



All of the following examples will require using complementary numbers. In order to fully understand the technique, it's best to work these examples using your abacus.

Example: $34 + 78 = 112$

	Step 1		Step 2		Step 3
$\begin{array}{r} \text{A B C} \\ \hline 0 \ 3 \ 4 \end{array}$		$\begin{array}{r} \text{A B C} \\ \hline 1 \ 0 \ 4 \end{array}$	$\begin{array}{r} \text{A B C} \\ \hline 0 \ 3 \ 4 \\ -3 \\ \hline 0 \ 0 \ 4 \\ +1 \\ \hline 1 \ 0 \ 4 \end{array}$	$\begin{array}{r} \text{A B C} \\ \hline 1 \ 0 \ 4 \\ -2 \\ \hline 1 \ 0 \ 2 \\ +1 \\ \hline 1 \ 1 \ 2 \end{array}$	<p>Step 2</p> <p>Step 2a</p> <p>Step 3</p> <p>Step 3a</p>

Step 1: Set 34 on rods BC.

Step 2: Add 7 to tens rod B. Use the complement and subtract 3, then....

Step 2a: Carry 1 to hundreds rod A leaving 104 on rods ABC.

Step 3: Add 8 to units Rod C. Subtract the complement 2, then....

Step 3a and the answer: Carry 1 to tens rod B leaving 112 on rods ABC.

Note the decimal numbers in the following two examples. Rod B is the designated unit rod.

Example: $8.9 + 56 = 64.9$

	Step 1		Step 2		Step 3
$\begin{array}{r} \text{A B C} \\ \hline 0 \ 8 \ 9 \end{array}$		$\begin{array}{r} \text{A B C} \\ \hline 0 \ 8 \ 9 \end{array}$	$\begin{array}{r} \text{A B C} \\ \hline 0 \ 8 \ 9 \\ +5 \\ \hline 5 \ 8 \ 9 \end{array}$	$\begin{array}{r} \text{A B C} \\ \hline 5 \ 8 \ 9 \\ -4 \\ \hline 5 \ 4 \ 9 \\ +1 \\ \hline 6 \ 4 \ 9 \end{array}$	<p>Step 2</p> <p>Step 3</p> <p>Step 3a</p>

Step 1: Designate rod B as the unit rod. Set 8.9 on rods BC.

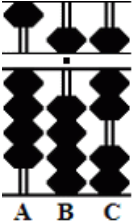
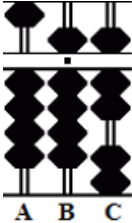
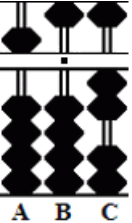
Step 2: Add 5 to tens rod A leaving 58.9

Step 3: Add 6 to units rod B. Subtract the complement 4, then....

Step 3a and the answer: Carry 1 to tens rod A leaving 64.9 on rods ABC.

This next example will be a little bit more difficult. With a little practice, solving problems of this type soon becomes second nature.

Example: $45.7 + 4.5 = 50.2$

 <p style="text-align: center;">Step 1</p> <table style="margin-left: auto; margin-right: auto;"> <tr><td style="border-right: 1px solid black; padding: 0 5px;">A</td><td style="border-right: 1px solid black; padding: 0 5px;">B</td><td style="padding: 0 5px;">C</td></tr> <tr><td colspan="3" style="text-align: center;">.</td></tr> <tr><td style="border-right: 1px solid black; padding: 0 5px;">4</td><td style="border-right: 1px solid black; padding: 0 5px;">5</td><td style="padding: 0 5px;">7</td></tr> </table>	A	B	C	.			4	5	7	 <p style="text-align: center;">Step 2</p> <table style="margin-left: auto; margin-right: auto;"> <tr><td style="border-right: 1px solid black; padding: 0 5px;">A</td><td style="border-right: 1px solid black; padding: 0 5px;">B</td><td style="padding: 0 5px;">C</td></tr> <tr><td colspan="3" style="text-align: center;">.</td></tr> <tr><td style="border-right: 1px solid black; padding: 0 5px;">4</td><td style="border-right: 1px solid black; padding: 0 5px;">9</td><td style="padding: 0 5px;">7</td></tr> <tr><td colspan="3" style="text-align: center;">+4</td></tr> <tr><td style="border-right: 1px solid black; padding: 0 5px;">4</td><td style="border-right: 1px solid black; padding: 0 5px;">9</td><td style="padding: 0 5px;">7</td></tr> </table> <p style="text-align: right; margin-right: 20px;">Step 2</p>	A	B	C	.			4	9	7	+4			4	9	7	 <p style="text-align: center;">Step 3</p> <table style="margin-left: auto; margin-right: auto;"> <tr><td style="border-right: 1px solid black; padding: 0 5px;">A</td><td style="border-right: 1px solid black; padding: 0 5px;">B</td><td style="padding: 0 5px;">C</td></tr> <tr><td colspan="3" style="text-align: center;">.</td></tr> <tr><td style="border-right: 1px solid black; padding: 0 5px;">4</td><td style="border-right: 1px solid black; padding: 0 5px;">9</td><td style="padding: 0 5px;">7</td></tr> <tr><td colspan="3" style="text-align: center;">-5</td></tr> <tr><td style="border-right: 1px solid black; padding: 0 5px;">4</td><td style="border-right: 1px solid black; padding: 0 5px;">9</td><td style="padding: 0 5px;">2</td></tr> <tr><td colspan="3" style="text-align: center;">-9</td></tr> <tr><td style="border-right: 1px solid black; padding: 0 5px;">4</td><td style="border-right: 1px solid black; padding: 0 5px;">0</td><td style="padding: 0 5px;">2</td></tr> <tr><td colspan="3" style="text-align: center;">+1</td></tr> <tr><td style="border-right: 1px solid black; padding: 0 5px;">5</td><td style="border-right: 1px solid black; padding: 0 5px;">0</td><td style="padding: 0 5px;">2</td></tr> </table> <p style="text-align: right; margin-right: 20px;">Step 3</p> <p style="text-align: right; margin-right: 20px;">Step 3a</p> <p style="text-align: right; margin-right: 20px;">Step 3b</p>	A	B	C	.			4	9	7	-5			4	9	2	-9			4	0	2	+1			5	0	2
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Step 1: Designate rod B as the unit rod. Set 45.7 on rods ABC.

Step 2: Add 4 to units rod B. This leaves 49.7 on rods ABC.

Step 3: Add 5 to tenths rod C. Use the complement and subtract 5, then....

Step 3a: Carry 1 to units rod B. Rod B is full. Subtract the complement 9, then....

Step 3b and the answer: Carry 1 to tens rod A. This leaves 50.2 on rods ABC.

Abacus: Mystery of the Bead
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