Picking the 5 W's from a problem

It seems that students sometimes have more problems picking the observational unit (the WHO) than picking the variables (the WHAT) from a problem, and lose points on resulting midterms because of it. Realizing that at least 2 of the 3 mid-terms have these kinds of questions on them, we should practice being able to correctly pick these things out, so we are ready for the exam. Below are some practice problems.

Problem:
The State Education Department requires local school districts to keep the following records on all students: age, race or ethnicity, days absent, current grade level, standardized test scores in reading and mathematics, and any disabilities or special educational needs.

I like to first answer the WHAT, because it seems easier to pick out variables than it is to pick out the observational units (WHO). I try to visualize a problem laid out in a spreadsheet approach. Then I pick the column labels of the spreadsheet as variables and row column titles as the observational units. It helps to see the characteristics of the individual units (rows) as entries in each column of the row of the “imagined” spreadsheet.

Variable:
- AGE [quantitative, units=years (probably)]
- RACE [categorical]
- DAYS ABSENT [quantitative, units=days]
- GRADE LEVEL [categorical]
- MATH SCORE [quantitative, units=points?]
- READING SCORE [quantitative, units=points?]
- NEEDS [categorical]

Observational Units: state school students

WHEN: don't know exactly, but probably current within the past school year

WHERE, HOW: not known in which state, or what procedure is used to collect and store the information

WHY: part of the state Ed. Dept. legally mandated responsibility is to keep current records on kids in the public schools

Notice that you should look at the complete “laundry list” of W's and H's when analyzing a statistics problem, but many of those may be unanswerable. If something about the study seems “fishy” or questionable to you as a skeptical analyzer, then you should come back to the authors of the study and request answers to those W's and H's you don't have. In short, the validity, authenticity, reliability, and “flags about bias” can many times be investigated about a study by thoroughly going through the W's and H's.

“Practice makes perfect” when learning how to pick out the W's and H's—so do a lot of book problems (odds have answers in the back of the book), until you feel confident.