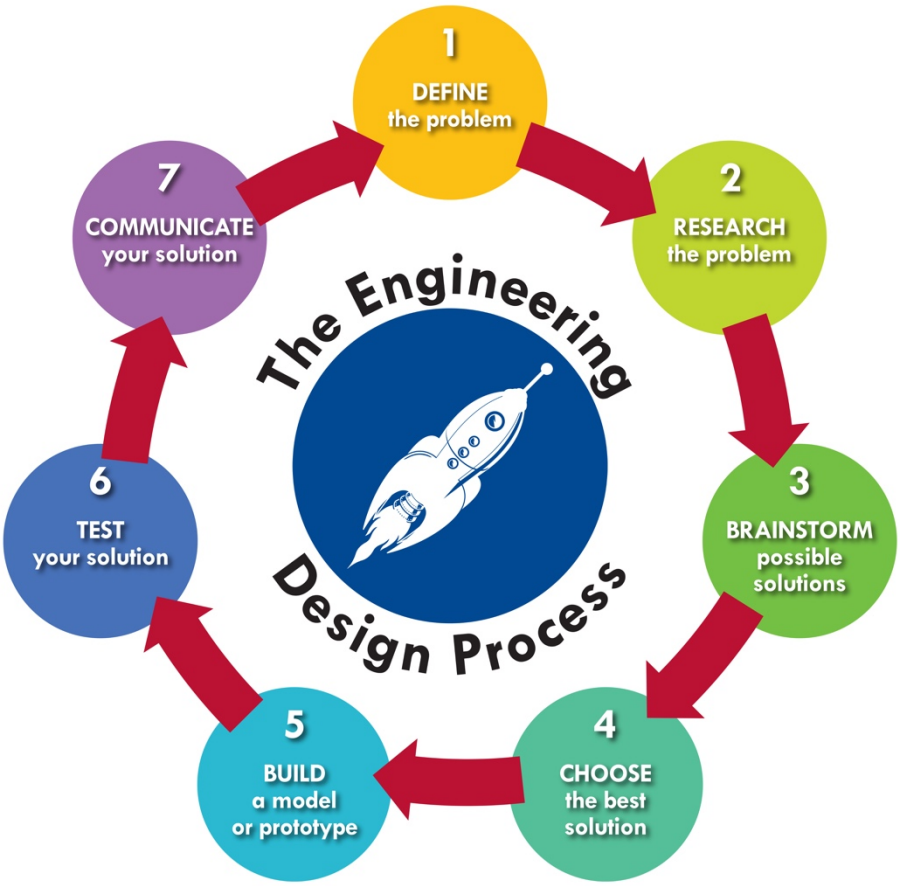
Solve It: A Student STEAM Challenge



Topic: Dinosaur Fossils and Prehistoric Models

Challenge:
Think like a paleo artist and research some of the fossils that have been found here in Arizona. Then design a model or illustration to represent what that dinosaur could have looked like.

Materials:
- Images of dinosaur fossils found in Arizona (online or printed)
- *Optional - Computer for research
- Various resources for students to create a model or illustration of their dinosaur.

Real World Connection:
Arizona Museum of Natural History: https://www.arizonamuseumofnaturalhistory.org/home
Make a Fossil / STEAM activity: https://www.engineeringemily.com/make-a-fossil-steam-activity-for-kids/
American Museum of Natural History- Drawing Dinos https://www.amnh.org/explore/ology/paleontology/drawing-dinos2
Science Friday- How do Scientists Know what Dinosaurs looked like? https://www.sciencefriday.com/educational-resources/how-do-scientists-know-what-dinosaurs-looked-like/
Paleo Art- New Visions of Ancient Creatures https://www.youtube.com/watch?v=t5NIua_Dveo&t=38s
An Illustrated History of Dinosaurs https://www.youtube.com/watch?v=JDnQmBFxIfE
Dinosaur National Monument https://www.youtube.com/watch?v=mOyeOH25yd8&t=11s
Morrison Formation https://www.nps.gov/dino/learn/nature/morrison-formation.htm
Petrified Forest National Park https://www.visitarizona.com/places/parks-monuments/petrified-forest-national-park/
National Dinosaur day activities: https://www.timeout.com/new-york-kids/news/celebrate-national-dinosaur-day-with-these-fun-activities-051420

STEM Pro Live! with AZ Museum of Natural History: https://schoolsup.org/stem-pro-live

Sequence of Instruction	
Define the Problem:	
Guided Questions	Teacher Notes
• 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?	• Have students make observations of pictures of dinosaur fossils (online or printed). You can use Where To Find Dinosaur Fossils and Footprints in Arizona - Rock Seeker or just do a Google search for images. • Have students make a drawing of what the skeleton of the dinosaur could have looked like. A good reference is: https://www.amnh.org/explore/ology/paleontology/drawing-dinos2 • Have students define what they think the problem is with the current models and drawings. • Establish your parameters (groups, roles, time limit, # of trials, amount of material allowed to use, etc.).
Research the Problem:	
Guided Questions	Teacher Notes
• 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? •	• Have students research what are the concerns related to current models and pictures of dinosaurs. • Use the links in the real-world connections to learn more about Paleo art. • Have the students research how our understanding of what dinosaurs looked like keeps changing.
Brainstorm Possible Solutions:	
Guided Questions	Teacher Notes

• 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?	• Have students individually come up with at least 2 possible designs that they could use to demonstrate what their dinosaur could have looked like. • Have students share designs with a group. **Encourage a variety of ideas and a safe environment.* • Encourage reflection and refinement of ideas
Choose the Best Solution:	
Guided Questions	Teacher Notes
• 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?	• Have students choose a design to make a plan to "build".
Build a Model or Prototype:	
Guided Questions	Teacher Notes
• What materials will you need? • Does your design meet the lesson objective? • Does your design clearly communicate your selected solution to the problem?	• Revisit the objective and make sure the students design matches what they chose for their solution to the problem.
Test your Solution:	
Guided Questions	Teacher Notes
• Did you record your observations? • How will you know if your design worked as intended? • How will you know if your design was successful?	• 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:	
Guided Questions	Teacher Notes
• 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 different if you could do it again? Why?	• *Have students reflect individually first and record responses.* • *Have students share responses with their group then whole class.* • *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. • *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.*