Chapter 02B: Metric System and Medication Calculations
Mulholland: The Nurse, The Math, The Meds, 3rd Edition

ESSAY

1. Give medication X for a systolic blood pressure *greater than or equal* to 160. Write the symbol for the italicized phrase.

    ANS:
    $\geq$

2. Hold the medication if the fever is *less than* 38° C. Write the symbol for the italicized phrase.

    ANS:
    $<$

3. Write the Arabic numerals for XXX.

    ANS:
    30

4. Write the Roman numeral for 15.

    ANS:
    XV

5. Write the product of $\frac{4}{5}$ and $\frac{1}{8}$. Reduce to lowest terms. Label the numerator and the denominator in the answer.

    ANS:
    $$\frac{4}{5} \times \frac{1}{8} = \frac{4}{40} = \frac{1}{10} \frac{\text{numerator}}{\text{denominator}}$$

6. Write two factors of the number 25 other than the number 1.

    ANS:
    5, 25

7. Write two common factors of 6 and 18 other than the number 1.

    ANS:
    3, 6

8. Write three multiples of the number 3.

    ANS:
    3 (3 × 1); 6 (3 × 2); 9 (3 × 3)

9. Write out 10^3 to illustrate the calculation and show the result. Which number is the base? Which number is the exponent?

ANS:
$10 \times 10 \times 10 = 1000$; 10 is the base; 3 is the exponent

10. Which is greater: 0.259 or 0.5?

ANS:
0.5

11. Which is smaller: $\frac{1}{250}$ or 0.5?

ANS:
$\frac{1}{250} = 0.004$

12. Multiply: $1\frac{1}{4} \times 2\frac{2}{3}$. Reduce to lowest terms.

ANS:
$\frac{5}{4} \times \frac{8}{3} = \frac{40}{12} = 3\frac{1}{3}$

13. Divide: $1\frac{1}{6} \div \frac{1}{2}$. Reduce to lowest terms.

ANS:
$\frac{13}{6} \div \frac{1}{2} = \frac{13}{6} \times \frac{2}{1} = \frac{26}{6} = 4\frac{1}{3}$

14. Round 6.565 to the nearest
    a. hundredth:
    b. tenth:
    c. whole number:

    ANS:

    a. 6.57
    b. 6.6
    c. 7

15. Change $\frac{1}{3}$ to a
    a. decimal:
    b. percentage:

    ANS:

    a. 0.333
    b. $33\frac{1}{3}\%$

16. Change 0.35
    a. to a percentage:
    b. to a fraction:

c.   and reduce to lowest terms:

ANS:

a. 35%

b. $\frac{35}{100}$

c. $\frac{7}{20}$

17. Change 75%
    a.   to a decimal:
    b.   to a fraction:
    c.   and reduce to lowest terms:

    ANS:
    a. 0.75
    b. $\frac{75}{100}$

        c. $\frac{3}{4}$

18. Multiply: 0.25×100.

    ANS:
    25

19. Divide: $120 \div 0.6$.

    ANS:
    200

20. Find three equivalent fractions for $\frac{1}{4}$.

    ANS:
    $\frac{2}{8}$; $\frac{3}{12}$; $\frac{4}{16}$

21. Find the least common denominator for $\frac{1}{8}$, $\frac{1}{4}$, and $\frac{1}{6}$.

    ANS:
    24

22. a.   Add: $\frac{1}{6} + 1\frac{1}{8}$.

    b.   Subtract: $2\frac{1}{4} - 1\frac{1}{8}$.

    ANS:
    a. $\frac{1}{6} = \frac{4}{24}$; $1\frac{1}{8} = \frac{27}{24}$

    $\frac{1}{6} = \frac{4}{24} + \frac{27}{24} = \frac{31}{24} = 1\frac{7}{24}$

b. $2\frac{1}{4} = \frac{18}{8}$; $1\frac{1}{8} = \frac{9}{8}$

$\frac{18}{8} - \frac{9}{8} = \frac{9}{8} = 1\frac{1}{8}$

23. Write the square of 10.

ANS:
$10^2 = 10 \times 10 = 100$

24. Write the sum of 10 and 4; write the product of 10 and 4.

ANS:
14; 40

25. Directions: Analyze the problem for the desired answer. Set up a dimensional-analysis style equation in the space provided using the available data. Estimate an approximate answer. Cancel all undesired units before doing math. Label answers. Evaluate your equation for setup, comparison of answer with the estimate, and math accuracy. For credit, show all work.

How many kilometers, to the nearest tenth, are in 50 miles?
Conversion formula: 1 km = 0.6 miles
DA equation:
Evaluation:

ANS:
$km = \frac{1 \text{ km}}{0.6 \text{ mi}} \div \frac{50 \text{ mi}}{1} = \frac{50}{0.6} = 83.3 \text{ km}$

26. Directions: Analyze the problem for the desired answer. Set up a dimensional-analysis style equation in the space provided using the available data. Estimate an approximate answer. Cancel all undesired units before doing math. Label answers. Evaluate your equation for setup, comparison of answer with the estimate, and math accuracy. For credit, show all work.

How many seconds are in 3 hours?
Conversion formulas: 60 seconds = 1 minute; 60 minutes = 1 hour
DA equation:
Evaluation:

ANS:
$seconds = \frac{60 \text{ sec}}{1 \text{ min}} \times \frac{60 \text{ min}}{1 \text{ hr}} \times 3 \text{ hr} = 10,800 \text{ seconds in 3 hours}$

27. Directions: Analyze the problem for the desired answer. Set up a dimensional-analysis style equation in the space provided using the available data. Estimate an approximate answer. Cancel all undesired units before doing math. Label answers. Evaluate your equation for setup, comparison of answer with the estimate, and math accuracy. For credit, show all work.

How many kilograms are in 25 pounds?
Conversion formula: 1 kg = 2.2 lb
DA equation:
Evaluation:

ANS:

$$kg = \frac{1kg}{2.2\ lb} \times 25\ lb = \frac{25}{2.2} = 11.36\ kg \rightarrow 11.4\ kilograms$$

28. Directions: Analyze the problem for the desired answer. Set up a dimensional-analysis style equation in the space provided using the available data. Estimate an approximate answer. Cancel all undesired units before doing math. Label answers. Evaluate your equation for setup, comparison of answer with the estimate, and math accuracy. For credit, show all work.

How many grams are in 350 milligrams?
Conversion formula: 1000 mg = 1 gram g. Move the decimal point. Verify with a DA equation.
DA equation:
Evaluation:

ANS:

$$grams = \frac{1\ gram}{1000\ mg} \times 350\ mg = 0.35\ grams$$

Comment: To solve by moving decimals, move the decimal 3 places to the left.

29. Directions: Analyze the problem for the desired answer. Set up a dimensional-analysis style equation in the space provided using the available data. Estimate an approximate answer. Cancel all undesired units before doing math. Label answers. Evaluate your equation for setup, comparison of answer with the estimate, and math accuracy. For credit, show all work.

Ointment must be applied to a 4-inch scar. What is the equivalent number of millimeters to the nearest whole number?
Conversion formulas: 1 inch= 2.54 centimeters; 1 cm = 10 mm
DA equation:
Evaluation:

ANS:

$$mm = \frac{10\ mm}{1\ cm} \times \frac{2.54\ cm}{1\ in} \times 4\ in = 101.6\ mm \rightarrow 102\ millimeters$$

30. Directions: Analyze the problem for the desired answer. Set up a dimensional-analysis style equation in the space provided using the available data. Estimate an approximate answer. Cancel all undesired units before doing math. Label answers. Evaluate your equation for setup, comparison of answer with the estimate, and math accuracy. For credit, show all work.

How many inches are there in 1 meter?
Conversion formulas: 1 inch = 2.54 centimeters (cm); 100 cm = 1 meter (m). Round your answer to the nearest tenth.
DA equation:
Evaluation:

ANS:
$$\frac{inches}{meter} = \frac{1\ inch}{2.54\ cm} \times \frac{100\ cm}{1\ meter} = \frac{100}{2.54} = 39.37 \rightarrow 39.4\ inches/meter$$
Comment: A slash means "per".

31. Directions: Analyze the problem for the desired answer. Set up a dimensional-analysis style equation in the space provided using the available data. Estimate an approximate answer. Cancel all undesired units before doing math. Label answers. Evaluate your equation for setup, comparison of answer with the estimate, and math accuracy. For credit, show all work.

How many syringes are there in a package of 10 dozen?
Conversion factor: 1 dozen = 12 syringes
DA equation:

ANS:
$$\text{\# of syringes}: \frac{12\ syringes}{1\ dozen} \times \frac{10\ dozen}{1} = 120\ syringes$$

32. Directions: Analyze the problem for the desired answer. Set up a dimensional-analysis style equation in the space provided using the available data. Estimate an approximate answer. Cancel all undesired units before doing math. Label answers. Evaluate your equation for setup, comparison of answer with the estimate, and math accuracy. For credit, show all work.

How many kilometers are in 75 miles?
Conversion factor: 0.6 mi = 1 km
DA equation:

ANS:
$$\text{\# of km}: \frac{1\ km}{0.6\ mi} \times \frac{75\ mi}{1} = 125\ km$$

33. Directions: Analyze the problem for the desired answer. Set up a dimensional-analysis style equation in the space provided using the available data. Estimate an approximate answer. Cancel all undesired units before doing math. Label answers. Evaluate your equation for setup, comparison of answer with the estimate, and math accuracy. For credit, show all work.

How many kg are equal to 66 pounds?
Conversion factor: 1 kg = 2.2 lb
DA equation:

ANS:

# of kg : $\dfrac{1\,kg}{2.2\,\cancel{lb}} \times \dfrac{66\,\cancel{lb}}{1} = 30\,kg$

34. Directions: Analyze the problem for the desired answer. Set up a dimensional-analysis style equation in the space provided using the available data. Estimate an approximate answer. Cancel all undesired units before doing math. Label answers. Evaluate your equation for setup, comparison of answer with the estimate, and math accuracy. For credit, show all work.

How many hours are there in 10 days?
Conversion factor: 24 hr = 1 day
DA equation:

ANS:

# of hours : $\dfrac{24\,hr}{1\,\cancel{day}} \times \dfrac{10\,\cancel{days}}{1} = 240\,hr$

35. Directions: Analyze the problem for the desired answer. Set up a dimensional-analysis style equation in the space provided using the available data. Estimate an approximate answer. Cancel all undesired units before doing math. Label answers. Evaluate your equation for setup, comparison of answer with the estimate, and math accuracy. For credit, show all work.

A newborn weighs 3500 grams. How many kilograms does the baby weigh?
Conversion factor: 1 kg = 1000 g
DA equation:

ANS:

# of kg : $\dfrac{1\,kg}{\cancel{1000}^{\,2}\,\cancel{g}} \times \dfrac{\cancel{3500}^{\,7}\,\cancel{g}}{1} = 3.5\,kg$

36. Directions: Analyze the problem for the desired answer. Set up a dimensional-analysis style equation in the space provided using the available data. Estimate an approximate answer. Cancel all undesired units before doing math. Label answers. Evaluate your equation for setup, comparison of answer with the estimate, and math accuracy. For credit, show all work.

How many minutes are there in 4.5 hours?
Conversion factor: 1 hour = 60 minutes
DA equation:

ANS:

# of min : $\dfrac{60\,min}{1\,\cancel{hr}} \times \dfrac{4.5\,\cancel{hr}}{1} = 270\,min$

37. Directions: Analyze the problem for the desired answer. Set up a dimensional-analysis style equation in the space provided using the available data. Estimate an approximate answer. Cancel all undesired units before doing math. Label answers. Evaluate your equation for setup, comparison of answer with the estimate, and math accuracy. For credit, show all work.

   How many seconds are there in 3 hours?
   Conversion factors: 60 seconds = 1 minute; 60 minutes = 1 hour
   DA equation:
   Evaluation:

   ANS:

   # of seconds : $\dfrac{60\,s}{1\,\cancel{min}} \times \dfrac{60\,\cancel{min}}{1\,\cancel{hr}} \times \dfrac{3\,\cancel{hr}}{1} = 10{,}800\ seconds$

38. A bottle of 40 capsules costs the pharmacy $100. How much does each tablet cost?
   DA equation:

   ANS:

   # $\dfrac{dollars}{tab} : \dfrac{\cancel{100}^{\,5}\ dollars}{1\,\cancel{bottle}} \times \dfrac{1\,\cancel{bottle}}{\cancel{40}_{2}\ tab} = 2.50\ \dfrac{dollars}{tab}$

39. The surgeon makes an incision that is $7\frac{1}{2}$ inches long. What is the equivalent in centimeters?
   Conversion factor: 2.5 cm = 1 inch
   DA equation:

   ANS:

   # of cm : $\dfrac{2.5\,cm}{1\,\cancel{inch}} \times \dfrac{7.5\,\cancel{inches}}{1} = 18.75\ cm$

40. The hospital assigns 4 interns to every resident. There are 7 residents. How many interns will the hospital need?
   DA equation:

   ANS:

   # of interns : $\dfrac{4\ interns}{1\,\cancel{resident}} \times \dfrac{7\,\cancel{residents}}{1} = 28\ interns$

41. The container holds 1 quart. How many ounces does it hold?
   Conversion factors: 8 ounces = 1 cup; 2 cups = 1 pint; 2 pints = 1 quart
   DA equation:

   ANS:

   # of ounces : $\dfrac{8\,oz}{1\,\cancel{c}} \times \dfrac{2\,\cancel{c}}{1\,\cancel{pt}} \times \dfrac{2\,\cancel{pt}}{1\,\cancel{qt}} \times \dfrac{1\,\cancel{qt}}{1} = 32\ oz$

42. The field is 300 yards long. How many meters is it?
   Conversion factor: 1 yard = approximately 0.9 meters
   DA equation:

ANS:

# of meters : $\dfrac{.9\,m}{1\,\cancel{yd}} \times \dfrac{300\,\cancel{yd}}{1} = 270\,m$

43. The accounting office prints 400 pages per day. How many reams of paper should be bought to last 1 month (to the nearest ream)?
Conversion factors: 1000 pages = 1 ream; 30 days = 1 month
DA equation:

ANS:

$\#\ \dfrac{reams}{month} : \dfrac{1\,ream}{\cancel{500}5\,\cancel{pages}} \times \dfrac{\cancel{400}^4\,\cancel{pages}}{1\,\cancel{day}} \times \dfrac{\cancel{30}^6\,\cancel{days}}{1\,month} = 24\ \dfrac{reams}{month}$

44. The patient takes 5 medications three times a day. How many medications does the patient take in a week (7 days = 1 week)?
DA equation:

ANS:

$\#\ \dfrac{meds}{week} : \dfrac{5\,meds}{1\,\cancel{time}} \times \dfrac{3\,\cancel{times}}{1\,\cancel{day}} \times \dfrac{7\,\cancel{days}}{1\,week} = 105\ \dfrac{meds}{week}$

45. There are 5 RNs on each unit per 12-hour shift. How many RN salaries are needed for a week on a unit?
Conversion factors: 1 shift = 12 hr; 24 hr = 1 day; 7 days = 1 week
DA equation:

ANS:

$\#\ \dfrac{RN\ salaries}{week} : \dfrac{5\,RN\ salaries}{1\,\cancel{shift}} \times \dfrac{1\,\cancel{shift}}{12\,\cancel{hr}} \times \dfrac{24\,\cancel{hr}}{1\,\cancel{day}} \times \dfrac{7\,\cancel{days}}{1\,week} = 70\ \dfrac{RN\ salaries}{week}$

46. The patient is supposed to drink 8 ounces of fluid every waking hour. How many quarts should be consumed in 12 hours?
Conversion factors: 16 oz = 1 pint, 2 pints = 1 quart
DA equation:

ANS:

$\#\ of\ qt : \dfrac{1\,qt}{\cancel{2}1\,\cancel{pt}} \times \dfrac{1\,\cancel{pt}}{\cancel{16}21\,\cancel{oz}} \times \dfrac{\cancel{8}^1\,\cancel{oz}}{1\,\cancel{hr}} \times \dfrac{\cancel{12}^{6^3}\,\cancel{hr}}{1} = 3\,qt$

47. The computer has 4 gigabytes (GB) of memory. How many megabytes (MB) of memory does this equal?
Conversion factor: 1024 megabytes = 1 gigabyte
DA equation:

ANS:

$\#\ of\ MB : \dfrac{1024\,MB}{1\,\cancel{GB}} \times \dfrac{4\,\cancel{GB}}{1} = 4096\,MB$

48. The cardiac rehab track is $\frac{1}{4}$ mile. The patient is now completing 12 circuits on the track every morning. How many miles is the patient completing?

Conversion factor: 4 circuits ($\frac{1}{4}$ mi) = 1 mile

DA equation:

Evaluation:

ANS:

# of mi : $\dfrac{1 \text{ mi}}{4_1 \text{ circuits}} \times \dfrac{\overset{3}{\cancel{12}} \text{ circuits}}{1} = 3 \text{ miles}$

MULTIPLE CHOICE

1. In dimensional analysis problems, what form of arithmetic is used?
   a. decimal multiplication
   b. decimal division
   c. fraction multiplication
   d. fraction division

   ANS: C