg} = m$$