EXPLORATION 1

THE POWER OF A PICTURE

How long would take to add up all the numbers from one to a million and back down again? In this exploration you will learn how to do it in less than one second!

TOPICS COVERED: The Counting Numbers; their Addition and Multiplication. Clever sums and Figurate numbers.

A. GETTING STARTED

The counting numbers are the numbers 1, 2, 3, 4, 5, 6,7, 8, 9, 10, 11, 12, … and true to their name they count things! (For example, 3 dogs, or 7 wombats, or 6672 flavours of ice-cream.)

Question 1: Is there a biggest counting number?

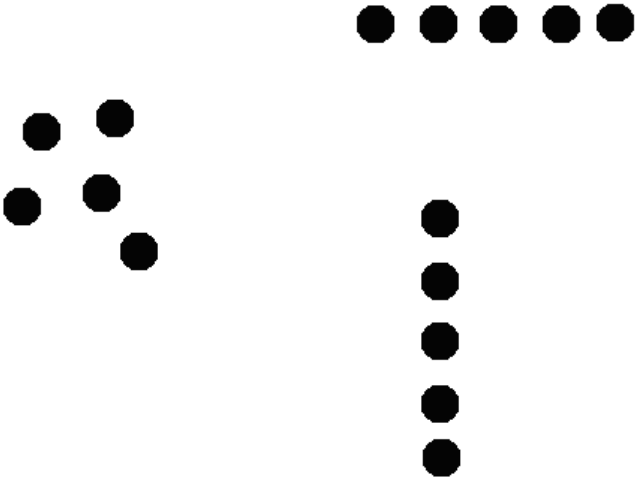
In this exploration we'll use the counting numbers to count dots. For example: "5" represents five dots:

and "2" represents two dots:

and "124,476,093,563,871,483,832,506" represents that many dots!

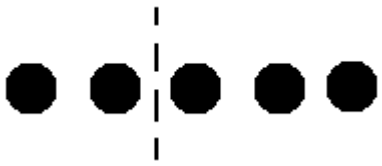
Question 2: Do you think 0 should be considered a counting number? What picture goes with zero dots?

Question 3: Do you think it matters how we display the dots? For example, do you think that each of these pictures represents "5," or are they different in what they represent?



We can add numbers and therefore we can add dots. For example, the statement $2+3=5$ is telling us:

"Two dots placed together with three dots gives five dots."



Question 4: Backwards Barry looks at this picture and sees the sum $3+2$. Explain how Barry sees this.

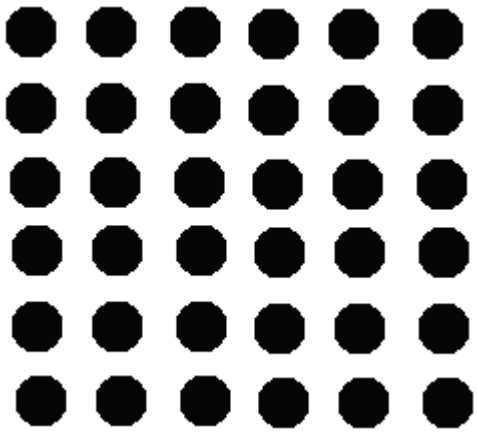
Question 5: Lulu's tutor asked Lulu to draw a picture for the sum $4+6$ and then a picture for the sum $6+4$. Lulu just drew one picture for them both. What picture did she draw?

Question 6: a) Does $456382+765521$ equal $765521+456382$? Describe the picture you could draw to explain your answer.

b) Does $a+b$ equal $b+a$ for any two counting numbers a and b?

B.BIG SUMS

Here is a picture of the product 6×6. There are $6 \times 6 = 36$ dots in all.



Diagonal Dan looks at this picture and instead of seeing six rows of six dots sees the sum:

$$1+2+3+4+5+6+5+4+3+2+1$$

Question 11: Mark on the diagram what Diagonal Dan sees to get the sum $1+2+3+4+5+6+5+4+3+2+1$?

Since the there 36 dots in the diagram it must have:

$$1+2+3+4+5+6+5+4+3+2+1=36$$

Question 12: Is it? Work out $1+2+3+4+5+6+5+4+3+2+1$ the hard way and see if it really does equal 36.

Question 13: Draw a diagram for the sum $1+2+3+4+3+2+1$. Without working it out (look at your diagram instead) what must the answer to the sum be?

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