## Exploring Regrouping Across Multiple Contexts

1. Add the numbers, using the traditional algorithm. Notice that regrouping is involved.
2. Use the given place value chart to add the numbers 165 and 187. Add the hundreds, tens, and ones separately, then regroup at the end.

| HUNDREDS | TENS | ONES |
| :---: | :---: | :---: |
| 1 | 6 | 5 |
| +1 | 8 | 7 |
|  |  |  |
|  |  |  |
|  |  |  |

3. Now use expanded forms to add 165 and 187.

$$
\begin{array}{r}
1(100)+6(10)+5(1) \\
+\quad 1(100)+8(10)+7(1) \\
\hline
\end{array}
$$

$\leftarrow$ First add like terms, remaining in expanded form (i.e., without regrouping).
$\leftarrow$ Then regroup so that you have the expanded form of a decimal number, using only the digits 0-9 before each place value. You might want to take multiple steps to do so.

Reflect: What is useful about the methods you were asked to use in questions 2 and 3 ? Discuss with your small group.
4. Subtract the numbers, using the traditional algorithm. Notice that regrouping is involved.
5. Use expanded forms to calculate 224-168. Start by rewriting the number 224 in expanded form. Rewrite the number in two steps (i.e., addressing one place value in each step), so that it will be easy to take 168 from 224 . This rewriting is the regrouping process.

$$
224=2(100)+2(10)+4(1)=
$$

$=$

Write your final regrouped number here $\rightarrow=$ Now subtract 168 from your regrouped number $\quad=[1(100)+6(10)+8(1)]$

$$
\text { And record your answer } \rightarrow
$$

6. a. Use the traditional algorithm to solve the following subtraction problem. Notice that regrouping across 0 is required.

$$
\begin{array}{r}
105 \\
-\quad 46 \\
\hline
\end{array}
$$

b. Collaborating with a partner, talk aloud through this procedure, coming up with a thorough verbal explanation for each step of the standard algorithm. Avoid words like "carry" or "borrow," and instead use words like "break apart" or "regroup."
c. Discuss with your small group: How might words like "carry" and "borrow" cause confusion in students? What other words could you use instead?

Extension: How else could you solve the subtraction problem?
7. A group of astronauts is going on a moon mission. It takes 3 days, 6 hours, and 42 minutes to get to the moon. The return trip to earth only lasts 2 days, 21 hours, and 37 minutes. How much time do the astronauts spend traveling? We can use a type of expanded form for time. Solve this problem by regrouping among days, hours, and minutes.

$$
\begin{array}{r}
3 \text { (days) }+6 \text { (hours) }+42 \text { (minutes) } \\
+2 \text { (days) }+21 \text { (hours) }+37 \text { (minutes) } \\
\hline
\end{array}
$$

8. On Saturday, Erin "Shoes" Madison ran 5 miles in 51 minutes and 25 seconds. She completed the same run on Sunday in 48 minutes and 46 seconds. How much time did she spend running over the weekend?
9. Problem: Twins were born-Mario weighed 6 lbs and 1 oz , and Tiffani weighed 4 lb and 9 oz . How much larger was Mario than Tiffani? Eddie solved this problem as follows. Explain what is wrong with Eddie's method, and show how to modify his method of regrouping to make it correct. (Do not start from scratch.)
10. Al Roker ran the 2010 NYC Marathon in 7:09:44. Katie Holmes ran the same marathon in 2007 in 5:29:58. How much longer did it take Al to complete the marathon? Solve this problem by regrouping among hours, minutes, and seconds.
```
    7(hours) + 9(minutes) + 44(seconds)
```

-5 (hours) +29 (minutes) +58 (seconds)

Reflection: How do you see yourself incorporating the ideas shared today in your classroom?

