

3. We convert to SI units (where necessary) and use $K = \frac{1}{2}mv^2$.

(a) $K = \frac{1}{2}(110)(8.1)^2 = 3.6 \times 10^3 \text{ J}.$

(b) Since $1000 \text{ g} = \text{kg}$, we find

$$K = \frac{1}{2} (4.2 \times 10^{-3} \text{ kg}) (950 \text{ m/s})^2 = 1.9 \times 10^3 \text{ J} .$$

(c) We note that the conversion from knots to m/s can be obtained from the information in Appendix D ($\text{knot} = 1.688 \text{ ft/s}$ where $\text{ft} = 0.3048 \text{ m}$), which is also where the $\text{ton} \rightarrow \text{kilogram}$ conversion can be found. Therefore,

$$K = \frac{1}{2} \left(91400 \text{ tons} \frac{907.2 \text{ kg}}{\text{ton}} \right) \left((32 \text{ knots}) \frac{0.515 \text{ m/s}}{\text{knot}} \right)^2 = 1.1 \times 10^{10} \text{ J} .$$