

# Title: Basic Medical Conversion Formulas

<b>Objectives</b> Students will be able to use multiplication and division to convert between tabletop, American, and metric measurements.										<b>Time frame to Complete</b> 20-30 minutes											
										<b>NRS EFL</b> 4											
Stackable Cert.	Documentation	Technology	Study / Life skills	EL-Civics	Career Pathways	Police	Paramedic	Fire Rescue	Medical Asst.	EKG / Cardio	Phlebotomy	Practical Nursing	Healthcare Admin	Pharmacy Tech	IMT	AMT	HVAC	Welding	Other:	STNA	
X					X		X		X	X	X	X		X						X	
<b>Standard(s) Addressed in Lesson</b> Use Math to Solve Problems and Communicate																					
<b>Benchmark(s) Addressed in Lesson</b> <ul style="list-style-type: none"> <li>M.4.2. Solve, with a high degree of accuracy, multi-digit addition, subtraction, multiplication and division problems in horizontal and vertical notation with regrouping, using whole numbers, fractions, decimals and positive/negative integers.</li> <li>M.4.13. Convert fluently, within measurement systems (metric, customary, time), from one unit to another in order to solve contextual problems and express the conversions using appropriate unit labels.</li> <li>M.4.14 Apply the concept of rounding to specified place value; distinguish between exact and approximate values.</li> <li>M.4.35. Perform with increasing independence, range and fluency in demonstrating level-appropriate mathematical skills in contextual situations (community, family, work).</li> </ul>																					
<b>Materials</b> <i>Basic Medical Conversion Formulas</i> worksheet																					
<b>Learner Prior Knowledge</b> Students should have a firm command of multiplication and division including whole numbers and decimals.																					
<b>Activities</b> <p><u>Step 1</u> Introduce the lesson: Health care workers are trained to use metric measurements because they are more accurate measures than the American measurements. For example, a centimeter is smaller than an inch; so measuring in centimeters provides a more accurate measurement without the need to estimate or round. In addition, metric measurements are consistent with measurements throughout the world. It is important that health care workers can convert between measurement systems for medicine dosages, health records, and other patient care tasks. Today's lesson will provide practice using common medical conversion formulas.</p> <p><u>Step 2</u> Distribute the <i>Basic Medical Conversion Formulas</i> worksheet, and review the formulas with the student/s.</p> <p><u>Step 3</u> Students complete the worksheet. Check answers and re-teach formulas as needed.</p>																					

Step 4 This worksheet can be used as documentation for a stackable certificate. Collect it as needed.

**Assessment/Evidence**

Mastery is demonstrated by a score of 90% on the worksheet.

**Adaptations for Beginning Students**

Beginning students may use a calculator to solve equations.

**Adaptations for Advanced Students**

**Teacher Reflection/Lesson Evaluation**

This lesson was created by Middletown ABLE.

## Basic Medical Conversion Formulas

Health care workers use metric measurements for precision and consistency. Workers in related fields need to be able to convert measurements from standard (American) to metric.

Formulas:

To convert pounds to kilograms:  $\text{lbs} / 2.2 = \text{kg}$

To convert kilograms to pounds:  $\text{kg} \times 2.2 = \text{lbs}$

To convert inches to centimeters:  $\text{inches} \times 2.54 = \text{cm}$

To convert centimeters to inches:  $\text{cm} \times 0.3937 = \text{inches}$

To convert pints (US) to milliliters:  $\text{pt} \times 473.18 = \text{mL}$

Common liquid measures:

1 teaspoon = 4.93 mL (approx. 5 mL)

1 tablespoon = 3 teaspoons (approx. 15 mL)

1 fl. ounce = 2 tablespoons

1 pint = 16 fl. ounces

**Use the formulas to convert measurements and solve the following mathematics problems. Round answers to two decimal places.**

1. At his exam, this patient measured 6 feet, 2 inches tall. How many *centimeters* tall is he?
2. The pediatrician tells the parents that their child is 92 centimeters tall. How many *feet* tall is the child?
3. A newborn baby is 53 centimeters long. How many *inches* long is she?
4. A patient weighs 56 pounds. How many *kilograms* does she weigh?

5. Last year Daniel donated 1892.72 milliliters of blood. If a person donates 1 *pint* each time, how many times did Daniel donate blood last year?

Use the dosage instructions in the following table to answer the questions 7-8.

<b>Age</b>	<b>Weight</b>	<b>Dose</b>
Under 4	Under 36	Do not use
4-5	36-47	1 tsp
6-11	48-95	2 tsp
12-Adult	Over 95	1 tb

6. If a child, age 4, weighs 36 pounds, how many *milliliters* of medicine will he take per dose?
7. If a child, age 12, weighs 105 pounds, how many *milliliters* of medicine will she take per dose?
8. Blood makes up 7% of a body's weight. If a person weighs 175 lbs, how much would his blood weigh? Provide the answer in both *pounds* and *kilograms*.
9. The average body has 10 pints of blood. How many ounces of blood are in a body?
10. How many milliliters of blood are in the body?

**ANSWER KEY** Use the formulas to convert measurements and solve the following mathematics problems. Round answers to two decimal places.

1. At his exam, this patient measured 6 feet, 2 inches tall. How many *centimeters* tall is he?  
 $74 \text{ inches} \times 2.54 = 187.96 \text{ cm}$
2. The pediatrician tells the parents that their child is 92 centimeters tall. How many *feet* tall is the child?  
 $92 \times 0.3937 = 36.22 \text{ inches}$   
3 feet
3. A newborn baby is 53 centimeters long. How many *inches* long is she?  
 $53 \times 0.3937 = 21.25 \text{ in}$
4. A patient weighs 56 pounds. How many *kilograms* does she weigh?  
 $56 / 2.2 = 25.45 \text{ kg}$
5. Last year Daniel donated 1892.72 milliliters of blood. If a person donates 1 *pint* each time, how many times did Daniel donate blood last year?  
 $1892.72 / 473.18 = 4 \text{ times}$

Use the dosage instructions in the following table to answer the questions 7-8.

Age	Weight	Dose
Under 4	Under 36	Do not use
4-5	36-47	1 tsp
6-11	48-95	2 tsp
12-Adult	Over 95	1 tb

6. If a child, age 4, weighs 36 pounds, how many *milliliters* of medicine will he take per dose?  
 $4.93 \text{ mL}$
7. If a child, age 12, weighs 105 pounds, how many *milliliters* of medicine will she take per dose?  
 $4.93 \times 3 = 14.79 \text{ mL}$
8. Blood makes up 7% of a body's weight. If a person weighs 175 lbs, how much would his blood weigh? Provide the answer in both *pounds* and *kilograms*.  
 $175 \times 0.07 = 12.25 \text{ lbs}$   
 $12.25 \times 2.2 = 5.57 \text{ kg}$
9. The average body has 10 pints of blood. How many ounces of blood are in a body?  
 $10 \times 16 = 160 \text{ oz}$
10. How many milliliters of blood are in the body?  
 $10 \text{ pints} \times 473.18 = 4731.8 \text{ mL}$