9/28/17 Working with Units of Measurements + Equalities

Conversions, Unit Cancelling or Dimensional Analysis

Process of changing from initial unit(s) to a different unit(s).

Equalities 100 pennies = 1 dollar 20 nickels = 1 dollar

4 quarters = 1 dollar 5 pennies = 1 nickel

Ratio $\frac{100 \text{ pennies}}{1 \text{ dollar}} = \frac{1 \text{ dollar}}{100 \text{ pennies}}$

$20 \text{ pennies} \times \frac{1 \text{ nickel}}{5 \text{ pennies}} \times \frac{1 \text{ dollar}}{20 \text{ nickels}} = 0.2 \text{ dollar}$

A witch needs a broom, she has 19 Fairy Tears how many brooms can she buy?

$19 \text{ fairy tears} \times \frac{5 \text{ drops of Myre lake } H_2O}{7 \text{ Fairy Tears}} \times \frac{1 \text{ dragon tail}}{10 \text{ drops Myre lake } H_2O} \times \frac{7 \text{ Toads}}{2 \text{ dragon tails}} \times \frac{4 \text{ eye of Newt}}{3 \text{ Toads}} \times \frac{1 \text{ broom}}{6 \text{ eye of Newt}} = 1.055\ldots$

1.1 Brooms

$(19 \times 5 \times 1 \times 7 \times 4 \times 1) \div (7 \times 10 \times 2 \times 3 \times 6) =$

Practice:

2 dozen (24) cookies require 6 eggs. We only have 4.0 eggs (given), how many cookies can we make?

given: 4.0 eggs (determines sf) need: ? cookies

$$\frac{4.0\ \text{eggs} \times 24\ \text{cookies}}{6\ \text{eggs}} = 16\ \text{cookies}$$ 2sf

The density of CO_2 gas is $1.43\ g/L$ what would that be in g/ml?

given: $\frac{1.43\ g}{1\ L}$ need: $\frac{g}{ml}$

$$\frac{1.43\ g}{1\ L} \times \frac{1\ L}{1000\ ml} = 0.00143\ g/ml \text{ or } 1.43 \times 10^{-3}\ g/ml$$

1 Mole (mol) = 6.022×10^{23} atoms or molecules = molar mass from the periodic table = 22.4L (of gas)

How many atoms are in 5.24 mol of aluminum?

given: 5.24 mol (3sf) need: ? atoms

$$\frac{5.24\ \text{mol} \times 6.022 \times 10^{23}\ \text{atoms}}{1\ \text{mol}} = 3.155528 \times 10^{24}\ \text{atoms} \quad (3.16 \times 10^{24})$$

Calculator Entry: EE means x10

TI 83|84 5.24 * 6.022 EE 23 Enter

TI 30 5.24 * 6.022 EE 23 =

A snail moves at $6.0\ cm/min$, how far has he gone in 90 seconds?

given: 90 seconds (1sf) need: ? cm

↳ 60 sec = 1 min → 6.0 cm = 1 min

$$\frac{90\ \text{seconds} \times 1\ \text{min} \times 6.0\ \text{cm}}{60\ \text{sec} \times 1\ \text{min}} = 9.\ \text{cm}$$

How many meters in 82.39 km?

given: 82.39 km need: ? m

$$\frac{82.39\ \text{km} \times 1000\ \text{m}}{1\ \text{km}} = 82390\ \text{m}$$

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5 pennies = 1 nickel

$$\frac{20 \text{ pennies}}{} \times \frac{1 \text{ nickels}}{5 \text{ pennies}} = \frac{4 \text{ nickels}}{} \times \frac{1 \text{ dollar}}{20 \text{ nickels}} = 0.2 \text{ dollar}$$

A witch wants to buy a new broom, she has 19 Fairy Tears and 40 mossy shells - which will buy her more brooms?

$$\frac{19 \text{ Fairy Tears}}{} \times \frac{5 \text{ drops ML}}{7 \text{ F.T.}} \times \frac{1 \text{ dragontail}}{10 \text{ drops ML}} \times \frac{7 \text{ toads}}{2 \text{ dragontails}} \times \frac{4 \text{ EoN}}{3 \text{ toads}} \times \frac{1 \text{ broom}}{6 \text{ EoN}} =$$

1.055

1 Broom

$$\frac{40 \text{ mossy shells}}{} \times \frac{6 \text{ drops R.v.S.}}{15 \text{ m.s.}} \times \frac{3 \text{ S.t.}}{5 \text{ drops RS.}} \times \frac{2 \text{ EoN}}{5 \text{ St.}} \times \frac{1 \text{ broom}}{6 \text{ EoN}} = 0.64 \text{ broom}$$

The density of CO_2 gas is 1.43 g/L. What would the density be in g/ml? given: $\frac{1.43 \text{ g}}{1 \text{ L}}$ need: ? $\frac{\text{g}}{\text{ml}}$

$$\frac{1.43 \text{ g}}{1 \text{ K}} \times \frac{1 \text{ K}}{1000 \text{ ml}} = 0.00143 \text{ g/ml} \text{ or } 1.43 \times 10^{-3} \text{ g/ml}$$

A snail crawls at 0.0062 m/min (6.2×10^{-3}), what is the speed in cm/min?

given: 0.0062 m/min need: ? cm/min

$$\frac{0.0062 \text{ m}}{1 \text{ min}} \times \frac{100 \text{ cm}}{1 \text{ m}} = \boxed{0.62 \frac{\text{cm}}{\text{min}}}$$

How many liters are in 64.3 ml?

given: 64.3 ml need: ? L

$$\frac{64.3 \text{ ml}}{1} \times \frac{1 \text{ L}}{1000 \text{ ml}} = \boxed{0.0643 \text{ L}} \quad \boxed{6.43 \times 10^{-2} \text{ L}}$$

1 digit

How many Kilometers are in 324.7 m?

given: 324.7 m need: ? km

$$\frac{324.7 \text{ m}}{} \times \frac{1 \text{ Km}}{1000 \text{ m}} = \boxed{0.3247 \text{ Km}}$$

A car travels (75 km/hr) what is the speed in m/min?

given: $\frac{75 \text{ Km}}{1 \text{ hr}}$ need: ? $\frac{\text{m}}{\text{min}}$

$$\frac{75 \text{ Km}}{1 \text{ hr}} \times \frac{1 \text{ hr}}{60 \text{ min}} \times \frac{1000 \text{ m}}{1 \text{ Km}} = \frac{1300}{1250} \frac{\text{m}}{\text{min}}$$

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→ 5 pennies = 1 nickel

$$\frac{20 \text{ pennies}}{} \times \frac{1 \text{ nickels}}{5 \text{ pennies}} = \boxed{4 \text{ nickels}}$$

$$\frac{4 \text{ nickels}}{} \times \frac{1 \text{ dollars}}{20 \text{ nickels}} = 0.2 \text{ dollar}$$

A witch needs a new broom – she has 19 Fairy Tears and 40 mossy shells – which will buy her more brooms?

$$\frac{19 \text{ Fairy Tears}}{} \times \frac{5 \text{ d. Myrtlecake}}{7 \text{ Fairy Tears}} \times \frac{1 \text{ dog. hair}}{10 \text{ d. Myrtlecake}} \times \frac{7 \text{ toads}}{2 \text{ dog. hairs}} \times \frac{4 \text{ Eye of Newt}}{3 \text{ toads}} \times \frac{1 \text{ Broom}}{6 \text{ E.o.N}} =$$

1.06

1 Broom

$$\frac{40 \text{ Mossy shells}}{} \times \frac{6 \text{ d. R. Slugs}}{15 \text{ mossy s}} \times \frac{3 \text{ S. tong}}{5 \text{ d. R. Slugs}} \times \frac{2 \text{ E. of N}}{5 \text{ S. tong}} \times \frac{1 \text{ broom}}{6 \text{ E. of N}} = < 1 \text{ broom}$$

∅ broom

How many liters in 57.45 cl?

given: 57.45 cl (4 sf) need: ? L

$$\frac{57.45 \text{ cl}}{\text{given}} \times \frac{1 \text{ L}}{100 \text{ cl}} = \boxed{0.5745 \text{ L}}$$

How many grams in 33.856 Kilograms?

given: 33.856 kg need: ? g

$$\frac{33.856 \text{ kg}}{} \times \frac{1000 \text{ g}}{1 \text{ kg}} = \boxed{33856 \text{ g}}$$

The density of CO_2 gas is 1.43 g/L. What is the density in g/ml?

given: $\frac{1.43 \text{ g}}{1 \text{ L}}$ need: $\frac{\text{g}}{\text{ml}}$ ✓

$$\frac{1.43 \text{ g}}{1 \text{ L}} \times \frac{1 \text{ L}}{1000 \text{ ml}} = 0.00143 \text{ g/ml}$$

or

1.43×10^{-3} g/ml

A snail crawls at a speed of 0.064 m/min, how fast is this in cm/min?

given: $\frac{0.064\text{ m}}{1\text{ min}}$ need: ? $\frac{\text{cm}}{\text{min}}$ ✓ ✓ m → cm

$$\frac{0.064\text{ m}}{1\text{ min}} \times \frac{100\text{ cm}}{1\text{ m}} = \boxed{6.4\text{ cm/min}}$$

? how fast is this in m/hr?

given: $\frac{0.064\text{ m}}{1\text{ min}}$ need: ? m/hr min → hr

$$\frac{0.064\text{ m}}{1\text{ min}} \times \frac{60\text{ min}}{1\text{ hr.}} = 3.84 \rightarrow \boxed{3.8\ \frac{\text{m}}{\text{hr}}}$$

$$\boxed{1\text{ mole (mol)}} = \boxed{6.022 \times 10^{23}\text{ atoms or molecules}} = \text{molar mass in grams from the P.T.} = 22.4\text{ L (of a gas)}$$

How many atoms are in 0.502 mol of Al?

given: 0.502 mol need: ? atoms

$$0.502\text{ mol} \times \frac{6.022 \times 10^{23}\text{ atoms}}{1\text{ mol}} = \boxed{3.02 \times 10^{23}\text{ atoms}}$$