

MULTI-DIGIT ADDITION STRATEGIES

Strategy connections for adding multi-digit numbers with & without regrouping



KEY IDEAS

Students need to develop an understanding that as long as values remain constant there are multiple ways to take apart and combine numbers to add. Flexibility with numbers is vital. The numbers should dictate which strategy a student chooses. The goal is always the most efficient method; often this is not the standard algorithm.



KEY TOOLS

objects for counting, fingers, base ten blocks, unifix blocks, number lines, hundreds charts, ten frames, part-part-whole boxes



VOCABULARY

add, whole, part-part, addend, sum, friendly numbers, compatible numbers, commutative property, decompose, compensate, unitizing

Part-Part-Whole Boxes help students visualize quantities as well as which part or parts are missing when solving an addition or subtraction word problem.

Here are some examples:

?	
64	38

$$64 + 38 = ?$$

100	
52	?

$$52 + ? = 100$$

$$100 - 52 = ?$$

$$100 - ? = 52$$

100	
?	?

$$? + ? = 100$$

What information is missing?

STRATEGY

HOW TO SOLVE THE PROBLEM

Counting

Modeling/counting out the problem.

TIPS

BEST PRACTICES & TOOLS

If students are struggling with unitizing (understanding that the base 10 rod is both 10 units and 1 ten) useifix blocks or 10 frames.

STRATEGY

HOW TO SOLVE THE PROBLEM

Tens then Ones

This is a form of counting on. Always break the second number into 10's and then 1's.

Do students start from the first number or start with the larger number? Those starting from the larger number have developed an understanding of commutative property.

TIPS

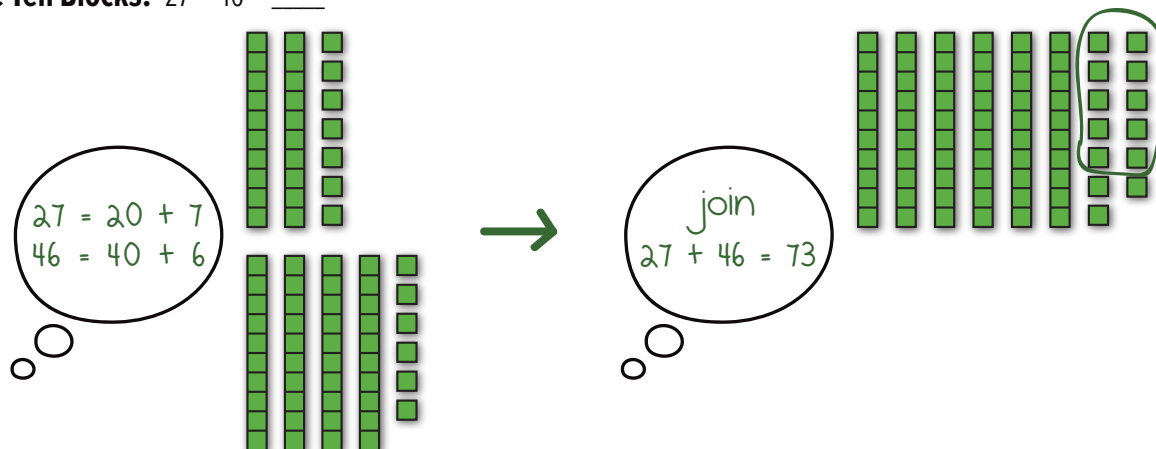
BEST PRACTICES & TOOLS

If students are struggling with counting by 10 from a number that does not end in 0, have them use a hundreds chart, do lots of rote counting practice and discuss the pattern.

WAYS TO RECORD

MUST BE DIRECTLY TAUGHT

Base Ten Blocks: $27 + 46 = \underline{\quad}$



WAYS TO RECORD

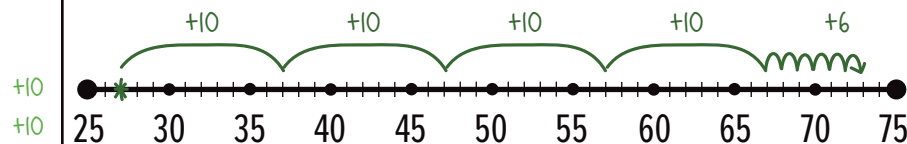
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Hundreds Chart: $27 + 46 = \underline{\quad}$

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

$$27 + 46 = 73$$

Number Line: $27 + 46 = \underline{\quad}$



$$27 + 40 = 67$$

$$67 + 6 = 73$$

$$27 + 46 = 73$$

STRATEGY

HOW TO SOLVE THE PROBLEM

Counting Strategy: Counting On

AKA: Adding Up in Chunks, Skip Counting

Start with one number and decompose (break apart) the second number into meaningful parts that equal the sum of the second number.

TIPS

BEST PRACTICES & TOOLS

If a student is breaking a number into larger chunks they have most likely developed an understanding of commutative property, but it is still important to note if a student is consistently starting from the larger number rather than the first number.

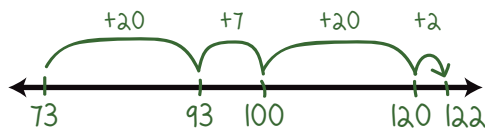
Encourage students to choose the larger added to start counting on from.

Students should know the combinations that make 10. Help students connect that this knowledge helps them know combinations that make 100 (e.g. $8 + 2 = 10$ and $80 + 20 = 100$).

WAYS TO RECORD

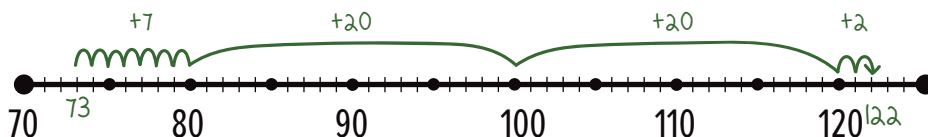
MUST BE DIRECTLY TAUGHT

Open Number Line: $73 + 49 = \underline{\quad}$



$$73 + 49 = 122$$

Closed Number Line: $73 + 49 = \underline{\quad}$



Hundreds Chart: $54 + 26 = \underline{\quad}$

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

$$26 + 54 = 80$$

Number Sentences/Equation: $289 + 35 = \underline{\quad}$

$$289 + 35$$

$$289 + 1 = 290$$

$$290 + 10 = 300$$

$$300 + 20 = 320$$

$$320 + 4 = 324$$

STRATEGY

HOW TO SOLVE THE PROBLEM

Solving by Place Value

Decompose (break apart) the numbers so that each digit shows its value, then add the like values to find the total sum.

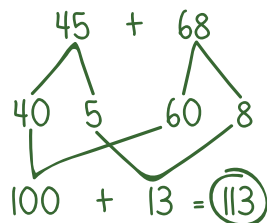
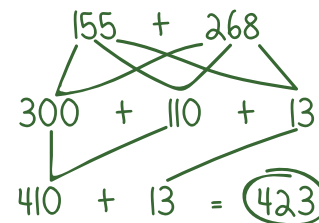
TIPS

BEST PRACTICES & TOOLS

When solving by place value many students start with the largest quantities first. They solve left to right.

WAYS TO RECORD

MUST BE DIRECTLY TAUGHT

Number Strings (2-digits): $45 + 68 = \underline{\quad}$ Number Strings (3-digits): $155 + 268 = \underline{\quad}$ Expanded Notation: $345 + 259 = \underline{\quad}$

$$\begin{array}{r} 345 \rightarrow 300 + 40 + 5 \\ +259 \rightarrow +200 + 50 + 9 \\ \hline 500 + 90 + 14 = \textcircled{604} \end{array}$$

OR

$$\begin{array}{r} 345 + 259 = ? \\ \hline \rightarrow 300 + 40 + 5 \\ \rightarrow 200 + 50 + 9 \\ \hline 500 + 90 + 14 = \textcircled{604} \end{array}$$

Number Sentence: $116 + 119 = \underline{\quad}$

$$\begin{array}{r} 116 + 119 = ? \\ 100 + 100 = 200 \\ 10 + 10 = 20 \\ 6 + 9 = 15 \\ 200 + 20 + 15 = \textcircled{235} \end{array}$$

Partial Sums: $116 + 119 = \underline{\quad}$

$$\begin{array}{r} 116 \\ +119 \\ \hline 100 + 100 = 200 \\ 10 + 10 = 20 \\ 6 + 9 = 15 \\ \hline \textcircled{235} \end{array}$$

STRATEGY

HOW TO SOLVE THE PROBLEM

Friendly Numbers

AKA: Landmark Numbers

Adjust one number to friendly numbers and then add or subtract the same amount to compensate.

TIPS

BEST PRACTICES & TOOLS

If students have trouble make a connection to rounding.

STRATEGY

HOW TO SOLVE THE PROBLEM

Near Doubles

Adjust both numbers to friendly numbers and then add or subtract the same amount to compensate.

TIPS

BEST PRACTICES & TOOLS

If students don't know whether to add or subtract ask, "Did you add too much or too little?"

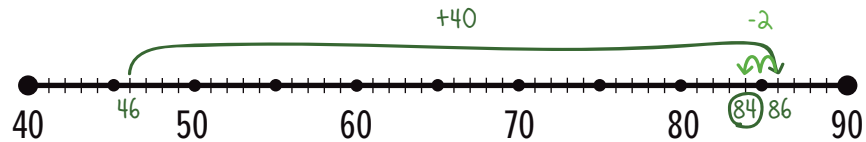
WAYS TO RECORD

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Number Line: $46 + 38 = \underline{\quad}$

$$46 + 38 = ?$$

Diagram showing 38 broken down into 40 and 2, with arrows indicating the adjustment process.



Number Sentences/Equations:

$$46 + 38 =$$

$$\downarrow +2$$

$$46 + 40 = 86$$

$$86 - 2 = 84$$

$$133 + 114 =$$

$$\downarrow +2 \quad \downarrow +1$$

$$135 + 115 = 150$$

$$150 - 3 = 147$$

$$52 + 79 =$$

$$\downarrow -2 \quad \downarrow +1$$

$$50 + 80 = 130$$

$$130 + 2 - 1 = 131$$

WAYS TO RECORD

MUST BE DIRECTLY TAUGHT

Number Bonds:

$$126 + 127 =$$

Diagram showing 126 broken down into 125 and 1, and 127 broken down into 125 and 2.

$$125 + 125 = 250$$

$$250 + 3 = 253$$

$$48 + 49 =$$

Diagram showing 48 broken down into 50 and 2, and 49 broken down into 50 and 1.

$$50 + 50 = 100$$

$$100 - 2 - 1 = 97$$

Number Sentences/Equations:

$$126 + 127 =$$

$$\downarrow -1 \quad \downarrow -2$$

$$125 + 125 = 250$$

$$250 + 3 = 253$$

$$52 + 49 =$$

$$\downarrow -2 \quad \downarrow +1$$

$$50 + 50 = 100$$

$$100 + 2 - 1 = 101$$

STRATEGY

HOW TO SOLVE THE PROBLEM

Compensation

Take from one number and give to another to make a more friendly number. This compensation occurs in the added, not in the sum.

TIPS

BEST PRACTICES & TOOLS

Students need lots of experience decomposing numbers. Number bonds are especially helpful for students visualize these number patterns.

STRATEGY

HOW TO SOLVE THE PROBLEM

Standard Algorithm

TIPS

BEST PRACTICES & TOOLS

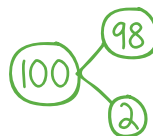
NOTE: Standard algorithm should be taught last after students have a strong understanding of previously learned strategies.

WAYS TO RECORD

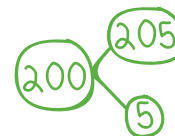
MUST BE DIRECTLY TAUGHT

Number Bonds:

$$\begin{array}{r} 56 + 98 = \\ \downarrow -2 \quad \downarrow +2 \\ 54 + 100 = \textcircled{154} \end{array}$$



$$\begin{array}{r} 205 + 144 = \\ \downarrow -5 \quad \downarrow +5 \\ 200 + 149 = \textcircled{349} \end{array}$$



Number Sentences/Equations:

$$\begin{array}{r} 116 + 119 = \\ \downarrow -1 \quad \downarrow +1 \\ 115 + 120 = \textcircled{235} \end{array}$$

$$\begin{array}{r} 707 + 1,293 = \\ \downarrow -7 \quad \downarrow +7 \\ 700 + 1,300 = \textcircled{2,000} \end{array}$$

OR

$$\begin{array}{r} 707 + 1,293 = \\ \downarrow +3 \quad \downarrow -3 \\ 710 + 1,290 = \textcircled{2,000} \end{array}$$

WAYS TO RECORD

MUST BE DIRECTLY TAUGHT

$$\begin{array}{r} 59 \\ +37 \\ \hline \textcircled{96} \end{array}$$

$$\begin{array}{r} 486 \\ +147 \\ \hline \textcircled{633} \end{array}$$

$$\begin{array}{r} 1293 \\ +707 \\ \hline \textcircled{2,000} \end{array}$$