



Unit 1-Dimensional analysis



Dimensional Analysis

Used to convert between units...



- **Equivalence Statement:** Relates the same amount (quantity) in 2 different units.
 - Ex. 2.54 cm = 1 inch.
- **conversion factors:** relates equivalence in a ratio

$$\frac{2.54\text{cm}}{1 \text{ in}} \quad \text{or} \quad \frac{1 \text{ in}}{2.54 \text{ cm}}$$



Dimensional Analysis-

- Converting from a known unit to an unknown unit
- 3 steps:
 1. What do I know? (underline)
 2. What do I want to know? (circle)
 3. How do I get there (equivalence statements)?



To convert...

- Use equivalence statements
- Treat the units as variables/ numbers.
- Arrange the measurements so that they will cancel out.



Ex- A: A new baby weighs 7.8 lb,
What is it's mass in kilograms?

$$1\text{kg} = 2.205\text{ lb.}$$

$$7.8\text{ lb} \times \frac{1\text{ kg}}{2.205\text{ lb}} = 3.5\text{ kg}$$

Ex- B: How many seconds are
in 2 days?

1 day = 24 hrs, 1 hr = 60 min, 1 min = 60s

$$2 \text{ days} \times \frac{24 \text{ hrs}}{1 \text{ day}} \times \frac{60 \text{ min}}{1 \text{ hr}} \times \frac{60 \text{ s}}{1 \text{ min}} = 172800 \text{ s}$$

**Examples: Convert the following:
show all of your work!!!!**

Practice A: 360 seconds to milliseconds

(note: 1000 milliseconds = 1 second)



How did you do?

A. 360 seconds to milliseconds →

$$360 \text{ s} \times \frac{1000 \text{ ms}}{1 \text{ s}} = 360,000 \text{ ms}$$

**Examples: Convert the following:
show all of your work!!!!**

Practice B: 4.98 feet to centimeters

(note: $1 \text{ ft} = 12 \text{ in}$ and $2.54 \text{ cm} = 1 \text{ in}$)



How did you do?

B. 4.98 feet to cm →

$$4.98 \text{ ft} \times \frac{12 \text{ in}}{1 \text{ ft}} \times \frac{2.54 \text{ cm}}{1 \text{ in}} = 152 \text{ cm}$$

**Examples: Convert the following:
show all of your work!!!!**

Practice C: 1500 seconds to hours

(note: 60 sec = 1min and 60 min= 1 hr)



How did you do?

C. 15000 seconds to hours →

$$1500\text{s} \times \frac{1 \text{ min}}{60 \text{ s}} \times \frac{1 \text{ hr}}{60 \text{ min}} = \frac{1500\text{hr}}{3600} = .42 \text{ hr}$$

**Examples: Convert the following:
show all of your work!!!!**

Practice D: 75 m to km

(note: $1000\text{m} = 1\text{km}$)



How did you do?

D. 75 m to km →

$$\underline{75 \text{ m}} \times \frac{\underline{1 \text{ km}}}{1000\text{m}} = 0.075 \text{ km}$$