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Keystrokes

Use Order of Operations

MATHEMATICAL PRACTICES
Use appropriate tools strategically.

QUESTION How can you use a graphing calculator to evaluate an expression?

You can use a graphing calculator to evaluate an expression. When you enter the expression, it is important to use grouping symbols so that the calculator performs operations in the correct order.

EXAMPLE Evaluate an expression

Use a graphing calculator to evaluate an expression.

Lean body mass is the mass of the skeleton, muscles, and organs. Physicians use lean body mass to determine dosages of medicine.

Scientists have developed separate formulas for the lean body masses of men and women based on their mass m (in kilograms) and height h (in meters). Lean body mass in measured in units called BMI (Body Mass Index) units.

Men: $1.10m - \frac{128m^2}{10{,}000h^2}$ **Women:** $1.07m - \frac{148m^2}{10{,}000h^2}$

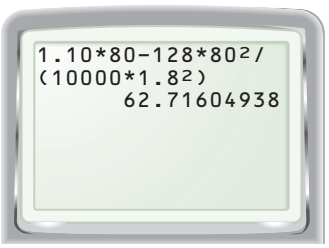
Find the lean body mass (in BMI units) of a man who is 1.8 meters tall and has a mass of 80 kilograms.

Solution

Enter the expression for men in the calculator. Substitute 80 for m and 1.8 for h. Because the fraction bar is a grouping symbol, enter the denominator using parentheses.

Use the following keystrokes.

1.10 × 80 − 128 × 80 x^2 ÷ (10000 × 1.8 x^2)



▸ The lean body mass of a man who is 1.8 meters tall and has a mass of 80 kilograms is about 62.7 BMI units.

PRACTICE

Use a calculator to evaluate the expression for $n = 4$. Round to the nearest thousandth.

1. $3 + 5 \cdot n \div 10$

2. $2 + \frac{3n^2}{4}$

3. $\frac{83}{3n^2} - 1.3$

4. $\frac{14.2n}{8 + n^3}$

5. $\frac{7 - n}{n^2}$

6. $5n^2 + \frac{4n^3 + 1}{3}$

7. Find the lean body mass (to the nearest tenth of a BMI unit) of a woman who is 1.6 meters tall and has a mass of 54 kilograms.

Patterns and Expressions

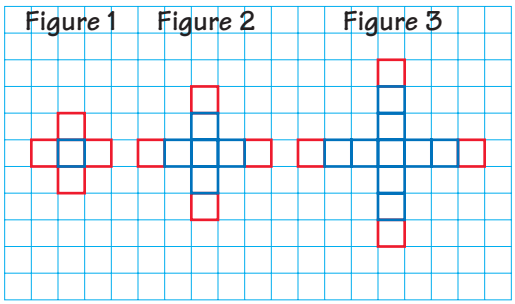
MATERIALS • graph paper

MATHEMATICAL PRACTICES
Look for and make use of structure.

QUESTION How can you use an algebraic expression to describe a pattern?

EXPLORE Create and describe a pattern

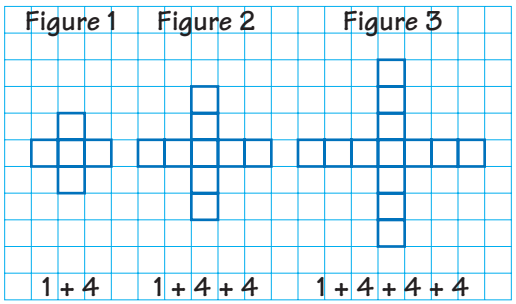
STEP 1



Draw a figure Draw a unit square on graph paper. Then draw a unit square against each side of the first square to form figure 1.

Copy figure 1 and draw a square on each "arm" to form figure 2. Use the same method to form figure 3.

STEP 2



Write expressions For each figure, write a numerical expression that describes the number of squares in the figure.

DRAW CONCLUSIONS Use your observations to complete these exercises

In Exercises 1–3, use the pattern in Steps 1 and 2 above.

1. How is the figure number related to the number of times 4 is added in the numerical expression? Predict the number of squares in the fourth figure. Create figure 4 and check your prediction.
2. *Describe* how to calculate the number of squares in the nth figure.
3. Write an algebraic expression for the number of squares in the nth figure. (*Hint:* Remember that repeated addition can be written as multiplication.)
4. **a.** Write an algebraic expression for the number of squares in the nth figure of the pattern shown.

   b. *Explain* why the expression n^2 is not an appropriate answer to part (a). Create a pattern that can be described by the expression n^2.


Figure 1


Figure 2


Figure 3


Figure 4