

ACTIVITY IA6.8: Higher Decade Addition and Subtraction Patterns

Intended learning: To generalize addition and subtraction across several decades without counting.

Instructional mode: Shorter, inquiry mode for individuals, small groups and whole class.

Materials: Chalkboard and chalk, or chart paper and pen.

Description: This activity involves presenting a series of related tasks designed to draw students' attention to number relationships across several decades. *What is $6 + 2$?* Record the equation $6 + 2 = 8$. Each of the following equations that notate student responses should be written just below $6 + 2$ so that the 6 in the ones place aligns with the 6 above (see Figure 6.8). *If you know that $6 + 2 = 8$, can you use that to help you work out $16 + 2$? How about $26 + 2$? $36 + 2$?* This task is intentionally exploiting additive and subtractive patterns over several decades. It is intended that students will use the pattern rather than solve each individual task separately. Facilitate student attention to the pattern by asking, *What do you think will be the next one? Are there others?* Repeat with other patterns.

$$\begin{array}{r} 6 + 2 = 8 \\ 16 + 2 = 18 \\ 26 + 2 = 28 \\ 36 + 2 = 38 \end{array}$$

Figure 6.8 Recording a series of number sentences for higher decade additions

Responses, variations and extensions:

- Use variations such as the following: (a) additive patterns that do not cross the decuple ($6 + 2$, $16 + 2$, $26 + 2$, ...); (b) subtractive patterns that do not cross the decuple ($8 - 4$, $18 - 4$, $28 - 4$, ... or $89 - 5$, $79 - 5$, $69 - 5$...); (c) additive patterns that cross the decuple

($8 + 5$, $18 + 5$, $28 + 5$, ...); (d) subtractive patterns that cross the decuple ($12 - 4$, $22 - 4$, $32 - 4$, ...); (e) additive tasks involving decuple addends ($24 + 10$, $24 + 20$, $24 + 30$, ...).

- If students are likely to count by ones (e.g. the string $29 + 8$, $29 + 18$, $29 + 28$, $29 + 38$...), the teacher might supply the first equation in the string.
- It is important for students to notice patterns in order to make conjectures about generalizations. These conjectures should be an explicit topic of discussion.