3. **Emoticons.**

   a) This is a voluntary response sample.

   b) We have absolutely no confidence is estimates made from voluntary response samples.

6. **Gallup World.**

   a) They are using a stratified design in which the countries are strata. They don't specify how the random samples are drawn within each stratum.

   b) The size of the sample has no effect on the precision of estimates from these surveys. Only the sample size matters.

9. **Population** – adults
   Parameter – proportion who think drinking and driving is a serious problem
   Sampling Frame – bar patrons
   Sample – every 10th person leaving the bar
   Method – systematic sampling
   Bias – undercoverage. Those interviewed had just left a bar, and may have opinions about drinking and driving that differ from the opinions of the population in general.

12. **Population** – all cars
   Parameter – proportion of cars with up-to-date (or out-of-date) registrations, insurance, or safety inspections.
   Sampling Frame – cars on that road
   Sample – cars stopped by the roadblock
   Method – cluster sample of an area, stopping all cars within the cluster
   Bias – undercoverage. The cars stopped might not be representative of all cars because of time of day and location. The locations are probably not chosen randomly, so might represent areas in which it is easy to set up a roadblock, resulting in a convenience sample.

15. **Mistaken poll.**

   The station's faulty prediction is more likely to be the result of bias. Only people watching the news were able to respond, and their opinions were likely to be different from those of other voters. The sampling method may have systematically produced samples that did not represent the population of interest.

18. **Parent opinion, part 2.**

   a) This sampling method suffers from voluntary response bias. Only those who see the show and feel strongly will call.

   b) Although this method may result in a more representative sample than the method in part **a)**, this is still a voluntary response sample. Only strongly motivated parents attend PTA meetings.

c) This is multistage sampling, stratified by elementary school and then clustered by grade. This is a good design, as long as the parents in the class respond. There should be follow-up to get the opinions of parents who do not respond.

d) This is systematic sampling. As long as a starting point is randomized, this method should produce reliable data.

21. Roller coasters.

a) This is a systematic sample.

b) This sample is likely to be representative of those waiting in line for the roller coaster, especially if those people at the front of the line (after their long wait) respond differently from those at the end of the line.

c) The sampling frame is patrons willing to wait in line for the roller coaster. The sample should be representative of the people in line, but not of all the people at the park.

24. Banning ephedra.

a) This is a voluntary response survey. The large sample will still be affected by any biases in the group of people that choose to respond.

b) The wording seems fair enough. It states the facts, and gives voice to both sides of the issue.

c) The sampling frame is, at best, those who visit this particular site, and even then depends of their volunteering to respond to the question.

d) This statement is true.

27. Phone surveys.

a) A simple random sample is difficult in this case because there is a problem with undercoverage. People with unlisted phone numbers and those without phones are not in the sampling frame. People who are at work, or otherwise away from home, are included in the sampling frame. These people could never be in the sample itself.

b) One possibility is to generate random phone numbers and call at random times, although obviously not in the middle of the night! This would take care of the undercoverage of people at work during the day, as well as people with unlisted phone numbers, although there is still a problem avoiding undercoverage of people without phones.

c) Under the original plan, those families in which one person stays home are more likely to be included. Under the second plan, many more are included. People without phones are still excluded.

d) Follow-up of this type greatly improves the chance that a selected household is included, increasing the reliability of the survey.

e) Random dialers allow people with unlisted phone numbers to be selected, although they may not be the most willing participants. There is a reason that the phone number is unlisted. Time of day will still be an issue, as will people without phones.

30. Fuel economy.

    a) The statistic calculated is the mean mileage for the last six fill-ups.

    b) The parameter of interest is the mean mileage for the vehicle.

    c) The driving conditions for the last six fill-ups might not be typical of the overall driving conditions. For instance, the last six fill-ups might all be in winter, when mileage might be lower than expected.

    d) The EPA is trying to estimate the mean gas mileage for all cars of this make, model, and year.

33. Quality control.

    a) Select three cases at random, then select one jar randomly from each case.

    b) Generate three random numbers between 61-80, with no repeats, to select three cases. Then assign each of the jars in the case a number 01-12, and generate one random number for each case to select the three jars, one from each case.

    c) This is not a simple random sample, since there are groups of three jars that cannot be the sample. For example, it is impossible for three jars in the same case to be the sample. This would be possible if the sample were a simple random sample.