
Grade Level: 7-9
Subject: Science

Topic: Understanding metric measurements with emphasis on nanotechnology.

Objectives and Goals:

* Learn prefixes of metric units
* Factor labeling
* Spatial concept of metric units
* Understand the importance of (nano)technology

Length of lesson:

* 90 minutes

Direct Instruction (30 minutes):

* Review/introduce the metric system

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| --- | --- | --- |
| 1018  | EXA  | 1,000,000,000,000,000,000  |
| 1015  | PETA  | 1,000,000,000,000,000  |
| 1012  | TERA  | 1,000,000,000,000  |
| 109  | GIGA  | 1,000,000,000  |
| 106  | MEGA  | 1,000,000  |
| 103  | KILO  | 1,000  |
| 102  | HECTO  | 100  |
| 101  | DEKA  | 10  |
| 10-1  | DECI  | .1  |
| 10-2  | CENTI  | .01  |
| 10-3  | MILLI  | .001  |
| 10-6  | MICRO  | .000 001  |
| 10-9  | NANO  | .000 000 001  |
| 10-12  | PICO  | .000 000 000 001  |

* Use the following site to show how objects are measured (10-15 min). This site shows a metric scale and is interactive for students.

<http://primaxstudio.com/stuff/scale_of_universe/>

* Show the Fantastic Trip power point (10 min). This power point has music.
* After PowerPoint presentation, discuss the importance of measurements and nanotechnology (10 min). <http://www.nanotech-now.com/current-uses.htm> and <http://www.dtsc.ca.gov/TechnologyDevelopment/Nanotechnology/index.cfm#What_are_its_current_applications_in_industry>? and <http://nanogloss.com/nanotechnology/what-is-nanotechnology-used-for-today/#axzz1RYdm65GR>

Guided Practice (20 minutes):

* Go to the following web site.

<http://www.nrc.gatech.edu/?q=content/instructional-units>

Find the unit relating to **Size and Scale units.** Look over the teacher guide, print size and scale pictures and size units for a number line (print 9 slides pre page, in color and laminate). You may want to work with the number line before you introduce the pictures to students.

* Place your students in groups of 4-5, give each group a piece of clothes line and 40 clothes pins.
* Have each group place the number line from smallest to largest and then the pictures on the clothes line with clothes pins.
* Have the groups compare their answers to the class and then have them come up with their final draft.

Closure (10 minutes):

* Show the class your (teacher’s) clothes line of the correct order the pictures. Have a class discussion explaining the placement of objects.

Independent Practice:

* For next class period, each student brings 3 pictures of objects that can be categorized using the metric scale.

Required Materials and Equipment:

* LCD
* Clothes line
* Clothes pins (40 per group)
* Colored pictures (laminated) of objects and numbers from <http://www.nrc.gatech.edu/?q=content/instructional-units>

Assessment and Follow-Up:

* Keep the clothes line with pictures attached. Hang them in the classroom so you can make references.
* Review the number line weekly.
* <http://www.pbs.org/wgbh/nova/tech/making-stuff-smaller.html> Complete measurements with video explaining uses of nanotechnology.

**Suggested Reading**

Look over the teacher’s guide from the gatech site. <http://www.nrc.gatech.edu/sites/default/files/education/sizeandscaleteacher9-11v3.pdf>