Open-Ended Tasks

Task Idea!

Strand: Number

Focus: Percent

Context: Open-ended question

Along with interviews and anecdotal records as ways to collect information about what their students know and how they represent their ideas, some teachers find it useful to give every student an open-ended task or problem. One sixth-grade teacher asks her students to respond to the question *What do you know about 35%?* Mattie's response indicates that 35 percent is equal to 0.35 and $\frac{35}{100}$. (See Figure 3–1.) While recognizing that her first thought is 35 out of 100, she also acknowledges that the percentage may be applied to a total of 60 or 146 (though she does not explain the proportional relationship). Mattie identifies that 1, 3, 5, and 7 are factors of 35, without indicating why this might be relevant. She associates percents with statistical data and surveys. She also explains that 35 percent is not a benchmark percent as it does not go equally into 100 percent. Note that her response does not include any visual representations.

Charlie provides two visual models for 35 percent along with the conclusion that if 35 percent of a group ordered pizza, 65 percent ordered something else. (See Figure 3–2.) His work then focuses on a common elementary school task of finding several combinations of a particular number, in this case, thirty-five. Beginning with his fourth example, he provides a systematic listing of all of the ways to make thirty-five with two addends, appearing to end this pattern when he begins to repeat a combination previously

Figure 3–1 *Mattie's response to the open-ended assessment task.*

What do you know about 35%?

When I see 35% on a math problem, my mind automatically thinks of "35 out of 100", since % means 'out of 100". But 35% could also have a lot of different meanings, like if it were 35% of 60 or 35% out of 146. I also immediately think about it's factors —1,35,5,and 7. I know that 35% is half of 70% and equal to .35 and $\frac{35}{100}$. I know that 35 could be talking about something less than a whole or something more than a whole—like 35% of a cookie or 35 out of 100 people. I also know that 35% could be used as a statistic—like about 35% of my juice is real juice—or in a survey, like my earlier example of 35 out of 100 people. Also, 35% does not go equally into 100%, so is not a benchmark percent.

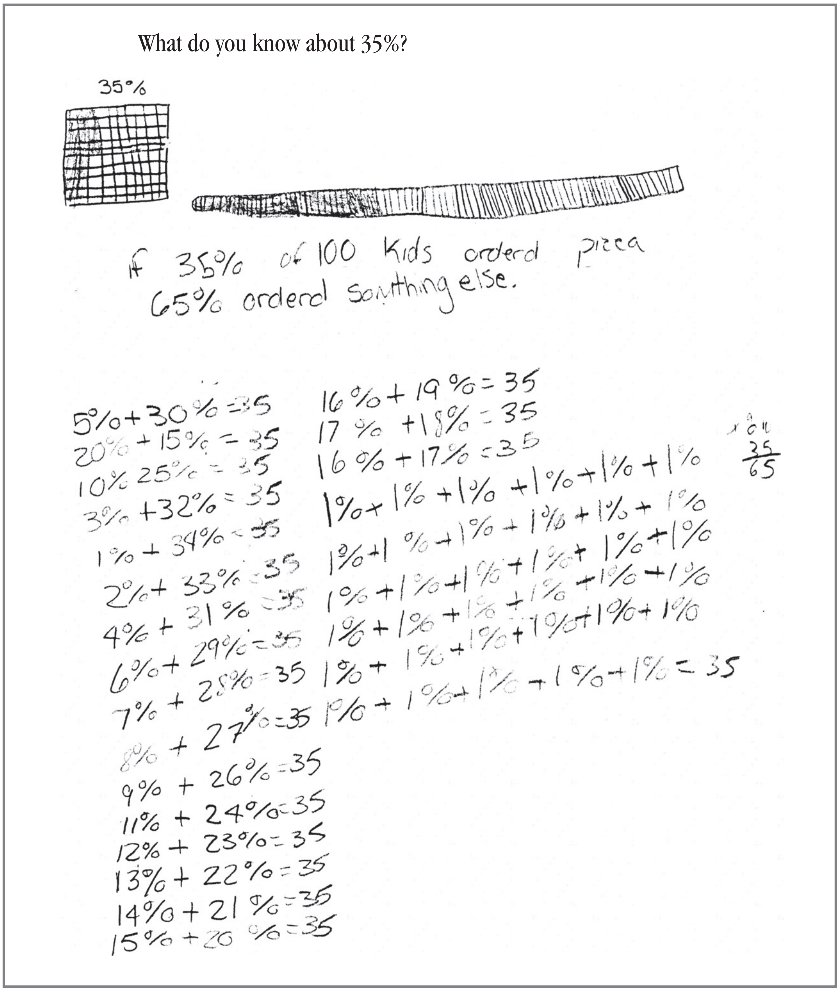

Figure 3–2 *Charlie's response provides visual models before focusing on addition.*

given in a different order. Such data, however, do not reveal his understanding of percent.

Many students write a decimal and a fraction equivalent to 35 percent. Holly expands on this idea by explaining that it could be written as 0.35, 0.350, or 0.3500, because *no matter how many zeros you put on the end of a decimal, the value is still the same.*

Margo includes a representation of what she identifies as a thermometer shaded to 35 percent, similar to what you might see for a fund-raising goal. In his response, Vic includes the misconception that 5% × 7% = 35%. Trevor correctly places 35 percent between $\frac{1}{2}$ and $\frac{1}{3}$ on a number line. Christo cites the familiar rule that to change from a percent to a decimal, you move the decimal point two places to the right.

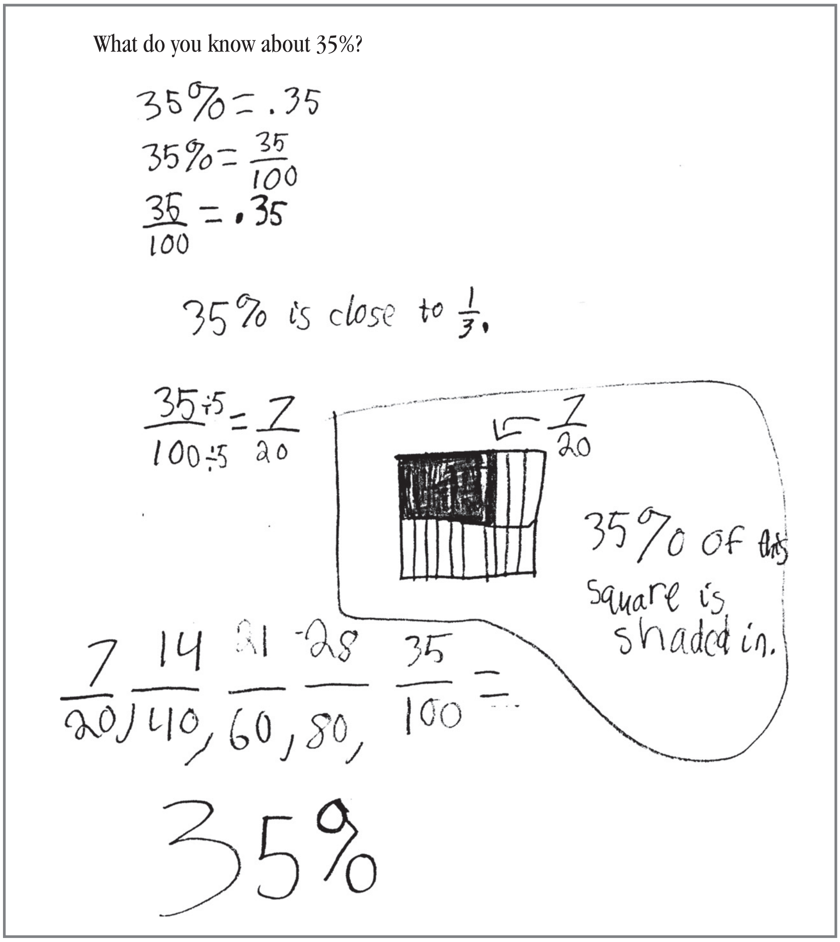

Figure 3–3 *Quinn made several connections with fractions.*

Quinn begins with writing 35 percent as a decimal and a fraction and then identifies it as close to $\frac{1}{3}$. (See Figure 3–3.) He divides 35 and 100 by 5 to find the equivalent fraction $\frac{7}{20}$, and draws a rectangle with 7 of 20 parts shaded. He writes, *35% of this square is shaded in*, next to this representation. He then writes five equivalent fractions equal to 35 percent.

Teacher Reflection

I like to pose the question *What do you know about 35%?* to my students during the first week of school. It gives me a little window of insight into their mathematical thinking. This is a question that students generally feel comfortable answering, since most are familiar with

(*Continued*)

percent. I am always amazed at the variety of the students' responses. Some students just write lots about one idea, while others provide a greater range of concepts. I'm always saddened when a couple of students respond, "I don't know." It worries me that they are uncertain as to how to answer an open-ended mathematical question, even a fairly straightforward one.

While I encourage the use of representations, numbers, or words to describe their thinking, some students rely only on equations. I worry about whether or not these students are making connections between the mathematics they study at school and their own lives. Percents seem to be everywhere, but still, many students fail to identify a real-world application.

I want students to realize that I expect several ideas from them and that this year is not going to be about just giving an answer.

I used to worry so much about finding the right assessment task when I first started using open-ended questions. Now I realize that a simple question such as this one gives me a quick look into students' thinking. Also, because this task is so open, it doesn't tend to intimidate them; they all have some way of responding. I also like giving my students only one question on the page. I want students to realize that I expect several ideas from them and that this year is not going to be about just giving an answer.

Though the range of responses to open questions is great, I don't want to read too much into them. After all, it's only one task and students sometimes need a week or two back in school before they really get going. But it is a place to begin and does help me develop some ideas about what my new students know. I don't have a specific response I am looking for, though I do look for accuracy, flexible thinking, and engagement. I also check to see if there is any evidence of a student looking uncomfortable during this work. It's just an initial task, but it really helps me get to know my students better.

This teacher reminds us of the balanced way we need to think about assessment tasks. No single task can be given too much attention and yet each appropriate task does provide us with some relevant data. It is particularly important to take a similarly balanced perspective on information that is passed from grade to grade. In many schools, teachers share data from one grade to another by way of lists of test scores and quarter and final grades. Many teachers receiving this information find it to be very helpful, while others prefer to begin to make their own judgments before reviewing any of the previous data. In either case it is important to remember the significance of gathering evidence from multiple sources.