

# 1-5 Open Sentences

You should have the following words defined in your notebook:

Open Sentence, Solution, Replacement Set, Element, Solution Set, Equation, and Inequality

**Ex 1: State whether  $4x^2 + 5 = 149$  is true or false using the given value,  $x = 3$**

$$4( )^2 + 5 = 149$$

$$4(3)^2 + 5 = 149$$

$$4(\boxed{9}) + 5 = 149$$

$$\boxed{36} + 5 = 149$$

$$\boxed{41} = 149$$

**FALSE**

Rewrite using an open parenthesis for each variable

Substitute the value of the variable into the parenthesis

Exponents first,  $3^2 = 3 \bullet 3 = 9$

Multiplication next,  $4 \bullet 9 = 36$

Addition last,  $36 + 5 = 41$

$$41 \neq 149$$

**Ex 2: Find the solution set for  $48 \div x \bullet 2 \leq 8 + x^2$  given the replacement set  $x = \{3, 4, 8\}$ .**

$$\underline{x = 3}$$

Label work with the element you are using

$$48 \div ( ) \bullet 2 \leq 8 + ( )^2$$

$$48 \div (3) \bullet 2 \leq 8 + (3)^2$$

Rewrite using an open parenthesis for each variable

Substitute the value of the variable into the parenthesis

Concentrate on one side of the statement and then do the other side. Therefore you will do one step of the order of operations **per side**.

Mult and Div from Left to Right:  $48 \div 3 = 16$

Now do the multiplication:  $16 \bullet 2 = 32$

$$\begin{array}{l} 48 \div (3) \bullet 2 \leq 8 + (3)^2 \\ \boxed{16} \bullet 2 \leq 8 + \boxed{9} \\ \boxed{32} \leq \boxed{17} \end{array}$$

Exponents:  $3^2 = 3 \bullet 3 = 9$

Now do the addition:  $8 + 9 = 17$

FALSE because 32 is bigger than 17, so  $x = 3$  is NOT a solution

(Ex 2 is continued on the next page.)

$$\underline{x = 4}$$

Label work with the element you are using

$$48 \div ( ) \bullet 2 \leq 8 + ( )^2$$
$$48 \div (4) \bullet 2 \leq 8 + (4)^2$$

Rewrite using an open parenthesis for each variable  
Substitute the value of the variable into the parenthesis

Concentrate on one side of the statement and then do the other side. Therefore you will do one step of the order of operations **per side**.

Mult and Div from Left to Right:  $48 \div 4 = 12$

Now do the multiplication:  $12 \bullet 2 = 24$

$$48 \div (4) \bullet 2 \leq 8 + (4)^2$$
$$\boxed{12} \bullet 2 \leq 8 + \boxed{16}$$
$$\boxed{24} \leq \boxed{24}$$

Exponents:  $4^2 = 4 \bullet 4 = 16$

Now do the addition:  $8 + 16 = 24$

TRUE because 24 is less than or **equal to** 24, so  $x = 4$  is a solution.

$$\underline{x = 8}$$

Label work with the element you are using

$$48 \div ( ) \bullet 2 \leq 8 + ( )^2$$
$$48 \div (8) \bullet 2 \leq 8 + (8)^2$$

Rewrite using an open parenthesis for each variable  
Substitute the value of the variable into the parenthesis

Concentrate on one side of the statement and then do the other side. Therefore you will do one step of the order of operations **per side**.

Mult and Div from Left to Right:  $48 \div 8 = 6$

Now do the multiplication:  $6 \bullet 2 = 12$

$$48 \div (8) \bullet 2 \leq 8 + (8)^2$$
$$\boxed{6} \bullet 2 \leq 8 + \boxed{64}$$
$$\boxed{12} \leq \boxed{72}$$

Exponents:  $8^2 = 8 \bullet 8 = 64$

Now do the addition:  $8 + 64 = 72$

TRUE because 12 is **less than** or equal to 72, so  $x = 8$  is a solution.

Since  $x = 4$  and  $x = 8$  make the statement true, the solution set will have these two elements. Therefore the answer is  $\boxed{\boxed{\{4, 8\}}}$