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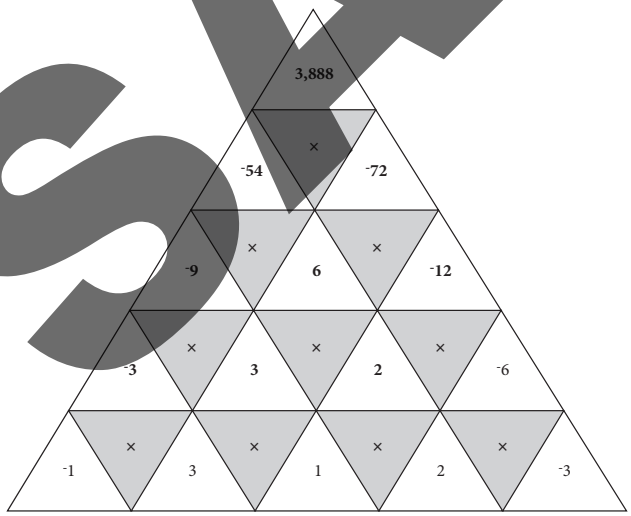
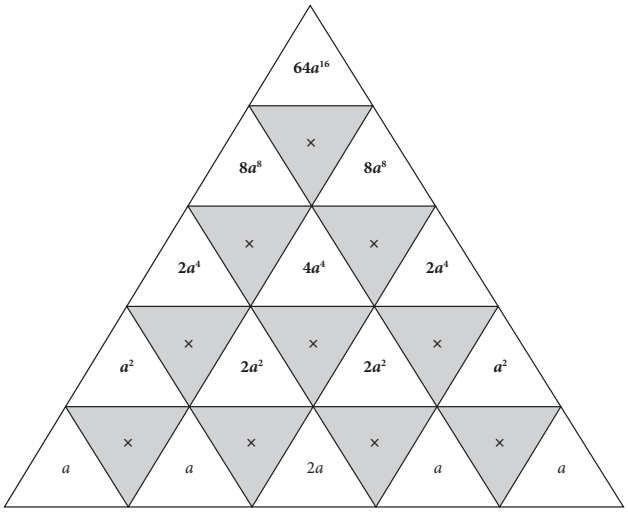
Introduction

Algebra and pre-algebra teach students to think about math in abstract terms. Instead of four bananas and four bananas (4 + 4), we have four bananas and an unknown quantity of bananas (4 + *b*).

While many students will go on to fields that do not require the daily use of algebra, they will all require the ability to think abstractly. Like any other muscle, the brain works best when it receives regular exercise. When it is asked to think in new ways, the brain builds new pathways. Pathways already built become stronger and stay active. *Algebra Puzzles* challenges students to use skills they have already acquired to solve problems that require them to think abstractly, or in ways that go beyond the typical review worksheet. The puzzles can be completed during free time over the course of the day or during a ten-minute open spot between subjects. They are a perfect sponge activity or can be assigned as "something different" for homework.

Algebra and pre-algebra vocabulary is reviewed, basic concepts are explained again, and analogies are made to familiar concepts or terms in other subject areas. *Algebra Puzzles* provides the opportunity to explore learned concepts in new ways, while challenging students to think more deeply about these concepts.

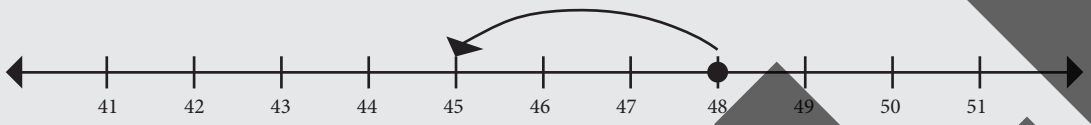




Name _____ Date _____

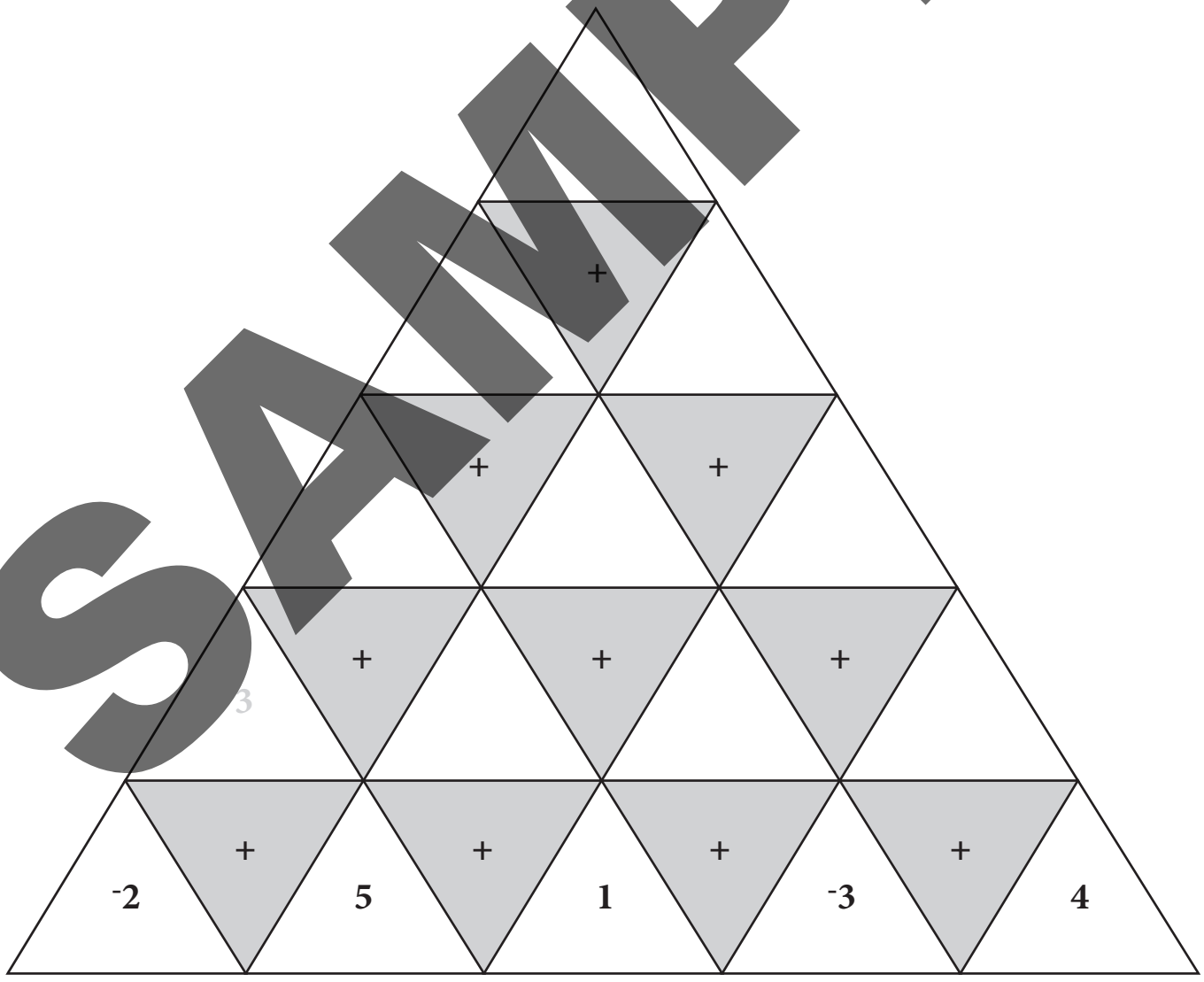
Integer Pyramid

Integer: a whole number that can be either greater than 0, called positive, or less than 0, called negative. Negative numbers are perfect for expressing "differences" (losses). Let's imagine that you weigh your poodle and find she is 48 pounds. You take her out running every day for a month and weigh her again and find she is 45 pounds. You could say she lost 3 pounds. You can also write *The difference in my poodle's weight between this month and last month is ¯3 pounds.* You could draw this on a number line like this:



DIRECTIONS

Add each pair of adjoining integers. Write the sum in the white triangle centered above each pair.



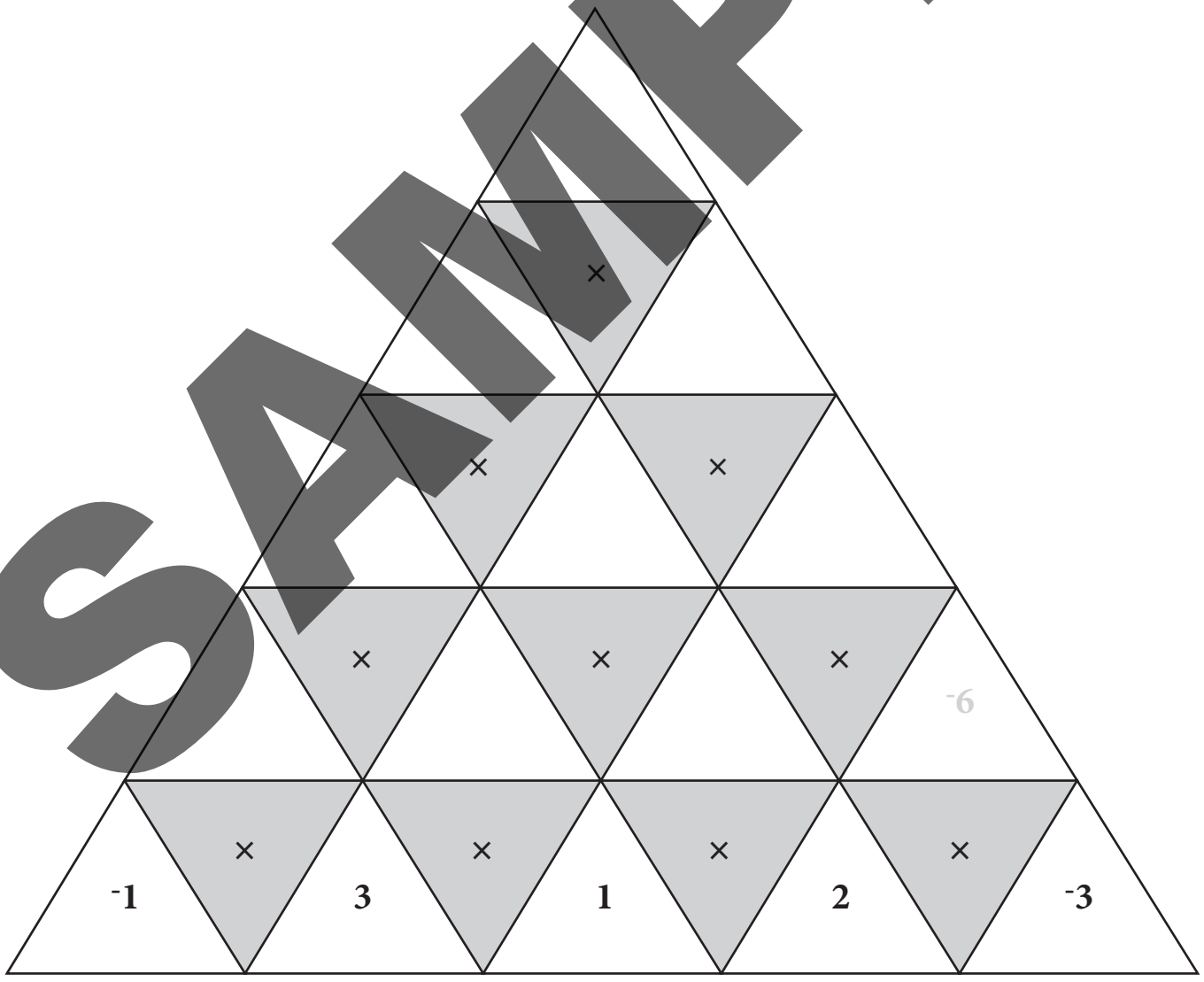
Name _____ Date _____

Multiplication Pyramid

If both integers are positive or negative, then the product is positive. If one integer is positive and the other is negative, then the product is negative.

DIRECTIONS

Multiply each pair of adjoining integers. Write the product in the white triangle centered above each pair.



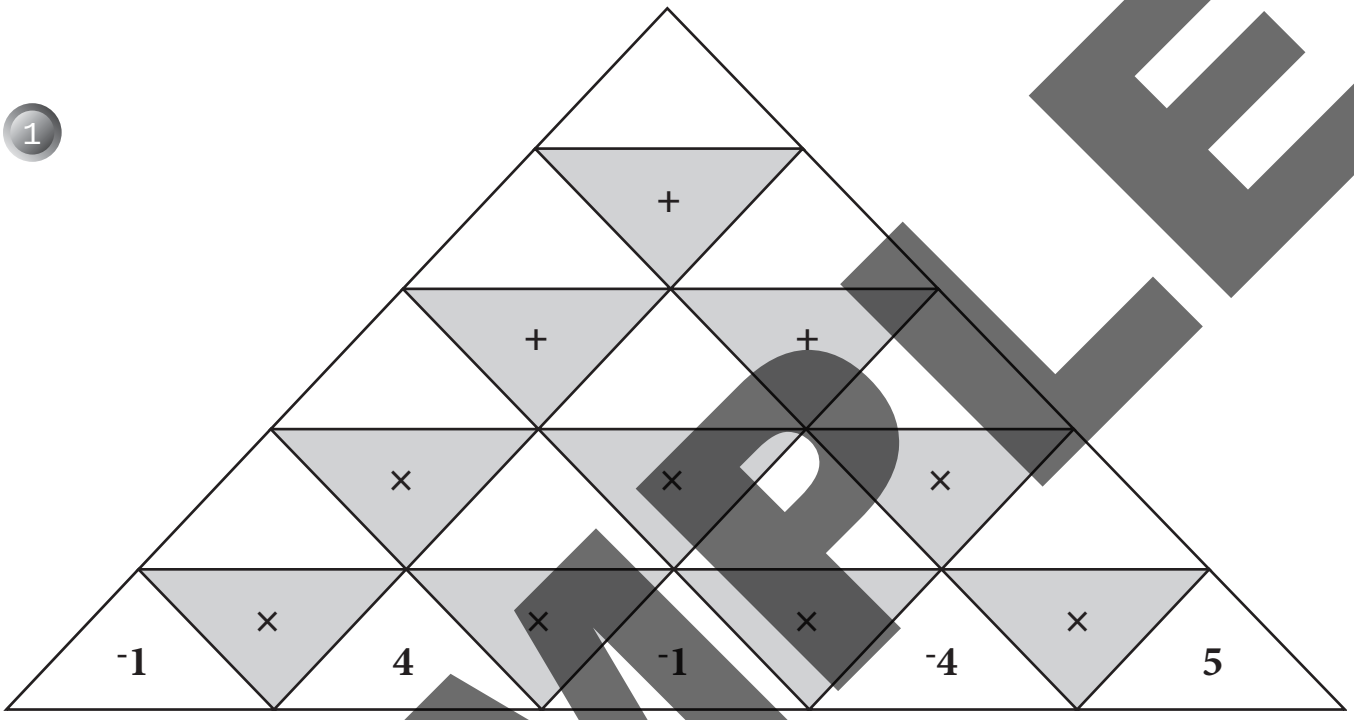
Name _____ Date _____

Mixed Operations Pyramids

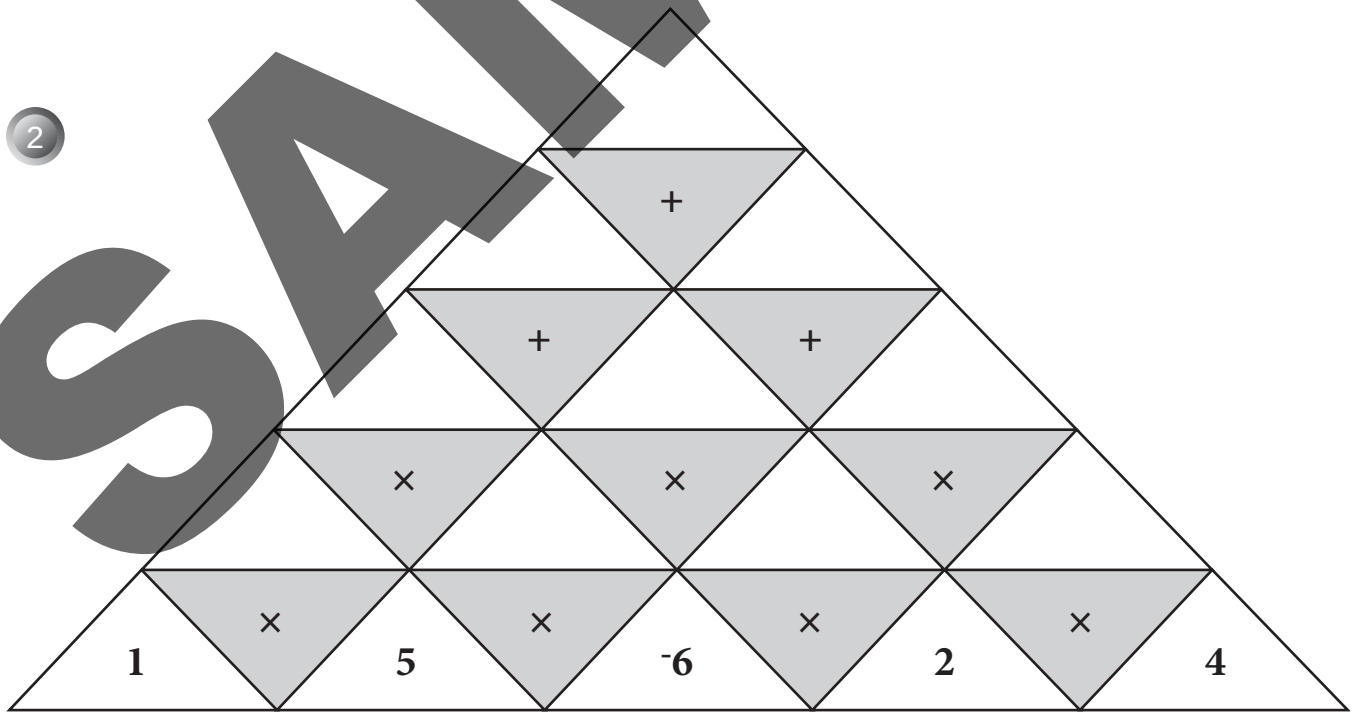
DIRECTIONS

Add or multiply each pair of adjoining integers as indicated. Write the answer in the white triangle centered above each pair.

1



2



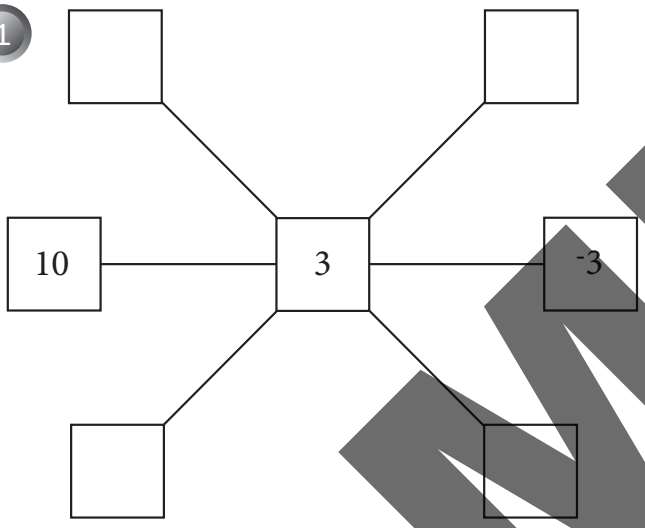
Name _____ Date _____

Integer Wheel

REMEMBER! If both integers are positive or negative, then the product is positive. If one integer is positive and the other is negative, then the product is negative.

DIRECTIONS The product of any 3 factors in a straight line across the wheel should be the same. Use the integers in the box next to each wheel to complete each 3-factor spoke. Write the product of each wheel's spokes.

1



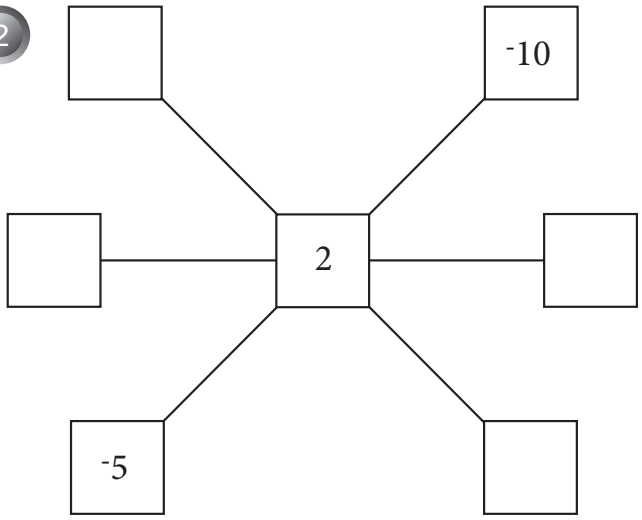
-15	-5
2	6

Product = _____

-20	10
-2	5

Product = _____

2



3 If one number in the wheel is zero, what must the product of every "spoke" be?

_____

Name _____ Date _____

It's Magic!

A magic square is a grid in which each row, each column, and the two corner-to-corner diagonals all have the same sum. This magic square has a magic number of 12.

7	0	5
2	4	6
3	8	1

DIRECTIONS Use the information given to determine the magic number of each square. Then write numbers in the boxes to complete the squares. There is more than one solution to some of the squares, so be prepared to share your answer with the class.

1

2		6
	4	
		6

2

14		8
-1	5	
		-4

3

		4
0	2	
-2		-2

Look for a pattern in the completed boxes. Examine the relationship between the number in the center box and the magic number.

4 What is the magic number of a magic square in which the center number is 8?

_____

DIRECTIONS Complete the remaining magic squares.

5

14		
	8	

6

		-1
-3	5	

7

	0	-1
		-4

Name _____ Date _____

"Sum" More Magic

DIRECTIONS

Add the given number to each number in the magic square. Three numbers have been completed for you. Look at the patterns. Then answer the question below.

1

8	0	7
4	5	6
3	10	2

+ 3 =

		10
	8	
		5

2

-1	4	6
10	3	-4
0	2	7

+ 5 =

3

4	-9	5
1	0	-1
-5	9	-4

+ 6 =

4 Does the new square follow the rules of a magic square? _____

Name _____ Date _____

Multiplication Mix-Up

Etymology is the study of the history of words. For example, **malaria** (a deadly disease) comes from the words ***mal*** and ***aria***, which are Italian words meaning "bad" and "air." These words reflect the ancient belief that a person caught malaria by breathing bad air. (We know now that mosquitoes are to blame.)

The original meaning of the word **product** is "a mathematical quantity obtained by means of multiplication" and it originated in the early 1400s from the Latin word ***producere*** (to bring forth).

Multiply each pair of factors and record the product in the table. Notice that the factors are out of order (when compared to a typical multiplication table).

×	5	-3	0	8	4	2	-9
9							
1							
6		-18					
5						10	
-4							
7							
-3							