

## Strategies for Addition and Subtraction

*(These are alternative ways to add and subtract and promote number sense. These are introduced at Grades 1 & 2 with smaller numbers and extended into Grades 3-5)*

### Addition Strategies:

#### 1. Breaking Apart (Place Value), also known as “Separating” or “Decomposing”

Break both numbers down to place value and add each, starting with the largest:

$$46 + 25 =$$

46 breaks into 40 plus 6 ( $40 + 6$ ), 25 breaks into 20 plus 5 ( $20 + 5$ )

$$40 + 20 = 60$$

$$6 + 5 = 11$$

$$60 + 11 = 71$$

Or:

Keep one number intact and only break second number down by place value and adding each place:

$$46 + 25 =$$

46 stays intact and 25 breaks into 20 and 5

$$46 + 20 = 66$$

$$66 + 5 = 71 \quad \text{or} \quad *66 + (4 + 1)$$

*\*Note: some students may prefer to break the 5 apart ( $4 + 1$ )*

*So that they can add 4 to 66 and get 70, then add on 1. It would only make sense to break down the ones to get to the “landmark” number 10.*

#### 2. Compensation:

Round one or more of the numbers to numbers that are easier to work with, then compensate:

$$256 + 687$$

$$256 + \boxed{-13} \longrightarrow 256 + 700 = 956$$

$$956 - \boxed{13} =$$

(decompose 13)

$$956 - 10 = 946$$

$$946 - 3 = 943$$

13 is added to 687 to get 700, an easier number to work with - keeping track of the adjustment is critical to making this strategy work, encourage students to box the adjustment (here we box the adjustment as -13 since 13 was added, now 13 must be subtracted out of the computation to get the final answer)

### 3. Transformation:

Transform the problem into an equivalent problem that is easier: (like compensation, this is a strategy more advanced math thinkers can handle, you're adding to one and taking away the same amount from the other)

a.  $46 + 28 = \underline{\quad}$

adding 2 to 28 makes it 30, an easy number to work with but if 2 is added into this equation, then 2 must be subtracted from the 46.

$$28 + 2 = 30$$

$$46 - 2 = 44$$

$$30 + 44 = 74$$

b.  $256 + 687 =$

add 13 to 687 to make it 700, subtract 13 from 256 to make it 243,

$$700 + 243 = 943$$

### Subtraction strategies:

1. *Breaking apart/ separating* – subtract one number in parts from the other number which stays intact, always starting with largest place value to subtract

a.  $54 - 23 =$

23 can be broken into  $20 + 3$

$$54 - 20 = 34$$

$$34 - 3 = 31$$

or  $56 - 29 =$

29 can be broken into  $20 + 6 + 3$ , breaking 9 into  $6 + 3$  makes it easier to subtract

$$56 - 20 = 36$$

$$36 - 6 = 30$$

$$30 - 3 = 27$$

b.  $547 - 297 =$

keep 547 intact, break 297 into  $200 + 90 + 7$ , subtract out one place value at a time

$$547 - 200 = 347$$

$$347 - 90 = 257$$

$$257 - 7 = 250$$

or  $547 - 297 =$

break 297 into  $247 + 50$ , subtract out each part

$$547 - 247 = 300$$

$$300 - 50 = 250$$

**2. Adding up/counting on** – Start with smaller number, add up to a landmark number\*, from the landmark add up to get to the target number. Add the two numbers you used.

$$212 - 197 =$$

$$197 \begin{array}{|l} + 3 \\ \hline \end{array} = 200*$$

$$200 \begin{array}{|l} + 12 \\ \hline \end{array} = 212$$

$$3 + 12 = 15$$

$$516 - 305 =$$

$$305 \begin{array}{|l} + 195 \\ \hline \end{array} = 500*$$

$$500 \begin{array}{|l} + 16 \\ \hline \end{array} = 516$$

$$195 + 16 = 211 \quad (195 + 10 = 205, 205 + 6 = 211)$$

### 3. Subtracting across the zeros:

Adding up is a good strategy when one of the subtrahends involves 0's. Students have a great deal of difficulty subtracting across the zeros.

$$\$10.00 - \$4.75 =$$

Think:  $\$4.75 + \$0.25 = \$5.00$

$$\$5.00 + \$5.00 = \$10.00$$

$$\$5.00 + \$0.25 = \$5.25$$

#### 4. Subtracting from 9's:

Given  $1,000 - 273$ :

(subtract 1 from 1,000 making it 999 – subtracting from 9's doesn't require any borrowing)

$$\begin{array}{r} 999 \\ -273 \\ \hline 726 \end{array}$$

$+1$  box the adjustment to remember to add it back in  
 $+1$  now add back the 1, the answer is 727

Given  $1006 - 273$  :

(subtract 7 from 1006 making it 999,

$$\begin{array}{r} 999 \\ -273 \\ \hline 726 \end{array}$$

$+7$  now add back the 7 making the answer 733

3. **Transform** the entire problem to an equivalent problem that is easier to solve by adding or subtracting the **same** number from/to both numbers in the subtraction problem. (Using the same number maintains the difference between the two numbers.) The goal of adding or subtracting a number is to make one or more of the numbers easier to work with.

$$547 - 297 =$$

add 3 to both numbers to bring 297 to 300 and 547 to 550, now 300 is an easier number to subtract from 550

$$550 - 300 = 250$$

4. **Compensation** – adjusting one of the numbers in a math problem in order to make them easier to work with

a.  $45 - 27 =$

$$27 \begin{array}{|c|} \hline -2 \\ \hline \end{array} = 25$$

$$45 - 25 = 20$$

$$20 \begin{array}{|c|} \hline -2 \\ \hline \end{array} = 18$$

You ignored 2 of the 27 so you need to subtract 2 out of the answer

b.  $45 - 27 =$

$$45 \begin{array}{|c|} \hline +2 \\ \hline \end{array} = 47$$

$$47 - 27 = 20$$

$$20 \begin{array}{|c|} \hline -2 \\ \hline \end{array} = 18$$

You added 2 to 47 so you need to subtract 2 out of the answer