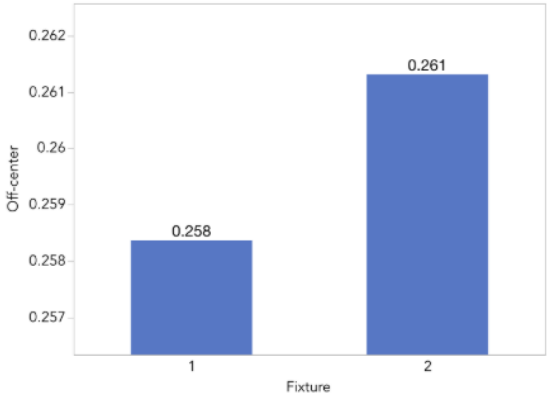
Questions Module 1

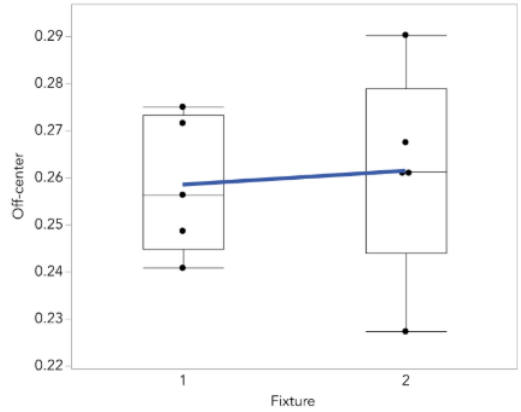
To improve any process, you must understand the sources of variation within the process.

- *a.* True
- *b.* False

Correct.
You need to quantify and understand the variation within the process, both good and bad. You also need to understand the process itself.
(Note: Scroll down to see the Show Answer button. The answer will display under the button.)
You are studying two fixtures used in a tooling process. In this process, a hole is drilled in the center of parts. The fixtures hold parts in place. An important measure of performance of the tooling process is the off-centering of the hole, measured in mm. You want to know whether the off-centering for the two fixtures is different. You measure five parts tooled using fixture 1, and five parts tooled using fixture 2. Consider these two graphs, which you learn about in the next module.
A bar chart displays the average (or mean) off-center values for each fixture, based on the five parts.



Two box plots show the individual off-center measurements (the dots) for the five parts produced with each fixture. The ends of the line are the mean off-center values for each fixture.



Which of these graphs tells you more about off-centering for the two fixtures? Which is more useful in comparing the off-centering for the two fixtures? Why?

The graph with the box plots is more informative because it shows you both the variation in the measurements of the individual parts and the mean off-center value for each fixture. The difference between the means is relatively small compared to the variation between the parts tooled with each fixture. The bar chart doesn't show the variation between the parts. The bar chart also inflates the difference in the mean between the two fixtures because the Y axis doesn't start at zero.

Which of the following is not a general step in most problem-solving approaches?

- *a.* Define the problem.
- *b.* Identify, analyze, and confirm the causes.
- *c.* Identify, evaluate, and implement the solutions.
- *d.* Take steps to ensure that the improvements are sustained.
- *e.* Find someone to blame for the problem.

Correct.

Problem solving is about identifying root causes of the problem and implementing solutions that address these root causes. People are a part of the process or system. If you want to solve a problem, you must address the issues within the process or system that cause the problem.

You can solve most industrial problems using statistical thinking and a structured approach to problem solving.

- *a.* True
- *b.* False

Correct.

Consider this W. Edwards Deming quote: "In God we trust, all others must bring data!" What does this mean?

When you make a decision, you need to support your decision with data.

What is the purpose of a problem statement?

- *a.* to make sure everyone has the same understanding of the problem
- *b.* to identify who to blame if you don't solve the problem
- *c.* to list the team members who will be working on the problem
- *d.* to define how the team will measure success

Correct.

A problem statement is a clear and concise statement of the problem.
Which of the following is not a part of a team goal statement?

- *a.* the characteristic (the KPI)
- *b.* the current state
- *c.* the desired or future state
- *d.* the time frame
- *e.* the solution

Correct.
Solutions are not included in goal statements.

You are on a team that is tasked with reducing the scrap rate. Which of the following goal statements is the best?

- *a.* Reduce the scrap rate from 12% by March 2020.
- *b.* Reduce the scrap rate to 5% by installing a new temperature controller.
- *c.* Reduce the scrap rate from 12% to no more than 5% by March 2020.
- *d.* Reduce the scrap rate to 5% by March 2020.

Correct.

This goal includes the KPI, the current rate, the desired rate, and the time frame. Ideally, the goal statement should have more information about the characteristic, "scrap rate." For example, suppose that an issue that the team is addressing is the scrap due to a particular defect, cracking. A better statement would be, "Reduce the scrap rate due to cracking from 12% to no more than 5% by March 2020." Goal statements should never include solutions.

When you develop a high-level, or "macro," process map, which of the following do you identify?

- *a.* inputs, the process or system, and outputs
- *b.* inputs, process steps, decision points, and outputs
- *c.* process steps, and who does what at each step
- *d.* employees, machines and equipment, and managers

Correct.

A macro process map is simply a very high-level diagram identifying the process, key inputs to the process, and key outputs. This gives you an overall picture of the process without the details.
What does SIPOC stand for?

- *a.* Sources, Inputs, Procedures, Outputs, Customers
- *b.* Suppliers, Inputs, Process, Outputs, Customers
- *c.* Sources, Inputs, Procedures, Outputs, Customers
- *d.* Suppliers, Inputs, Problems, Outputs, Containment

Correct.

Why do you need to determine how each CTQ (Critical to Quality) characteristic is measured?

If you can't measure a characteristic, you can't evaluate your performance relative to the characteristic, and you can't tell if you are making improvements.

In the box beside each type of map, enter the letter of the appropriate use description.

c	SIPOC map or I/O map
a	Top-down flowchart
b	Deployment flowcharts

a. Use when you have a few major steps with many substeps.

b. Use when you want to map the flow of information or materials through different functional areas.

c. Use when you have only a few process steps, when the process is linear, and when you want to identify the most important input variables.

Correct.

Which of the following IS NOT a brainstorming ground rule?

- *a.* Welcome exaggeration.
- *b.* Criticize and evaluate.
- *c.* Record ideas.
- *d.* Emphasize quantity over quality.

Correct.

During a brainstorming session, ideas are not criticized or evaluated.

In a brainstorming session, why is it helpful to have a facilitator?

Solution (There can be many answers.):

A facilitator helps keep the team on track and focused on the task. The facilitator manages the session. This frees the team members to focus on idea generation.

If possible, you should use a facilitator that is not a team member and does not have a vested interest in the objective. This enables the facilitator to be an unbiased moderator of the session. This is extremely important if the team dynamics are challenging. For example, there might be dominant members of the team or quiet members who aren't as willing to contribute ideas. Or the team might have members from different levels of the organization.

On a problem-solving team, when is multi-voting used?

- *a.* when you can easily reach a consensus on the best ideas
- *b.* when you don't agree with the ideas offered by your colleagues
- *c.* when you want to prove that an idea is correct
- *d.* when you want to generate ideas and then narrow down the list

Correct.

With multi-voting, ideas are generated, and then the list is narrowed down.

What is the value of the 5 Whys in root cause analysis?

The 5 Whys is about digging beneath the surface. When you identify a potential root cause, this cause might be the effect of another cause. Repeatedly asking "Why?" can enable you to get to the true underlying root cause.

You are trying to list potential root causes of a problem. Which tool should you use? (Select the best answer)

- *a.* brainstorming
- *b.* affinity diagram
- *c.* cause-and-effect matrix
- *d.* cause-and-effect diagram

You have developed a process map. You have identified several input variables and multiple output variables. You want to identify the most important input variables. Which tool should you use?

- *a.* brainstorming
- *b.* affinity diagram
- *c.* cause-and-effect matrix
- *d.* cause-and-effect diagram

A critical input characteristic in a chemical manufacturing process is the inlet temperature. Inlet temperature can range from 100 to 110 degrees F. You measure the inlet temperature for 40 batches. What type of data are the inlet temperature values? (Note that in JMP this is referred to as the modeling type.)

- *a.* nominal
- *b.* ordinal
- *c.* continuous
- *d.* none of these

An operational definition is a clear and unambiguous definition of a measurement or metric.

- *a.* True
- *b.* False

Why do you need clear operational definitions for each characteristic that you are measuring?

An operational definition is a clear and unambiguous definition of the characteristic. You need operational definitions to make sure that everyone clearly understands what is being measured and how.

You are studying the performance of a manufacturing process. Out of the last 100 batches of a particular product, produced over a four-week period, only 64 of the batches were acceptable to the customer. You compile all of the data that were collected for these 100 batches to try to understand what might be causing the problem. Which data collection strategy is this?

- *a.* experimental
- *b.* observational
- *c.* retrospective

In the previous question, historical data are compiled on 100 batches of product produced over a four-week period.

What are some limitations of using these data to identify potential causes of the quality problem?

There are many possible answers. You might not have collected data on all of the important characteristics, or there might be hidden (lurking) variables that have not been identified. There might be data quality issues. You might not know how some of the characteristics were measured.

When would you use an experimental study?

Here are a few possible answers.

- when you can't answer your questions using available retrospective or observational data
- when you don't trust or have confidence in the available data

- when you need to make deliberate interventions or changes in to a process to understand cause and effect