

Topic: Dimensional Analysis (time)

Objective: Students will be able to write unit rates and convert units of measure

① Equivalence (=)

$$60 \text{ secs} = 1 \text{ min}$$

$$60 \text{ min} = 1 \text{ hr}$$

$$24 \text{ hrs} = 1 \text{ day}$$

$$365 \text{ days} = 1 \text{ year}$$

② Unit rates (unit fractions)

$$\frac{1 \text{ min}}{60 \text{ secs}} \rightarrow \frac{60 \text{ secs} \div 60}{1 \text{ min} \div 60} = \frac{1 \text{ sec}}{0.017 \text{ mins}}$$

$$\frac{1 \text{ hr}}{60 \text{ mins}} \rightarrow \frac{60 \text{ min} \div 60}{1 \text{ hr} \div 60} = \frac{1 \text{ min}}{0.017 \text{ hrs}}$$

$$\frac{1 \text{ day}}{24 \text{ hrs}} \rightarrow \frac{24 \text{ hrs} \div 24}{1 \text{ day} \div 24} = \frac{1 \text{ hr}}{0.042 \text{ days}}$$

$$\frac{1 \text{ year}}{365 \text{ days}} \rightarrow \frac{365 \text{ days} \div 365}{1 \text{ year} \div 365} = \frac{1 \text{ day}}{0.0027 \text{ years}}$$

$$* \frac{1 \text{ year}}{? \text{ mins}} = \frac{1 \text{ year}}{525,600 \text{ min}}$$

$$\textcircled{*} \frac{1 \text{ year}}{365 \text{ days}} \times \frac{1 \text{ day}}{24 \text{ hrs}} \times \frac{1 \text{ hr}}{60 \text{ mins}} = \frac{1 \text{ year}}{525,600 \text{ mins}}$$

* Examples

1) 12 mins = $\boxed{720 \text{ seconds}}$
* Start with the proper unit rate

$$\frac{1 \text{ min}}{60 \text{ secs}} \times 12 \rightarrow \frac{12 \text{ min}}{720 \text{ seconds}}$$

2) 12 seconds = $\boxed{0.204 \text{ minutes}}$

$$\frac{1 \text{ sec}}{0.017 \text{ mins}} \times 12 \rightarrow \frac{12 \text{ secs}}{0.204 \text{ mins}}$$

3) 14 years = $\boxed{7,358,400 \text{ mins}}$

$$\frac{1 \text{ year}}{525,600 \text{ mins}} \times 14 \rightarrow \frac{14 \text{ years}}{7,358,400 \text{ mins}}$$

4) 140 seconds = $\boxed{0.0017 \text{ days}}$

$$\textcircled{*} \frac{1 \text{ sec}}{? \text{ days}} \rightarrow \frac{1 \text{ sec}}{0.000012 \text{ days}} \times 140 = \frac{140 \text{ secs}}{\boxed{0.0017 \text{ days}}}$$

⊛ Need to find the correct/proper unit rate

$$\frac{1 \text{ sec}}{0.017 \text{ min}} \times \frac{1 \text{ min}}{0.017 \text{ hrs}} \times \frac{1 \text{ hr}}{0.042 \text{ days}}$$

$$\frac{1 \text{ sec}}{0.000012 \text{ days}}$$