NAME _____ DATE Key PERIOD _____

2-8 Notes *(continued)*

Dimensional Analysis

Use dimensional analysis to convert each rate. Show all of your work and draw a line through the units that cancel.

RUNNING A 10K run is 10 kilometers long. If 1 meter = 1.094 yards, use dimensional analysis to find the length of the race in miles. (*Hint*: 1 mi = 1760 yd)

length of run × kilometers to meters × meters to yards × yards to miles

$\frac{10\text{ km}}{1\text{ run}} \cdot \frac{1000\text{ meters}}{1\text{ km}} \cdot \frac{1.094\text{ yds}}{1\text{ meter}} \cdot \frac{1\text{ mile}}{1760\text{ yds}} = \frac{6.2\text{ miles}}{1\text{ run}}$

Exercises

1. Convert 13 feet per second to miles per hour.

$\frac{13\text{ ft}}{1\text{ sec}} \cdot \frac{3600\text{ sec}}{1\text{ hr}} \cdot \frac{1\text{ mile}}{5280\text{ ft}} = \frac{8.86\text{ miles}}{1\text{ hr}}$

2. Convert 40 miles per hour to feet per second.

$\frac{40\text{ miles}}{1\text{ hr}} \cdot \frac{1\text{ hr}}{3600\text{ sec}} \cdot \frac{5280\text{ ft}}{1\text{ mile}} = \frac{58.67\text{ feet}}{1\text{ sec}}$

3. Convert 150 yards per minute to feet per day.

$\frac{150\text{ yds}}{1\text{ min}} \cdot \frac{3\text{ feet}}{1\text{ yd}} \cdot \frac{60\text{ min}}{1\text{ hr}} \cdot \frac{24\text{ hrs}}{1\text{ day}} = \frac{648{,}000\text{ feet}}{1\text{ day}}$

4. A car travels a distance of 100 feet in about 2.8 seconds. What is the velocity of the car in miles per hour? Round to the nearest whole number.

$\frac{100\text{ ft}}{2.8\text{ sec}} \cdot \frac{1\text{ mile}}{5280\text{ ft}} \cdot \frac{3600\text{ sec}}{1\text{ hr}} = \frac{24.35\text{ miles}}{1\text{ hr}}$

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5. A person is walking at a rate of 160 feet per minute. Use dimensional analysis to find the speed at feet per second.

$\frac{160\ ft}{1\ min} \cdot \frac{1\ min}{60\ sec} = \frac{2.67\ ft}{sec}$

6. Convert 3.82 meters per second to kilometers per hour.

$\frac{3.82\ m}{1\ sec} \cdot \frac{1\ km}{1000\ m} \cdot \frac{60\ sec}{1\ min} \cdot \frac{60\ min}{1\ hr} = \frac{13.752\ km}{1\ hr}$

7. Convert 15 miles per hour to inches per second.

$\frac{15\ miles}{1\ hr} \cdot \frac{1\ hr}{60\ min} \cdot \frac{1\ min}{60\ sec} \cdot \frac{5280\ ft}{1\ mile} \cdot \frac{12''}{1\ ft} = \frac{264\ inches}{1\ sec}$

8. Falcons can dive at speeds of up to 318 feet per second. Convert this speed to miles per hour.

$\frac{318\ ft}{1\ sec} \cdot \frac{1\ mile}{5280\ ft} \cdot \frac{60\ sec}{1\ min} \cdot \frac{60\ min}{1\ hr} = \frac{216.82\ miles}{1\ hr.}$

9. A cyclist travels 56 miles in 4 hours. What is the cyclist's speed in feet per minute?

$\frac{56\ miles}{4\ hrs} \cdot \frac{1\ hr}{60\ min} \cdot \frac{5280\ ft}{1\ mile} = \frac{1232\ feet}{1\ min.}$