WKS

Dimensional Analysis WS 1

NAME Answer Key

Period _____ **Date** _____

Use dimensional analysis (the "factor-label" method) to solve the following problems. **Show all steps** needed to convert from starting units to ending units. Use any of the following relationships if needed:

VI. Conversion Factors: Sols, Arks, meks etc....

Conversion factors

1 sol = 5 nats	**36 sols = 1 dran**	**12 sols = 1 mek**	**1 sol = 3 arks**	**10 arks = 1.20 freds**

1) 15 sols = ? nats

$$? \text{ nats} = 15 \text{ sols} \times \frac{5 \text{ nats}}{1 \text{ sol}} = \boxed{75 \text{ nats}}$$

2) 0.50 drans = ? sols

$$? \text{ sols} = 0.50 \text{ drans} \times \frac{36 \text{ sols}}{1 \text{ dran}} = \boxed{18 \text{ sols}}$$

3) 7.84 arks = ? freds

$$? \text{ freds} = 7.84 \text{ arks} \times \frac{1.20 \text{ freds}}{10 \text{ arks}} = \boxed{0.941 \text{ freds}}$$

4) 24 meks = ? drans (2-step)

$$? \text{ drans} = 24 \text{ meks} \times \frac{12 \text{ sols}}{1 \text{ mek}} \times \frac{1 \text{ dran}}{36 \text{ sols}} = \boxed{8.0 \text{ drans}}$$

5) 6.5 freds = ? sols (2-step)

$$? \text{ sols} = 6.5 \text{ freds} \times \frac{10 \text{ arks}}{1.20 \text{ freds}} \times \frac{1 \text{ sol}}{3 \text{ arks}} = \boxed{18 \text{ sols}}$$

6) 18 arks = ? drans (2-step)

$$? \text{ drans} = \frac{18 \text{ arks}}{1} \left| \frac{1 \text{ sol}}{3 \text{ arks}} \right| \frac{1 \text{ dran}}{36 \text{ sols}} = \boxed{0.17 \text{ drans}}$$

7) 60.0 freds = ? meks (3 steps)

$$? \text{ meks} = 60.0 \text{ freds} \times \frac{10 \text{ arks}}{1.20 \text{ freds}} \times \frac{1 \text{ sol}}{3 \text{ arks}} \times \frac{1 \text{ mek}}{12 \text{ sols}} = \boxed{13.9 \text{ meks}}$$

VII. The Process: Real Units

Use the following conversion factors, as needed. Remember, **never start your calculation with a conversion factor** unless you are converting the conversion factor (Video #9).

1 mile = 1760 yds	16 oz = 1 lb	1 L = 1.057 qts	1 day = 24 hours
1 yd = 3 ft	2000 lbs = 1 ton	4 qts = 1 gal	1 hour = 60 mins
1 in = 2.54 cm	1 oz = 28.35 g	32 liquid oz = 1 qt	1 min = 60 secs
1 mile = 1.6093 km	1 kg = 2.205 lbs	1 qt = 2 pts	
1 m = 6.214×10^{-4} mile			

8) A runner competed in a 5.00-mile run. How many yards did she run?

Relationship: 1 mile = 1760 yds

$$? \text{ yds} = 5.00 \text{ miles} \times \frac{1760 \text{ yds}}{1 \text{ mile}} = \boxed{8.80\times10^{3} \text{ yds}}$$

9) In the Tour de France, cyclists ride 3,653.6 km in 21 days. How many miles do they go? [Hint: watch for unimportant information!]

Relationship: 1 mile = 1.6093 km

$$? \text{ mi} = \frac{3653.6 \cancel{\text{ km}}}{1.6093 \cancel{\text{ km}}} \left| \frac{1 \text{ mile}}{} \right. = \boxed{2270.3 \text{ mi}}$$

10) Some steakhouses offer a 72-oz steak for free if you can eat it. How many pounds of meat would you have to swallow for a free dinner?

Relationship: 16 oz = 1 lb

$$? \text{ lbs} = 72 \cancel{\text{ oz}} \times \frac{1 \text{ lb}}{16 \cancel{\text{ oz}}} = \boxed{4.5 \text{ lbs}}$$

11) After eating your steak, perhaps you'd finish it off with a pound (1.00 lb) cake for dessert. What would the name of this cake be in grams?

Relationships: 1 lb = 16 oz; 1 oz = 28.35 g

$$? \text{ g} = \frac{1.00 \cancel{\text{ lb}}}{1 \cancel{\text{ lb}}} \left| \frac{16 \cancel{\text{ oz}}}{1 \cancel{\text{ oz}}} \right| \frac{28.35 \text{ g}}{} = \boxed{454 \text{ g}}$$

12) If you go to school for 180 days (a counted number!) each school year and you are in school 7.00 hours each day, how many minutes are spent in school in 2.00 school years?

Information: 1 school year = 180 days; 1 school day = 7.00 hours

$$? \text{ min} = 2.00 \cancel{\text{ school year}} \times \frac{180 \cancel{\text{ school days}}}{1 \cancel{\text{ school year}}} \times \frac{7.00 \cancel{\text{ hrs}}}{1 \cancel{\text{ school day}}} \times \frac{60 \text{ min}}{1 \cancel{\text{ hr}}} = \boxed{151{,}00 \text{ min or } 1.51 \times 10^5 \text{ min}}$$

13) A running back gained 225 yds in one game. How many meters did he go?

Relationships: 1 mi = 1760 yd; 1 m = 6.214×10^{-4} mile

$$? \text{ m} = \frac{225 \cancel{\text{ yds}}}{1760 \cancel{\text{ yd}}} \left| \frac{1 \cancel{\text{ mi}}}{6.214 \times 10^{-4} \cancel{\text{ mi}}} \right| \frac{1 \text{ m}}{} = \boxed{206 \text{ m}}$$

14) Soda is (used to be?) sold in 20-liquid oz bottles (1 bottle = 20.0 liquid oz). How many liters (L) would six of these bottles contain? [What quantity should you start with?]

Information: 20 oz = 1 bottle; Relationships: 32 oz = 1 qt; 1 L = 1.057 qts

$$? \text{ L} = 6 \cancel{\text{ bottles}} \times \frac{20.0 \cancel{\text{ oz}}}{1 \cancel{\text{ bottle}}} \times \frac{1 \cancel{\text{ qt}}}{32 \cancel{\text{ oz}}} \times \frac{1 \text{ L}}{1.057 \cancel{\text{ qt}}} = \boxed{3.55 \text{ L}}$$