1. **C**. The experiment only measures the rate of ripening of bananas with an injection and without an injection. It does not conclude anything about the amount of chemicals injection, the price of the bananas, and the size of the bananas. The experiment shows that the members of the experiment group were more likely to take a shorter amount of time for a brown spot to appear than members of the control group. Choice A is incorrect because the experiment does not say anything about the price of the bananas. Choice B is incorrect because the experiment does not make any conclusions about the size of the bananas. Choice D is incorrect because the experiment group, the bananas injected with the chemicals, took fewer days for a brown spot to appear than the bananas in the control group.

2. **D**. A properly conducted survey should produce unbiased, valid data from a population sample randomly selected from the entire population being studied. It would be incorrect for the student to only study students in her grade, as she is ignoring the rest of the grades in the student body. Thus, it should not be a component of her survey. Choices A, B, and C are incorrect because they are all good components to have in a survey. A survey should include all representatives from all members of the study and should be randomly selected.

3. **A**. The researcher is separating subjects into a control group that does not receive a treatment (fewer threads) and an experimental group that receives a treatment (extra threads), so the data collection approach that is most appropriate for this situation is a controlled experiment. Choices B, C, and D are all incorrect because they do not properly describe this particular research study.

4. **B**. The researcher is obtaining data from a subset (randomly selected employees of the company) of an entire population (all the employees of the company) through a questionnaire. Thus, the most appropriate data collection approach is a sample survey. Choices A, C, and D are all incorrect because they do not properly describe this particular research study.

5. **B**. The population of 80 high schoolers are divided into two groups, and one group is given a treatment of listening to music before performing a cognitive task. Thus, this is a controlled experiment. Choices A, C, and D are all incorrect because they do not properly describe this particular research study.

6. **A.** Experimental research, or controlled experiments, is a method used to study a subset of a population and generalize the results to the entire population. However, the restrictions in order to make a generalization are the following:
    - The population must be well-defined
    - The participants must be selected at random
    - The participants must be randomly assigned to treatment groups

   The described experiment meets all these requirements. The conclusion can be made that the pill is likely to improve the reaction time of people between the ages of 18 and 25. The results of the experiment is only limited to the population of people between the ages of 18 and 25 and cannot be extended to other treatment methods or other age groups. Choice B is incorrect because it makes an incorrect conclusion about the effectiveness of the pill compared to all other available methods. The study cannot be generalized to other methods in the market. Choice C is incorrect because the study only included participants between the ages of 18 and 25, so the conclusion is limited to that age group. Choice D is incorrect because the conclusion made that it "will cause a substantial improvement in reaction time" is too strong and too vague as it does not specify for whom the pill helps.

7. **D**. Survey research is an efficient way to estimate the preferences of a large population. In order to properly generalize the results from a survey, the participants must be randomly selected from all the people in that population. However, this study was administered at a single movie theater, and the conclusion from the survey cannot be generalized to all moviegoers. Choices A, B, and C are incorrect because they do not affect the reliability of the conclusion as strongly as Choice D, where the survey was administered.

8. **B**. Standard deviation measures how spread out the values are from an average value. By putting the data sets into a list on a calculator, we can calculate the standard deviation for Jerry to be 0.35 and the standard deviation for Samuel to be 0.76. The answer can also be found through observation as Jerry's sprint times are closer together in value than Samuel's. Thus, the standard deviation of 100 m sprint times for Samuel is larger. Choices A, C, and D are incorrect because none of them make a true conclusion based on the tables given.

9. **D**. A sample of 17 tabby kittens was selected at random from all the tabby kittens at the shelter, and since 15% of them weighed more than 5 pounds, it can be concluded that approximately 15% of all the tabby kittens at the shelter weight more than 5 pounds. The conclusion cannot be generalized to all the kittens at the shelter because the sample contained 17 *tabby* kittens. Choices A, B, and C are incorrect because they all make conclusions on all the kittens at the shelter, when the information given is only relevant to the tabby kittens at the shelter. Thus, they all make an incorrect conclusion.

10. **D**. In order to properly generalize the results of the survey to the entire student body, the survey must randomly survey a sample from the entire student body. However, this survey only takes a random sample from student who had morning classes and did not include students who did not have morning classes. No conclusion about the entire student body can be made. Also, the sample size is sufficient. Thus, the survey sample is biased because it is not representative of the entire student body. Choice A is incorrect because a conclusion cannot be made on the entire student body. Choice B is incorrect because the sample should have included more students who did *not* have morning classes, to be more representative of the entire student body. Choice C is incorrect because the sample should *not* have only consisted of students who did not have morning classes, but rather both students who have morning classes and students who did not have morning classes in order to contain the entire student body and not be biased.