

Section 1.7 Exponents and Order of Operations

Math 102 Course Outline Unit I Objectives:

- Use a graphing utility to evaluate numerical expressions requiring the order of operations.
- Use a graphing utility to verify computations obtained using pencil and paper methods.

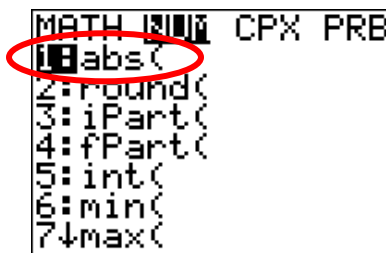
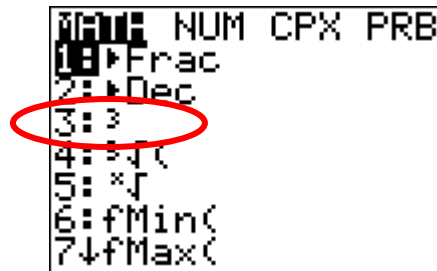
Introduce the graphing calculator features AFTER students have mastered evaluating numerical expressions by hand.

Calculator features used in this lesson:

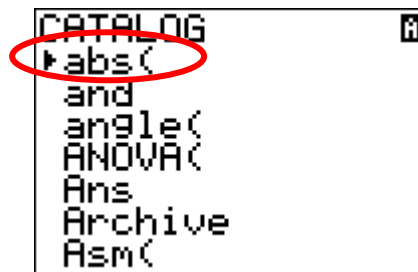
- Home screen
- Operations keys: +, -, ×, ÷
- Opposite key: (-)
- Caret key ^
- x^2 key
- x^3 (cubing operation) in the MATH menu



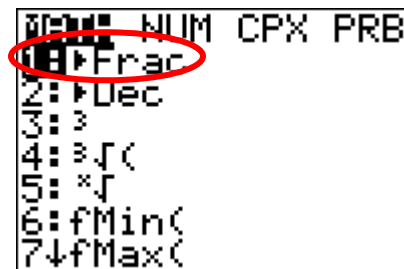
- key
- DEL key
- INS key
- Absolute value symbol
 - in MATH menu



- in CATALOG



- Change answer to a fraction in MATH menu



Part I

Objective: Use a graphing utility to evaluate numerical expressions requiring the order of operations.

Compare the answers to the following problems. Emphasize the correct use of parentheses with problems 1, 3, 5 and 6.

1. $5 + \frac{8}{4}$ versus $\frac{5+8}{4}$

2. $|-5 - 18|$ versus $|-5| - 18$

3. -3^2 versus $(-3)^2$

4. 7^3 (from the MATH menu) versus $7 \wedge 3$

5. $20/4 \cdot 5$ versus $\frac{20}{4 \cdot 5}$

6. $5/5+5$ versus $\frac{5}{5+5}$

Part II

Objective: Use the calculator as a verification tool.

Have students evaluate each expression "by hand" and then check on the calculator. If necessary, express answers both as a rational number without decimals and as a decimal approximation, to the nearest hundredth.

1. $\frac{12(2)^3}{4^2 + 4 \cdot 5}$

Answer: $\frac{8}{3} \approx 2.67$

2. $\left(\frac{7 - 5^2}{8 + 4 \cdot 2}\right)^2$

Answer: (exact) $\frac{81}{64}$, **1.265625**

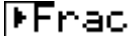
3. $\frac{(-3+1)^3 + |7-9|}{24 \div 6 + 2 \cdot 4}$

Answer: $-\frac{1}{2}$, **-0.5**

4. A student has grades of 80, 75, 95, and 60 on four algebra quizzes. Find the student's quiz average. **Answer: 77.5**

INSTRUCTOR NOTES

As you do these problems, note to students that

- You can edit expressions before executing by moving the cursor along a line and typing over characters. Use DEL or 2nd INS to delete or insert characters (respectively) at the cursor location.
- CLEAR clears an entire line of text where the cursor is located or the Home Screen if the cursor is on a blank line.
- The last entered expression can be recalled by pressing 2ND ENTRY. The expression may be edited and re-entered.
- Answers can be expressed in fractional form using the  Frac feature in the MATH menu.

At some point during the lesson, demonstrate how to edit a numerical expression using the DEL key and the INS key.