



Drexel-SDP GK-12 LESSON

Lesson: Convert It

Subject Area(s) Data Analysis & Probability, Measurement, Number & Operations

Associated Unit Forget the Chedda!

Lesson Title Convert It

$$\frac{1 \text{ inch}}{25.4 \text{ mm}} = 1$$

Don't be afraid to express yourself in different ways.

Grade Level 7 (6-12)

Lesson # 2 of 5

Lesson Dependency

Time Required 20 minutes

Summary

Students are shown how to convert between measurement systems using the factor-label method, which is introduced with an emphasis on equivalence (multiplying by 1). The concepts shown in this lesson allow students to relate familiar, imperial measurements to unfamiliar metric units. Metric units are not only used in this curricular unit's activities, but they are also used as a global standard.

Engineering Connection

In the United States and United Kingdom, engineers need to work in imperial and metric measurement systems since both are accepted and used, albeit by different scientific communities. If engineers need to know the properties or dimensions of an object, they may

consult a reference or measure it themselves. The engineer may have to convert the units if the reference doesn't state the information or if the measurement is not taken in the same system of units in which the engineer is working.

Conversions are necessary for the understanding and interpretation of quantities found outside the United States and United Kingdom, which are the only countries in which imperial units are used. Since "International System" (SI) units are the standard of all countries but the U.S. and U.K., international projects, such as those relating to the space station, need to be solved in terms of SI units.

Keywords

Measure, classroom object, car, distance, force, convert, meter, inches, foot, yard, kilometer, mile, English unit, metric unit, SI unit, MKS

Educational Standards

- PA Science:
 - 3.1.7 – Unifying themes
- PA Math:
 - 2.1.8.D – Apply ratio and proportion to mathematical problem situations involving distance, rate, time, and similar triangles
 - 2.2.8.A – Complete calculations by applying the order of operations
 - 2.3.5.D – Convert linear measurements within the same system
 - 2.3.8.A – Develop formulas and procedures for determining measurements
 - 2.4.5.B – Use models, number facts, properties, and relationships to check and verify predictions and explain reasoning

Pre-Requisite Knowledge

Students must be familiar with unit lengths and units' association with the imperial and metric systems.

Learning Objectives

After this lesson, students should be able to:

- Understand the reason for using conversion methods
- Identify equivalence between units
- Compute measurements between imperial and metric units

Introduction / Motivation

Who has noticed that there are different measurements on soda cans and bottles? (Poll for show of hands). Everyone knows what I'm talking about if I asked you what a 12-ounce soda can looks like, correct? What if I called it a 355 milliliter soda can? Would you still picture the same can? What do you think a 67.6 fluid-ounce bottle of soda looks like? That's actually a 2-liter bottle of soda. Why do we have these markings on our soda bottles, and do you think you would find the same markings if you went to Mexico? (Because both units are accepted in the U.S.; you might not find markings in ounces if you went to Mexico).

Engineers work on problems that are not usually solved in a straightforward way by using English, or imperial, units – (feet, yards, miles, ounce, pound). Sometimes engineers need to

share information with other engineers who don't even use imperial units! We can work around this, however, by *converting* our measurements to the format in which we need them. To do this, we use what is known as the factor-label method: multiply the original number by a conversion *factor* that is equal to one, then cross off the unit *labels* repeated in the numerator and denominator. You can use several steps and some reasoning to determine how the units are related and multiplied.

Lesson Background & Concepts for Teachers

The factor-label method uses simple multiplication and division. It may be helpful to suggest that students go one term at a time or multiply across the numerators and divide by the quantity of the denominators (*i.e.* remember to use parentheses to multiply the divisors). The principle of factoring out units as they equal one is similar to multiplying the lines by quantities that equal 1.

Associated Activities

Convert It

Lesson Closure

Segue into associated activity: use second part of “Quantify It” activity worksheet or “Convert It” worksheet.

Assessment

Check worksheet section associated with “Convert It” activity.

Additional Multimedia Support

chedda_3_lesson_convert_it.ppt

References

<http://www.cnn.com/TECH/space/9911/10/orbiter.02/>

<http://en.wikipedia.org/wiki/SI>

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