15-Minute STEM Challenges

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- **STEM Challenges:**
  - incorporate the 2016 Science and Engineering Process (SEPS)
  - are engaging, minds-on, hands-on and feet-on-the ground
  - connect students to real-life situations and problems and to the natural world
  - promote problem solving, critical thinking, collaboration, and communication
  - promote interest in STEM-related classes and careers

- **Tips for Successful STEM Challenges:**
  - Have materials prepared.
  - Decide on time alloted, how many people per group, and other specifications ahead of time.
  - Refer to the engineering design process often - ASK - IMAGINE - PLAN - CREATE - TEST - REFLECT - IMPROVE.
  - Have the EDP displayed or available in a way that students can reference it.
  - Ask "what" questions → What is the plan? What materials are you using? What worked well? What did not work well? What do you want to change?
  - Encourage teamwork and the idea that everyone participates, and everyone can participate and has something to offer.
  - Have teams share progress and ideas with other teams; collaboration is good!
  - Competition will occur but the focus should be on all teams succeeding and meeting the challenge so every design will improve.
  - Imitation is the best compliment - everyone can learn from each other.
  - Give time to improve and reflect.
  - The process is as important as the outcome.
  - Repetition of challenges will lead to new discoveries and changing specifications can create a whole new challenge.
  - Challenges work with the same-age participants as well younger and older participants working together.
  - Encourage creativity and be open to letting students try things that you may not have anticipated (within reason).

- **Sample STEM Challenges:**
  - 50-Cup Challenge - Discuss engineers and the engineering design process. Have students use 50 plastic cups to construct a tower. Provide goals and the opportunity for students to improve upon their designs.
    - Science Standards: K-8 SEPS, K-2.E.3, 3-5.E.1, 3-5.E.2, 3-5.E.3
  - Toothpick Tower Challenge - Discuss engineers and the EDP. Have students use playdough and toothpicks to create a tower that fits on a paper plate.
    - Science Standards: K-8 SEPS, K-2.E.3, 3-5.E.1, 3-5.E.2, 3-5.E.3
  - STEM Scavenger Hunt Challenge - Discuss definitions for science, technology, engineering, and math. Look at collection of everyday objects that relate to STEM disciplines or go for a walk and find objects that relate to different aspects of STEM disciplines. Reinforce the idea that STEM is all around.
    - Science Standards: K-8 SEPS
  - Scientists Use Their Senses Challenge - Discuss the five senses and focus on how scientists use them to make observations of the world. Take a walk to identify and record things using different senses or have students investigate mystery containers to using different senses to identify objects.
    - Science Standards: K-8 SEPS, K.PS.1, K.LS.2, 1.LS.3, 2.PS.1, 3.PS.3
  - Animals are Amazing Engineers - Show the children examples of bird nests, wasp nests and other animal homes. Discus what animals need to survive: food, water, air and shelter. Challenge the children to create animal homes and have them explain how the animal's needs will be met in the their habitat.
    - Science Standards: K-8 SEPS, K.LS.3, 1.LS.3, 1.LS.4, K-2.E.2, K-2.E.3

- **Literature Connections:**
  - *Not a Box* by Antoinette Potts
  - *The Most Magnificent Thing* by Ashley Spires
  - *Engineering the ABC's: How Engineers Shape Our World* by Patty O'Brien Novak
  - *The Listening Walk* by Paul Showers
  - *Touching* by Rebecca Olien
  - *Birds, Eggs, and Nests* by Mel Boring
  - *Rosie Revere, Engineer* and *Iggy Peck, Architect* by Andrea Beatty
  - *If I Built a House* and *If I Built a Car* by Chris Van Dusen