STUDENT HANDOUT
How to Convert within the Metric System

Metric Conversion Pneumonic

King	Henry	Died	Monday	Drinking	Chocolate	Milk
kilo	hecta	deca	meter (unit)	deci	centi	milli

To make the conversion:
• count from the measure where you start to the new unit
• move the decimal point that many spaces in the same direction

Example Problems.

1. You are asked to convert 2 meters into kilometers.

First, look at the chart above.
Second, from **Monday** (meter): count left to the **King** (kilo) cell. You should move your finger 3 cells to the left.
Third, this means that you move the decimal point 3 spaces to the left.

2 meters
0.002 kilometers

So, 2 meters equals 0.002 kilometers

2. You are asked to convert 543 kilometers into meters.

First, look at the chart above.
Second, from **King** (kilo) cell, count right to the **Monday** (meter) cell. You should move your finger 3 cells to the right.
Third, this means that you move the decimal point 3 spaces to the right.

543 kilometers
543,000 meters

So 543 kilometers equals 543,000 meters

ARIZONA
GEOGRAPHIC ALLIANCE

STUDENT HANDOUT
How to Change Numbers from Standard form into Scientific Notation and Back

To convert a number from standard form into scientific notation you will move the decimal point until there is only 1 digit to the left of the decimal point. You will represent the move by also writing x10 raised to a power. If you move the decimal point to the left, the power of ten is positive (ex. 10^6), if you move the decimal point to the right the power of ten is negative (ex. 10^{-4}). The power of ten is the number of times you move the decimal.

Example 1. 4,542,000 meters equals _____ in scientific notation.

Example 2. 0.00045 meters equals _____ in scientific notation.

To convert a number from scientific notation into standard form, you will move the decimal point to the right if the power of ten is positive (ex. 10^3) and you will move the decimal to the left if the power of ten is negative (ex. 10^{-6}). You will move the decimal point the same number as the power of ten.

Example 3. 7.49 x 10^3 meters equals _____ in standard form.

Example 4. 9.2 x 10^{-6} meters equals _____ in standard form.

Math Worksheet

Map or Image Used	What you measure	Column 1 Distance in Meters	Column 2 Scientific Notation for meters	Column 3 Distance in Kilometers	Column 4 Scientific Notation for kilometers
Ballpark Aerial Photograph	Distance between Arena (X) and Ballpark (Y)				
Bisbee, Arizona Topographic Map	Distance between the letter "e" in Bisbee and the letter "W" in Warren				
Satellite Image of the Phoenix Area	Distance between the "S" in Sun City and the "a" in Mesa				
Aerial Photograph of Hollywood Sign	Length of the Sign from the H to the D				
Aerial photograph of area around a neighborhood school	Distance between the apartment and the bike lock-up at the middle school				
Disneyland Aerial Photograph	Distance between where you park to the center of Disneyland. Measure the length of the black arrow to entrance and white arrow to the park center				
Arizona Mills Mall Aerial Photograph	Length of the entire mall				
Satellite Image of Imperial Valley/Mexico Border	Length of the Salton Sea (from upper left to lower right)				
Arizona Regions	Distance between Page and Nogales				
United States Map	From "A" in Arizona to the "y" in Maryland				

		Column 1	Column 2	Column 3	Column 4
Map or Image Used	What you measure	Distance in Meters	Scientific Notation for meters	Distance in Kilometers	Scientific Notation for kilometers
United States River Map	Straight line from the headwaters of the Mississippi River to its Mouth				
Africa Natural Regions Map	Length of 15°N latitude across North Africa from Atlantic Ocean to Read Sea				
Russia and Its former republics	Length of Russia from its border with Georgia to its intersection with the 180° meridian				
Mexico	Length of Mexico from the NW corner of Baja California to the SE corner of Chiapas				

What would you pick—besides Google Earth?

1. If you wanted to see your house, what sort of image or map would you use and why?

2. If you wanted to study a big city, what sort of image or map would you use and why?

3. If you wanted to study a big river or desert, what sort of image or map would you use and why?

4. If you wanted to take a trip to visit a friend somewhere in the United States, what sort of image or map would you use and why?

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Math Worksheet KEY

	Column 1	Column 2	Column 3	Column 4
Map or Image Used	What you measure	Distance in Meters	Scientific Notation for meters	Distance in Kilometers	Scientific Notation for kilometers
Bank One Ball Park Aerial Photograph	Distance between America West Arena (X) and Bank One Ballpark (Y)	300	3.00×10^2	0.3	3.0×10^{-1}
Bisbee, Arizona Topographic Map	Distance between the letter "e" in Bisbee and the letter "W" in Warren	6500	6.5×10^3	6.5	6.5×10^0
Satellite Image of the Phoenix Area	Distance between the "S" in Sun City and the "a" in Mesa	65,000	6.5×10^4	65	6.5×10^1
Aerial Photograph of Hollywood Sign	Length of the Sign from the H to the D	300	3.0×10^2	0.3	3.0×10^{-1}
Aerial photograph of area around a neighborhood school	Distance between the apartment and the bike lock-up at the middle school	580	5.8×10^2	0.58	5.8×10^{-1}
Disneyland Aerial Photograph	Distance between where you park to the center of Disneyland. Measure the length of the black arrow to entrance and white arrow to the park center	420	4.2×10^2	0.42	4.2×10^{-1}
Arizona Mills Mall Aerial Photograph	Length of the entire mall	600	6.0×10^2	0.6	6.0×10^{-1}

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Satellite Image of Imperial Valley/Mexico Border	Length of the Salton Sea (from upper left to lower right)	50,000	5.0×10^4	50	5.0×10^1
Arizona Landform Regions	Distance between Page and Nogales	680,000	6.8×10^5	680	6.8×10^2
United States Map	From "A" in Arizona to the "y" in Maryland	3,300,000	3.3×10^6	3300	3.3×10^3
United States River Map	Straight line from the headwaters of the Mississippi River to its Mouth	2,100,000	2.1×10^6	2100	2.1×10^3
Africa Natural Regions Map	Length of 15°N latitude across North Africa from Atlantic Ocean to Read Sea	6,100,000	6.1×10^6	6100	6.1×10^3
Russia and Its former republics	Length of Russia from its border with Georgia to its intersection with the 180˚ meridian	7,200,000	7.2×10^6	7200	7.2×10^3
Mexico	Mexico Length from NW corner Baja Calif to SE corner of Chiapas	3,300,000	3.3×10^6	3300	3.3×10^3

What would you pick besides Google Earth?

Note: The general concept is that images and maps exist at different scales. If you want to see details, you will have to use aerial photographs and city maps. If you want to see general features, you would use satellite images and state/country maps. If you want to see relationships among countries or river basins, you would have to use continent-scale maps or a globe.

1. If you wanted to see your house, what sort of image or map would you use and why?

ANSWER: You would probably want to use an aerial photograph that shows individual houses or buildings.

2. If you wanted to study a big city, what sort of image or map would you use and why?

ANSWER: You would probably want to use a satellite image that shows a whole city.

3. If you wanted to study a big river or desert, what sort of image or map would you use and why?

ANSWER: You would probably want to use a map of a continent or a country.

4. If you wanted to take a trip to visit a friend somewhere in the United States, what sort of image or map would you use and why?

ANSWER: You would probably want to use a map of the whole United States, or you could also get a map of the state your friend lives in.