What is the STEAM Design Process?

A. **STEAM**: the integration of science, technology, engineering, art and math

B. Scientists, mathematicians, artists engineers and technology experts solve problems using processes to come up with solutions

C. City Academy has developed a design process for its STEAM classes:
   1. OBSERVE
   2. IMAGINE
   3. PLAN
   4. CREATE
   5. EVALUATE
   6. ENHANCE
What does it mean to Observe?

A. **OBSERVE**: to view or examine closely; to study or inspect with focused attention.
   1. The 5 senses are important tools when making observations
      a. SIGHT, SOUND, TOUCH, SMELL, TASTE
   2. When making observations, focus your attention on the details, you may need to observe it over and over again
   3. Collect and record information so you have it to plan your work

B. Below are some ways to encourage and increase observation:
   1. take time to think about what they see
   2. use all their senses to experience the problem or concern
   3. write or verbalize your own questions
   4. research the topic or problem
   5. process what you think or saw through discussion with others
   6. establish differences between fact and opinion
   7. explain observations in written or verbal form
What does it mean to Imagine?

A. **Imagine**: to form a mental picture of something that does not yet exist; to dream up or envision something new

1. Information from observations should guide ideas when imaging how to create or invent
2. Imagining in the mind is important, but putting it down on paper helps bring ideas into the real world
   a. Sketching forms pictures of ideas
   b. Writing puts your ideas into words to help plan

B. Below are some ways to encourage and increase observation:

1. envision the solution
2. Encourage others to think outside the box
3. explain your ideas
4. present or share your ideas with other
5. gather information or clarification from others
6. sketch or model your idea
What does it mean to Plan?

A. **PLAN:** to develop a system or way of doing something in advance; a method of performing an activity that guides how it gets done
   1. A plan helps organize ideas and materials before putting forth all the effort and time of making something
   2. A part of the plan should involve thinking about ways to build quick prototypes or models that allow ideas to become 3 dimensional
      a. **PROTOTYPE:** an inexpensive, easy model that serves as a quick first try at an idea

B. Below are some ways to encourage and increase observation:
   1. Listen to different ideas
   2. Organize ideas
   3. Decide which ideas will work or will be tried first
   4. Establish materials lists of what you need or what you have available
   5. Consider ways to quickly prototype with your materials
   6. Delegate responsibilities if working on a team
   7. Plan a schedule to manage time
What does it mean to Create?

A. **CREATE:** to make something new or unique from one’s imagination; to design or invent.

1. Make sure the plan guides your creation
   a. If the plan includes a prototype, the prototype should be something quick and easy
   b. Allow people to see the prototype so people can get ideas.

2. Creating or inventing something is NOT the last step, it has to be tested.

B. Below are some ways to encourage and increase observation:

1. Use the plan as a guide for creation
2. Use quick prototyping techniques so you can testing your idea
3. Understand it is okay to make mistakes
4. Understand that creation is not the last step
5. Understand that plans can change once an idea takes shape
6. Have fun
7. Showcase your idea with others and explain what you are doing
What does it mean to Evaluate?

A. **EVALUATE:** to test or determine the quality of one’s creation; to assess the effectiveness of an invention
   1. Does your creation do what it is supposed to do?
   2. Consider some tests that can be performed to see if it does what it is supposed to do
      a. Tests should not be complicated, test one thing at a time
      b. Make observations and determine what worked and what didn’t

B. Below are some ways to encourage and increase observation:
   1. Evaluate your creation according to the plan
   2. Think of ways to test your creation
   3. Test your creation and see if it does what it is supposed to do
   4. Retest to see if it is able to perform the same way every time
   5. Explain your creation to others through discussion or writing
   6. Share ideas to see if your creation follows the plan
   7. Determine specifically what worked and did not work
   8. Understand it is okay to make mistakes
What does it mean to Enhance?

A. **ENHANCE**: to modify or improve one’s creation in order to increase its effectiveness; to increase the quality of an invention based on testing

1. Do not let frustration inform what you change or fix
   a. Close observations from a test can tell you what to focus on
   b. Taking everything apart and starting from scratch isn’t always the best option
2. When you make a change, test and retest to see if the changes had an effect
   a. Changes may fix something and they may not, pay close attention
   b. Changes or fixes might have to happen a few times

B. Below are some ways to encourage and increase observation:

1. explain why a design worked or didn’t work
2. determine what needs to be changed and change that one thing
3. understand that frustration is a part of the process
4. realize that plans and designs change as they are tested
5. react appropriately when something requires change
6. When a change is made, test and retest to make sure it works
7. Evaluating and enhancing might have to happen over and over again