2-1 Enrichment
Guess the Number

Think of a number. Add five to your number. Now, double your result. Double your result again. Divide you answer by four. Finally, subtract your original number. Your result is five.

How is it possible to know what the answer is without knowing the original number? Write the steps listed above as an expression in equation form. Then use algebra to show why this trick works.

Think of a number: $\qquad$ x

Add five to your number: $\qquad$ $x + 5$

Double your result: $\qquad$ $2(x + 5)$

Double your result again: $\qquad$ $2(2(x + 5))$

Divide your answer by four: $\qquad$ $\dfrac{2(2(x + 5))}{4}$

Subtract your original number: $\qquad$ $\dfrac{2(2(x + 5))}{4} - x$

Simplify the final expression: $\qquad$ $\dfrac{4(x + 5)}{4} - x$ $\qquad$ Multiply.

$\qquad\qquad\qquad\qquad\qquad\qquad\quad$ $x + 5 - x$ $\qquad$ Divide.

$\qquad\qquad\qquad\qquad\qquad\qquad\quad$ 5 $\qquad$ Simplify.

So, the result will always be five, no matter what the starting number is.

Write variable expressions to determine why each number trick works.

1. Think of a number. Add eight. Double your result. Next, subtract 16. Finally, divide your result by 2. You get your original number back.

$$\frac{2(x+8)-16}{2} = x$$

2. Think of a number. Multiply by 10. Add 5 to your result. Next, subtract 3. Then add 2. Next, subtract 4. Divide your result by 5. Finally, subtract your original number. Your result is your original number.

$$\frac{10x+5-3+2-4}{5} - x = x$$

3. Think of a number. Add 1. Multiply your result by 6. Now, double your result. Next, divide your result by 12. Finally, subtract your original number. Your result is 1.

$$\frac{2(6(x+1))}{12} - x = 1$$

4. Think of a number. Multiply by 5. Add five to your result. Now, divide by 5. Subtract 1 from your result. Finally, subtract your original number. Your final result is 0.

$$\frac{5x+5}{5} - 1 - x = 0$$

5. Think of a number. Add 30. Multiply by 3. Multiply again by 2. Divide your result by 6. Finally, subtract your original number. Your answer is 30.

$$\frac{2(3(x+30))}{6} - x = 30$$