

# WS 1.6 Dimensional Analysis (CONVERSIONS)

This may be the most important worksheet of the semester.

1 ft = 12 in
1 mi = 5280 ft
1 lb = 16 oz
1 gal = 4 qt
1 in = 2.54 cm
1 mi = 1.61 km
1 lb = 454 g
1 L = 1.057 qt
1 m = 100 cm
1 km = 1000 m
1 kg = 1000 g
1 L = 1000 mL
1 mL = 1 cm <sup>3</sup>

example A: 29.5 in → ft:  $29.5 \cancel{\text{in}} \times \frac{1 \text{ ft}}{12 \cancel{\text{in}}} = 2.46 \text{ ft}$

example B: 0.036 m → in:  $0.036 \cancel{\text{m}} \times \frac{100 \cancel{\text{cm}}}{1 \cancel{\text{m}}} \times \frac{1 \text{ in}}{2.54 \cancel{\text{cm}}} = 1.4 \text{ in}$

1) 2.45 ft → mi:  $\frac{2.45 \cancel{\text{ft}}}{5280 \cancel{\text{ft}}} \times 1 \text{ mi} = 0.000464 \text{ mi}$  or  $4.64 \times 10^{-4} \text{ mi}$

2) 75.0 kg → lb:  $\frac{75.0 \cancel{\text{kg}} \times 1000 \cancel{\text{g}}}{454 \cancel{\text{g}}} = 165.2 \text{ lb}$

3) 10.0 gal → mL:  $\frac{10.0 \cancel{\text{gal}} \times 4 \cancel{\text{qt}}}{1.057 \cancel{\text{qt}}} \times \frac{1000 \text{ mL}}{1 \cancel{\text{L}}} = 37843 \text{ mL}$

4) 89 km → in:  $\frac{89 \cancel{\text{km}} \times 1000 \cancel{\text{m}} \times 100 \cancel{\text{cm}}}{2.54 \cancel{\text{cm}}} = 3.50 \times 10^6 \text{ in}$

example C: 5.17 lb/gal → lb/qt:  $5.17 \text{ lb/gal} \times \frac{4 \text{ qt}}{1 \text{ gal}} = 20.68 \text{ lb/qt}$

example D: 3.4 mi/hr → km/min

5) 459 ft/sec → mi/hr:  $\frac{459 \cancel{\text{ft}}}{5280 \cancel{\text{ft}}} \times \frac{1 \text{ mi}}{1} \times \frac{60 \text{ sec}}{1 \cancel{\text{min}}} \times \frac{60 \text{ min}}{1 \text{ hr}} = 312.95 \text{ mi/hr}$

6) 2.40 g/mL → lb/gal:  $\frac{2.40 \cancel{\text{g}}}{454 \cancel{\text{g}}} \times \frac{1000 \cancel{\text{mL}}}{1 \cancel{\text{L}}} \times \frac{1 \text{ L}}{1.057 \cancel{\text{qt}}} \times \frac{4 \text{ qt}}{1 \text{ gal}} = 20.0 \text{ lb/gal}$

7) 32.56 km/hr → ft/hr:  $\frac{32.56 \cancel{\text{km}}}{1.61 \cancel{\text{km}}} \times \frac{5280 \text{ ft}}{1 \cancel{\text{mi}}} = 1.068 \times 10^5 \text{ ft/hr}$

example E: 3.9 cm<sup>3</sup> → ft<sup>3</sup>

8) 5800 mi<sup>2</sup> → km<sup>2</sup>:  $\frac{5800 \cancel{\text{mi}^2}}{1 \cancel{\text{mi}^2}} \times \frac{1.61 \text{ km}^2}{1 \cancel{\text{mi}^2}} = 15,034.2 \text{ km}^2$

9) 35.2 ft<sup>2</sup> → cm<sup>2</sup>:  $\frac{35.2 \cancel{\text{ft}^2}}{1 \cancel{\text{ft}^2}} \times \frac{12 \cancel{\text{in}}}{1 \cancel{\text{ft}}} \times \frac{2.54 \text{ cm}}{1 \cancel{\text{in}}} = 32,702 \text{ cm}^2$

ANS (IRO+2): 0.000464 165 107,000 22.4 32,700 15,000 313 220. 3,500,000 20.0 37,800

UNITS (IRO+2): km<sup>2</sup> mL lb/gal mi ft/hr cm<sup>2</sup> in mi/hr lb kg lb/ft<sup>3</sup>