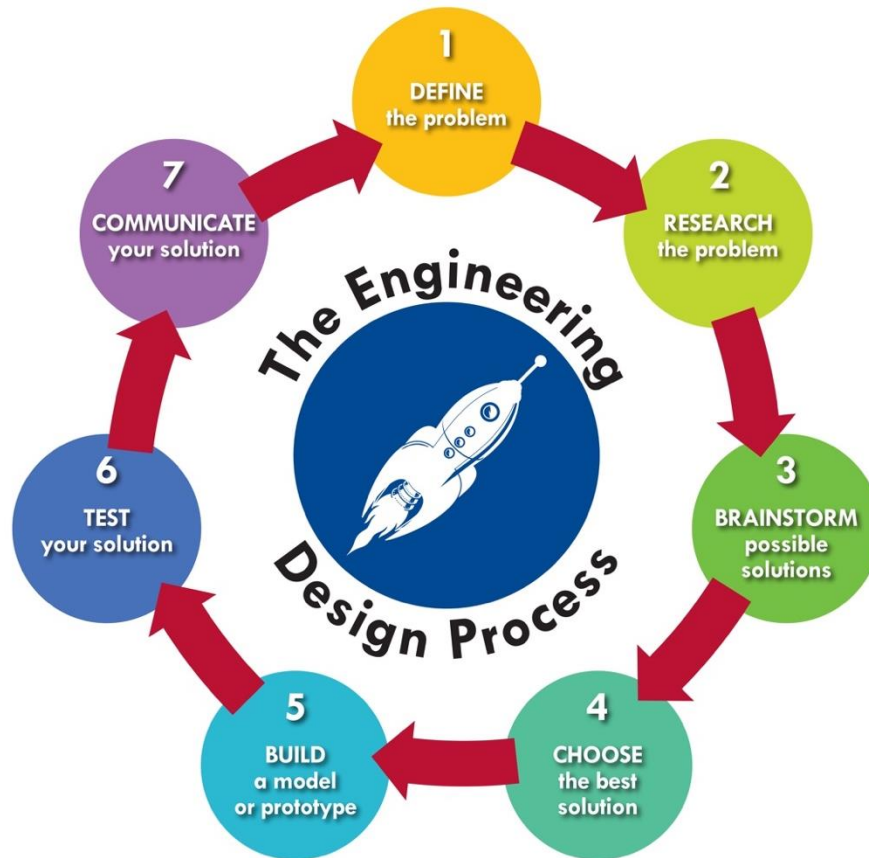


Solve It: A Student STEM Challenge



<p>Topic: Physical Therapy and Rehab</p>	<p>Materials:</p> <ul style="list-style-type: none"> • Computers for research • Paper • Goggles or Safety Glasses • Petroleum Jelly • Meter stick • Headphones • Music player • Math worksheet (grade level appropriate)
<p>Challenge:</p> <p>To research the current safety equipment and protocols that are in place to prevent or reduce concussions during physical activities and improve or design a solution to improve them.</p>	
<p>Real World Connection:</p> <ul style="list-style-type: none"> • National Concussion Awareness Day- http://nationalconcussionawarenessday.com/index.html • CDC HEADS UP to Youth Sports: http://www.cdc.gov/headsup/youthsports/index.html • Brain Injury Association of America: http://www.biausa.org/ • Barrow Neurologic Institute: https://www.barrowneuro.org/press-releases/barrow-concussion-survey-2018/ • Concussion and Brain Injury Center: https://www.barrowneuro.org/specialty/concussions/ • What your Brain is like with a concussion: https://www.youtube.com/watch?v=MboxdG2EZA0 • Concussion Data by Sport: https://www.everydayhealth.com/concussion/symptoms/which-high-school-college-level-sports-have-most-concussions/ • Concussion Conundrum lesson: http://healthpoweredkids.org/lessons/concussion-conundrum/ • Noise Dose Chart: https://www.noisehelp.com/noise-dose.html • STEM Pro Live! with Next Level Physical Therapy: https://schoolsup.org/stemprolive/ 	

Define the Problem:	
<u>Guided Questions</u>	<u>Teacher Notes</u>
<ul style="list-style-type: none"> • What do you have available to work with when designing your solution? • What would a successful solution look like? How will you know if your design is successful? • What are your constraints or limitations? 	<ul style="list-style-type: none"> • Establish your parameters (groups, roles, time limit, # of trials, amount of material allowed to use, etc.). • Taking your students through the Engineering Design Process will vary depending on what problems you identify that will need a solution.
Research the Problem:	
<u>Guided Questions</u>	<u>Teacher Notes</u>
<ul style="list-style-type: none"> • What is already known about the problem? • What are some current solutions that can be built upon/improved? • What technology is available to help you understand the problem better? • What are some obstacles, challenges connected to your problem? 	<p>Once you have narrowed down the problem you want to solve you will want to identify what solutions currently exist to decide how to implement or improve a solution.</p>
Brainstorm Possible Solutions:	
<u>Guided Questions</u>	<u>Teacher Notes</u>
<ul style="list-style-type: none"> • How many ideas can you come up with individually? • How many ideas can you come up with as a group? • How can you use/build on the groups ideas to refine your own? 	<ul style="list-style-type: none"> • Have students individually come up with at least 4 possible designs that they could use in their solution • Have students share designs with a group. <i>*Encourage a variety of ideas and a safe environment.</i> • Encourage reflection and refinement of ideas
Choose the Best Solution:	
<u>Guided Questions</u>	<u>Teacher Notes</u>
<ul style="list-style-type: none"> • Which solution(s) could you build using the materials/time you have available? • Which solution(s) could you build considering the constraints/ limitations? • Which solution do you think has the best chance to be successful? 	<ul style="list-style-type: none"> • Have students choose an idea to design and make a plan to build/create (*even if you have no intention to actually build). • Have students draw a model of their prototype and label the parts (*if applicable). • List the materials that will be needed to build (*if applicable). • Describe how the materials will be used.

Build a Model or Prototype:	
<u>Guided Questions</u>	<u>Teacher Notes</u>
<ul style="list-style-type: none"> • What materials will you need? • Does your design meet the lesson objective? • Does your design clearly communicate your selected solution to the problem? 	<ul style="list-style-type: none"> • Revisit the objective and make sure the student's design matches what they chose for their solution to the problem.
Test your Solution:	
<u>Guided Questions</u>	<u>Teacher Notes</u>
<ul style="list-style-type: none"> • Did you record your observations? • How will you know if your design worked as intended? • How will you know if your design was successful? 	<ul style="list-style-type: none"> • Have students make and record observations during their trial(s). • Encourage students to stay true to their design and not make modifications while testing.
Communicate your Solution:	
<u>Guided Questions</u>	<u>Teacher Notes</u>
<ul style="list-style-type: none"> • Did your design work as intended? How do you know? • Did it solve the problem that you identified? How do you know? • Do you still think your solution is the best one for the problem? Why or why not? • What would you do differently if you could do it again? Why? 	<ul style="list-style-type: none"> • <i>Have students reflect individually first and record responses.</i> • <i>Have students share responses with their group then whole class.</i> • <i>To make iterations, you will want to re-enter the Engineering Design Process and begin thinking about defining the problem(s) they had with the initial idea.</i> • <i>The purpose is to provide a process for them to formalize their thinking and not rely on trial and error to merely accomplish a task.</i> • <i>Share your students' designs and ideas with us at: stem@maricopa.gov</i>