# Title: Basic Metric Measurements Conversion (police)

Obje	Objectives					1	Time frame to Complete														
<ul> <li>Students will be able to remember the order of metric units</li> </ul>							30 minutes														
•	<ul> <li>Students will be able to convert basic metric</li> </ul>							NRS FFI													
	mea	surem	ients.											-			4				
Stackable Certificate 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:			
×					X																
Stand	dard(	s) Ad	dres	sed i	n Les	ssor	1														
Use M	ath to	Solve	Proble	ems a	nd Co	mmı	inica	te													
Benc	hmai	rk(s)	Addr	esse	d in L	_ess	son		,												
<ul> <li>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>4.15 Identify, extend and construct arithmetic/geometric patterns and sequences that are one-step and linear or exponential.</li> <li>4.16 Evaluate and simplify algebraic expressions and solve equations.</li> </ul>																					
Mate	Materials																				
<ul> <li>Ho</li> <li>Ca</li> </ul>	<ul> <li>How to Convert Basic Metric Measurements worksheet</li> <li>Calculator (optional)</li> </ul>																				
Learner Prior Knowledge Place value																					
Basic multiplication and division by powers of ten																					
<u>Step 1</u> Survey students, by a show of hands, about how many are familiar with the metric system. Volunteers may share what they know (they may be familiar with running a 5K or how some food packaging is labeled in grams, or they may only know that it is different than the measurements commonly used in the United States). Introduce the metric system as a measurement system that is based on units of ten.																					
Stop 2 Distribute the worksheet How to Convert Resig Matrie Measurements. Evaluin to students that the																					

<u>Step 2</u> Distribute the worksheet *How to Convert Basic Metric Measurements*. Explain to students that the metric system of measurement is based on ten. If review is needed, share a few examples of multiplying and dividing by ten (with answers as both whole numbers and decimals).

<u>Step 3</u> Share the mnemonic devices on the *How to Convert Basic Metric Measurements* worksheet with students as a means to remember the order of metric units: kilo, hecto, deka, unit (ones), deci, centi, milli. Write one sentence and the units on the board to use as a reference during the lesson.

## <u>Step 4</u> Explain and demonstrate the conversion process. Answer questions as needed.

<u>Step 5</u> Students complete the second side of the sheet individually. As they work, the teacher can circulate to answer questions and check work as needed. When the class is finished, check answers together.

# Assessment/Evidence

Students will solve equations and label metric conversions correctly.

## Adaptations for Beginning Students

Beginning students could work in pairs and utilize a calculator.

### Adaptations for Advanced Students

More advanced students could also write each expression using scientific notation.

Teacher Reflection/Lesson Evaluation

This lesson was created by Middletown ABLE.

The metric system is based upon units of ten.

*Mnemonic devices* These funny sentences can help you remember the order of metric units for common conversions. The first letter of each word is the same as the first letter of the metric prefix.

<u>Kim Hit D</u>avid [until] <u>D</u>avid <u>C</u>ried <u>M</u>ama! <u>King H</u>enry <u>D</u>ied [until] <u>D</u>rinking <u>C</u>hocolate <u>M</u>ilk <u>King H</u>enry <u>D</u>ied [U] <u>D</u>idn't <u>C</u>are <u>M</u>uch

The metric measurements are: Kilo Hecto Deka [ unit ] Deci Centi Milli

#### A Shortcut to Converting from one unit to another:

1. Draw a line and label it with the prefixes as shown in the diagram below. "Unit" will be the unit of measurement you're working with (meter, gram, etc.)

• Kilo------Hecto-----Deka------[Unit]------Deci------Centi------Milli.

2. Draw an arrow from the prefix you have to the prefix you want to convert to, making stops at each unit of measure along the way. So if you want to change kilometers into millimeters, for example, then draw a series of arrows from "kilo" to "milli".



Kilo-----Hecto-----Deka------["Meters"]-----Deci-----Centi------Milli.
 1,000
 10
 1
 0.1
 0.01
 0.01

3. Determine whether you are converting into a smaller or a larger unit. If the arrow is pointing right, you are converting from a larger unit into a SMALLER one. If the arrow is pointing left, you are going from a smaller unit into a LARGER one.

4. Move the decimal point one digit the same direction as the number of places you found in the previous step. If there is no decimal in the number, assume it's after the last digit in the number.

- For example, when converting from kilometers to millimeters, you will move the decimal point six places to the right. 1 kilometer = 1,000,000 millimeters
- To convert 5 centigrams to grams, you need to move the decimal point two places to the left. 5 centigrams = 0.05 grams

5. Add zeroes as necessary. Only do this if you have run out of digits in the number you were converting.

• For example, to convert 2.5 meters to millimeters, you have to move the decimal point to the right three places. There's only one more digit after the decimal point, so you would need to add two zeroes. Final answer: 2,500 millimeters.

Complete the table with *equivalent* measures:

<mark>larger units</mark>	$\rightarrow$ $\rightarrow$	$\rightarrow$ $\rightarrow$	$\rightarrow$	$\rightarrow$ $\rightarrow$	→ sm	<mark>aller units</mark>
К	н	D	[unit]	D	С	м
kilo	hecto	deka		deci	centi	milli
	0.01		1 gram	10		
	hectograms			decigrams		
0.002			2 liters			2,000
kiloliters						centiliters
	50	500			500,000	
	hectometers	dekameters			centimeters	

Mathematically, as you move the decimal point one place to the right (moving right on the chart), you are multiplying by 10.

1 meter x 10 = 10 decimeters

As you move the decimal point one place to the left (moving left on the chart), you are dividing by 10.

2 liters  $\div$  10 = 0.2 dekaliters

Which is larger? (Circle the larger number in the following pairs.)

A)	1 decimeter	OR	1 meter
B)	63 kilograms	OR	18 grams
C)	1 liter	OR	212 centiliters
D)	72 centigrams	OR	41 dekagrams

Solve the equations.

- A) Eight grams of marijuana were found in the suspect's car. How many centigrams?
- B) The officer chased the suspect approximately 15 hectometers through the field. How many kilometers did the officer run?
- C) Police seized 0.2283 kilograms of crack cocaine from the suspect's home. The estimated value is \$22,830. What is the value of <u>one gram</u> of crack cocaine?

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 1,000
 10
 1
 0.1
 0.01
 0.01

3. Determine whether you are converting into a smaller or a larger unit. If the arrow is pointing right, you are converting from a larger unit into a SMALLER one. If the arrow is pointing left, you are going from a smaller unit into a LARGER one.

4. Move the decimal point one digit the same direction as the number of places you found in the previous step. If there is no decimal in the number, assume it's after the last digit in the number.

- For example, when converting from kilometers to millimeters, you will move the decimal point six places to the right. 1 kilometer = 1,000,000 millimeters
- To convert 5 centigrams to grams, you need to move the decimal point two places to the left. 5 centigrams = 0.05 grams

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Complete the table with *equivalent* measures:

<mark>larger units</mark>	$\rightarrow$ $\rightarrow$	$\rightarrow$ $\rightarrow$	$\rightarrow$	$\rightarrow$ $\rightarrow$	→ sm	<mark>aller units</mark>
к	н	D	[unit]	D	С	М
kilo	hecto	deka		deci	centi	milli
0.001	0.01	0.1	1 gram	10	100	1000
kilograms	hectograms	dekagrams		decigrams	centigrams	milligrams
0.002	0.02	0.2	2 liters	20	200	2,000
kiloliters	hectograms	dekaliters		decigrams	centigrams	centiliters
5	50	500	5,000	50,000	500,000	5,000,000
kilometers	hectometers	dekameters	meters	decimeters	centimeters	millimeters

Mathematically, as you move the decimal point one place to the right (moving right on the chart), you are multiplying by 10.

1 meter x 10 = 10 decimeters

As you move the decimal point one place to the left (moving left on the chart), you are dividing by 10.

2 liters  $\div$  10 = 0.2 dekaliters

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C)	1 liter	OR	212 centiliters
D)	72 centigrams	OR	41 dekagrams

Solve the equations.

- Eight grams of marijuana were found in the suspect's car. How many centigrams?
   8 x 100 = 800 centigrams
- E) The officer chased the suspect approximately 15 hectometers through the field. How many kilometers did the officer run?
   15 hm / 10 = 1.5 kilometers
- F) Police seized 0.2283 kilograms of crack cocaine from the suspect's home. The estimated value is \$22,830. What is the value of <u>one gram</u> of crack cocaine?
   0.2283 kg x 1000 = 228.3 grams \$22,830 / 228.3 = \$100 per gram