

### Activity Overview

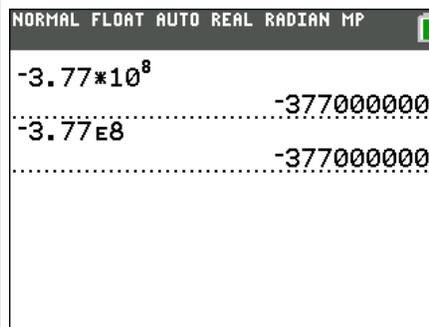
This activity gives students an opportunity to see where large and small numbers are used and how scientific notation offers a convenient method of writing such numbers.

### Topic: Numbers and Operations

- Understand numbers, ways of representing numbers, relationships among numbers, and number systems
- Develop an understanding of large numbers and recognize and appropriately use exponential, scientific, and calculator notation

### Teacher Preparation and Notes

- To download the data list and student worksheet, go to [education.ti.com/exchange/sn](http://education.ti.com/exchange/sn)



This activity utilizes MathPrint™ functionality and includes screen captures taken from the TI-84 Plus C Silver Edition. It is also appropriate for use with the TI-83 Plus, TI-84 Plus, and TI-84 Plus Silver Edition but slight variances may be found within the directions.

#### Compatible Devices:

- TI-84 Plus Family
- TI-84 Plus C Silver Edition

#### Associated Materials:

- Scientific\_Notation\_Student.pdf
- Scientific\_Notation\_Student.doc

#### Tech Tips:

- Access free tutorials at <http://education.ti.com/calculators/pd/US/Online-Learning/Tutorials>
- Any required calculator files can be distributed to students via handheld-to-handheld transfer.

### Part 1 – Writing Scientific Notation in Expanded Form

Questions 1 -4

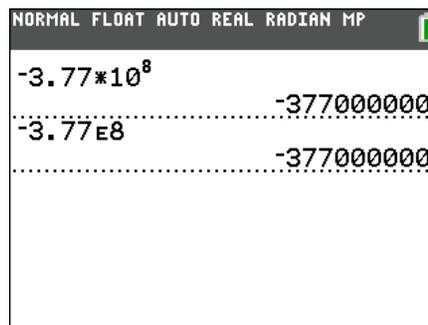
Have students write their answers and check them on the calculator. Help students understand the form for scientific notation.

Students can enter scientific notation numbers two different ways, using 10 or E. Note that the key is labeled EE but the display is E.

1.  $(-)$   $3$   $.$   $77$   $\times$   $10$   $^$   $8$
2.  $(-)$   $3$   $.$   $77$   $2^{nd}$   $EE$   $8$

To check  $-3.77 \times 10^8$ , enter in one of the two ways shown above and see if it matches their answer.

Sometimes the calculator's limitations won't let it write the answer in expanded form. In that case have students enter their answers in expanded form and see if they match the original.



### Part 2 – Writing Numbers in Scientific Notation

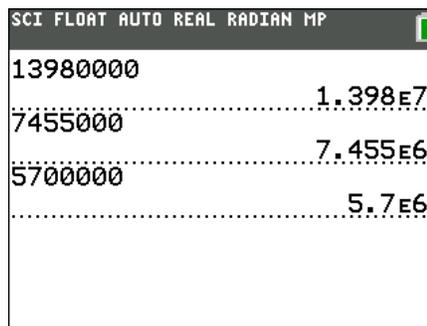
Questions 5 & 6

Students can change the TI-84 Plus mode to “Sci” to convert numbers to scientific notation. To change the mode, press  $\text{MODE}$  and  $\blacktriangleright$  to move to **Sci**, then press  $\text{ENTER}$ .

The answer will appear with an E. Explain to students that this represents  $\times 10$  and the number that follows the E is the exponent.

Students should not enter the commas into the calculator when converting the salaries.

Discuss with students how to compare numbers with the exponent. What is different between Carson's salary and Stacy's?



Questions 7 & 8

Students need to change the calculator mode to **Normal** by pressing [MODE] [ENTER]. Press [2nd] [QUIT] to return to the Home Screen..

Students can fold a piece of paper in half to understand how the thickness doubles. Ensure students understand that the  $\times 2$  represents the doubled thickness.

The key presses for the screen to the right are [0] [.] [0] [0] [4] [ENTER] [x] [2] [ENTER] [ENTER] [ENTER]. Continue pressing [ENTER] to solve the problem. They will need to count how many times they press enter.

They do not count the first entry as a paper fold.

Questions 9 & 10

Place students in pairs to discuss the probability of a head when tossing one coin. When you toss the coin twice, what is the probability? Discuss as a class if this number is getting larger or smaller. Let students guess how small the answer may be.

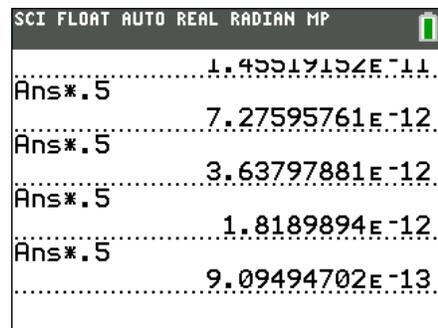
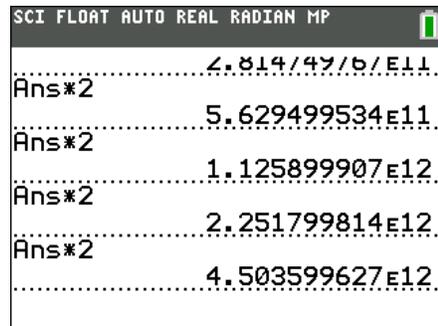
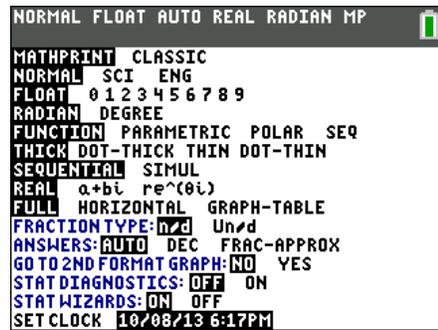
Solve the problem with the following key presses:

[.] [5] [ENTER] [x] [.] [5] [ENTER] [ENTER] [ENTER] ...

They need to count the first entry because it is a flip.

Students are to then write the answer in expanded form.

For the first few flips you can ask the students to convert the decimal to a fraction and/or a percent.



**Part 3 – Ordering Numbers in Scientific Notation**

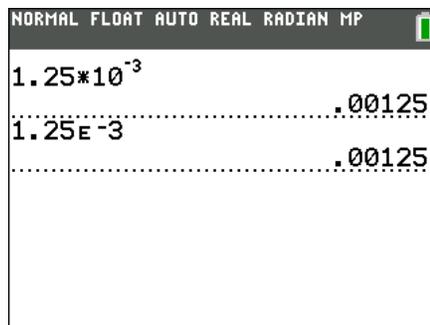
Students often confuse a negative number with a negative exponent. Using a number line to look at relative location can help student understanding.

Questions 11 & 12

If students have difficulty placing the numbers on the number line, have them convert the tick marks to expanded form for assistance.

Students should ensure that the calculator is in **Normal** mode. Press **[MODE]** **[ENTER]** **[2nd]** **[QUIT]**.

Enter the first number,  $1.25 \times 10^{-3}$ , or **[1]** **[.]** **[2]** **[5]** **[2nd]** **[EE]** **[(-)]** **[3]** and then press **[ENTER]**. Students can repeat this process for each of the numbers.



**Solutions to Student Worksheet**
**Part 1 – Writing Scientific Notation in Expanded Form**

1.  $-3.77 \times 10^8$  **Answer: –377,000,000**
2.  $1.202 \times 10^5$  **Answer: 120,200**
3.  $4.224 \times 10^{-6}$  **Answer: 0.000004224**
4.  $-5.24 \times 10^{-12}$  **Answer: –0.00000000000524**

**Part 2 – Writing Numbers in Scientific Notation**

5. The following are salaries for the 5 top paid players of the Cincinnati Bengals. Write each salary in scientific notation. **Answer:**

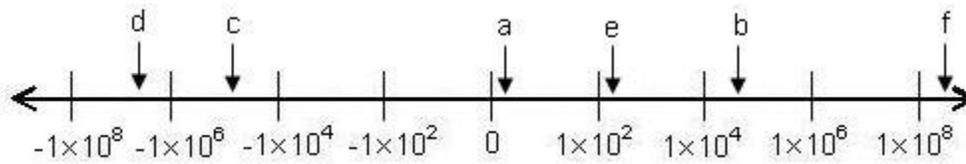
Player	Salary	Scientific Notation
Carson Palmer	\$13,980,000	$1.398 \times 10^7$
Stacy Andrews	\$7,455,000	$7.455 \times 10^6$
Chad Johnson	\$6,415,370	$6.41537 \times 10^6$
Antwan Odom	\$5,700,000	$5.7 \times 10^6$
Levi Jones	\$5,266,666	$5.266666 \times 10^6$

6. The 2007 median American household income was  $\$5.0233 \times 10^4$ . How does this compare to the salaries above?

**Answer: Students should notice that the exponents have a difference of 2. The football salaries are more than 100 times the median income.**

7. Imagine you could fold a piece of paper 0.004 inches thick 50 times. About how many inches thick would the resulting paper be after the 50<sup>th</sup> fold? **Answer:  $4.504 \times 10^{12}$  inches**
8. What is the answer in expanded form? **Answer: 4,504,000,000,000 inches**
9. What is the percent chance of flipping a coin 40 times and having it come up heads each time?  
**Answer:  $9.095 \times 10^{-13}$**
10. What is the answer in expanded form? **Answer: 0.0000000000009095**

**Part 3 – Ordering Numbers in Scientific Notation** 11. Place the following numbers on the number line. After placing them on the number line, switch with a partner to check answers. **Answer:**



12. Draw an appropriate number line for the following numbers. Explain your choice.

**Answer:** All the numbers are between  $-1$  and  $1$ . The larger the negative exponent, the closer the number is to zero. A possible number line is given.

