Section 1.8 Simplifying Algebraic Expressions

Math 102 Course Outline Unit II objectives:

- Evaluate algebraic expressions using a graphing utility.
- Use a graphing utility to verify computations obtained using pencil and paper methods.

Calculator features used in this lesson:

- Home screen
- Operations keys: +, −, ×, ÷
- Opposite key: (−)
- Variable key 

- Caret key 
- ERROR message
- x^2 key 

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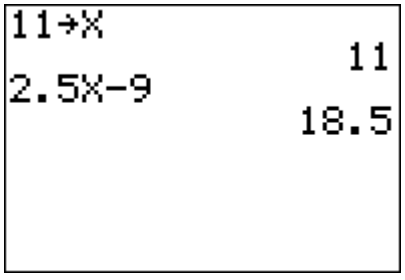
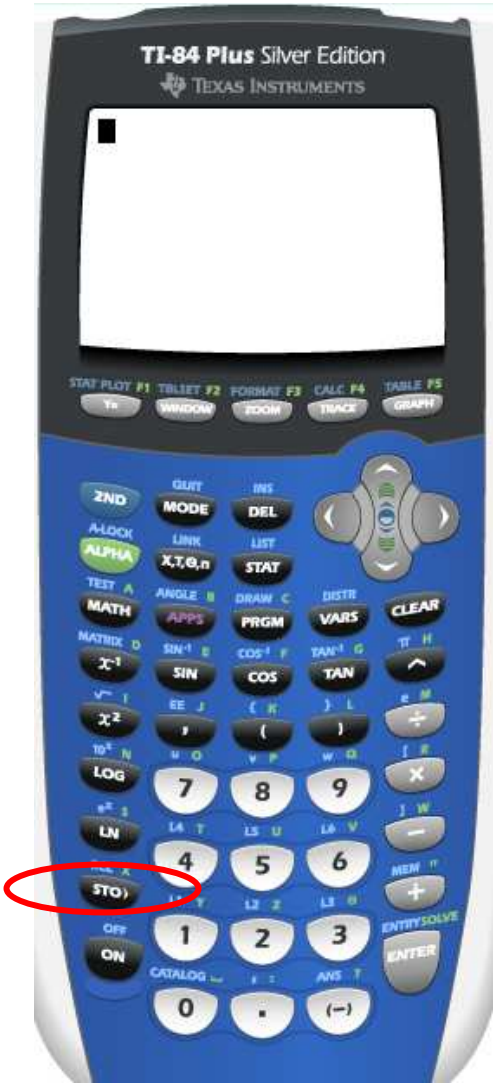
key
- Change answer to a fraction in MATH menu
- Store key: 

(see calculator screen to the right)

NOTE: The value of the variable must be entered in the calculator **BEFORE** pressing the 

key.

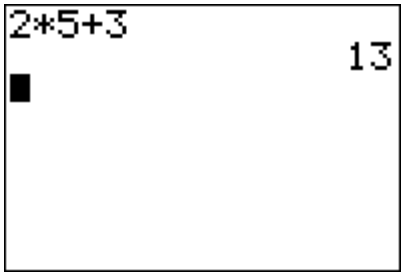


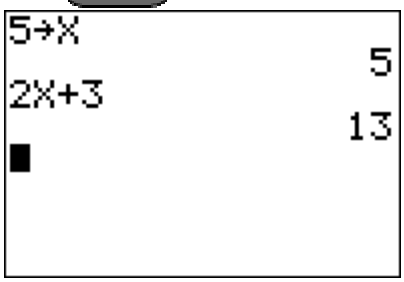


Part I

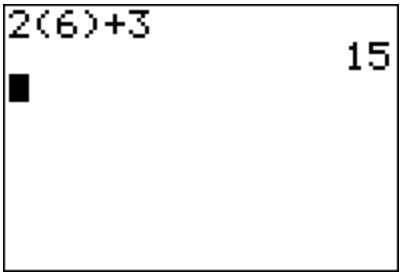
Objective: Evaluate algebraic expressions using a graphing utility.

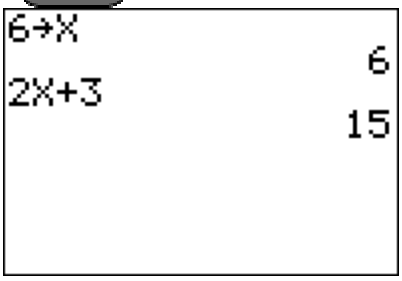
1. Evaluate $2x + 3$ when $x = 5$ using substitution on the home screen.
   Evaluate $2x + 3$ when $x = 5$ using the STO▸ key.





Evaluate $2x + 3$ when $x = 6$ using substitution on the home screen.
Evaluate $2x + 3$ when $x = 6$ using the STO▸ key.

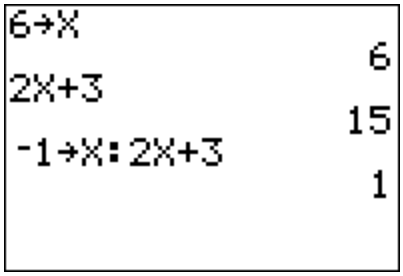




Evaluate $2x + 3$ when $x = -1$ using substitution on the home screen.
Evaluate $2x + 3$ when $x = -1$ using the STO▸ key.

INSTRUCTOR NOTE

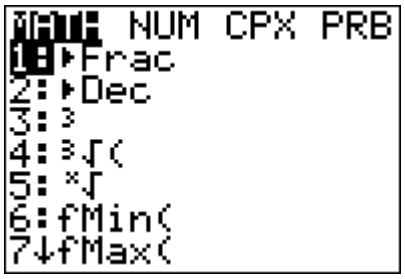
The colon key (ALPHA 0) can be used to separate the value of the variable from the algebraic expression, thereby placing both the value of the variable and the expression on one line.

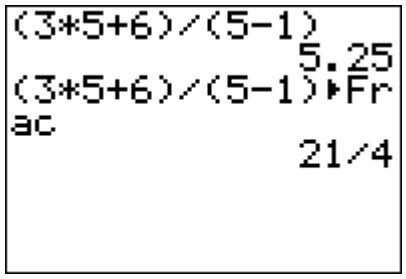


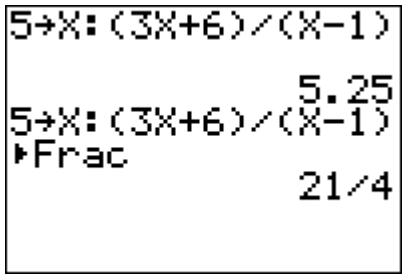
2. Evaluate $\frac{3x+6}{x-1}$ when x = 5, using substitution on the home screen.

NOTE: Show students how to express the answer either as a decimal value or a fraction in lowest terms using the ▸Frac feature in the MATH menu.

Evaluate $\frac{3x+6}{x-1}$ when x = 5 using the STO▸ key.







INSTRUCTOR NOTES

- Emphasize the correct use of parentheses whether using substitution on the home screen or using the STO▸ key.
- Students should be able to express the answer either in decimal form or rational number form without decimals.

Evaluate $\frac{3x+6}{x-1}$ when x = -3, using substitution on the home screen.

Evaluate $\frac{3x+6}{x-1}$ when x = -3, using the STO▸ key.

Answer: 0.75 or $\frac{3}{4}$

Evaluate $\frac{3x+6}{x-1}$ when x = -1, using substitution on the home screen.

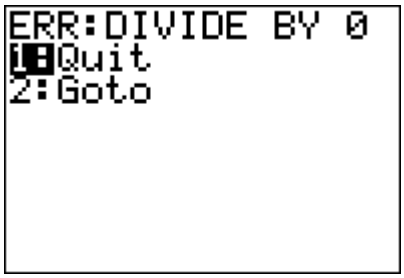
Evaluate $\frac{3x+6}{x-1}$ when x = -1, using the STO▸ key.

Answer: -1.5 or $-\frac{3}{2}$

Evaluate $\frac{3x+6}{x-1}$ when x = 1 using either substitution on the home screen or the STO▸ key.

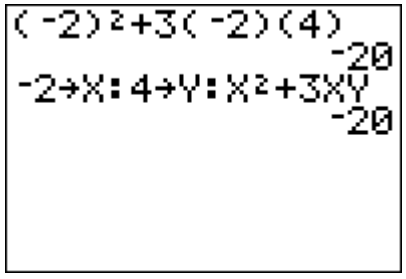
INSTRUCTOR NOTE

Discuss the ERROR message that is generated for this problem and why it is generated.



3. Evaluate x^2+3xy when x = -2 and y = 4, using substitution on the home screen.

Evaluate x^2+3xy when x = -2 and y = 4, using the STO▸ key.



Part II

Objective: Use a graphing utility to verify computations obtained using pencil and paper methods.

For these problems, determine the solution by hand and then check using either substitution on the home screen or the 

key.

1. The cost of renting a moving van for one day is \$19.95 plus \$0.25 per mile. The expression $19.95 + 0.25m$ represents the total cost of renting the truck for one day and driving m miles. Evaluate the expression $19.95 + 0.25m$ for $m = 315$.

   Answer: \$98.70

2. The length of a rectangle is 3 feet more than twice its width, x. The algebraic expression $2(2x+3)+2x$ represents the perimeter of the rectangle. Evaluate the expression $2(2x+3)+2x$ for $x = 9$.

   Answer: 60 feet

3. The area of a triangle with base b inches and height h inches is given by the expression $\frac{1}{2}bh$. Determine the area of a triangle in which $b = 7$ and $h = 9$.

   Answer: 31.5 square inches