QUESTIONS:

1. **You're attempting to characterize the distribution of your product. Your product is built on two different machines. What type of sampling should you choose to properly characterize your product?**
   - Sequential Sampling
   - Stratified Sampling
   - Random Sampling
   - Acceptance Sampling

2. **You're designing a new car bumper and you must perform destructive testing to confirm that the impact resistance achieved the target value. This destructive testing is expensive and you want to minimize the number of samples tested. Which sampling approach should you use?**
   - Sequential Sampling
   - Stratified Sampling
   - Random Sampling
   - Acceptance Sampling

3. **When determining the data collection strategy that you want to use, which assumption must be met for random sampling to be appropriate?**
   - The Assumption of Normality
   - The Assumption of Linearity
   - The Assumption of Homogeneity
   - The Assumption of Equality of Variances

4. **What is random sampling?**
   - Selecting items without any pattern
   - Sampling that ensures every item has an equal chance of being selected
   - Choosing items based on a predetermined sequence
   - Collecting data without any planning

5. **When is stratified sampling most useful?**
   - When the population is very small
   - When the population is not homogenous
   - When there is no clear structure in the population
   - When convenience is the primary concern

6. **In statistical terms, what is a "population"?**
   - An entire group of observation or events that you want to study
   - Data collected for a study
   - The sample size divided by the total number of items
   - A small subset of a larger group

7. **What does "homogeneity" refer to in the context of data?**
   - The variability within a population or sample
   - The uniformity or similarity of items within a population or sample
   - The average value of a dataset
   - The size of a sample relative to the population

8. **What is "bias" in the context of data collection?**
   - The tendency for data to be consistently higher than the actual values
   - The influence that systematically distorts data in one direction
   - The randomness in data that cannot be explained
   - The accuracy of data collected from a random sample

9. **What are "strata" in the context of stratified sampling?**
   - Randomly selected items from a population
   - Subgroups within a population with shared characteristics
   - Sequential samples in systematic sampling
   - Outliers in a dataset

10. **A safety incident just occurred, and an employee barely avoided a crippling injury. The root cause of the incident is not obvious, and many different ideas, factors and events have been discussed in relationship to this event. What tool could be used to visualize the cause-and-effect relationship between all these ideas, factors and events?**
    - Interrelationship Diagram
    - Affinity Diagram
    - Prioritization Matrix
    - Tree Diagram

SOLUTIONS:

1. **You're attempting to characterize the distribution of your product. Your product is built on two different machines. What type of sampling should you choose to properly characterize your product?**
   - Sequential Sampling
   - **Stratified Sampling**
   - Random Sampling
   - Acceptance Sampling

   The "Stratified Sampling" divides the product population into machine-specific groups (strata) and randomly selects samples from each stratum. It ensures representation from both production processes for an accurate characterization.

2. **You're designing a new car bumper and you must perform destructive testing to confirm that the impact resistance achieved the target value. This destructive testing is expensive and you want to minimize the number of samples tested. Which sampling approach should you use?**
   - **Sequential Sampling**
   - Stratified Sampling
   - Random Sampling
   - Acceptance Sampling

   The "Sequential Sampling" allows you to gradually collect and test samples, making decisions as you go based on the results. It helps reduce testing costs while maintaining quality control.

3. **When determining the data collection strategy that you want to use, which assumption must be met for random sampling to be appropriate?**
   - The Assumption of Normality
   - The Assumption of Linearity
   - **The Assumption of Homogeneity**
   - The Assumption of Equality of Variances

   The "Assumption of Homogeneity" means that the population you are sampling from is relatively uniform or similar in the characteristic you are studying. Ensuring homogeneity is essential to the validity of random sampling.

4. What is random sampling?

- Selecting items without any pattern
- **Sampling that ensures every item has an equal chance of being selected**
- Choosing items based on a predetermined sequence
- Collecting data without any planning

Random sampling involves selecting items from a population in such a way that each item has an equal chance of being included in the sample. This approach helps reduce bias and ensures representativeness.

5. When is stratified sampling most useful?

- When the population is very small
- **When the population is not homogenous**
- When there is no clear structure in the population
- When convenience is the primary concern

Stratified sampling is particularly useful when the population is not homogenous and should be divided into distinct subgroups or strata. It helps ensure that each stratum is adequately represented in the sample.

6. In statistical terms, what is a "population"?

- **An entire group of observation or events that you want to study**
- Data collected for a study
- The sample size divided by the total number of items
- A small subset of a larger group

In statistics, a population refers to the entire group or collection of individuals, items, or data points that share certain common characteristics or attributes.

7. What does "homogeneity" refer to in the context of data?

- The variability within a population or sample
- **The uniformity or similarity of items within a population or sample**
- The average value of a dataset
- The size of a sample relative to the population

Homogeneity relates to the degree of similarity or uniformity among items within a population or sample. High homogeneity indicates that items are similar, while low homogeneity suggests diversity.

8. What is "bias" in the context of data collection?

- The tendency for data to be consistently higher than the actual values
- **The influence that systematically distorts data in one direction**
- The randomness in data that cannot be explained
- The accuracy of data collected from a random sample

Bias refers to the presence of systematic errors or influences that cause data to consistently deviate from the true values in one direction, either overestimating or underestimating.

9. What are "strata" in the context of stratified sampling?

- Randomly selected items from a population
- **Subgroups within a population with shared characteristics**
- Sequential samples in systematic sampling
- Outliers in a dataset

In stratified sampling, a population is divided into subgroups called strata, where items within each stratum share similar characteristics.

10. A safety incident just occurred, and an employee barely avoided a crippling injury. The root cause of the incident is not obvious, and many different ideas, factors and events have been discussed in relationship to this event. What tool could be used to visualize the cause-and-effect relationship between all these ideas, factors and events?

- **Interrelationship Diagram**
- Affinity Diagram
- Prioritization Matrix
- Tree Diagram

The tool that could be used to visualize the cause-and-effect relationship between ideas, factors, and events related to a safety incident is the Interrelationship Diagram. It helps identify the root causes by mapping out the complex relationships among contributing factors, enabling focused efforts on preventing similar incidents in the future.