

Assignment – Dimensional Analysis

Conversions (for your convenience)		
1 hour = 60 minutes	1 mile = 5280 feet	1 yard = 3 feet
1 meter = 3.28 feet	1 km = 0.62 miles	1 light second = 300,000,000 meters
1 kg = 2.2 lbs	1 lb = 0.45 kg	1 quart = 0.946 liters
1 m/s = 2.2 miles/hour	1 foot = 12 inches	1 gallon = 3.78541 liters
1000 m = 1 kilometer	1000 mm = 1 meter	1 inch = 2.54 cm = 25.4 mm
10 mm = 1 centimeter	1 minute = 60 seconds	100 cm = 1 meter

Convert the following quantities using Dimensional Analysis and showing ALL of your work including the units.

1. 565,900 seconds = _____ days

$$\frac{565,900 \cancel{\text{secs}}}{1} \cdot \frac{1 \cancel{\text{min}}}{60 \cancel{\text{sec}}} \cdot \frac{1 \cancel{\text{hr}}}{60 \cancel{\text{min}}} \cdot \frac{1 \cancel{\text{day}}}{24 \cancel{\text{hrs}}} = \frac{565,900}{(60)(60)(24)} \text{ days}$$

6.5 days

2. 43 miles = _____ feet

$$\frac{43 \cancel{\text{miles}}}{1} \cdot \frac{5,280 \cancel{\text{feet}}}{1 \cancel{\text{mile}}} = \frac{(43)(5,280)}{1} \text{ feet}$$

227,040 feet

3. 165 lbs = _____ kg

$$\frac{165 \cancel{\text{lbs}}}{1} \cdot \frac{0.45 \cancel{\text{kg}}}{1 \cancel{\text{lbs}}} = \frac{(165)(0.45)}{1} \text{ kg}$$

74.25 kg

Solve the following (show all of your work)

4. $60 \frac{\text{miles}}{\text{hour}} = \frac{\text{meters}}{\text{second}}$

① $\frac{60 \text{ miles}}{1} \cdot \frac{5,280 \text{ feet}}{1 \text{ miles}} \cdot \frac{1 \text{ meter}}{3.28 \text{ feet}} = \frac{(60)(5,280)}{3.28} \text{ meters} = 96,585.4 \text{ m}$

② $\frac{1 \text{ hour}}{1} \cdot \frac{60 \text{ min}}{1 \text{ hour}} \cdot \frac{60 \text{ secs}}{1 \text{ min}} = \frac{(60)(60)}{1} \text{ secs} = 3600 \text{ secs}$

③ $\frac{96,585.4 \text{ meters}}{3600 \text{ secs}} = \boxed{26.8 \frac{\text{meters}}{\text{second}}}$

5. $88 \frac{\text{inches}}{\text{second}} = \frac{\text{miles}}{\text{day}}$

① $\frac{88 \text{ inches}}{1} \cdot \frac{1 \text{ foot}}{12 \text{ inches}} \cdot \frac{1 \text{ mile}}{5,280 \text{ feet}} = \frac{88}{(12)(5,280)} \text{ miles} = 0.0013\bar{8} \text{ miles}$

② $\frac{1 \text{ second}}{1} \cdot \frac{1 \text{ min}}{60 \text{ sec}} \cdot \frac{1 \text{ hr}}{60 \text{ min}} \cdot \frac{1 \text{ day}}{24 \text{ hr}} = \frac{1}{(60)(60)(24)} \text{ day} = 0.000011574 \text{ days}$

③ $\frac{0.0013\bar{8} \text{ miles}}{0.000011574 \text{ days}} = \boxed{120 \frac{\text{miles}}{\text{day}}}$

6. $150 \frac{\text{gallons}}{\text{day}} = \frac{\text{gallons}}{\text{year}}$

① $150 \text{ gallons} = 150 \text{ gallons}$

② $\frac{1 \text{ day}}{1} \cdot \frac{1 \text{ year}}{365 \text{ days}} = \frac{1}{365} \text{ years} = 0.002739726 \text{ years}$

③ $\frac{150 \text{ gallons}}{0.002739726 \text{ years}} = \boxed{54,750 \frac{\text{gallons}}{\text{year}}}$