

Dimensional Analysis Practice II

Use Dimensional analysis to solve the following problems. Make sure to include units!

Conversions

1 hour = 60 minutes

1 meter = 3.28 feet

1 kg = 2.2 lbs

1 m/s = 2.2 miles/hour

1000 m = 1 kilometer

10 mm = 1 centimeter

1 mile = 5280 feet

1 km = 0.62 miles

1 lb = 0.45 kg

1 foot = 12 inches

1000 mm = 1 meter

1 minute = 60 seconds

1 yard = 3 feet

1 light second = 300,000,000 meters

1 quart = 0.946 liters

1 inch = 2.54 cm = 25.4 mm

100 cm = 1 meter

1. 565,900 seconds into days *Seconds* → *minutes* → *hours* → *days*

$$\left(\frac{565,900 \text{ sec}}{1} \right) \times \left(\frac{1 \text{ min}}{60 \text{ sec}} \right) \times \left(\frac{1 \text{ hr}}{60 \text{ mins}} \right) \times \left(\frac{1 \text{ day}}{24 \text{ hrs}} \right) = \boxed{6.550 \text{ days}}$$

2. 17 years into minutes *yrs* → *days* → *hrs* → *min*

$$\left(\frac{17 \text{ yrs}}{1} \right) \times \left(\frac{365 \text{ days}}{1 \text{ yr}} \right) \times \left(\frac{24 \text{ hrs}}{1 \text{ day}} \right) \times \left(\frac{60 \text{ mins}}{1 \text{ hr}} \right) = \boxed{8.9 \times 10^6 \text{ mins}}$$

3. 43 miles into feet *miles* → *feet*

$$\left(\frac{43 \text{ mi}}{1} \right) \times \left(\frac{5280 \text{ ft}}{1 \text{ mi}} \right) = \boxed{2.3 \times 10^5 \text{ feet or } 230,000 \text{ feet}}$$

4. 165 pounds into kilograms *pounds* → *kg*

$$\left(\frac{165 \text{ lbs}}{1} \right) \times \left(\frac{1 \text{ kg}}{2.2 \text{ lbs}} \right) = \boxed{75.0 \text{ kg}}$$

5. 100 years into ~~meters~~ ^{*mins*} *years* → *days* → *hrs* → *mins*.

$$\left(\frac{100 \text{ yrs}}{1} \right) \times \left(\frac{365 \text{ days}}{1 \text{ yr}} \right) \times \left(\frac{24 \text{ hrs}}{1 \text{ day}} \right) \times \left(\frac{60 \text{ mins}}{1 \text{ hr}} \right) = \boxed{50,000,000 \text{ mins}}$$

** This one is a big round to get to 1 sig. fig!*

6. 22,647 inches into miles *inches* → *feet* → *miles*

$$\left(\frac{22,647 \text{ in}}{1} \right) \times \left(\frac{1 \text{ ft}}{12 \text{ in}} \right) \times \left(\frac{1 \text{ mi}}{5280 \text{ ft}} \right) = \boxed{0.35743 \text{ mi}}$$

7. 2678 cm into feet *cm* → *inches* → *feet*

$$\left(\frac{2678 \text{ cm}}{1} \right) \times \left(\frac{1 \text{ in}}{2.54 \text{ cm}} \right) \times \left(\frac{1 \text{ ft}}{12 \text{ in}} \right) = \boxed{87.86 \text{ ft}}$$

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8. 60 miles per hour into meters per second

$$\frac{\text{miles}}{\text{hr}} \rightarrow \frac{\text{meters}}{\text{sec}}$$

$$\left(\frac{60 \text{ miles}}{1 \text{ hr}} \right) \times \left(\frac{5280 \text{ ft}}{1 \text{ mile}} \right) \times \left(\frac{1 \text{ m}}{3.28 \text{ ft}} \right) \times \left(\frac{1 \text{ hr}}{60 \text{ min}} \right) \times \left(\frac{1 \text{ min}}{60 \text{ sec}} \right) = 26.83 \text{ m/sec}$$

↓ 1.5F
30 m/sec

9. 130 meters per second into miles per hour

$$\frac{\text{meters}}{\text{sec}} \rightarrow \frac{\text{miles}}{\text{hr}}$$

$$\left(\frac{130 \text{ m}}{1 \text{ sec}} \right) \times \left(\frac{3.28 \text{ ft}}{1 \text{ m}} \right) \times \left(\frac{1 \text{ mi}}{5280 \text{ ft}} \right) \times \left(\frac{60 \text{ sec}}{1 \text{ min}} \right) \times \left(\frac{60 \text{ min}}{1 \text{ hr}} \right) = 290 \text{ miles/hr}$$

10. 1100 feet per second into miles per hour

$$\frac{\text{Feet}}{\text{sec}} \rightarrow \frac{\text{miles}}{\text{hr}}$$

$$\left(\frac{1100 \text{ ft}}{1 \text{ sec}} \right) \times \left(\frac{1 \text{ mi}}{5280 \text{ ft}} \right) \times \left(\frac{60 \text{ sec}}{1 \text{ min}} \right) \times \left(\frac{60 \text{ min}}{1 \text{ hr}} \right) = 750 \text{ miles/hr}$$

11. 53 yards per hour into inches per week

$$\frac{\text{yd}}{\text{hr}} \rightarrow \frac{\text{in}}{\text{week}}$$

$$\left(\frac{53 \text{ yd}}{1 \text{ hr}} \right) \times \left(\frac{3 \text{ ft}}{1 \text{ yd}} \right) \times \left(\frac{12 \text{ in}}{1 \text{ ft}} \right) \times \left(\frac{24 \text{ hrs}}{1 \text{ day}} \right) \times \left(\frac{7 \text{ days}}{1 \text{ week}} \right) = 3.2 \times 10^5 \text{ in/week}$$

or
320,000 in/week

12. 721 lbs per week into kg per second

$$\frac{\text{lbs}}{\text{week}} \rightarrow \frac{\text{kg}}{\text{sec}}$$

$$\left(\frac{721 \text{ lbs}}{1 \text{ week}} \right) \times \left(\frac{0.45 \text{ kg}}{1 \text{ lbs}} \right) \times \left(\frac{1 \text{ week}}{7 \text{ days}} \right) \times \left(\frac{1 \text{ day}}{24 \text{ hrs}} \right) \times \left(\frac{1 \text{ hr}}{60 \text{ min}} \right) \times \left(\frac{1 \text{ min}}{60 \text{ sec}} \right) = 5.36 \times 10^{-4} \text{ kg/sec}$$

or
0.000536 kg/sec

13. 88 inches per second into miles per day

$$\frac{\text{in}}{\text{sec}} \rightarrow \frac{\text{mi}}{\text{day}}$$

$$\left(\frac{88 \text{ in}}{1 \text{ sec}} \right) \times \left(\frac{1 \text{ ft}}{12 \text{ in}} \right) \times \left(\frac{1 \text{ mi}}{5280 \text{ ft}} \right) \times \left(\frac{60 \text{ sec}}{1 \text{ min}} \right) \times \left(\frac{60 \text{ min}}{1 \text{ hr}} \right) \times \left(\frac{24 \text{ hrs}}{1 \text{ day}} \right) = 120 \text{ mi/day}$$

14. The average student is in class 330 minutes per day. How many hours per day is the student in class?

$$\frac{\text{min}}{\text{day}} \rightarrow \frac{\text{hrs}}{\text{day}}$$

$$\left(\frac{330 \text{ min}}{1 \text{ day}} \right) \times \left(\frac{1 \text{ hr}}{60 \text{ mins}} \right) = 5.5 \text{ hrs/day}$$

15. 27 miles per hour to feet per second

$$\frac{\text{mi}}{\text{hr}} \rightarrow \frac{\text{ft}}{\text{sec}}$$

$$\left(\frac{27 \text{ mi}}{1 \text{ hr}} \right) \times \left(\frac{5280 \text{ ft}}{1 \text{ mi}} \right) \times \left(\frac{1 \text{ hr}}{60 \text{ mins}} \right) \times \left(\frac{1 \text{ min}}{60 \text{ sec}} \right) = 40 \text{ ft/sec}$$