Name _____   Date _____

Nano Metrics Conversions Answer Key

Part 1. You will complete a series of metric conversions by providing answers to the questions and prompts below. Be prepared to discuss your responses in small groups or as a class.

1. Match the metric length units below with their correct abbreviations. Then order the unit abbreviations from largest to smallest.

   - kilometer (km)
   - decimeter (dm)
   - nanometer (nm)
   - meter (m)
   - micrometer (µm)
   - centimeter (cm)
   - millimeter (mm)

   Largest Unit __km__ __m__ __dm__ __cm__ __mm__ __µm__ __nm__ Smallest Unit

2. Using your teacher's guidance and a meter stick for visual reference, fill in the following blanks:
   a. 1 kilometer = ____1,000____ meters
   b. 1 meter = ____1,000____ millimeters
   c. 1 millimeter = ____1,000____ micrometers
   d. 1 micrometer = ____1,000____ nanometers

3. You should notice a pattern in your responses to Questions 1 and 2. Explain the pattern you see.

   Students should notice that the metric system is a decimal based system, which means each successively larger or smaller unit increases or decreases by the same factor, respectively. Most of the examples in this worksheet are set up to increase or decrease by a factor of 1000 (converting between mm, µm, nm), and sometimes 10 or 100 (converting between mm, cm, dm).

4. In the space provided, use a ruler to draw 3 squares and indicate next to each how you write the size of the square using unit abbreviations.
   - Square 1: 1 decimeter wide by 1 decimeter tall (1 dm^2)
   - Square 2: 1 centimeter wide by 1 centimeter tall (1 cm^2)
   - Square 3: 1 millimeter wide by 1 millimeter tall. (1 mm^2)

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Nano Metrics, continued

Part 2. Nanoscale Ruler Conversions

5. Use the Nano Ruler to measure the objects listed below. Then fill in the chart by converting your nano measurements to macro and micro scales. NOTE: The answers provided are approximations. Student answers should be checked for accuracy.

Object	Nano Scale (nm)	Micro Scale (μm)	Macro Scale (mm)
Diameter of a penny	19,000,000	19,000	19
Diameter of your pinky fingernail	10,000,000	10,000	10
Diameter of a crayon	8,000,000	8,000	8
Length of your pen/pencil	Answers vary	Answers vary, converted at the same rate as above	Answers vary, converted at the same rate as above
Object of your choice	Answers vary	Answers vary, converted at the same rate as above	Answers vary, converted at the same rate as above

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