

**Mark scheme for Support Worksheet – Topic 1,  
Worksheet 1**

- 1  $365 \times 24 \times 60 \times 60 \approx 400 \times 20 \times 3600$  [1]  
 $\approx 4 \times 10^2 \times 2 \times 10 \times 4 \times 10^3$   
 $\approx 32 \times 10^6$   
 $\approx 3 \times 10^7 \text{ s}$
- 2  $t = \frac{1.5 \times 10^{11}}{3 \times 10^8} = 0.5 \times 10^3 = 500 \text{ s} = \frac{500}{60} = \frac{50}{6} \approx 8 \text{ min}$  [1]
- 3 10% of Rutherford's students must be at least 1 and the smallest number that achieves this from the answers given is 12. [1]
- 4 The answer is **C**. [1]
- 5  $F = kv \Rightarrow k = \frac{F}{v}$ . The units are then  $\frac{\text{N}}{\text{m s}^{-1}} = \frac{\text{kg m s}^{-2}}{\text{m s}^{-1}} = \text{kg s}^{-1}$  [1]
- 6  $\frac{8.0 \text{ mJ}}{4.0 \text{ nJ}} = 2.0 \times \frac{10^{-3}}{10^{-9}} = 2.0 \times 10^6$  [1]
- 7 The answer must have 2 s.f. and so:  $F = ma = 1.25 \times 4.0 = 5.0 \text{ N}$  [1]
- 8 The variable  $y$  is said to be proportional to variable  $x$  if a graph of  $y$  versus  $x$  gives a straight line through the origin, **B**. [1]