

EASTERN Center for Arts and Technology
Practical Nursing
MED MATH PACKET

Ratio and Proportion

- A. **Ratio:** in medications, ratio is the weight (strength) of the drug in a tablet or capsule.

$$50 \text{ mg} = 1 \text{ tablet}$$

OR

The weight of the drug in a certain volume

$$1 \text{ mL} = 50 \text{ mg}$$

- B. **Proportion:** we use a proportion equation to show that 2 ratios are equal

$$1 \text{ tab} : 50 \text{ mg} = 2 \text{ tab} : 100 \text{ mg}$$

$$1 \text{ mL} = 50 \text{ mg} = 2 \text{ mL} : 100 \text{ mg}$$

To solve, multiply the 2 outer (extremes) and then the 2 inner numbers (means)

$$1 \text{ tab} : 50 \text{ mg} = 2 \text{ tab} : 100 \text{ mg}$$

$$1 \times 100 = 50 \times 2$$

$$100 = 100$$

Always write the "Known" on the left, and the "Want to know-Unknown" on the right.

The units must be the same order/place on both sides of the equation.

For example: $g : \text{mg} = g : \text{mg}$

NOT

$$\text{mg} : g = g : \text{mg}$$

Now, substitute numeric values for the "Known" ratio on the left, and "Want-to-know-Unknown" ratio on the right. Use (x) for the "want to know" quantity.

For example, the Doctor's order reads: Give "drug a" 10 mg to the patient.

You have a bottle of "drug a" in which the label reads: 8 mg/1 ml. (This is KNOWN).

You need to find out the UNKNOWN, or how much of what is in the bottle will be equal to what the doctor ordered.

Set up a ratio and proportion equation:

_____ : _____ = _____ : _____
(Known Side) (Unknown Side)

Known Side

What you want to know – Unknown Side

8 mg	:	1 ml	=	mg	:	ml
8 mg	:	1 ml	=	10 mg	:	X ml

$$8x = 10$$

Divide both sides of the equation by the same number – the number in front of the X

$$\frac{8x}{8} = \frac{10}{8}$$

$$X = 1.25$$

Label your answer with the what you wanted to know, in this case "ml"

1.25 ml

You will give 1.25 ml of "Drug a" to give the patient 10 mg.

You can check your answer by substituting it for x and solving the equation.

$$8 \text{ mg} : 1 \text{ mL} = 10 \text{ mg} : 1.25 \text{ mL}$$

$$8 \times 1.25 = 1 \times 10$$

$$10 = 10$$

The Metric System

The metric system of weights and measures is the system of choice when calculating drug dosages.

The basic metric units of measurement are the:

- 1) gram (weight) 2) liter (volume) 3) meter (length)

You will use weight and volume measurements frequently when calculating drug dosages.

These units of measurement are usually abbreviated.

g = gram

L = liter

m = meter

Note: "L" is capitalized. You might see a capital "G" or "gm" for gram- the preferred use is a lower case "g".

Prefixes combined with the basic unit names indicate larger or smaller quantities of the base units.

You will need to memorize these!

Only one prefix is larger than the basic unit:

kilo - "k" 1000

1 kg = 1000 g

Only use "g" for drug calculations
(not km or kL)

Three prefixes denote units smaller than the basic unit:

centi- "c" 0.01 (one-hundredth)

milli- "m" 0.001 (one-thousandth)

micro- "mc" or u 0.000001 (one-millionth)

In drug administration, you will most often use:

milligram (mg)

weights

microgram (mcg)

milliliter (mL) → volume

One cubic centimeter (cc) = one mL. The abbreviation "cc" is NO LONGER used anymore. Use only the abbreviation "ml" or "mL"

There are rules to follow when writing quantities in the metric system:

- 1) write numbers in Arabic (1,2,3, etc.) 5 g
- 2) write the numbers before the abbreviation 5 g (NOT g5)
- 3) express fractions as decimals 1.5 g (NOT 1 ½ g)
- 4) place a zero in front of a decimal point when it is not preceded by a whole number

0.5 g (NOT .5g)

- 5) omit unnecessary zeros 0.5 g (NOT .50 g)
 5 g (NOT 5.0 g)

Now you try it. Write these, using correct notation rules and abbreviations:

Four kilograms	<u>4 kg</u>
Fifty milliliters	<u>50 ml</u>
Two-thirds microgram	<u>0.67 mcg</u>
One and one-fourth liters	<u>1.25 L</u>
Three hundred milliliters	<u>300 ml</u>
Five and eight-tenths grams	<u>5.8 g</u>
Eight hundred milligrams	<u>800 mg</u>

Answers:

4 kg 50 ml 0.67 mcg 1.25 L 300 ml 5.8 g 800 mg

Converting Between Metric Units of Measurement

When calculating drug dosages prescribed in the metric system, it may be necessary to convert between measurements within a unit, i.e. g to mg, mg to mcg.

We will use ratio and proportion to do this:

You will have to **memorize** only 4 units of weight and 2 units of volume in order to do this:

Weight

$$1 \text{ kg} = 1000 \text{ g}$$

$$1 \text{ g} = 1000 \text{ mg}$$

$$1 \text{ mg} = 1000 \text{ mcg}$$

Volume

$$1 \text{ L} = 1000 \text{ mL}$$

Example: Suppose you want to convert 425 mg into grams.

Known: $1 \text{ g} = 1000 \text{ mg}$ (You memorized this)

Known Side				What you want to know – Unknown Side			
1 g	:	1000 mg	=	g	:	mg	
1 g	:	1000 mg	=	X g	:	425 mg	

To solve: Multiply the means and extremes.

$$1000 x = 425$$

Then divide each side by the number in front of the X

$$\frac{1000x}{1000} = \frac{425}{1000}$$

$$x = 0.425$$

Label the answer with what you wanted to know, in this case "g"

$$0.425 \text{ g}$$

So, 425 mg is equal to 0.425 g

Try this: Convert 2.3 g to milligrams

$$2.3 \text{ g} = \underline{\hspace{2cm}} \text{ mg}$$

$$\underline{\hspace{2cm}} : \underline{\hspace{2cm}} = \underline{\hspace{2cm}} : \underline{\hspace{2cm}}$$

What do you know? 1 g = 1000 mg

Write this on the left side of the ratio.

(1 g : 1000)

What do you want to know?

(How many milligrams (x) in 2.3 g)

Write this on the right side of the ratio.

$$1 \text{ g} : 1000 \text{ mg} = 2.3 \text{ g} : x \text{ mg}$$

Did you remember the correct order for g + mg?

(Must be in the same order as on the left side!)

Now solve the problem.

$$1 : 1000 = 2.3 : x$$

$$1 x = 2300 \text{ mg}$$

$$\mathbf{2.3 \text{ g} = 2300 \text{ mg}}$$

There is a shortcut to convert between metric units of measurement. Each numeric value for kilogram, gram, milligram, and microgram, and for liter and milliliter differ by 1000 between each increment. You will only calculate drug dosages by one increment at a time.

- a) to convert a larger unit to the next smaller unit, move the decimal point 3 places to the right.

$$8 \text{ kg} = \underline{\hspace{2cm}} \text{ g}$$

$$8.000 = 8000$$

→→→

$$8 \text{ kg} = 8000 \text{ g}$$

Try this: 0.25 g = _____ mg

Answer: 250- same as multiplying by 1000)

- b) to convert a smaller unit to the next larger unit, move the decimal point 3 places to the left.

600 mg = _____ g

600. = 0.6 g

←←←

Try this:

5500 mcg = _____ mg

Answer: 5.5 mg

Hint:

5500 mcg = _____ mg, Label which is "b"igger and which is "s"maller. (mcg is a smaller unit than mg).

5500 ^smcg = _____ ^bmg

So, in this case, you want to find the "b"igger

Now, think about how the alphabet is laid out,

(Left side) (Right side)
A thru Z, (a**b**cdefghijk l m nopqr**s**tuvwxyz). Which side is the "b" on? It is on the left side of the alphabet. So in this case you want to move the decimal 3 places to the left, towards the "b", the left side of the alphabet.

5500 mcg = 5500 mg

5500 mcg is equal to 5.5 mg

Now let's try

1.25 ^bmg = _____ ^smcg

1.25 mg = 1.250 mcg

We want to find the "s"maller. So we move 3 places to the right, because the "s" is on the right side of the alphabet.

1.25 mg = 1250 mcg

Household Measurements

Not routinely used for calculating drug dosages. You will use to calculate a patient's Intake and Output (I & O) of fluids and possibly when calculating liquid medications, especially in Pediatrics.

Equivalents: **Must memorize!**

1 tbs = 5 ml

1 ounce – 30 ml

2.2 lbs = 1 kg or 1000 g

Conversions 1

1. 500 ml = 0.5 L

2. 0.015 g = 15 mg

3. 8 mg = 0.008 g

4. 10 mg = 0.01 g

5. 60 mg = 0.06 g

6. 300 mg = 0.3 g

7. 0.2 mg = 0.0002 g

8. 1.2 g = 1200 mg

9. 0.0025 kg = 2.5 g

10. 0.065 g = 65 mg

11. 0.005 L = 5 mL

12. 1.5 L = 1500 ml

13. 450 ml = 0.45 L

14. 250 ml = 0.25 L

15. 2 kg = 2000 g

16. 79,200 mL = 79.2 L

17. 1 L = 1000 mL

18. 1 g = 1000 mg

19. 1 mL = 0.001 L

20. 0.23 mcg = 0.00023 mg

21. 1.05 g = 0.00105 kg

22. 0.01 mcg = 0.00001 mg

23. 0.4 mg = 400 mcg

24. 25 g = 0.025 kg

25. 10 L = 10,000 mL

26. 5 mL = 0.005 L

27. 30 mg = 30,000 mcg

Conversions 2

1. $1 \text{ g} = \underline{1000} \text{ mg}$

2. $2 \text{ g} = \underline{2000} \text{ mg}$

3. $1.5 \text{ g} = \underline{1500} \text{ mg}$

4. $0.5 \text{ g} = \underline{500} \text{ mg}$

5. $0.25 \text{ g} = \underline{250} \text{ mg}$

6. $0.05 \text{ g} = \underline{50} \text{ mg}$

7. $0.1 \text{ g} = \underline{100} \text{ mg}$

8. $1.1 \text{ g} = \underline{1100} \text{ mg}$

9. $0.3 \text{ g} = \underline{300} \text{ mg}$

10. $25 \text{ mg} = \underline{0.025} \text{ g}$

11. $5 \text{ mg} = \underline{0.005} \text{ g}$

12. $3000 \text{ mg} = \underline{3.0} \text{ g}$

13. $1500 \text{ mg} = \underline{1.5} \text{ g}$

14. $15,000 \text{ mg} = \underline{15} \text{ g}$

15. $10 \text{ mg} = \underline{0.01} \text{ g}$

16. $100 \text{ mg} = \underline{0.1} \text{ g}$

17. $0.5 \text{ mg} = \underline{0.0005} \text{ g}$

18. $7.5 \text{ mg} = \underline{0.0075} \text{ g}$

19. $20.15 \text{ mg} = \underline{0.02015} \text{ g}$

Conversions 3**Show all work and label all answers.**

Remember: 1 mg = 1000 mcg 1 kg = 1000 g
1 g = 1000 mg 1 L = 1000 ml

Use ratio and proportion:

1. 25 mg = 0.025 g

6. 89 kg = 89,000 g

2. 0.064 g = 64 mg

7. 45 mg = 45,000 mcg

3. 4 mg = 0.004 g

8. 0.6 g = 600 mg

4. 4.6 g = 4600 mg

9. 50 kg = 110 lb

5. 375 ml = 0.375 L

10. 2500 g = 5.5 lb

Practice Problems: SHOW all work and LABEL all answers.

Use ratio and proportion.

1. 500 mg = 0.5 g

2. 25 mg = 0.025 g

3. 5 mg = 5000 mcg

4. 0.2 g = 200 mg

5. 4 g = 4000 mg

6. A patient drank 8 ounces of milk. How many mL is this?

$$1 \text{ ounce} : 30 \text{ mL} = \underline{8} \text{ oz} : \underline{x} \text{ mL}$$

$$\frac{1}{1} \times = \frac{240}{1} \\ \frac{1}{1} \times x \longrightarrow x = 240$$

240 mL

7. A patient weighs 70 kg. How many pounds is this?

$$1 \text{ Kg} : 2.2 \text{ pounds} = \underline{70} \text{ Kg} : \underline{x} \text{ lbs}$$

$$\frac{1}{1} \times = \frac{154}{1} \\ \frac{1}{1} \times x \longrightarrow x = 154$$

154 pounds

8. The patient drank 4 ounces of juice, 6 ounces of milk, and 8 ounces of water. How many mL of fluid did the patient drink?

$$4 \text{ oz Juice} = 4 \times 30 = 120 \text{ mL}$$

$$6 \text{ oz Milk} = 6 \times 30 = 180 \text{ mL}$$

$$8 \text{ oz H}_2\text{O} = 8 \times 30 = 240 \text{ mL}$$

$$\underline{540 \text{ mL}}$$

540 mL

9. The physician orders "force fluids to 2000 mLs." How many liters is this?

$$1 \text{ liter} : 1000 \text{ mL} = \underline{x} \text{ L} : \underline{2000} \text{ mL}$$

$$\frac{1000}{1000} \times = \frac{2000}{1000} \\ \frac{1000}{1000} \times x \longrightarrow x = 2 \text{ liters}$$

2 liters

10. Ordered: 60 mg. On hand you have 20 mg tablets. How many tablets will you give? (Is this a one-step or a two-step problem?)

$$20 \text{ mg} : 1 \text{ Tablet} = \underline{60} \text{ mg} : \underline{x} \text{ tablet}$$

$$\frac{60}{20} = \frac{20x}{20} \\ 3 = x$$

3 tablets

11. Ordered: 0.75 g. On hand you have 250 mg tablets. How many tablets will you give? (Is this a one-step or a two-step problem?)

$$250 \text{ mg} : 1 \text{ tablet} = \underline{750} \text{ mg} : \underline{x} \text{ tablet}$$

3 tablets

$$\frac{750}{250} = \frac{250x}{250} \\ 3 = x$$

12. Ordered: 10 mg of diazepam (Valium). On hand you have 0.02 g in each scored tablet. How many tablets will you give? (Is this a one-step or two-step problem?)

$$0.02 \text{ g} : 1 \text{ tablet} = \underline{0.01} \text{ g} : \underline{x} \text{ tablet}$$

1/2 tablet

$$\frac{0.01}{0.02} = \frac{0.02x}{0.02} \times 12 \\ 0.5 = x$$

One-Step Metric Problems: Show all work. Use ratio and proportion, and label all work.

1. Ordered: diazepam (Valium) 5 mg. You have 10 mg tablets. How many tablets will you give?



"Known"

$$10 \text{ mg} : 1 \text{ tab} = \frac{5 \text{ mg}}{10} \times \text{tab}$$

$$\frac{5}{10} = \frac{10x}{10}$$

$$0.5 = x$$

"Known"

1/2 tablet

2. Ordered: 0.1 g of secobarbital. On hand are 0.05 g capsules. How many capsules will you give?

$$0.05 \text{ g} : 1 \text{ capsule} = \frac{0.1 \text{ g}}{0.05} \times \text{cap}$$

$$\frac{0.1 \text{ g}}{0.05} = \frac{0.05x}{0.05}$$

$$2 = x$$

2 capsules

3. Ordered: 500 mg of achromycin. On hand are 250 mg capsules. How many capsules will you give?

"Known"

$$250 \text{ mg} : 1 \text{ capsule} = \frac{500 \text{ mg}}{250} \times \text{cap}$$

$$\frac{500}{250} = \frac{250x}{250}$$

$$2 = x$$

2 capsules

4. Ordered: 0.25 g of erythromycin. On hand you have 1 g per 10 ml. How many ml will you give?

"Known"

$$1 \text{ gm} : 10 \text{ ml} = \frac{0.25 \text{ gm}}{1} \times \text{ml}$$

$$\frac{1x}{1} = \frac{2.5}{1}$$

$$x = 2.5$$

2.5 ml

5. Ordered: 15 mg of codeine. On hand you have 30 mg tablets. Will you give more or less of what you have on hand? How many tablets will you give?

$$30 \text{ mg} : 1 \text{ tablet} = \frac{15 \text{ mg}}{30} \times \text{tab}$$

$$\frac{15}{30} = \frac{30x}{30}$$

$$0.5 = x$$

1/2 tablet

Two-Step Metric Problems: Show all work. Use ratio and proportion, label all work.

1. Ordered: 2 g of staphcillin. The vial reads: "Add 8.6 ml of diluent to contents of vial. Each ml will contain 500 mg of staphcillin." How many ml will you administer?

$$500 \text{ mg} : 1 \text{ ml} = \frac{2000 \text{ mg}}{2 \text{ grams} \xrightarrow{\text{BF}} 2000 \text{ mg}} : \frac{X \text{ ml}}{4 \text{ ml}}$$

$$\frac{500X}{500} = \frac{2000}{500}$$

$$X = 4$$

2. Ordered: 500 mg of gantrisin. Available are gantrisin 0.25 g tablets. How many tablets will you give?

$$0.25 \text{ g} : 1 \text{ tab} = \frac{0.5 \text{ g}}{500 \text{ mg} \xrightarrow{\text{BF}} 0.5 \text{ g}} : \frac{X \text{ tab}}{2 \text{ tabs}}$$

$$\frac{0.5}{0.25} = \frac{0.25X}{0.25}$$

$$2 = X$$

3. You are to give 0.125 g of keflin. On hand you have keflin 50 mg/5ml. How many ml will you give? The keflin will be administered in an IV solution.

$$50 \text{ mg} : 5 \text{ ml} = \frac{125 \text{ mg}}{0.125 \text{ g} \xrightarrow{\text{BF}} 125 \text{ mg}} : \frac{X \text{ ml}}{12.5 \text{ ml}}$$

$$\frac{625}{50} = \frac{50X}{50}$$

$$12.5 = X$$

4. Ordered: robinul 0.002 g. Available are 1 mg tablets. How many tablets will you give?

$$1 \text{ mg} : 1 \text{ tab} = \frac{2 \text{ mg}}{0.002 \text{ g} \xrightarrow{\text{BF}} 2 \text{ mg}} : \frac{X \text{ tab}}{2 \text{ tabs}}$$

$$\frac{2}{1} = \frac{1X}{1}$$

$$2 = X$$

5. Ordered: 0.75 g of erythromycin. On hand you have 250 mg tablets. How many tablets will you give?

$$250 \text{ mg} : 1 \text{ tablet} = \frac{750 \text{ mg}}{0.75 \text{ g} \xrightarrow{\text{BF}} 750 \text{ mg}} : \frac{X \text{ tablet}}{3 \text{ tablets}}$$

$$\frac{750}{250} = \frac{250X}{250}$$

$$3 = X$$

6. Ordered: diazepam (Valium) 10 mg. On hand you have diazepam (Valium) 0.005 g tablets. How many tablets will you give?

$$0.005 \text{ g} : 1 \text{ tablet} = \frac{0.01 \text{ g}}{10 \text{ mg} \times \frac{10}{1000}} \text{ g} : \underline{\quad \times \quad} \text{ tablet}$$

$$\frac{0.01}{0.005} = \frac{0.005x}{0.005}$$

$$2 = x$$

2 tablets

7. Ordered: 4 mg of codeine. On hand you have 0.002 g tablets of codeine. How many tablets will you give?

$$0.002 \text{ g} : 1 \text{ tablet} = \frac{0.004 \text{ g}}{4 \text{ mg} \times \frac{10}{1000}} \text{ g} : \underline{\quad \times \quad} \text{ tablet}$$

$$\frac{0.004}{0.002} = \frac{0.002x}{0.002}$$

$$2 = x$$

2 tablets

8. Ordered: 75 mg of demerol IM. On hand you have a vial of 0.050 g per ml. How many ml will you give?

$$0.05 \text{ g} : 1 \text{ ml} = \frac{0.075 \text{ g}}{75 \text{ mg} \times \frac{10}{1000}} \text{ g} : \underline{\quad \times \quad} \text{ ml}$$

$$\frac{0.075}{0.05} = \frac{0.05x}{0.05}$$

$$1.5 = x$$

1.5 ml

9. Ordered: chlorpromazine 0.075 g. On hand you have chlorpromazine 25 mg/ml. How many ml will you give?

$$25 \text{ mg} : 1 \text{ ml} = \frac{75 \text{ mg}}{0.075 \text{ g} \times \frac{1000}{10}} \text{ mg} : \underline{\quad \times \quad} \text{ ml}$$

$$\frac{75}{25} = \frac{25x}{25}$$

$$3 = x$$

3 ml

Medication Orders:

Name of Drug: generic name (Brand Name)

Dosage of Drug

Route of Drug (po, IM, IV, SQ)

Frequency given: every day, every 4 hours, etc....

LABEL all answers and **SHOW** all work.

1. Order: Give digoxin (Lanoxin) 0.125 mg. You have: digoxin (Lanoxin) 0.25 mg per tablet. How many tablets will you give?



$$0.25 \text{ mg} : 1 \text{ tab} = \underline{0.125 \text{ mg}} : \underline{x \text{ tab}}$$

$$\frac{0.125}{0.25} = \frac{0.25x}{0.25}$$

$$0.5 = x$$

1/2 tablet

2. Order: Give furosemide (Lasix) 80 mg. You have: furosemide (Lasix) 40 mg tablets
How many tablets will you give?



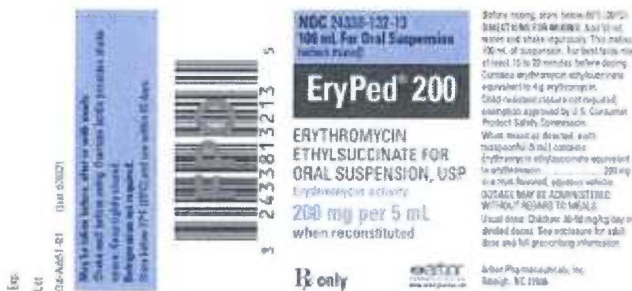
$$40 \text{ mg} : 1 \text{ tab} = \underline{80 \text{ mg}} : \underline{x \text{ tab}}$$

$$\frac{80 \text{ mg}}{40} = \frac{40x}{40}$$

$$2 = x$$

2 tablets 16

3. Order: Give erythromycin (EryPed) 160 mg You have: erythromycin (EryPed)
200 mg/5 ml. How much erythromycin will you give?



$$200 \text{ mg} : 5 \text{ mL} = \frac{160 \text{ mg}}{200} : \frac{5 \text{ mL}}{200} \times \text{ mL}$$

$$\frac{200x}{200} = \frac{800}{200}$$

$$x = 4$$

4 mL

4. Order: nystatin 250,000 units. You have: nystatin 100,000 units per mL
How much will you give?



$$100,000 \text{ units} : 1 \text{ mL} = \frac{250,000 \text{ units}}{100,000} : \frac{1 \text{ mL}}{100,000} \times \text{ mL}$$

$$\frac{250,000}{100,000} = \frac{100,000x}{100,000}$$

$$2.5 = x$$

2.5 mL

5. Order: Give sucralfate (Carafate) 500 mg. You have: sucralfate (Carafate) 1 g per tablet. How many tablets will you give?



$$1g : 1 \text{ tab} = \frac{0.5 \text{ g}}{500 \text{ mg}} : \frac{X \text{ tab}}{500 \text{ mg}} \quad \text{FB}$$

$$\frac{0.5}{1} = \frac{1x}{1}$$

$$0.5 = x$$

1/2 tablet

6. Order: methylprednisolone (Medrol) 8 mg. You have: methylprednisolone (Medrol) 2 mg per tablet. How many tablets will you give?



$$2 \text{ mg} : 1 \text{ tab} = 8 \text{ mg} : X \text{ tab}$$

$$\frac{8}{2} = \frac{2x}{2}$$

$$4 = x$$

4 tablets

7. Order: Give promethazine (Chlorpromazine) 25 mg
You have: promethazine (Chlorpromazine) 10 mg/5 mL. How much will you give?

$$10 \text{ mg} : 5 \text{ mL} = \frac{25 \text{ mg}}{10} : \frac{X \text{ mL}}{10}$$

$$\frac{125}{10} = \frac{10x}{10}$$

$$12.5 = x$$

12.5 mL

8. Order: Give atropine 0.3 mg

You have: atropine 0.4 mg/mL

DIST. BY: PHYSICIANS TOTAL CARE
TULSA, OK 74146
NDC 54868-0740-2 25 ML
ATROPINE SUL 0.4MG/ML VIAL
LOT # 0000 EXP. DATE 01/60
MFG. BY: AMERICAN REGENT, INC.
BRIDGE PLAZA NY 11967



07400250000

$$0.4 \text{ mg} : 1 \text{ mL} = 0.3 \text{ mg} : \underline{\quad X \quad} \text{ mL}$$

$$\frac{0.3}{0.4} = \frac{0.4X}{0.4}$$

$$0.75 = X$$

0.75 mL

9. Order: Give midazolam (Versed) 3 mg po. You have: Versed 5 mg/mL. How much will you give?

NDC 17478-524-01	
Midazolam Hydrochloride Injection, USP 5 mg/mL Midazolam 5 mg/mL (as the hydrochloride) For Intramuscular or Intravenous Use Only	Each mL contains: Active: Midazolam Hydrochloride equivalent to 5 mg midazolam. Inactive: Contains Disodium, 5.2% Sodium Chloride, 0.9% and Water for Injection. (It is adjusted to 2.3 to 3.5 mEq Hydrochloride Acid and/or Sodium Hydroxide). Preservative: Benzyl Alcohol, 1%.
Contains Benzyl Alcohol 10 Sterile Vials (1 mL each)	AKORN
NDC 17478-524-01	
Midazolam Hydrochloride Injection, USP 5 mg/mL Midazolam 5 mg/mL (as the hydrochloride) For Intramuscular or Intravenous Use Only	Usual Dosage: See package insert for dosage information. Storage: Store at 20° to 25°C (68° to 77°F) [see USP Controlled Room Temperature].
10 Sterile Vials (1 mL each)	AKORN

$$5 \text{ mg} : 1 \text{ mL} = 3 \text{ mg} : \underline{\quad X \quad} \text{ mL}$$

$$\frac{3}{5} = \frac{5X}{5}$$

$$0.6 = X$$

0.6 mL

10. Order: Give Cefadyl 750 mg.
How much will you give?

You have: Cefadyl 500 mg/ 2 mL

$$500 \text{ mg} : 2 \text{ mL} = \frac{750 \text{ mg}}{500} \text{ mg} : \underline{\quad \times \quad} \text{ mL}$$

$$\frac{1500}{500} = \frac{500 \times}{500}$$

$$3 = x$$

3 mL

11. Order: Give penicillin G 1,200,000 units.

You have: penicillin G 6,000,000 units/10 mL. How much will you give?

$$6,000,000 \text{ units} : 10 \text{ mL} = \frac{1,200,000 \text{ units}}{6,000,000} \text{ units} : \underline{\quad \times \quad} \text{ mL}$$

$$6,000 \text{ units} : 10 \text{ mL} = \frac{1,200 \text{ units}}{6,000} \text{ units} : \underline{\quad \times \quad} \text{ mL}$$

$$\frac{12,000}{6,000} = \frac{6,000 \times}{6,000}$$

$$2 = x$$

2 mL

12. Order: Give digoxin (Lanoxin) 0.125 mg.

You have: digoxin (Lanoxin) 250 mcg/mL.

How much will you give?

$$250 \text{ mcg} : 1 \text{ mL} = \frac{125 \text{ mcg}}{250} \text{ mcg} : \underline{\quad \times \quad} \text{ mL}$$

$$0.125 \text{ mg} \xrightarrow{\text{B}} \frac{125 \text{ mcg}}{250}$$

$$\frac{125}{250} = \frac{250 \times}{250}$$

$$0.5 = x$$

0.5 mL

13. Order: Give levothyroxine (Synthroid) 0.225 mg

You have: levothyroxine (Synthroid) 75 mcg/tab.

How many tablets will you give?

$$75 \text{ mcg} : 1 \text{ tab} = \frac{225 \text{ mcg}}{75 \text{ mcg}} \text{ mcg} : \underline{\quad \text{tab} \quad}$$

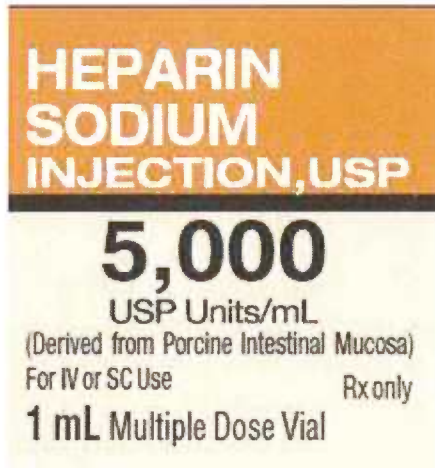
$$0.225 \text{ mg} \xrightarrow{\text{B}} \frac{225 \text{ mcg}}{75}$$

$$\frac{225}{75} = \frac{75 \times}{75}$$

$$3 = x$$

3 tabs

14. The physician orders heparin 10,000 U SQ q 12 hours for your patient with a below-the-knee amputation. You have heparin 5000 U per ml available. How many milliliters will you administer? _____



$$5000 \text{ units} : 1 \text{ mL} = 10000 \text{ u} : x \text{ mL}$$

$$\frac{10000}{5000} = \frac{5000x}{5000}$$

$$2 = x$$

2 mL

15. Your patient with a gastric pull-up receives penicillin G 200,000 U IM Q 6 hours. You have penicillin G 250,000 per ml available. How many milliliters will you administer? _____

$$250,000 \text{ units} : 1 \text{ mL} = 200,000 \text{ u} : x \text{ mL}$$

$$\frac{200,000}{250,000} = \frac{250,000x}{250,000}$$

$$0.8 = x$$

0.8 mL

16. Your patient with a lumbar puncture receives heparin 7500 U q 12 hours. Heparin 5000 U per ml is available. How many milliliters will you administer? _____



$$5000 \text{ units} : 1 \text{ mL} = 7500 \text{ u} : x \text{ mL}$$

$$\frac{7500}{5000} = \frac{5000x}{5000}$$

$$1.5 = x$$

1.5 mL

17. Mr. Cook requires medication for nausea. prochlorperazine (Compazine) 10 mg PO every 4 hours prn, is ordered. You have 5mg tablets available. How many tablets will you administer? _____

$$5 \text{ mg} : 1 \text{ tab} = \underline{10 \text{ mg}} : \underline{x \text{ tab}}$$

$$\frac{10}{5} = \frac{5x}{5}$$

$$2 = x$$

2 tabs

18. Mr. Pace receives hydroxyzine (Atarax) 100 mg PO hs prn to relieve anxiety. You have 50 mg tablets available. How many tablets will you administer? _____

$$50 \text{ mg} : 1 \text{ tab} = \underline{100 \text{ mg}} : \underline{x \text{ tab}}$$

$$\frac{100}{50} = \frac{50x}{50}$$

$$2 = x$$

2 tabs

19. Mr. Day receives digoxin (Lanoxin) 0.25 mg PO daily for atrial fibrillation. How many tablets will the nurse administer? _____



$$0.125 \text{ mg} : 1 \text{ tab} = \underline{0.25 \text{ mg}} : \underline{x \text{ tab}}$$

$$\frac{0.25}{0.125} = \frac{0.125x}{0.125}$$

$$2 = x$$

2 tabs

20. Mr. Payne receives Keflex 500 mg PO qid before his dental extraction. How many capsules will the nurse give?



$$250 \text{ mg} : 1 \text{ tablet} = \frac{500 \text{ mg}}{250} \times \text{tbl}$$

$$\frac{500}{250} = \frac{250 \times}{250}$$

$$2 = x$$

2 tabs

21. Mr. Tune is admitted with pancreatitis and receives diazepam (Valium) 5 mg PO q6 h prn for anxiety. You have 10mg tablets available. How many tablets will you administer?



$$10 \text{ mg} : 1 \text{ tablet} = \frac{5 \text{ mg}}{10} \times \text{tbl}$$

$$\frac{5}{10} = \frac{10 \times}{10}$$

$$0.5 = x$$

1/2 tablet

22. Mr. Jones, admitted with irritable bowel syndrome, takes dicyclomine (Bentyl) 20 mg PO tid ac. The drug is available in 10mg capsules. How many capsules will the nurse administer?

$$10 \text{ mg} : 1 \text{ capsule} = \frac{20 \text{ mg}}{10} \times \text{capsule}$$

$$\frac{20}{10} = \frac{10 \times}{10}$$

$$2 = x$$

2 capsules

23. Mrs. Tyth has pruritic dermatoses. The physician prescribes hydroxyzine (Atarax) 30 mg PO bid as part of her therapy. The drug supplied in syrup containing 10 mg per 5 mL. How many milliliters will the nurse administer?

$$10 \text{ mg} : 5 \text{ mL} = \frac{30 \text{ mg}}{10} : \frac{x \text{ mL}}{10}$$

$$\frac{150}{10} = \frac{10x}{10}$$

$$15 = x$$

15 mL

24. Mrs. Gale, admitted for alcohol abuse, has an order for ascorbic acid 0.75 g PO daily while hospitalized. You have 250-mg tablets available. How many tablets will you administer?

$$250 \text{ mg} : 1 \text{ tab} = \frac{750 \text{ mg}}{0.75 \text{ g} \rightarrow 750 \text{ mg}} : \frac{x \text{ tabs}}{1 \text{ tab}}$$

$$\frac{750}{250} = \frac{250x}{250}$$

$$3 = x$$

3 tablets

ANSWERS:

Conversion 1

1. 0.5
2. 15
3. 0.008
4. 0.01
5. 0.06
6. 0.3
7. 0.0002
8. 1200
9. 2.5
10. 65
11. 5
12. 1500
13. 0.45
14. 0.25
15. 2000
16. 79.2
17. 1000
18. 1000
19. 0.001
20. 0.00023
21. 0.00105
22. 0.00001
23. 400
24. 0.025
25. 10,000
26. 0.005
27. 30,000

Conversion 2

1. 1000
2. 2000
3. 1500
4. 500
5. 250
6. 50
7. 100
8. 1100
9. 300
10. 0.025
11. 0.005
12. 3.0
13. 1.5
14. 15
15. 0.01
16. 0.1
17. 0.0005
18. 0.0075
19. 0.02015

Conversion 3

1. 0.025
2. 64
3. 0.004
4. 4600
5. 0.375
6. 89,000
7. 45,000
8. 600
9. 110
10. 5.5

Practice Problems

1. 0.5
2. 0.025
3. 5,000
4. 200
5. 4,000
6. 240 ml
7. 154 lbs
8. 540 ml
9. 2 liters
10. 3 tablets
11. 3 tablets
12. 0.5 or $\frac{1}{2}$ tablet

One-Step Metric Problems

1. 0.5 tablets
2. 2 capsules
3. 2 capsules
4. 2.5 ml
5. 0.5 or $\frac{1}{2}$ tablet

Two-Step Metric Problems

1. 4 ml
2. 2 tablets
3. 12.5 ml
4. 2 tablets
5. 3 tablets
6. 2 tablets
7. 2 tablets
8. 1.5 ml
9. 3 ml

Medication Orders

1. 0.5 or $\frac{1}{2}$ tablet
2. 2 tablets
3. 4 ml
4. 2.5 ml
5. $\frac{1}{2}$ tablet
6. 4 tablets
7. 12.5 ml
8. 0.75 ml
9. 0.6 ml
10. 3 ml
11. 2 ml
12. 0.5 ml
13. 3 tablets
14. 2 ml
15. 0.8 ml
16. 1.5 ml
17. 2 tablets
18. 2 tablets
19. 2 tablets
20. 2 tablets
21. $\frac{1}{2}$ tablet
22. 2 capsules
23. 15 ml
24. 3 tablets