
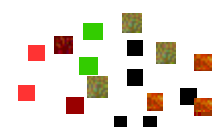


Numbers 3




Place value

17

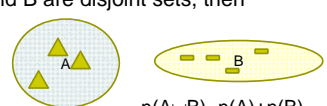


- What is a 7 in this numeral and what is a 1?
- If you were to show the 1 and the 7 using the chips on the side, how would you do it?
- How would you do it if you had base 10 blocks?





Review

- Two models for addition of whole numbers:
 - Set model: if A and B are disjoint sets, then




$n(A \cup B) = n(A) + n(B)$
 - Measurement model: Place two arrows of the given lengths tail to head:





Closure property with respect to addition

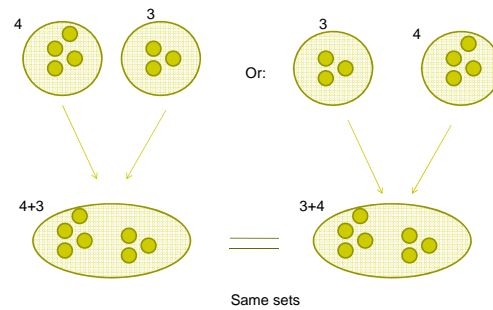
1. Set of whole numbers is closed under addition.
2. Set of even numbers is closed under addition.
3. Is set of odd numbers closed under addition?
4. Is set $\{0, 10, 20, 30, 40, \dots\}$ closed under addition?
5. Is the set of whole numbers greater than 17 closed under addition?
6. Is the set $\{1, 2\}$ closed under addition?
7. Is the set of whole numbers *smaller than 17* closed under addition?



Commutative property

- How will a child find $8+2$?
- Would they use the same strategy for $2+8$?
- If a and b are whole numbers then
 $a+b=b+a$
- How would you justify this property?

$a+b=b+a$

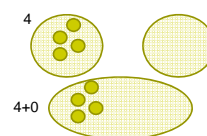


Associative property

- Use sets to represent the following two expressions:
 - $(3+4)+2$
 - $3+(4+2)$
- What do you notice?
- If a , b and c are whole numbers then
 $(a+b)+c=a+(b+c)$

Zero

- How do you explain the fact that for any whole number
 $0+a=a+0=a$?
- 0 is the only whole number with this property.
We say that 0 is the *additive identity*.



Operations on whole numbers in k-3:

addition Introduction Development/practice Algorithm

subtraction Introduction Development/practice Algorithm

Basic addition facts

+	0	1	2	3	4	5	6	7	8	9	10
0											
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											

Strategies

Adding 0

Counting on By 1 and 2

Adding 10

doubles

commutativity

associativity

Doubles +1, +2

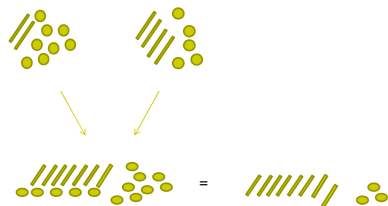
Multidigit addition

- $23+42$:

$23+42=20+3+40+2=60+5=65$

Multidigit addition with rubundling

- 28+45:



$$28+45=20+8+40+5=60+13=73$$

Exercises:

- Find the following sums using thinking strategies:
 - 58+22
 - 71+49
 - 45+47
 - 94+27+6+13
 - 5+13+25+31+47

Equal sign

- What does the equal sign mean?
- Students often interpret it as “Do something”
- The symbol = means that the number (object) on its left is equal to the number (object) on its right.

Exercise

- Show how to find the sum 143+234 using base ten blocks, chip abacus and place value.
- Do the same for 274+357.