

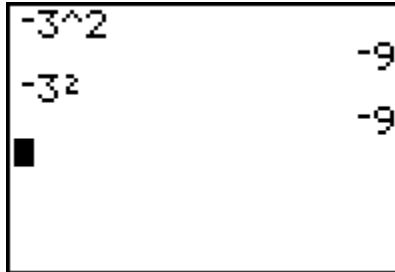
Math 0098 Graphing Calculator Notes for Appendix F
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Objective 1: Use the calculator to evaluate exponential expressions.

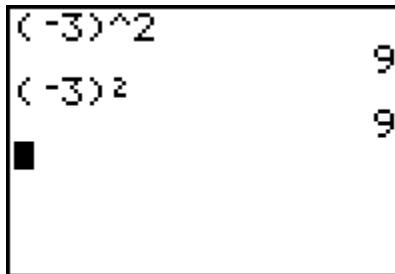
Example: Evaluate the following expressions.

$$-3^2$$

Use the \wedge symbol or the x^2 key to square a number.

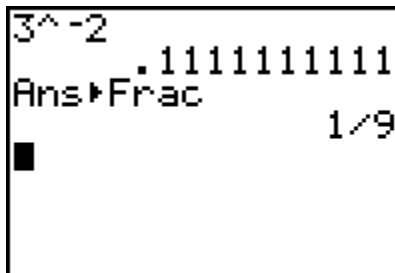


$$(-3)^2$$



$$3^{-2}$$

To convert answer to a fraction, press MATH, enter, enter.



Objective 2: Verify your work with exponents.

Simplify the expressions by hand and use your calculator to check your work. To check your work, enter the original expression in Y1 and your answer in Y2 and see if the table values agree. Note: This only works with one-variable expressions.

Example: Simplify $(2x^3)(-3x^{-5})$ using properties of exponents.

Answer (by hand): $-6x^{-2} = \frac{-6}{x^2}$.

To check on the calculator: Enter the original problem in Y1 and your answer in Y2. Use the $\boxed{X, T, \theta, n}$ key for the variable. To compare the table values, press 2^{nd} , Graph. The y1 and y2 columns will agree if you have simplified the problem correctly.

Plot1	Plot2	Plot3
Y1	$(2X^3)(-3X^{-5})$	
Y2	$-6/X^2$	
Y3	=	
Y4	=	
Y5	=	
Y6	=	

X	Y1	Y2
0	ERROR	ERROR
1	-6	-6
2	-1.5	-1.5
3	-.6667	-.6667
4	-.375	-.375
5	-.24	-.24
6	-.1667	-.1667

X=0

Since the y-columns agree, our simplification is correct.

Example: Simplify $(x+2)^2$.

Answer (by hand):

$$\begin{aligned} (x+2)^2 &= (x+2)(x+2) \\ &= x^2 + 2x + 2x + 4 \\ &= x^2 + 4x + 4 \end{aligned}$$

Verify on calculator:

Plot1	Plot2	Plot3
Y1	$(X+2)^2$	
Y2	X^2+4X+4	
Y3	=	
Y4	=	
Y5	=	
Y6	=	
Y7	=	

X	Y1	Y2
0	4	4
1	9	9
2	16	16
3	25	25
4	36	36
5	49	49
6	64	64

X=0

Since the y columns agree, our answer is correct.

Note: A common mistake is to simplify $(x+2)^2$ as $x^2 + 4$ but notice below that the tables for these expressions do not agree. Therefore, this is not the right simplification.

Plot1	Plot2	Plot3
Y1	$(X+2)^2$	
Y2	X^2+4	
Y3	=	
Y4	=	
Y5	=	
Y6	=	
Y7	=	

X	Y1	Y2
0	4	4
1	9	5
2	16	8
3	25	13
4	36	20
5	49	29
6	64	40
X=0		

Objective 3: Verify factoring problems.

Follow the steps in objective 2, that is, enter the original polynomial in y1, the factored form in y2, and compare the table values.

Example 2: Factor $x^2 - 9$.

Answer (by hand): $(x+3)(x-3)$

Check on the calculator:

Plot1	Plot2	Plot3
Y1	X^2-9	
Y2	$(X+3)(X-3)$	
Y3	=	
Y4	=	
Y5	=	
Y6	=	
Y7	=	

X	Y1	Y2
0	-9	-9
1	-8	-8
2	-5	-5
3	0	0
4	7	7
5	16	16
6	27	27
X=0		

Since the two y columns agree, our factoring is correct.

Objective 4: Find factors on the calculator.

When factoring trinomials whose leading coefficient is not 1, you can use the grouping method which requires you to find factors of the product $a \cdot c$. The calculator will find the factors of a number as shown below.

Example: Factor $4x^2 - 15x + 9$

To factor this, find the factors of $(4)(9) = 36$ that have a sum of 15. To find the factors of 36 on the calculator, enter the expression $36/x$ (36 divided by x) in the equation editor and view the table. The pair of numbers whose x value and y1 value are integers are factors of the number.

Plot1	Plot2	Plot3
Y1	36/X	
Y2	=	
Y3	=	
Y4	=	
Y5	=	
Y6	=	
Y7	=	

X	Y1
0	ERROR
1	36
2	18
3	12
4	9
5	7.2
6	6

The factors of 36 are
 1, 36
 2, 18
 3, 12
 4, 9
 6, 6

To finish factoring the problem, find the factors in the list that have a sum of 15. These are 3 and 12. Since the last sign of the trinomial is positive (sum), these numbers will be inserted with the same sign as whatever is on the middle coefficient, which in this case is negative. Then use grouping to factor.

$$\begin{aligned}
 4x^2 - 15x + 9 &= 4x^2 - 3x - 12x + 9 \\
 &= x(4x - 3) - 3(4x - 3) \\
 &= (4x - 3)(x - 3)
 \end{aligned}$$

Check the answer on the calculator.

Plot1	Plot2	Plot3
Y1	4X ² -15X+9	
Y2	(4X-3)(X-3)	
Y3	=	
Y4	=	
Y5	=	
Y6	=	
Y7	=	

X	Y1	Y2
0	9	9
1	-2	-2
2	-5	-5
3	0	0
4	13	13
5	34	34
6	63	63

Since the two y columns agree, our factoring is correct.