Name _____

ORDER OF OPERATIONS

In "When Zombies Attack!" on page 4, you learned how to solve problems using formulas. When solving an equation, you need to use the order of operations. Round all money answers to the nearest cent. Round all years and temperatures to the nearest whole number.

> **Order of Operations:**
> **1.** Simplify terms in parentheses or brackets.
> **2.** Simplify terms that include exponents.
> **3.** Complete any multiplication and division. Do this from left to right (whichever comes first).
> **4.** Complete any addition and subtraction. Do this from left to right (whichever comes first).

EXAMPLE: A soup company uses the formula for surface area of a cylinder ($SA = 2\pi r^2 + 2\pi rh$) to find out how much metal is needed to make each soup can. The soup cans have a radius of 1.5 inches and a height of 3 inches.
To solve this equation, replace the variables with their given values:

$$SA = 2 \times \pi \times 1.5^2 + 2 \times \pi \times 1.5 \times 3$$

Now you can solve the equation using order of operations.

1. There are no parentheses or brackets in the equation, so skip this step.
2. Simplify the term that includes an exponent:
$1.5^2 = 2.25$
$SA = 2 \times \pi \times 2.25 + 2 \times \pi \times 1.5 \times 3$
3. Complete multiplication and division from left to right:
$2 \times \pi \times 2.25 = 14.13$ and $2 \times \pi \times 1.5 \times 3 = 28.26$
$SA = 14.13 + 28.26$
4. Complete addition and subtraction from left to right:
$14.13 + 28.26 = 42.39$

So, each soup can uses about 42.39 square inches of metal.

1 The total cost (including tax) of dinner at a pizza place is: $C = 1.06 \times (2.5p + 1.89d)$, where p is the number of slices of pizza and d is the number of drinks. A family buys 6 slices of pizza and 4 drinks.
A. Find $2.5p$.

B. Find $1.89d$.

C. Find $(2.5p + 1.89d)$.

D. Find $1.06 \times (2.5p + 1.89d)$.

E. Another family buys 7 pieces of pizza and 3 drinks. How much does their meal cost?

2A. Convert 86° Fahrenheit to degrees Celsius using the formula: $C = 5(F - 32) \div 9$.

B. Convert 24° Celsius to degrees Fahrenheit using the formula $F = 9C \div 5 + 32$.

3 You can use the formula $A = C \div 3.14 \times G$ to find the approximate age of a tree. C is the tree's circumference in inches and G is the tree's growth factor.
A. A white oak has a growth factor of 5 and a circumference of 56 inches. About how old is the white oak?

B. A green ash tree has a growth factor of 4 and a circumference of 22 inches. About how old is the green ash?

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A ZOMBIE BOOM

In "When Zombies Attack!" on page 4, you read about how to use formulas to solve word problems. Use the formulas below to answer five more questions about a (make-believe!) zombie invasion.

N = uninfected human population
Z = number of zombies
R = transmission rate per hour
b = number of people a zombie infects in an hour
t = number of hours

Number of people a single zombie can infect in 1 hour: $N \times R$
Number of new infections that zombies cause in 1 hour: $N \times Z \times R$
Number of people turned into zombies over time: b^t

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1 A. There are 200 people trapped in a room with a single zombie whose transmission rate is 0.01. Which formula would you use to determine the number of people who will be infected after an hour?

B. Solve the formula using the information above.

2 A. If there were 3 zombies, all with a transmission rate of 0.01, in a room with 200 people, which formula would you use to find the number of people infected after an hour?

B. Solve the formula using the information above.

3 A zombie can infect 5 humans in one hour. Which formula would you use to determine how many people it can infect in 3 hours?

4 Zombie A, who has a transmission rate of 0.001, enters a small town with a population of 15,000 people. At the same time, Zombie B, who has a transmission rate of 0.01, enters a neighboring town with a population of 10,000. Which zombie will infect more people in 1 hour?

5 One powerful zombie can infect 8 humans in an hour. How many new people will be infected if it goes prowling between midnight and 6 a.m.?

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