

Dimensional Analysis Practice

Name: _____

Show your work for each and circle your answer. Be sure to answer to the correct number of significant figures and write units with your answers.

1. 5.63 grams to kilograms

$$5.63 \text{ grams} \times \frac{1 \text{ Kg}}{1000 \text{ grams}} =$$

Calculation
 $5.63 \times 1 \div 1000$

$$= 0.00563 \text{ Kg}$$

$$= 5.63 \times 10^{-3} \text{ Kg}$$

In sci note since it is small number

2. 2.69 feet to metres

$$2.69 \text{ ft} \times \frac{30.48 \text{ cm}}{1 \text{ ft}} \times \frac{1 \text{ m}}{100 \text{ cm}} = 0.820 \text{ m}$$

Calc: $2.69 \times 30.48 \times 1 \div 1 \div 100 = 0.819912$

0.819912 rounded to 3 sig figs

3. 6300 mm to inches

$$6300 \text{ mm} \times \frac{1 \text{ cm}}{10 \text{ mm}} \times \frac{1 \text{ inch}}{2.54 \text{ cm}} = 250 \text{ inches}$$

Calculation: $6300 \times 1 \times 1 \div 10 \div 2.54 = 248.03...$

248.03... rounded to 2 sig figs

4. 252.26 miles to cm

$$252.26 \text{ miles} \times \frac{5280 \text{ ft}}{1 \text{ mile}} \times \frac{30.48 \text{ cm}}{1 \text{ ft}} = 40597000 \text{ cm}$$

$$= 4.0597 \times 10^7 \text{ cm}$$

Calculation: $252.26 \times 5280 \times 30.48 \div 1 \div 1 = 40597311.74$

rounded to 5 sig figs as both conversions are perfect (= not ≈)

5. 0.0050 miles to mm

$$0.0050 \text{ miles} \times \frac{5280 \text{ ft}}{1 \text{ mile}} \times \frac{30.48 \text{ cm}}{1 \text{ ft}} \times \frac{10 \text{ mm}}{1 \text{ cm}}$$

Calculation: $0.0050 \times 5280 \times 30.48 \times 10 \div 1 \div 1 \div 1$
 $= 8046.72$

$$= 8.0 \times 10^3 \text{ mm}$$

must use sci note to show 2 sig figs

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6. 2.14 miles per hour to miles per day

$$\frac{2.14 \text{ miles}}{\text{hour}} \times \frac{24 \text{ hr}}{1 \text{ day}} = 51.36 \frac{\text{miles}}{\text{day}} \approx 51.4 \text{ miles/day}$$

↑
rounded to 3
sig figs

7. 2.14 miles per hour to km per hour

$$\frac{2.14 \text{ miles}}{\text{hour}} \times \frac{1.609 \text{ km}}{1 \text{ mile}} = 3.44326 \frac{\text{km}}{\text{hr}} \approx 3.44 \text{ km/hr}$$

8. 2.14 miles per hour to km per day

$$\frac{2.14 \text{ miles}}{\text{hour}} \times \frac{1.609 \text{ km}}{1 \text{ mile}} \times \frac{24 \text{ hr}}{1 \text{ day}} = 82.63824 \frac{\text{km}}{\text{day}} \approx 82.6 \text{ km/day}$$

9. 953 grams per second to pounds per hour

$$\frac{953 \text{ g}}{\text{sec}} \times \frac{60 \text{ sec}}{1 \text{ min}} \times \frac{60 \text{ min}}{1 \text{ hr}} \times \frac{1 \text{ pound}}{454 \text{ g}} = 7556.828 \frac{\text{pounds}}{\text{hr}} \approx 7560 \frac{\text{pounds}}{\text{hr}} \text{ OR } 7.56 \times 10^3 \frac{\text{pounds}}{\text{hr}}$$

10. 5.23×10^7 metres per second to miles per hour

$$\frac{5.23 \times 10^7 \text{ m}}{\text{sec}} \times \frac{1 \text{ yd}}{0.9144 \text{ m}} \times \frac{1 \text{ mile}}{1760 \text{ yd}} \times \frac{60 \text{ sec}}{1 \text{ min}} \times \frac{60 \text{ min}}{1 \text{ hr}} = 116991768.1 \frac{\text{mi}}{\text{hr}} \approx 117000000 \frac{\text{miles}}{\text{hr}} = 1.17 \times 10^8 \text{ miles/hr}$$

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11. 2.5 square feet into square inches

$$2.5 \text{ ft}^2 \times \frac{12 \text{ in}}{1 \text{ ft}} \times \frac{12 \text{ in}}{1 \text{ ft}} = 360 \text{ in}^2 \text{ or } 360 \text{ sq in}$$

Need to use conversion factor twice to cancel both "feet" in ft^2

12. 9.00 square cm into square metres

$$9.00 \text{ cm}^2 \times \frac{1 \text{ m}}{100 \text{ cm}} \times \frac{1 \text{ m}}{100 \text{ cm}} = 0.000900 \text{ m}^2 = 9.00 \times 10^{-4} \text{ m}^2$$

13. 950 cm^2 into square yards.

$$950 \text{ cm}^2 \times \left(\frac{1 \text{ in}}{2.54 \text{ cm}}\right)^2 \times \left(\frac{1 \text{ yd}}{36 \text{ in}}\right)^2 = 0.113619 \text{ yd}^2$$

Another way to write $\frac{1 \text{ in}}{2.54 \text{ cm}} \times \frac{1 \text{ in}}{2.54 \text{ cm}} \approx 0.11 \text{ sq yd}$

need to show 3 sig figs. Since it is a small number sci note is best

14. 52 000 cm^3 per second into m^3 per hour.

$$52\,000 \text{ cm}^3 \times \left(\frac{1 \text{ m}}{100 \text{ cm}}\right)^3 = 0.052 \text{ m}^3$$

Since we are dealing with cubic units, need to use conversion 3 times

15. 405 000 $\frac{\text{grams}}{\text{cm}^2}$ per day into pounds per square inch

$$\frac{405\,000 \text{ g}}{\text{cm}^2} \times \left(\frac{2.54 \text{ cm}}{1 \text{ in}}\right)^2 \times \frac{1 \text{ pound}}{454 \text{ g}} = 5755.28 \frac{\text{pounds}}{\text{inch}^2}$$

$$\approx 5760 \text{ pounds/inch}^2 \text{ OR } 5.76 \times 10^3 \text{ pounds/sq in}$$