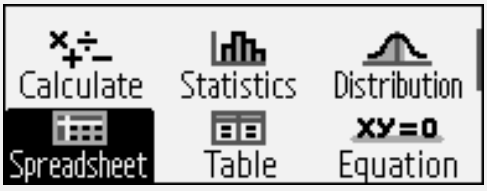
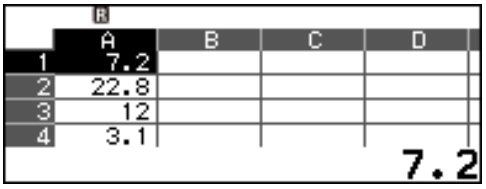
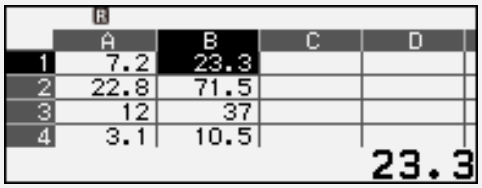
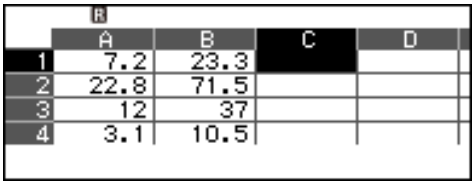
Unit 3: Lesson 3 – Exploring Circumference: Spreadsheet App

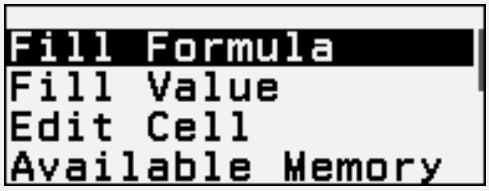
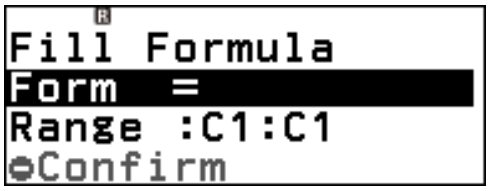
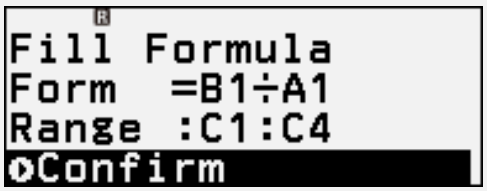
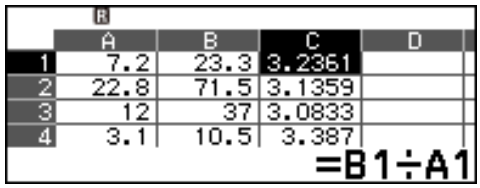
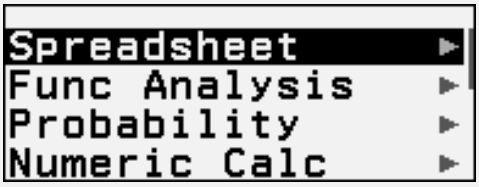
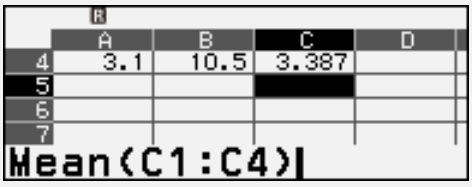
Activity 3.2: Measuring Circumference and Diameter

Skill: Use the Spreadsheet app to estimate the proportionality constant between variables.

Activity Summary:

In this activity, students will measure the diameter and circumference of various circular objects, mirroring a previous activity involving squares. They will observe that these two quantities exhibit a proportional relationship. Through graphical analysis, students should be able to estimate the constant of proportionality to be approximately a number "slightly larger than 3"; introducing the constant of π. Since the circumference of a circle is proportional to its diameter, each object's ratio of circumference to diameter will be a constant. The Spreadsheet app of the calculator can be used to analyze our measurements and to determine an estimate for the proportionality constant between the circumference and diameter of a circular object.

1. This task will utilize the **Spreadsheet app** to quickly calculate, view, and analyze multiple measurements of circular objects' diameter and circumference. Press ⌂ **– Home** and then use the **arrow keys** to highlight the **Spreadsheet app**.	
2. Enter the measured **diameters** of the circular objects in **Column A**. Press either OK or EXE to enter the value and move to the cell below. Four sample objects are used for these notes. Press the **scroll up key**, ⏫, after entering your last value to return to **Cell A1**.	
3. Press the **right arrow**, ▶, to move to **Cell B1** to begin entering the corresponding **circumference** measurements. Press either OK or EXE to enter the value and move to the cell below. Press the **scroll up key**, ⏫, after entering your last value to return to **Cell B1**.	
4. Since a circle with a diameter approaching zero also has a circumference approaching zero, the relationship between circumference and diameter is a proportional relationship. Press the **right arrow**, ▶, to move to **Cell C1**.	

5. The **Fill Formula** command can be used to complete **Column C** with the **circumference** of each circular object **divided** by its **diameter**. Press ⚙ **– Tools** to open the menu of options.	
6. The **Fill Formula** option is highlighted at the top. Press either OK or EXE. The **proportionality constant** is the circumference, **Column B**, **divided by** the diameter, **Column A**.	
7. For **Form =**, enter **B1 ÷ A1** by typing ⬆ 5 1 ÷ ⬆ 4 1 followed by either OK or EXE. For **Range**, change the **second 1** to a **4**, our last row of data. **Right arrow** to the far right, press the **Backspace key**, ◀, and press 4. Press either OK or EXE to enter.	
8. Press either OK or EXE to **Confirm**. Now **Column C** is filled in with the **quotient** of each object's **circumference divided** by its **diameter**.	
9. The **average(mean)** of these **four** values can be found in the spreadsheet. Move to **Cell C5**. Press the **Catalog button**, ▭. **Spreadsheet** is highlighted at the top of the menu as we are currently in the **Spreadsheet app**.	
10. Press either OK or EXE to open this menu. Press the **up arrow**, ▲, **twice** to highlight **Mean**.	
11. Press either OK or EXE to select. After the **left parentheses**, enter **C1:C4** by typing ⬆ 6 1 ▭ OK ▼ ▼ ▼ OK ⬆ 6 4.	
12. Press either OK or EXE. **3.2106**, the **average** of the four ratios, is very close to **3.1415926…** the value of π!