

Year 11

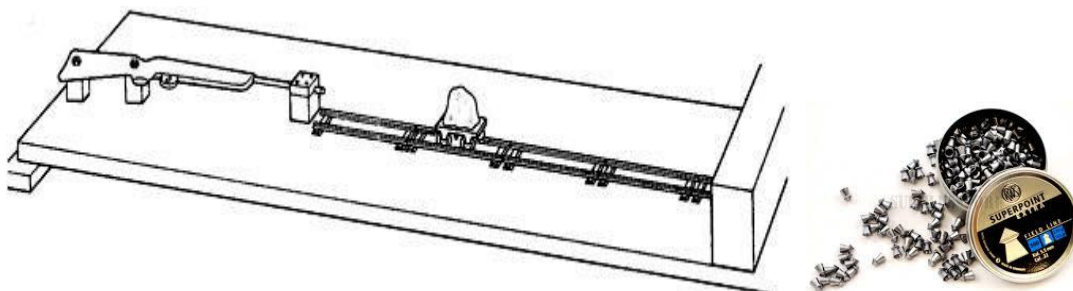
Forces and Motion

Chapter 4 – Momentum

Question 2, p.47

An air rifle pellet of mass 2 g is fired into a block of modeling clay mounted on a model railway truck. The truck and modeling clay have a mass of 0.1 kg. the truck moves off after the pellet hits the modeling clay with an initial velocity of 0.8 m/s.

- Calculate the momentum of the modeling clay and truck just after the collision.
(Hint: this is a case where after the collision, the pellet is embedded into the clay)
- State the momentum of the pellet just before it hits the modeling clay.
(Hint: by just stating the momentum, we mean to write down its formula with any known values)
- Use your answers to **a** and **b** to calculate the velocity of the pellet just before it hits the modeling clay.
(Hint: conservation of momentum)
- State any assumptions you made in this calculation.



Question 3, p.47

A rocket of mass 1200 kg is travelling at 2000 m/s. It fires its engine for 1 minute. The forward thrust provided by the rocket engines is 10 kN (10,000 N)

- Use increase of momentum = $F \times t$ to calculate the increase of momentum of the rocket.
(Hint: use Figure 4.2 and the formulae as shown in page 41)
- Use your answer to **a** to calculate the increase in velocity of the rocket and its new velocity after firing the engines.
(Hint: definition of momentum and $u = 2000 \text{ m/s}$, $v = ? \text{ m/s}$)