For questions 1 - 7, tell what the population is, the sample, the sampling design and any possible sources of bias and what the effect of that bias would most likely be, if possible.

1. A local TV station conducts a poll about the use of Green Technology during the show "*Save the Planet.*" They ask viewers to call in and give their opinion.

The population is the viewers that watch a particular TV station. The sampling design is voluntary response sample. The sample would be the people who actually call in. Because they are asking during a "Save the Planet" show, the responses are most likely to be biased toward pro-Green Technology.

2. An Algebra 2 teacher wants to know how many students are projected to enroll in AP Statistics next year. He randomly picks two of his classes and asks every student in class what their plans are.

The population is all Algebra 2 students. The sampling design is a cluster sample. The sample would be all of the specific students from the two classes selected. Biases could exist based on those specific class. For example, if AP Physics is scheduled the same period as one of the classes, all of the "AP Physics-interested" students may be absent from that specific class. These types of students may be more likely to enroll in AP Stats.

3. A different Algebra 2 teacher has the same question. Instead, he separates his students into two groups: Students with at least a B average, and students below a B average. He then randomly selects 20 students from each group.

The population is all Algebra 2 students. The sampling design is a stratified sample. The sample would be all of the specific students that were actually selected. Depending on the proportion of each type of student, his sample may overestimate or underestimate the true proportion of students. For example, if only 10% of the students are earning a B or higher in Algebra 2, they are being represented at a higher rate when selected equally as the students earning below a B. This could over represent the proportion interested in taking AP Stats.

4. A third Algebra 2 teachers has the same question. He simply asks the students he sees at the STEM club he runs afterschool.

The population is all Algebra 2 students. The sampling design is a convenience sample. The sample would be all of the specific students surveyed at STEM club. Obviously, students at STEM club enjoy STEM related subjects like Statistics. The bias would likely overestimate the proportion of students wanting to take AP Statistics.

5. Dr. Smith, principal at KHS, wants to know how many students feel they "Work Hard and Be Nice To Each Other." He sends a survey to every 5th student on his enrollment list.

The population is all KHS students. The sampling design is a systematic random sample. The sample would be all of the specific students selected to participate. Biases? Hard to think of any.....

6. A local politician wants to gain insight to what his constituents feel about a particular issue. One afternoon, she randomly selects 3 blocks in her neighborhood and asks everyone who is home from those blocks what they feel about the issue.

The population is all constituents in the politician's district. The sampling design is a cluster sample. The sample would be all of the specific citizens surveyed. Biases include undercoverage: some people who aren't home won't be represented. Also, the three blocks might not represent all citizens: maybe they picked the "fancy" blocks, in which the Kellys of the world would not be represented.

7. A famous celebrity wants to meet with 10 students from your school. Your principal puts everyone's name on a list and selects 5 students randomly to meet with the celebrity.

The population is all students in your school. The sampling design is a SRS (simple random sample). The sample would be all of the specific students selected. No biases ... SRS's are the best!

8.
11. The first question leads respondents to feel empathetic toward the students who do not pass. The wording "in order to stay with their classmates" may also lead to bias. The second question leads respondents to holding schools accountable (saying yes). Who doesn't want accountability? The wording bias in each will misrepresent the population's true feelings.

Create your own question that has more neutral wording that could be uses to assess the opinions of parents.

"Do you feel that students should be required to pass a standardized when advancing to the next grade level?"

9. Your school has been awarded a trip to Paris for 5 students to help increase French culture and awareness at your school. Naturally, many students are interested in this free trip. Of the 580 students that sign up, 124 are 9th graders. Students are numbered from 1-580 and 5 students are selected using a random number generator. Despite several students from each grade level signing up, all 5 students selected are from the 9th grade.

a. What type of Sampling Design did the school use to select the sample? Explain.

The school used the good 'ol Simple Random Sample. All students had an equal chance of being selected.

b. Was there any bias in the sampling procedure? Explain.

No. Each student had the same chance of being selected.

c. Suppose your administration wanted at least two 12th graders to go on the trip. What sampling design would have ensured that of 5 students selected, at least 2 of the students were 12th graders?

The best way to ensure two 12th graders are selected is to conduct a stratified sample.
Divide students into 2 groups: 12th graders and non-12th graders. Select 2 students randomly from the 12th graders. Select 3 students from the non-12th graders.

10. a. Given that students are frequently off task using their cell phone, do you believe cell phones should be banned at school?
Lots of bias here! ("frequently off-task")

"Should students have access to their cell phones at school?"

b. Should students who have worked hard to earn a 4.0 GPA be allowed to leave during seminar?

Bias includes the wording "students who have worked hard"

"Do you believe that students who earn a 4.0 should be allowed to leave during seminar?"

11. a. Select the 10 female soldiers after seeding your calculator at 30.

Females numbered $37, 68, 77, 8, 61, 55, 41, 66, 82, 94$ are selected

b. Select the 10 male soldiers after seeding your calculator at 40.

Males numbered $494, 142, 9, 462, 281, 239, 122, 526, 54, 352$

c. Why do you think the decision was made to use a stratified sample?
Because there is a greater proportion of males in the battalion, they probably wanted to ensure that female soldiers' option was represented.

12. #s 2 and 4 (Brust and Sullivan) will represent the Algebros. This is appropriate because they both tend to be very lame.

13. Find the exact value of sin 225° $-\dfrac{\sqrt{2}}{2}$

$\dfrac{\sqrt{2}}{2}$ 14. Find the exact value of cos 315°

13.1 Sampling Methods Practice Solutions