MATH 094

Dimensional Analysis Practice

Complete each of the following problems by using dimensional analysis. This includes setting up the problem in the pattern of the example. (What do you start with? Use unit fractions to convert as needed.) Use the conversion table from section 4.2 as needed. Note: 1mile = 5280 feet.

Example: How many minutes are in 5 years? Go to Insert → Equation to get this.

$$5 \text{ years} * \frac{365 \text{ days}}{1 \text{ year}} * \frac{24 \text{ hours}}{1 \text{ day}} * \frac{60 \text{ minutes}}{1 \text{ hour}} = 252800 \text{ minutes}$$

An alternate set up is to use the "railway method." This gets you to the same place in the same way, just sets this up as a table instead.

Go to Insert → Table to get this

5 years	365 days	24 hours	60 minutes	= 252800 minutes
	1 year	1 day	1 hour	

1. 261 g to kg

$$261 \text{ g} \cdot \frac{1 \text{ kg}}{1000 \text{ g}} = 0.261 \text{ kg}$$

2. 3 days to seconds

3. 9,474 mm to cm

4. 0.73 kL to L

5. 5.93 cm^3 to m^3

6. 1 ft^3 to m^3

7. 8.24 g/cm^2 to mg/mm^2

8. 20.25 m/s to miles/hr

9. 10095 m/s to miles/s

10. 9.81 m/s^2 to ft/s^2

11. 5400 in to miles

12. 16 weeks to seconds

13. 36 cm/sec to mph

14. 25 yards to inches

15. Traveling at 65 miles/hour, how many minutes will it take to drive 125 miles to San Diego? (Make sure to use dimensional analysis – this should match your reasoning!)

16. Traveling at 65 miles/hour, how many feet can you travel in 22 minutes?

17. Sally Leadfoot was pulled over on her way from Syracuse to Ithaca by an officer claiming she was speeding. The speed limit is 65 mi/hr and Sally had traveled 97 km in 102 minutes. How fast was Sally's average speed? Does she deserve a ticket?

18. Winnipeg is refilling the pool. How many gallons of water will it take if the pool is 50m by 25m by 1.5m? (Note: 1 cubic meter = 1000 liters and 3.785 liters = 1 gallon)

19. Meredith found some lace at a price of 4.0 £/meter in Ireland that she liked but was afraid she was paying too much for it. The same lace in the Canada would sell for $5.99/yd. Was she paying too much for it? ($1 = 0.82 £)

20. You find 13,406,190 pennies. If each penny weighs 4 grams, how many pounds was the bag you carried the pennies in? (Assume the weight of the bag is negligible. Note: 1 kg = 2.2lb)

Answers:
1) 0.261 kg; 2) 259,200 sec; 3) 947.4 cm; 4) 730 L; 5) 0.00000593 m^3; 6) 0.0283 m^3; 7) 0.824 mg/mm^2; 8) 45.28 mph; 9) 6.27 mi/sec; 10) 32.185 m/ft^2; 11) 0.085 mi; 12) 9676800 sec; 13) 0.805 mph; 14) 900 in; 15) 115.38 min; 16) 125840 ft; 17) 35.44 mph, No; 18) 495376.5 gal; 19) $4.46/yd, No; 20) 24374.89 lbs