GRADE 9 MATH
ASSIGNMENT #1
A SEARCH FOR PATTERNS

Mathematics has often been described as a "search for pattern". We will be searching for patterns as we review some arithmetic.

As you do these exercises, you should be asking yourself, "what is this pattern?", "can I believe that the pattern will always be there?". "why is there a pattern?" and "how can I understand this pattern?"

Exercise 1. Using a calculator(if you like), complete the following table:

1089 x 1	1089
1089 x 2	
1089 x 3	
1089 x 4	
1089 x 5	
1089 x 6	
1089 x 7	
1089 x 8	
1089 x 9	

Do you recognize any patterns in the answers that you have found?

Describe them.

Write down a three digit number that behaves in the same way.

List any others if you are able.

Exercise 2.

a) Select four digits, not any the same, from {0,1,2,3,4,5,6,7,8,9}.

Write them here: ____________

b) Write down the largest number possible using these four digits. _______

c) Write down the smallest number possible using these four digits. _______

d) Subtract these numbers. _______

e) Using the four digits of this difference, repeat steps b), c) and d) until you recognize a pattern emerging.

Questions

1. Why do we insist that not any of the digits in the original number be the same?

2. Why is there no point in continuing this process after a certain number of steps?

3. Repeat this exercise for a few different choices of four digits.

4. How many different choices of four digits are there?

5. Can we check that all of these choices behave in the same way?

6. Repeat this process for three digit numbers.

7. Is there a similar pattern for two digit numbers?

Exercise 3.

a) Select any number. _____

b) Multiply your number by 6 _____

c) add 12 _____

d) divide by 3 _____

e) subtract twice the original number _____

f) Repeat these steps with a different original number.

g) Repeat these steps with several different numbers. Try fractions.

h) What do you observe?

i) Explain why this happens.

j) Invent your own series of operations that will give similar results.

k) Challenge: in step a) use a letter to represent your first choice.

Exercise 4. Describe any patterns that you see in this arrangement of numbers:

Using these patterns, fill in the blank spaces.

(+3) x (+4) = +12

(+3) x (+3) = +9

(+3) x (+2) = +6

(+3) x (+1) = ____

(+3) x (+0) = ____

(+3) x (-1) = ____

(+3) x (-2) = ____

(+3) x (-3) = ____

(+3) x (-4) = ____

According to these patterns, we can say that whenever we multiply a positive number by a negative number we always get a __________ number.

Exercise 5. Describe any patterns that you see in this arrangement of numbers:

Using these patterns, fill in the blank spaces.

(+4) x (-4) = -16

(+3) x (-4) = -12

(+2) x (-4) = -8

(+1) x (-4) = ____

(0) x (-4) = ____

(-1) x (-4) = ____

(-2) x (-4) = ____

(-3) x (-4) = ____

(-4) x (-4) = ____

According to these patterns, we can say that whenever we multiply a negative number by a negative number we always get a __________ number.

Exercise 6. Using the patterns described above, answer the following questions:

a) what sort of answer would you expect if you were to divide a positive number by a positive number?

____

b) what sort of answer would you expect if you were to divide a positive number by a negative number?

____

c) what sort of number would you expect if you were to divide a negative number by a positive number?

____

d) what sort of number would you expect if you were to divide a negative number by a negative number?

____

Answer the following questions:

a) (+5) x (-2) =

b) (-4) x (+6) =

c) (-3) x (-8) =

d) (+3) x (+6) =

e) (-12) x (-7) =

f) (+6) x (+8) =

g) $\frac{+14}{-7} =$

h) $\frac{-48}{+16} =$

i) (-5) x (-2) x (+4) =

j) $\frac{(-3)\times(-6)}{(-9)} =$

k) $\frac{(-4)\times(-3)}{(+6)\times(-3)} =$

l) $\frac{(-1)\times(-1)\times(-1)\times(-1)}{(-1)\times(-1)\times(-1)} =$