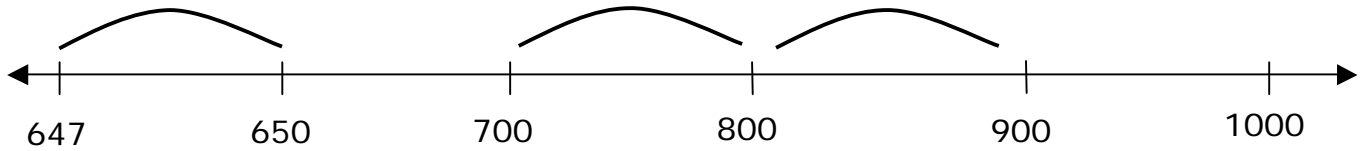


Subtracting with Multi-Digit Numbers

I know that to get from 647 to 650 is making a jump of 3. From 650, I know that jumping 50 more will get me to 700. I can jump another 100 to 800, then another 100 to 900, and then another 100 to 1000. I also could have gone straight from 700 to 1000 because I know that's a jump of 300.



From looking at my open number line, I can see that the difference between 1000 and 647 is $3 + 50 + 100 + 100 + 100$, or 353.

Other possibilities for the same number line:

Decomposition

When we're faced with a problem that scares us, one thing we can do is look for a way to break it down into problems that are easier for us to solve. That's where decomposition comes in. If trying to subtract 647 from 1000 is hard for me, I'm going to find a way to subtract 647 from something that isn't as hard for me.

$$\begin{array}{r} \\ \hline \end{array} \quad \begin{array}{r} 999 + 1 \\ \hline 647 \\ \hline = 352 + 1 \\ \hline = 353 \end{array} \quad \begin{array}{l} \text{I can decompose } 1000 \text{ into } 999 + 1. \\ \text{Then I subtract the } 647 \text{ from } 999. \\ \text{Then I cannot forget to recompose the } 1. \end{array}$$

Traditional Algorithm

We should still be able to solve this using the traditional algorithm. One reason to save this one for last is that since we have now solved our problem twice, we can check our answer right away to confirm if we used the traditional algorithm correctly.

$$\begin{array}{r} \\ \\ 1000 \\ \hline 647 \\ \hline 353 \end{array}$$

Once you have determined that you arrived at the same answer all three ways, then you can use the inverse operation to check your answer: + =

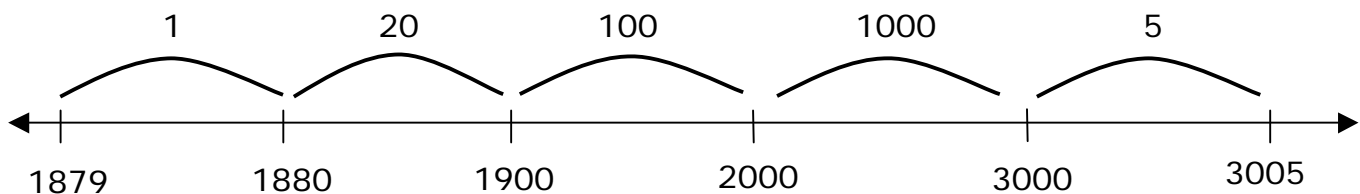
Example:
$$\begin{array}{r} 3005 \\ - 1879 \\ \hline \end{array}$$

Open Number Line

Write an open number line with two end marks on it.

Tell your partner which number is going to be written on which side of the number line. [1879 on the left, 3005 on the right] We're going to start at 1879 and make logical jumps until I get to 3005.

Have the students give you suggestions for the size of the jumps. Below is one way to solve the problem.



How will we find the difference between 3005 and 1879? [We will add up all of our jumps.]

$$\begin{array}{r} 1 \\ 20 \\ 100 \\ 1000 \\ + \quad 5 \\ \hline 1126 \end{array}$$

Decomposition

$$\begin{array}{r} 3005 \\ - 1879 \\ \hline \end{array} = 2999 + 1 + 5$$

I can decompose 3005 into 5 + 2999 + 1.

$$\begin{array}{r} ! 1879 \\ \hline \end{array} = 1120 + 1 + 5$$

Then I subtract the 1879 from 2999.

Then I cannot forget to recompose the 5 and the 1.

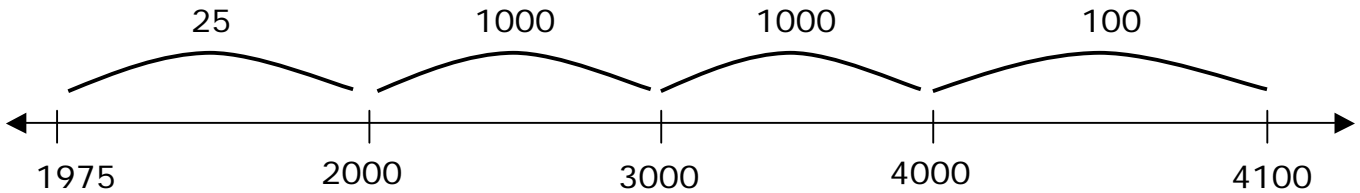
$$= 1126$$

We know that there are different ways to decompose. What is another way in which you could you decompose 3005 to help you solve this problem? [2999 + 6]

Traditional Algorithm

*There are many different possibilities for the solutions with open number lines and with decomposition. These are simply one example.

$$4100 - 1975$$

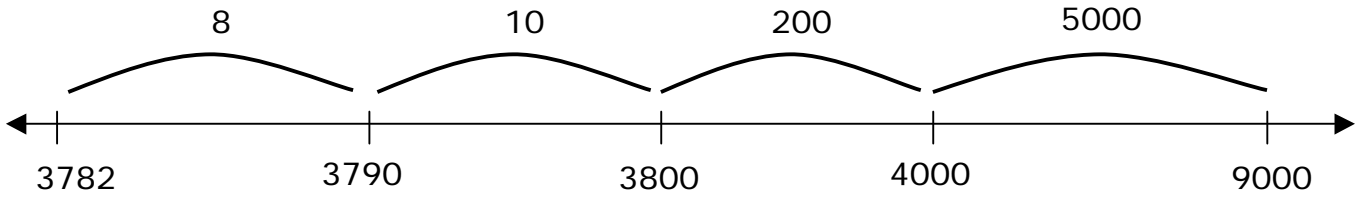


$$\begin{array}{r}
 25 \\
 1000 \\
 1000 \\
 + 100 \\
 \hline
 2125
 \end{array}$$

$$\begin{array}{r}
 4100 \\
 - 1975 \\
 \hline
 \end{array}
 = \begin{array}{r}
 3999 + 1 + 100 \\
 \underline{1975} \\
 = 2024 + 1 + 100 \\
 = 2125
 \end{array}$$

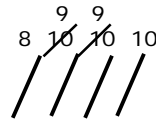
$$\begin{array}{r}
 \begin{array}{c}
 10 \quad 9 \\
 3 \quad 0 \quad 10 \quad 10 \\
 \hline
 4100 \\
 \hline
 \end{array} \\
 \hline
 \end{array}
 \begin{array}{r}
 \hline
 1975 \\
 \hline
 2125
 \end{array}$$

$$9000 - 3782$$



$$\begin{array}{r}
 8 \\
 10 \\
 200 \\
 + 5000 \\
 \hline
 5218
 \end{array}$$

$$\begin{array}{r}
 9000 \\
 \hline
 \text{! } 3782 \\
 \hline
 \end{array}
 =
 \begin{array}{r}
 8999 + 1 \\
 \hline
 \text{! } 3782 \\
 \hline
 \end{array}
 = 5217 + 1 = 5218$$



502 - 273

273

280

7
20
200
+ 2
229

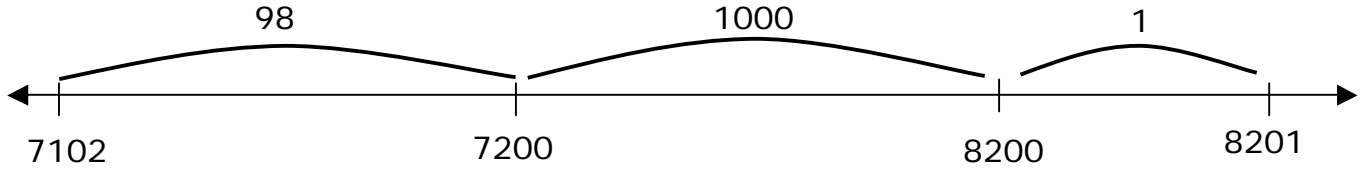
502 499 1 2
! 273 273
= 226 1 2
 229

⁹
4 10 12
502
273
229

5005

3156

8201 - 7102

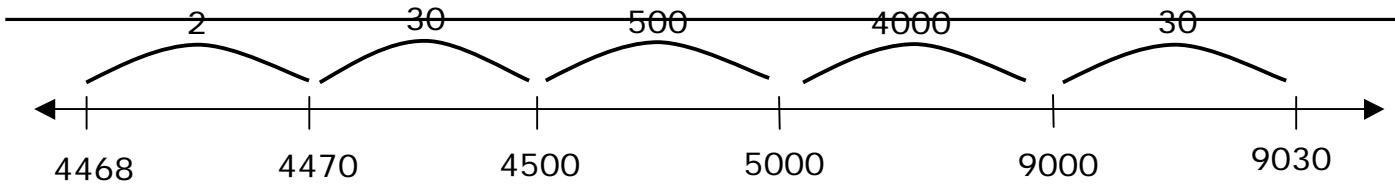


$$\begin{array}{r} 98 \\ 1000 \\ \underline{\quad 1} \\ 1099 \end{array}$$

$$\begin{array}{r} 01 \\ - 10 \\ \hline \end{array} \quad \begin{array}{l} 7999 + 1 + 201 \\ \underline{\quad \quad \quad} \\ ! \quad 7102 \\ = 897 + 1 + 201 \\ = 898 + 1 + 200 \\ = 1098 + 1 \\ = 1099 \end{array}$$

$$\begin{array}{r} \overset{9}{\cancel{8}} \overset{10}{\cancel{2}} \overset{11}{\cancel{0}} 1 \\ \underline{\quad \quad \quad} \\ ! \quad 7102 \\ 1099 \end{array}$$

9030 - 4468



$$\begin{array}{r} 2 \\ 30 \\ 500 \\ 4000 \\ \underline{\quad 30} \\ 4562 \end{array}$$

$$\begin{array}{r} 9030 \\ - 4468 \\ \hline \end{array} \quad \begin{array}{l} 8999 + 1 + 30 \\ \underline{\quad \quad \quad} \\ 4468 \\ = 4531 + 1 + 30 \\ = 4562 \end{array}$$

$$\begin{array}{r} \overset{9}{\cancel{8}} \overset{10}{\cancel{2}} \overset{11}{\cancel{0}} \overset{12}{\cancel{9}} \\ \underline{\quad \quad \quad} \\ // // // // \\ ! \\ \underline{\quad \quad \quad} \end{array}$$