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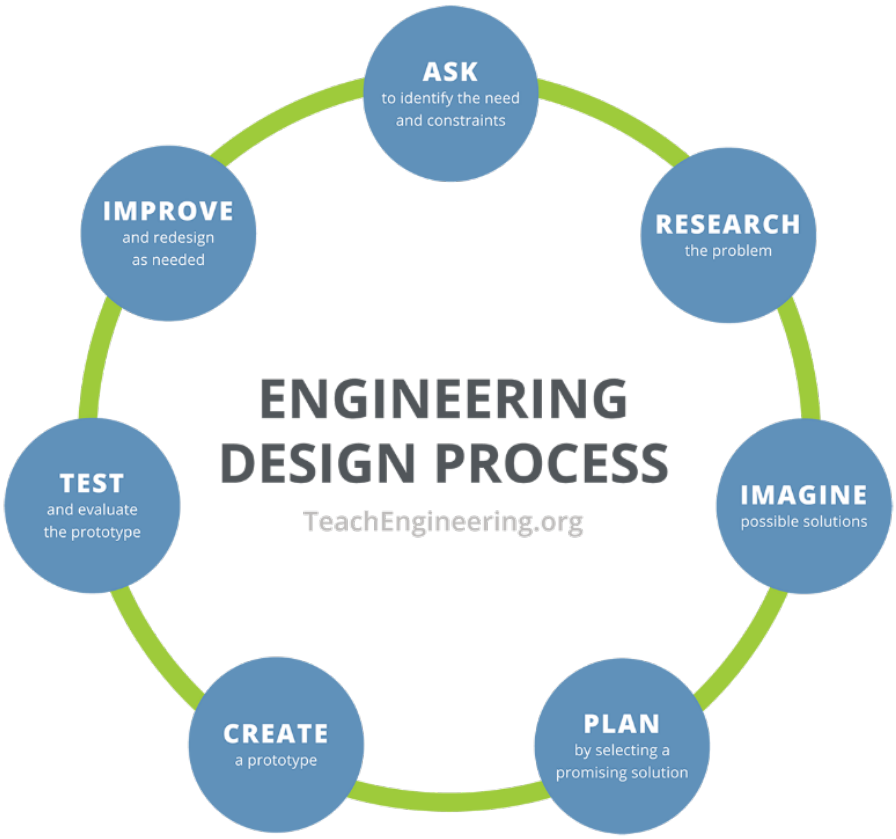
Engineering Design Process Worksheet

Instructions: In this worksheet, you will use the steps of the engineering design process to ask, research, imagine, plan, create, test, and improve activities that potentially will lower heart rate during a simulated panic attack. You will need to identify one activity that can be done at home, one done at work or school, and one activity with no accessories. Good luck!



Step 1: Ask

1. What problem are you trying to solve?

2. What are the constraints of the problem?

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Step 2: Research

3. Using your laptop, explore recommendations from popular online sources related to psychology, neuroscience, anxiety, and panic attacks.

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Step 3: Imagine

4. Based on your research, individually brainstorm 5-6 ideas or activities that could lower heart rate during a simulated panic attack.

a.	b.
c.	d.
e.	f.

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Step 4: Plan

5. With your partner, choose three ideas/activities you will test, one for each scenario. Fill out the information below to plan each activity.

Activity 1: Can be carried out within your home.
Activity to test: Do you need any items for this activity: Justification: Why do you think this activity will mitigate a panic attack?
Activity 2: Can be carried out at work or school.
Activity to test: Do you need any items for this activity: Justification: Why do you think this activity will mitigate a panic attack?
Activity 3: Can be carried out in any setting with no accessories.
Activity to test: Justification: Why do you think this activity will mitigate a panic attack?

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Steps 5/6: Create and Test

6. Before testing, copy over your data from the Day 1 tests.

   Average baseline heart rate (HR) for 5 minutes: _____

   Average HR during simulated panic attack for 5 minutes: _____

   HR during mammalian diving reflex (MDR) for _____ seconds: _____

   How long did you hold your breath?

7. Repeat the steps to simulate a panic attack. During the simulated panic attack, have the test subject engage in the team's chosen activity or idea to STOP the panic attack. Have the data specialist record the average heartrate over 5 minutes and record below.

Activity	Average HR for 5 min

8. Which, if any, of the three activities was able to lower the test subject's heart rate during the simulated panic attack?

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Step 7: Improve

9. If you could do this activity again, what would you do differently? What would you improve?

10. How would you change your chosen activities?

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Reflection Questions:

1. What did you think of this activity?

2. What surprised you in this activity?

3. Imagine you had a friend who confides in you that they have no idea how to manage their panic attacks and asks for your advice. What would you say?

4. Real-world connection: Agoraphobia is commonly mistaken as the fear of going out into public, but more accurately it is the fear of experiencing anxiety and/or panic attacks in public. Consider how your activity can be carried out in this setting without drawing too much attention.

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5. How does the mammalian diving reflex (MDR) lower heart rate?

6. What role does the vagus nerve (X) play in the MDR?

7. What must be true if I find that my activity lowers my heart rate during the simulated panic attack?

8. How is your brain like a computer?