Modelling in mechanics 8C

1 a $65 \text{ km h}^{-1} = \dfrac{65\times1000}{60\times60} \text{ m s}^{-1} = 18.1 \text{ m s}^{-1}$ (to 3 s.f.)

b $15 \text{ g cm}^{-2} = \dfrac{15\div1000}{1\div(100\times100)} \text{ kg m}^{-2} = 150 \text{ kg m}^{-2}$

c 30 cm per minute $= \dfrac{30\div100}{60} \text{ m s}^{-1} = 5\times10^{-3} \text{ m s}^{-1}$

d $24 \text{ g m}^{-3} = \dfrac{24}{1000} \text{ kg m}^{-3} = 2.4 \times 10^{-2} \text{ kg m}^{-3}$

e $4.5 \times 10^{-2} \text{ g cm}^{-3} = \dfrac{4.5\times10^{-2}\div1000}{1\div(100\times100\times100)} \text{ kg m}^{-3} = 45 \text{ kg m}^{-3}$

f $6.3 \times 10^{-3} \text{ kg cm}^{-2} = \dfrac{6.3\times10^{-3}}{1\div(100\times100)} \text{ kg m}^{-2} = 63 \text{ kg m}^{-2}$

2 a A: normal reaction, B: forward thrust, C: weight, D: friction

b A: buoyancy, B: forward thrust, C: weight, D: drag/water resistance

c A: normal reaction, B: friction, C: weight, D: tension

d A: normal reaction, B: weight, C: friction