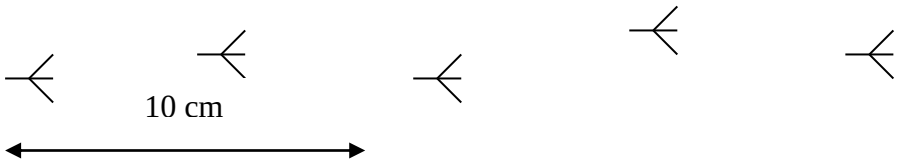
L1.7 Momentum LO 73b Rev A

1. Calculate the momentum of a 1000 tonne train travelling at $7ms^{-1}$. (1 tonne = 1000kg)

2. An electron has a momentum of 1.5×10^{-25} $kgms^{-1}$. How long will it take to travel once around a particle accelerator with a diameter of 1.2 km?

3. A bird (mass 65g) walks across a muddy shore. It takes 2.8 s to travel 4 steps .(see below). Calculate its momentum.



4. A sprinter has a mass of 55 kg and runs 100m N and then 100m E taking a total time of 12.2 s.
   a) What is her average momentum?
   b) What was her average speed?

Answers

1. 7×10^{6} $kgms^{-1}$
2. $v = p/m = 1.5 \times 10^{-25} / 9.11 \times 10^{-31} = 1.65 \times 10^{5} ms^{-1}$; $t = \text{distance}/\text{speed} = \pi D/v = \pi \times 1.2 \times 10^{3} / 1.65 \times 10^{5} = 0.023$ s
3. distance from front of first clawprint to front of the fifth = 111mm
   distance travelled = 111/47 x 10 cm = 0.236m
   $p = mv = 0.065 \times 0.236 / 2.8 = 5.5 \times 10^{-3}$ $kgms^{-1}$
4. a) use of displacement = 141m ; $p=mv = 55 \times 141 / 12.2 = 640$ $kgms^{-1}$ **NE**
   b) $200/12.2 = 16.4$ ms^{-1}