



### Science Objectives

- Students will learn what types of measurements scientists make.
- Students will learn why measurements have units.
- Students will understand that the metric system or *International System of Units* (SI) is the most widely used system of measurement in the world.
- Students will learn why measurements need to be converted from one unit to another.
- Students will practice unit conversions using the Science Nspired Unit Conversion Tool.

### Vocabulary

- Measurement
- Scientific Unit
- Conversion
- Metric System

### About the Lesson

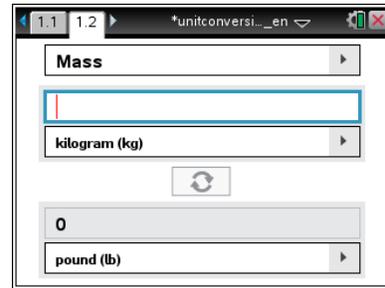
- In this activity, students will be converting one metric unit of measurement into another using a unit conversion tool on their calculator.
- As a result, students will:
  - Understand why scientists use measurement with units.
  - Understand why measurements need to be converted from one unit to another measurement unit.

### TI-Nspire™ Navigator™

- Send out the *unitconversion\_en.tns* file.
- Monitor student progress using Screen Capture.
- Use Live Presenter to spotlight student answers.

### Activity Materials

- *unitconversion\_en.tns* document
- TI-Nspire™ Technology



### TI-Nspire™ Technology Skills:

- Download a TI-Nspire document
- Open a document
- Move between pages
- Use a drop-down menu

**Tech Tips:** This document does not accept commas. The number will turn red to indicate the document is not working.

### Lesson Materials:

#### *Student Activity*

- Unit\_Conversion\_Student.doc
- Unit\_Conversion\_Student.pdf

#### *TI-Nspire document*

- unitconversion\_en.tns



### Discussion Points and Possible Answers

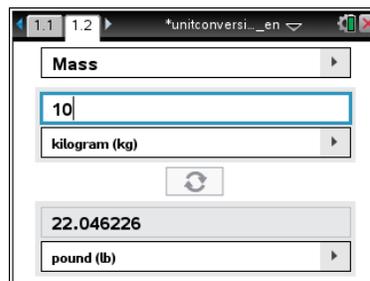
Have students read the background information stated on their activity sheet. Have students practice using the conversion tool on their calculator using the following example.

Move to page 1.2.

#### Example 1:

In this first example, students learn how to navigate a unit conversion by using the calculator functions. Have them following the given directions to work through the problem.

1. First students select the measurement, **Mass**. With the first box highlighted, press **▶** or **enter**. Highlight **Mass** and press **enter**.
2. Students are to press **tab** to move to the next box and enter the number **10**.
3. Now students move to the third box to select the unit of measure to convert from. From the drop-down menu, select **kilogram (kg)**.
4. Finally, students move to the last box to select the unit of measure to convert to. From the drop-down menu, select **pound (lb)**.
5. The converted value will be visible in the fourth box. Check to be sure it shows 22.046226 pounds (lb).
6. To shift to converting pounds to kilograms, students can click the reversal button. 

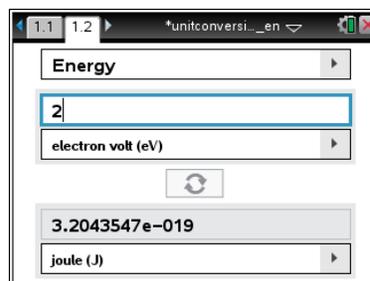


On the student activity sheet, students will record the converted measurement given on the handheld after entering the correct inputs.

Have students use the unit conversion tool to answer questions 1-11 on their activity sheet. Make sure students include the correct units for each measurement. Remind them that measurements mean nothing without units!

Q1. A red photon with a wavelength of 621 nm has 2 electron volts (eV) of energy. What is this amount of energy in joules (J)?

**Answer:** 3.2043547e-019



### TI-Nspire Navigator Opportunities

Use *Class Capture* to make sure that all students understand how to correctly select the category of measurement and the units from the drop down menu.



**Teacher Tip:** Significant digits/rounding: When using the conversion tool on their calculator, the answer will NOT be rounded, so students will need to be informed how many significant figures their answers should have. The answers have not been rounded and will show the exact output that students will get on their handheld.

Q2. Food energy is often expressed in calories. How many calories (cal) are there in 1 joule (J)?

**Answer:** 4.1868 J

Q3. A meteorologist reports that atmospheric pressure is 106 kilopascals (kPa).

A. What is the pressure in atmospheres (atm)?

**Answer:** 1.0461387 atm

B. What is the pressure in millimeters of mercury (mmHg)?

**Answer:** 795.06358 mmHg

Q4. Scientists discovered a humpback whale weighing 30,000 kilograms (kg) washed ashore.

A. How many pounds (lb) does this whale weigh?

**Answer:** 66,138.679 lbs

B. How many tons does this whale weigh?

**Answer:** 33.069339 tons

Q5. An ichthyologist needs to measure a rainbow trout and then compare the standard length of 19.5 inches (in), to the fish's total length of 24 inches (in).

A. What is the length difference in centimeters (cm)?

**Answer:** 11.43 cm

B. What is the fish's total length in millimeters (mm)?

**Answer:** 609.6 mm



Q6. A chemist is mixing a solution of 300 milliliters (ml) of saltwater to 2 liters (l) of freshwater:

- A. What is the final volume of the solution in milliliters (ml)

**Answer:** 2,300 ml

- B. What is the final volume of the solution in gallons (gal)?

**Answer:** 0.60759572 gal

Q7. A businessperson is looking at purchasing two adjacent pieces of property, the first one is 108 hectares (ha) and the second is 26 acres.

- A. How many acres is the first piece of property?

**Answer:** 266.87381 acres

- B. How many hectares (ha) is the second piece of property?

**Answer:** 10.521827 ha

- C. Find the total area of the two pieces of property in square miles (m<sup>2</sup>).

**Answer:** 0.45760828 m<sup>2</sup>

Q8. A high school runner completes a 400-meter race in 1.12 minutes (min).

- A. How many seconds (s) was this race completed in?

**Answer:** 67.2 sec

- B. If the runner maintained this pace for another 400 meters, what would the final time be in seconds (s)?

**Answer:** 134.4 sec



Q9. A long distance runner has a pace of 6.4 miles per hour (mi/hr).

- A. How many feet per minute (ft/min) does he travel?

**Answer:** 563.2 ft/min

- B. What is his pace in kilometers per hour (km/hr)?

**Answer:** 10.299802 km/hr

Q10 The temperature of the sun is approximately 5,770 Kelvin (K) degrees.

- A. What is this temperature in degrees Fahrenheit (°F)?

**Answer:** 9926.33 °F

- B. What is this temperature in degrees Celsius (°C)?

**Answer:** 5496.85 °C

Q11. A homeowner has a 350-kilowatt (kW) portable generator.

- A. What is the horsepower (hp) of this generator?

**Answer:** 469.35773 hp

- B. How many watts (W) are there in a 500 horsepower (hp) generator?

**Answer:** 372849.94 W



### **Extension – Student Inquiry**

As an extension inquiry activity, choose objects in the classroom for the students to measure. Students will choose an object, sketch the object, and then choose a measurement to take. Once students take their measurement, they will use the unit conversion tool on the calculator to perform a unit conversion of their choice.

Some examples may include:

- A. objects of different masses and a digital scale or triple beam balance for mass measurements
- B. objects of different temperatures and a thermometer for temperature measurements
- C. objects of different volumes and graduated cylinders for volume measurements
- D. objects of different lengths and sizes and rulers for length or area measurements

Students will record their responses on the student activity sheet.

### **TI-Nspire Navigator Opportunities**

Have students work out individual unit conversion problems and review the steps together as a class. Use Class Capture to monitor students' progress through the lesson. Use Quick Poll to send formative assessment questions during the lesson.

### **Wrap Up**

When students are finished with the activity, discuss activity questions using Slide Show.

### **Assessment**

- Formative assessment will consist of questions on the student activity sheet to be used alongside the unit conversion tool.
- Summative assessment will consist of questions/problems on the chapter test
- Use of the RAFT (Role, Audience, Format, Topic) strategy: Have students measure items found in the classroom and use the conversion tool to change the measurement units.