



One indicator of how well a student understands percent problems is to compare a student's work and explanation for a problem with how other students have responded to the same problem. Students, parents, or teachers can use the following problem and sample responses to evaluate understanding.

Directions for the Student:

- 1) Solve the following problem and explain your work and answer.
- 2) Compare your work to the sample responses in order to determine if your work indicates deep, partial, or beginning understanding.

Problem:

Sixty percent of the class ate hot lunch. That is 18 students. How many students are in the class?

Level of Understanding	Sample Student Response	Comments
Deep Understanding	<p>Student 1: "I showed that 60% equaled 18. Ten percent of the class is one sixth of 60%, so 10% is 3. Ten times that many is the whole class, so the class has 30 students."</p>	<p>The percent bar enables the student to use a number sense approach. One sixth of 60% is 10%, and $\frac{1}{6}$ of 18 equals 3, so 10% is equal to three students. If three students equal 10% of the class, 3 times 10, or 30, is 100% of the class.</p>
	<p>Student 2: "If 60% of the class is 18 students, then 10% is 3 students. Forty percent of the class is 4 times 3, or 12 students. Eighteen plus 12 equals 30 students."</p> <p>10%, 20%, 30%, 40%, 50% 60% 3 6 9 12 15 18 12 + 18 = 30</p>	<p>This student determined that 10% equals 3 students, 20% equals 6 students, etc. The student then added 18 (60% of the students) and 12 (40% of the students) to get 30 (100% of the students).</p>



Level of Understanding	Sample Student Response	Comments
Partial Understanding	<p>Student 3: “If 18 was 50%, the class would have 36 students. But it’s 60%, so maybe 32 students.”</p>	<p>This student understands 50% but is not able to use 60% to determine the exact number of students.</p>
	<p>Student 4: “What I did was take 18 and divided it with 60, but I took the 0 off and got 3. Then I counted by tens to 100 and put 3 circles for each ten and I got 30.”</p> <p style="text-align: center;"> </p>	<p>This student has a correct answer. The diagram seems to show that 10% of the class equals 3 students and 100% of the class equals 30 students. The 18 shaded circles seem to represent 60% of the class. However, the student’s explanation does not make sense and it is unclear how the student decided 10% is equal to 3 students.</p>

Level of Understanding	Sample Student Response	Comments
Beginning Understanding	<p>Student 5:</p> $\frac{60}{18} = \frac{x}{100}$ $18x = 6000$ $x = 333$	<p>This student understands how to solve a proportion, but did not set it up correctly. The ratio, 60% to 18 students, is not equal to the ratio, x students to 100%. The student could have correctly made the second ratio 100% to x students. It appears this student knows a procedure for solving percent problems but does not understand why the procedure works.</p>
	<p>Student 6:</p> <p>“Eighteen divided by 60 is about 32.”</p> $ \begin{array}{r} 3.26 \\ 18 \overline{)60.0} \\ \underline{54} \\ 60 \\ \underline{18} \\ 42 \\ \underline{36} \\ 6 \end{array} $	<p>Eighteen divided by 60% is 30, the correct answer. This student said “18 divided by 60” but the work shows 60 divided by 18. It appears that the student does not understand how to set up the problem. The student also made computational errors. The student seems to realize that 3.2 is an unreasonable answer and changes it to 32.</p>