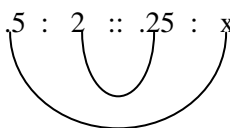


Boston Reed College
Math Handout: Dose Calculations

Formula One: Ratio

Number 1 Supply (On Hand)	Number 2 Need (Doctor's Order)
<p>Supply or what you have; this number is always on top of the fraction.</p> <p style="font-size: 1.2em;">.5</p>	<p>Need or what you want = x; this number is always on the bottom of the fraction.</p> <p style="font-size: 1.2em;">.5x</p>
<p>$.5 : 2 :: 25 : x$ is to as is to</p> <p>(.5 is to 2 as .25 is to x)</p>  <p style="font-size: 1.2em;">$.5 : 2 :: .25 : x$</p>	
<p>Calculator use: Put in top number; press ÷ Put in bottom number; press =</p>	
<p>To arrive at the numbers below, multiply the two outside numbers. This equals the denominator or the bottom number. By multiplying the two inside numbers, this equals the numerator or the top number.</p>	
<p> Numerator \longleftrightarrow $\frac{5}{.5x} = 1$ \longleftrightarrow Denominator </p>	

Math Formulas For Dose Calculations

Formula Two

FORMULA	Form of Medication	Formula	Long hand	Calculator
	Pills	$\frac{D}{H} = X$	$H \overline{) \frac{X}{D}}$	$D \div H = X$
	Liquid Medication	$\frac{D}{H} \cdot Q = X$	$\frac{X}{H} \cdot Q = \boxed{X}$ $H \overline{) \frac{X}{D}}$	$D \div H \cdot Q = X$

Legend for the Formula

$\cdot = \times$ (Multiply the numbers together)

D = MD order

H = Dose on hand/Supply

X = The amount of medication to give

X¹ = A temporary answer

Q = Amount of liquid that a set amount of medication is diluted by.
It does not mean how much liquid is in the bottle.

Example of Q:

On Hand (H) = MedZ 10mg/5ml
 $\begin{array}{cc} \uparrow & \uparrow \\ H & Q \end{array}$

H=10mg
Q=5ml

Liquids: Medication Formula Steps

Step 1	Is the MD order (D) unit and the on hand (H) unit the same?
	Yes = Go onto step 2 No = Convert the <u>MD order</u> to the unit on hand. <i>(See metric conversion chart)</i>
Step 2	$\frac{D}{H} \cdot Q = X$ Divide the amount ordered by the amount on hand
Step 3	Always double-check your answer!

Liquid formula example:

MD order: MedZ concentrate 750mg IM now.
On Hand: MedZ concentrate 1g/2cc's .

Step 1: Convert the MD order with the formula on the **metric conversion chart**.

Conversion factor (how many milligrams (mg) are in a gram (g)? **1000**

Rule: To convert larger unit to smaller unit multiply by the conversion factor

Rule: To convert smaller unit to a larger unit divide by the conversion factor

Rule: Only convert the unit of the MD order, never convert the unit you have on hand. The unit must be the same for both the supply and MD order prior to working the formula.

Milligrams (smaller) → Grams (larger) = *divide by 1000*

$$D = 750\text{mg} = \underline{\hspace{1cm}}\text{g}$$

$$D = 750 \div 1000 = 0.75\text{g}$$

$$D = \mathbf{0.75\text{g}}$$

D=0.75g
H=1g
Q= 2cc's

Step 2: Follow the formula

$$\frac{D}{H} \cdot Q = X$$

Formula	Long hand	Calculator
$\frac{D}{H} \cdot Q = X$	$\frac{X}{1} \cdot Q = \boxed{X}$ $H \overline{) D}$	$D \div H \cdot Q = X$
$\frac{0.75}{1} \cdot 2 = 1.5\text{cc's}$	$1 \overline{) 0.75} \cdot 2 = \boxed{1.5 \text{cc's}}$	$0.75 \div 1 \cdot 2 = 1.5 \text{cc's}$

Step 3: Double-check your answer!

Dosage Calculation Practice Worksheet

Correct each problem right after you complete it.

1. _____ MD Order: MedX 1.5g PO. On Hand: MedX 750mg tabs. How many tablets will you give?
2. _____ MD Order: MedX 1.5g IM. On Hand: MedX 500mg/cc. How many mg do you give? How many cc's do you draw up? _____
3. _____ MD Order: MedK 25mg PO. On Hand: MedK 10mg tabs. How many tablets do you give?
4. _____ MD Order: MedA 3g PO. On Hand: MedA 750mg tabs. How many tablets do you give?
5. _____ MD Order: MedK elixer 125mg PO. On Hand: MedK elixer 25mg/5cc. How many cc's do you give?
6. _____ MD Order: MedA elixer 1g PO. On Hand: MedA elixer 200mg/3cc. How many cc's do you give?
7. _____ MD Order: MedX 60mg IM. On Hand: MedX 100mg/cc. How many cc's do you inject?
8. _____ MD Order: ZMed 650mg. On Hand: ZMed 325mg. How many tablets do you give?
9. _____ MD Order: KrZMED 2g PO. On Hand: KrZMED 500mg tablets. How many tablets do you give?
10. _____ MD Order: MedQ 1500mg PO. On Hand: MedQ 1g tablets. How many tablets do you give?
11. _____ Mr. Smith weighs 180 pounds. MD Order: MedX 5mg/kg PO. How many kg's does Mr. Smith weigh? How many mg of MedX is Mr. Smith going to receive? (you may round off to the nearest kg) _____
12. _____ Mr. Jones weighs 240 pounds. MD Order: MedX 2mg/kg. How many kg's does Mr. Jones weigh? How many mg of MedX is Mr. Jones going to receive? _____

Metric Conversion Chart

Abbreviation	Definition
ML, ml	Milliliter
cc	Cubic centimeter
g	Gram
mg	Milligram
gr	Grain
mcg	Microgram
mm	Millimeter
cm	Centimeter
In.	Inch
ft.	Foot
lbs.	Pounds
kg	Kilograms
Tsp	Teaspoon
Tbsp	Tablespoon

<i>GRAM</i>	<i>G</i>	WEIGH T
METE R	M	LENGTH
LITER	L	VOLUME

Conversion Factors

UNITS OF VOLUME (LITER)		UNITS OF SOLIDS	
* 1 cc	1 ml	* 1 g	1000 mg
* 1 liter	1000ml	* 1 mg	1000 mcg
1 L	100 centiliters	1 g	100 centigrams
1 L	10 deciliters	1 g	10 decigrams
1 dekaliter	10 L	1 dekagram	10 g
1 hectoliter	100 L	1 hectogram	100 g
1 kiloliter	1000 L	1 kilogram	1000 g
LIQUID MEASUREMENT		WEIGHT	
METRIC	APOTHECARY	METRIC	APOTHECARY
* 1000ml	1 quart	30 g	1 oz
* 500 ml	1 pint	15 g	4 drams
* 30 ml	1 fluid oz	1 g	15 grains
1 ml	15 OR 16 minims	0.5g	7 ½ gr.
0.06 ml	1 minim	* 60 mg	1 gr.
		30 mg	½ gr.
		1 mg	1/60 gr.
OTHER			
METRIC	MISC.	METRIC/misc	MISC.
* 5 cc	1 TSP	2.5 cm	1 in.
* 15 cc's	1 TBSP	12 in.	1 ft
240 cc's	1 CUP	10 mm	1 cm
* 1 kg	2.2 lbs		

* Memorize

Metric Conversion Chart-Directions

Practice problem:

METRIC DECIMAL PLACE FINDER (to help see if a unit is larger/smaller as compared to another unit)

What is the conversion factor for grams to milligrams?

◆ **Rule:** When referring to the “conversion factor,” look at the chart provided and find the units mentioned. There should be two numbers listed. The conversion factor is the number other than 1.

Example: What is the conversion factor for grams to milligrams?

1 g = 1000 mg (from table)
So the conversion factor is **1000**

➤ To convert *from a smaller unit to a larger unit*, **Divide** by the conversion factor

➤ To convert *from a larger unit to a smaller unit*, **Multiply** by the conversion factor

Practice problem:

*The physician has ordered Tylenol 1g by mouth now.
Our on hand supply is Tylenol 500 mg tablets.*

◆ **Rule:** If the unit of the physicians order and the unit of your supply are different you must convert the **physicians order** so that both are the same unit (either grams, milligrams, etc.). See box above for directions.

Example: The physician has ordered Tylenol 1g by mouth to be given now.
Our on hand supply is Tylenol 500 mg tablets.

- ⇒ Change the 1gram to ? milligrams
- ⇒ Find the conversion factor from the table (1000)
- ⇒ We are converting from a larger unit to a smaller unit so we must multiply by the conversion factor. Formula & example follow:

MD order x Conversion factor = “new” MD order with new unit title

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

How do I know what is the larger unit? See the boxes below.

<i>Example in \$</i>	\$1000	\$100	\$10	\$1	.10¢	.01¢	.001¢	.000001¢
<i>Placement</i>	THOUSANDS	HUNDREDS	TENS	ONES	TENTHS	HUNDREDTHS	THOUSANDTHS	MILLIONTHS
<i>Metric Term</i>	KILO	HECTO	DEKA	SINGLE UNIT	DECI	CENTI	MILLI	MICRO
<i>Abbreviation</i>	k	h	dk	g, L, or m	d	c	m	mc

Add g, L, or m after the abbreviation to indicate weight, liquid, or length.

Example: mg, mL, or mm are each from the “ones” column.

Dosage Calculations Practice Worksheet Answers:

- 1. 2 tablets**
- 2. 1500mg; 3 cc's**
- 3. 2 ½ tablets**
- 4. 4 tablets**
- 5. 25 cc's**
- 6. 15 cc's**
- 7. 0.6 or 0/60 cc's**
- 8. 2 tablets**
- 9. 4 tablets**
- 10. 1 ½ tablets**
- 11. 82 kg; 410 mg**
- 12. 109 kg; 218 mg**