

**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

## 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  $\times 10$  raised to a power.

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

$4.542 \times 10^6$  meters

Example 2. 0.00045 meters equals \_\_\_\_\_ in scientific notation

$4.5 \times 10^{-4}$  meters

Example 3.  $7.49 \times 10^3$  meters equals \_\_\_\_\_ in standard form

7490 meters

Example 4.  $9.2 \times 10^{-6}$  meters equals \_\_\_\_\_ in standard form

0.0000092 meters

## Worksheet

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  $\times 10$  raised to a power.

| 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)   |                    |                                |                        |                                    |
| 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   |  |  |  |  |
| 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 Red 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?

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?

## Worksheet KEY

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  $\times 10$  raised to a power.

| 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                | $3.00 \times 10^2$             | 0.3                    | $3.0 \times 10^{-1}$               |
| Bisbee, Arizona Topographic Map                        | Distance between the letter "e" in Bisbee and the letter "W" in Warren  | 6500               | $6.5 \times 10^3$              | 6.5                    | $6.5 \times 10^0$                  |
| Satellite Image of the Phoenix Area                    | Distance between the "S" in Sun City and the "a" in Mesa  | 65,000             | $6.5 \times 10^4$              | 65                     | $6.5 \times 10^1$                  |
| Aerial Photograph of Hollywood Sign                    | Length of the Sign from the H to the D  | 300                | $3.0 \times 10^2$              | 0.3                    | $3.0 \times 10^{-1}$               |
| Aerial photograph of area around a neighborhood school | Distance between the apartment and the bike lock-up at the middle school  | 580                | $5.8 \times 10^2$              | 0.58                   | $5.8 \times 10^{-1}$               |
| 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 | 420                | $4.2 \times 10^2$              | 0.42                   | $4.2 \times 10^{-1}$               |

|  |  |           |                   |      |                      |
|--|--|-----------|-------------------|------|----------------------|
|  | the park center  |           |                   |      |                      |
| Arizona Mills Mall Aerial Photograph             | Length of the entire mall  | 600       | $6.0 \times 10^2$ | 0.6  | $6.0 \times 10^{-1}$ |
| Satellite Image of Imperial Valley/Mexico Border | Length of the Salton Sea (from upper left to lower right)                                | 50,000    | $5.0 \times 10^4$ | 50   | $5.0 \times 10^1$    |
| Arizona Landform Regions                         | Distance between Page and Nogales  | 680,000   | $6.8 \times 10^5$ | 680  | $6.8 \times 10^2$    |
| United States Map                                | From "A" in Arizona to the "y" in Maryland   | 3,300,000 | $3.3 \times 10^6$ | 3300 | $3.3 \times 10^3$    |
| United States River Map                          | Straight line from the headwaters of the Mississippi River to its Mouth                  | 2,100,000 | $2.1 \times 10^6$ | 2100 | $2.1 \times 10^3$    |
| Africa Natural Regions Map                       | Length of 15°N latitude across North Africa from Atlantic Ocean to Red Sea               | 6,100,000 | $6.1 \times 10^6$ | 6100 | $6.1 \times 10^3$    |
| Russia and Its former republics                  | Length of Russia from its border with Georgia to its intersection with the 180° meridian | 7,200,000 | $7.2 \times 10^6$ | 7200 | $7.2 \times 10^3$    |
| Mexico   | Mexico Length from NW corner Baja Calif to SE corner of Chiapas                          | 3,300,000 | $3.3 \times 10^6$ | 3300 | $3.3 \times 10^3$    |

## What would you pick?

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.