Basic Mathematics

Marcella L. Morgan R.N., M.S.N.

Roman Numerals

- ss = ½
- I = 1 or i
- II = 2 or ii
- III = 3 or iii
- IV = 4 or iv
- V = 5
- VI = 6
- VII = 7
- VIII = 8
- IX = 9
- X = 10
- XI =11 or xi
- XII = 12 or xii
- XIV = 14
- XV = 15
- XIX = 19
- XX = 20
- XXXIX = 39
- XL = 40
- LI = 51
- LX = 60

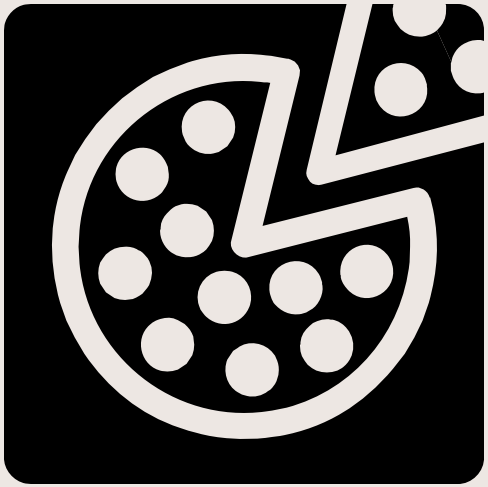
Fractions

- Part of whole number

  6/8 , $\frac{6}{8}$ (numerator) (denominator)

Can be reduced by division

3/4, $\frac{3}{4}$



Types of Fractions

- Proper Fractions: 3/4
- Mixed numbers: 2 1/3 = 2 + 1/3
- Improper fractions: 3/3 or 8/3

Proper Fractions

- Always reduce proper fractions to its lowest form
- 8/10 = 4/5
- 3/9 = 1/3
- 8/16 = ½
- 3/12 = 1/4

Mixed Numbers

- 5 4/8 = 5 ½
- 16 4/6 = 16 2/3
- 7 3/9 = 7 1/3
- 11 12/16 = 11 3/4

Improper Fractions

- Numerator larger than denominator ie: 8/4 or 16/6
- 8 divided by 4 = 2 (Whole number)
- 16 divided by 6 = 2 4/6 (Mixed Number)
- 2 4/6 = 2 1/3

Changing Mixed Numbers to Improper Fractions

$2\ \frac{3}{8} = 8 \times 2 + 3 = \frac{19}{8}$ (numerator / denominator)

$4\ \frac{2}{5} = 5 \times 4 + 2 = \frac{22}{5}$ (numerator / denominator)

Adding & Subtracting Fractions

- Denominators MUST be the same
- Add or subtract numerators

- 5/16 – 2/16 = 3/16
- 3/8 + 1/8 = 4/8 or 1/2
- ¾ +1/4 = 4/4 or 1

Common Denominator

- Number that can be divided evenly by **ALL** the denominators in the problem

- 5/16 – 1/8
- 3/8 + 2/16
- ¾ = 2/8

Changing a Fraction

- Whatever is done to the denominator (multiply or division) must be done to the numerator
- 5/16 – 1/8 = 5/16 – 2/16

Addition of Fractions and Mixed Numbers

- 1/5 + 2/5 = 3/5
- 2/6 + 1/6 = 3/6 reduced to ½

- 7/10 + 8/15 = 21/30 + 16/30 = 36/30
- 36/30 = 6/5 (improper fraction)
- 6/5 = 1 1/5 (mixed number)

Adding & Subtracting Mixed Numbers

- 9 5/8 + 6 1/6
- 1st step: 5/8 + 1/6

  15/24 + 4/24 = 19/24

- 9 + 6 = 15

- Answer: 15 19/24

Value of Fractions

1/7	1/7	1/7	1/7	1/7	1/7	1/7

1/9	1/9	1/9	1/9	1/9	1/9	1/9	1/9	1/9

1/5	1/5	1/5	1/5	1/5

Which is Greater ?

1/3 or 1/5

1/250 or 1/300

1/10 or 1/7

¼ or 2/8

Which is Less ?

- 1/100 or 1/125
- 1/7 or 1/9
- 1/50 or 1/100
- 3/4 or 2/8

Review

- Roman Numerals
- 3 types of fractions
- Reduction of fractions
- Addition & subtraction of fractions & mixed numbers
- Value of fractions

Multiplying Fractions

- Change the mixed number to an improper fraction
- 4 ½ x 2 ¼
- (2x4) + 1 x (4x2) + 1 = (8)+1 x (8)+1
- 9/2 x 9/4
- Multiply numerators
- 9 x 9 = 81
- Multiply denominators
- 2 x 4 = 8
- 81/8
- Reduce
- 10 1/8

Division of Fractions

- Change mixed numbers to improper fractions
- Invert the number after the division sign and multiply
- 1/2 divided by 5/8
- 1/2 x 8/5 = 8/10
- 4/5

Decimals

- Fraction whose denominator is 10, 100, 1000, or 10,000
- All whole numbers are to the left of the decimal point
- Decimal fractions are to the right
- 0.257 = 257/1000
- 0.2057 = 2057/10,000
- 327.006 = 327 6/1000

Comparison of Decimals

- 0.4 or 0.2
- 0.68 or 0.8
- 1.465 or 1.29
- 5.12 or 0.512
- 0.005 or 0.015
- 0.25 or 0.250
- .826 or .830

Addition & Subtraction of Decimals

- Keep all decimals in column with decimal points lined up
- Place decimal point directly under the decimal points in the problem

- $\begin{array}{r} 0.8 \\ +\ 0.5 \\ \hline 1.3 \end{array}$ $\begin{array}{r} 3.27 \\ +\ 0.06 \\ \hline 3.33 \end{array}$ $\begin{array}{r} 4.50 \\ -\ 0.75 \\ \hline 3.75 \end{array}$ $\begin{array}{r} 0.45 \\ -\ 0.09 \\ \hline 0.36 \end{array}$

Multiplication of Decimals

- 2.6 x 0.0002

- 2.6 (one decimal point)
  x 0.0002 (four decimal point)

  0.00052 (5 decimal point)

Division of Decimals

- Is the divisor a whole number or a decimal?
- Make the divisor a whole number
- Divide as whole number
- Refer to pages 20 & 21 in text

Changing Decimals to Fractions and Vise Versa

- 0.375
- 375/1000

- 0.91
- 91/100

- 0.4
- 4/10

EASY RULE: To change **decimals to fractions**, the amount of numbers on top (the numerator) will equal the amount of zeros on the bottom (the denominator

To change **fractions to decimals**, it is just the opposite. The amount of zeros on the bottom will equal the amount of "places" after the decimal

Rounding Decimals

- 2.7 = 3 (rounding to whole number)
- 2.55 = 2.6 (rounding to tenths)
- 3.762 = 3.76 (rounding to hundredths)

Percentages, Decimals & Fractions

- Percent (%) means *per hundred*
- 25% means 25 *per hundred*

25% = 25/100 = .25

50% = 50/100 = .50

Finding the Percentage

- Change the % to a decimal or common fraction
- Multiply the number by this decimal

- 23% of 64 = 64 x 0.23 = 14.72
- 5% of 10 = 10 x 0.05 = 0.5

Ratios & Proportions

Ratio is the relationship of one quantity to another

1/3 = 1: 3

1/2 = 1 : 2

Give 1 mg for each kg of body weight.

1mg/1kg or 1mg : 1kg

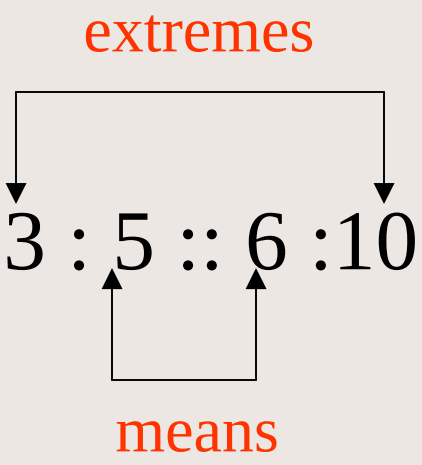
Ratios as Fractions

- 3:6 = 3/6 or ½
- 5:7 = 5/7
- 4:20 = 4/20 or 1/5
- 5:30 = 5/30 or 1/6
- 7:49 = 7/49 or 1/7
- 2:38 = 2/38 or 1/9
- 6:85 = 6/85
- 9:81 = 9/81 or 1/9

Proportions

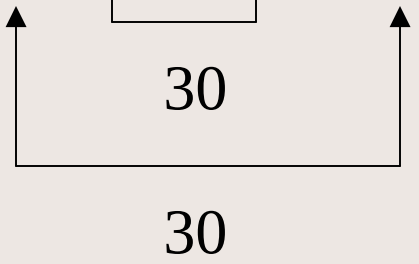
- Relationship between two equal ratios.
- Expressed as $3 : 5 :: 6 : 10$

  $3 : 5 = 6 : 10$



Solving Ratio/Proportion Problems

- Multiply the EXTREMES
- Multiply the MEANS
- Answers should be the same

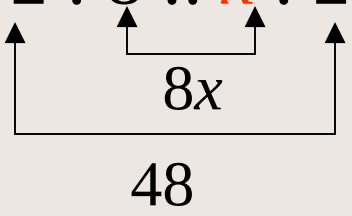
- 3 : 5 :: 6 : 10
- 

(e) $\frac{3}{5}$ $\frac{6}{10}$ (m)
(m) (e)

3 X 10 = 30
5 X 6 = 30

$2 : 8 :: x : 24$

- $2 : 8 :: x : 24$

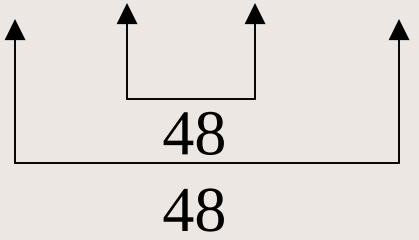


- $8x = 48$
- $\frac{8x}{8} = \frac{48}{8}$
- $x = 6$

Check your answer

$2 : 8 :: 6 : 24$

$2 : 8 :: 6 : 24$



Setting Up Ratios & Proportions

- Always put on the left hand side of the (=) what you already have or know
- The ***X*** goes on the right hand side. This is what you want to know. 6 : 4 :: *x* : 30
- Each side of the equation is set up the same way
- After multiplying, place *x* on the left side of the (=) sign to solve. 4*x* = 180
- *X* = 45

Setting Up Ratios & Proportions

- Know — 6 bananas : 9 apples
- Want to know — x bananas : 72 apples

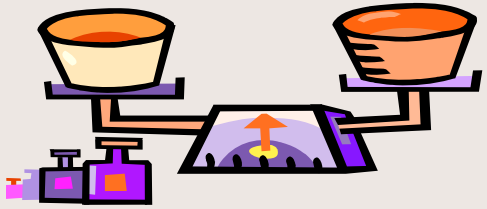
- $6 : 9 :: x : 72$
- $9x = 432$
- $x = 48$
- $6 : 9 :: 48 : 72 \longrightarrow 432 = 432$

Setting Up Ratios & Proportions

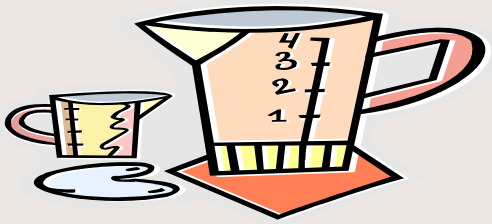
- The order is for 100 mg. The pharmacy sends 50 mg tablets. How many tablets will the nurse give?
- 50 mg : 1 tablet
- 100 mg : *x* tablets
- 50 mg : 1tablet : 100 mg : *x* tablets
- Solve for *x*
- *X* = 2 tablets

Systems of Measurement

- Metric System

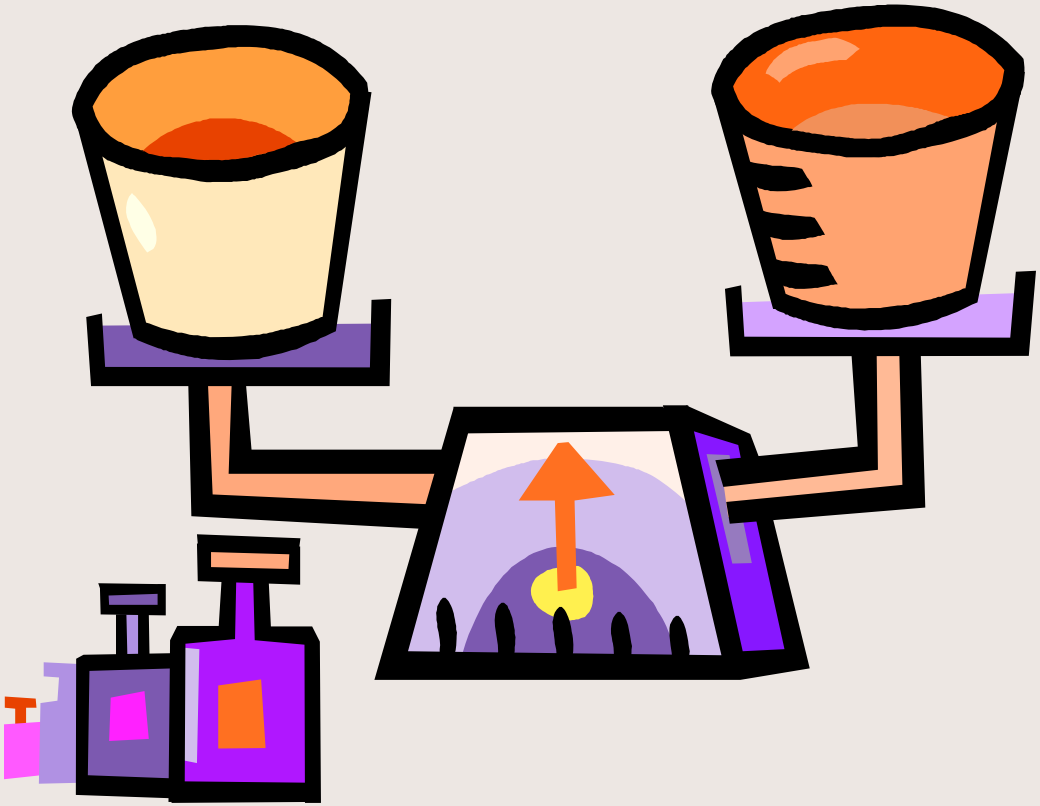


- Household System



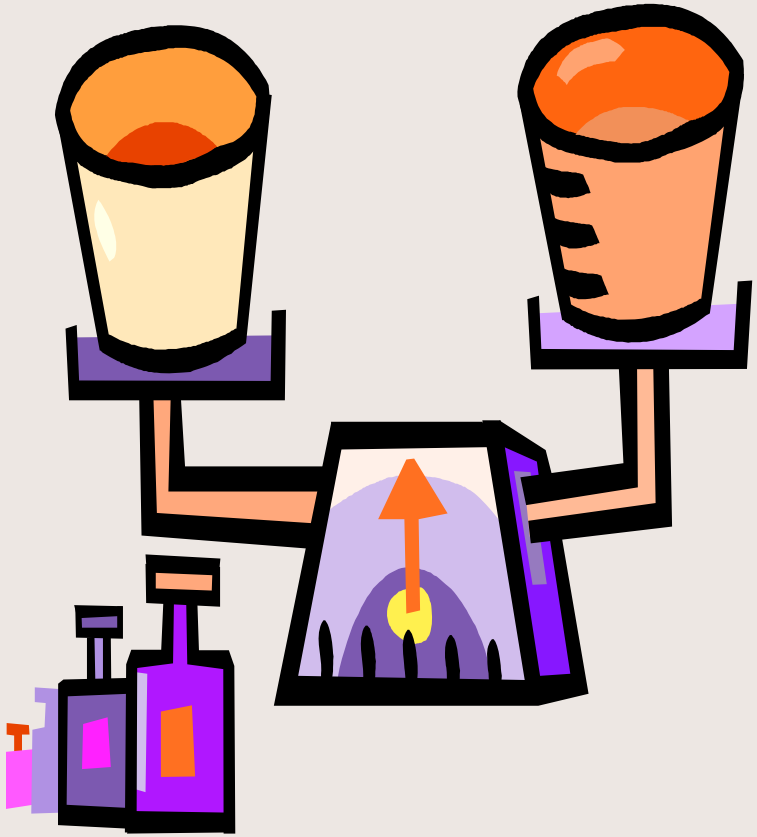
- Apothecary Apothecary

Metric System



Metric System

- **Weight:** Gram
- **Volume:** Liter
- **Length:** Meter



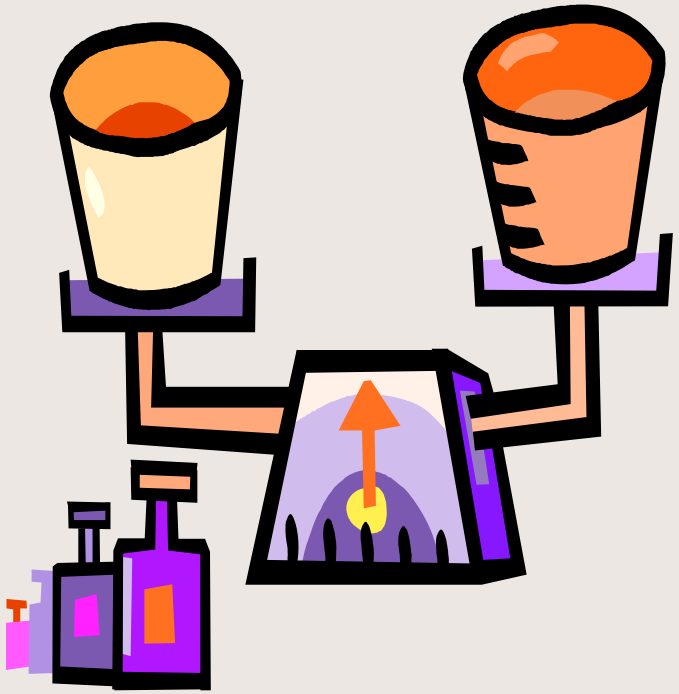
Metric System

Micro = $\frac{1}{1{,}000{,}000}$

Centi = $\frac{1}{100}$

Milli = $\frac{1}{1{,}000}$

Kilo = 1,000



Metric System

- Milli + liter = milliliter

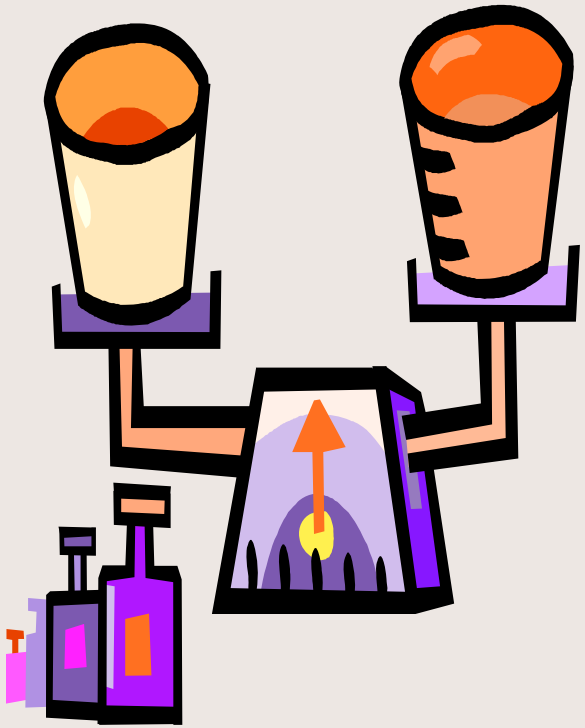
  0.001 of a liter

- Micro + gram = microgram

  0.000001 of a gram

- Kilo + meter = kilometer

  1,000 meters



Metric System

WEIGHT		**VOLUME**	
• Gram	Gm	Liter	L
• Microgram	mcg		
• Milligram	mg	Milliliter	ml
• Kilogram	Kg		
		Cubic Centimeter	cc

Metric Conversions

- 1000 mg = kg
- 0.75 L = ml
- 450 mm = cm
- 10,000 mcg = grams
- 1kg = mg

Metric Conversions

Kilo 1,000	Hecto 100	Deka 10	***UNIT***	Deci 1/10	Centi 1/100	Milli 1/1000

1000 mg = g

160 cm = mm

10 L = ml

109 g = kg

Metric Conversion

Kilo 1,000	Hecto 100	Deka 10	***UNIT***	Deci 1/10	Centi 1/100	Milli 1/1000
K I N G	H E N R Y	D I E D	U N E X P E C T E D L Y	D R I N K I N G	C H O C O L A T E	M I L K

Rounding Medication Doses

Remember: Seldom should a patient receive more than one or two multiples of the unit dose supplied.

Rx: 750mg

Have: 300mg tabs

Call Pharmacy

Rounding Medications

- **RULE:** Always round your answers to the nearest *measurable dose* ***AFTER*** verifying the dose is correct for that patient

- If tablets are scored, you may break.
- Never break unscored tablets.
- Recheck if dose is > 2 tablets.

Rounding Milliliters (ml or cc)

- **RULE:** To round to the nearest tenth, examine the hundredths column. If it's 0.05 or greater, round up to the next tenth. If it is 0.04 or less, the tenths column remains the same.

- 1.75ml ⟶ 1.8ml

1.53ml ⟶ 1.5ml

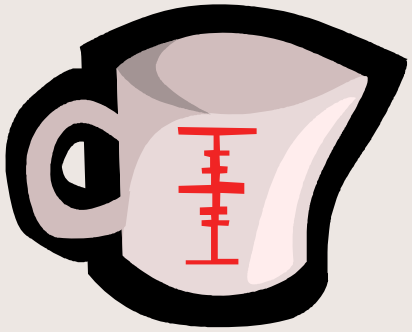
Rounding Milliliters

- **RULE:** To round to the nearest hundredth, examine the thousandths column. If 0.005 or greater, round up to the next hundredth.

- 0.756ml round to 0.76ml
- 0.754ml round to 0.75ml

CLINICAL ALERT

- Never round up liquid medications to the nearest whole number.
- 1.7ml does not round up to 2ml
- Use a medication cup, spoon, dropper or needles syringe



Metric System Rules

- 1. ***ARABIC*** numbers are used to express quantities
- 2. Parts of a unit are expressed as ***DECIMALS.*** Fractions are never used
- 3. The quantity is ***ALWAYS*** written before the abbreviation or symbol of the unit of measure