

ACTIVITY IA8.7: The Prodigious Sum

Intended learning: To use formal algorithms for multi-digit addition and subtraction.

Instructional mode: Longer, inquiry mode for individuals or groups.

Materials: Writing materials, and a single set of digit cards 0–9 for each student.

Description: Pose the following problem using a diagram as in Figure 8.10a. *I had a 3-digit addition sum here: a 3-digit number plus another 3-digit number, and the answer was a 3-digit number. But the digits have walked off somewhere. It was a very interesting sum, because it used all the digits 1 to 9. Can you figure out what the sum was?* Students copy the blank diagram, and arrange digit cards in the diagram to find possible 3-digit numbers. A significant breakthrough is to recognize that a solution needs to involve regrouping in one column. Students should come to realize there is more than one solution. Challenge students to find more.

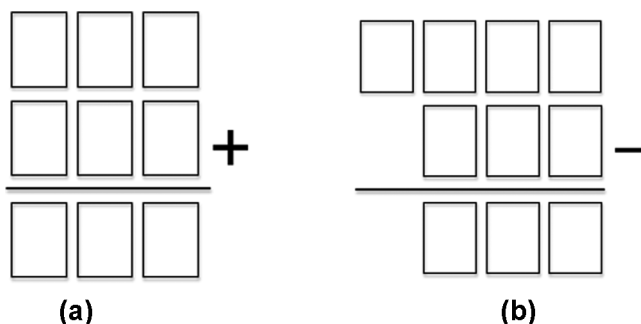


Figure 8.10 (a) Complete the addition using the digits 1–9, and (b) complete the subtraction using the digits 0–9

Responses, variations and extensions:

- Students will probably need to do many written additions to test the possible arrangements.
- Solving the problem involves working with the relationships between the digits in the addition. A formal addition algorithm also involves the relationships between digits, whereas a semi-formal addition strategy involves the relationships between whole tens and hundreds. Hence, testing arrangements and working towards a solution are considerably easier when using the formal addition algorithm, rather than using a semi-formal strategy.
- Demonstrating why a solution needs to involve regrouping in one column relies on a subtle analysis of patterns of odd and even digits, worthy of a separate investigation.
- A similar problem can be posed to complete the subtraction diagram shown in Figure 8.10b using all the digits 0–9.