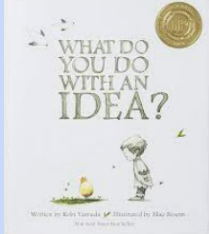


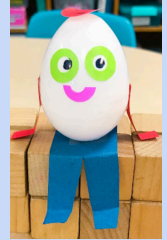
We Are Engineers! Calendar

UTK Unit 4

Essential Question: How do engineers help the world?

Lesson 1	Lesson 2	Lesson 3
Phenomenon: Engineers create things to solve problems. Question to Investigate: What is an engineer? Lesson Objective: Students explore engineering realia and draw themselves as an engineer to develop an understanding of engineering. Success Criteria: I can draw myself as an engineer. Launch: Introduce the Essential Question: How do engineers help the world? Read: <u>Andrew Learns about Engineers</u>. Ask students what do you notice? What do you wonder? Chart students' responses. Explore: Students explore realia (provided by teacher) or pictures of construction tools, engineered objects, and community workers (in Google Slides). Students draw themselves as engineers. Reflect: What did you include in your pictures? Extension: Watch Mystery Science: <u>How do you become an inventor/engineer?</u>	Phenomenon: Engineers create things to solve problems. Question to Investigate: What do engineers create? Lesson Objective: Students identify items that are engineered to develop an understanding of engineering. Success Criteria: I can identify items that are engineered. Launch: Read <u>What Do You Do With an Idea?</u> Chart students' thinking about engineering on a circle map. Explore: Go on an engineering walk. Students look for items that have been engineered. Make a circle map of items you found as a class. Draw something you found that was engineered. Reflect: What do engineers create? 	Phenomenon: Engineers create things to solve problems Question to Investigate: How do engineers create? Lesson Objective: Students practice engineering using Creative LEGO DUPLO. Success Criteria: I can design solutions to problems. Launch: Read the story, <u>I Want to be an Engineer</u>. Review learning (and charts) from previous lessons. Explore: Read <u>The Magnificent Thing</u>. Stop reading before the last page. Using LEGO DUPLO bricks, students engineer what they think the girl in the story will make for her magnificent thing. Share ideas in small groups. Then finish the story. Reflect: Was your creation similar or different to the story's ending? Extension: Video: <u>Solve Problems: Be an Engineer</u>

Lesson 4	Lesson 5	Lesson 6
Phenomenon: Engineers can find problems to solve. Question to Investigate: What problems are you curious about? Lesson Objective: Students brainstorm problems at school, in the community, or the world. Success Criteria: I can identify problems. Launch: Read: If I Built a Car. What problems is he solving with his new car? Explore: Brainstorm as a class any problems at school students are curious about. Watch: Mystery Science: How were skateboards invented? Draw a picture of something you wonder about. What is the problem? Reflect: Which problem would you want to solve? Extension: Add paper on clipboards to the block area for drawing ideas or creations.	Phenomenon: Engineers use a Design Thinking Process to solve problems. Question to Investigate: How do people solve problems? Lesson Objective: Students design solutions to save bears from lava to form an understanding of a Design Thinking Process. Success Criteria: I can design solutions to problems. Launch: Play the Floor is Lava game. Build Teamwork Norms for the Explore challenge. Explore: Co-create a chart of a Design Thinking Process. Pass out 3 cups, 5 popsicle sticks, and 10 counting bears to small groups. Students need to find a solution to save their bears from the lava. After groups have created a solution, pass out one index card to each group and 5 more bears, try a new solution. Reflect: How did you save the bears from the lava?	Phenomenon: Engineers can use a Design Thinking Process to solve problems. Question to Investigate: How can we keep Humpty Dumpty safe? Lesson Objective: Students make a plan to keep Humpty safe on the wall. Success Criteria: I can make a plan. Launch: Read Humpty Dumpty nursery rhyme. Students make a Humpty Dumpty to sit on the wall (which will be used in lessons 7-8.) Explore: Introduce the new vocabulary: BLUEPRINT. When engineers design a solution, they make a blueprint. Show Design Process and complete 1. ASK: What is the problem? 2. IMAGINE: What are the possible solutions? Have students draw pictures of their solution plan. 3. PLAN: Which solution will work the best? Reflect: How do you plan to keep Humpty Dumpty safe? Extension: Add graph paper on clipboards to the block area for drawing blueprints and plans.



Lesson 7	Lesson 8	Lesson 9 - THEATRE
Phenomenon: Engineers use a Design Thinking Process to solve problems. Question to Investigate: How can we keep Humpty Dumpty safe? Lesson Objective: Students create and improve a wall (or other idea) to keep Humpty Dumpty safe. Success Criteria: I can design solutions to problems. Launch: Watch What's an Engineer? Read the nursery rhyme Humpty Dumpty. Review completed steps 1-3 from lesson 6. Explore: Create a solution for Humpty Dumpty using LEGO Duplo bricks. Then complete the second page of the Design Thinking Process: 4. CREATE: Draw completed solution. Test idea using Humpty Dumpty craft. Complete steps 5. IMPROVE and 6. COMMUNICATE. <i>Take pictures of some examples of students' work for the next lesson.</i> Reflect: Which solutions worked best to keep Humpty Dumpty safe? Extension: The Wall in the Middle of the Book (Vooks)	Phenomenon: Engineers can imagine more than one solution to a problem. Question to Investigate: How many different ways can we solve a problem? Lesson Objective: Students compare solutions to a problem by using a graphic organizer to find the best solutions. Success Criteria: I can try a new idea. Launch: Read: Jabari Tries. What other solutions can we think of? Show pictures of students' creations from lesson 7. Students can imagine a new solution to keep Humpty Dumpty safe. Explore: Students will create or improve a solution to keep Humpty Dumpty safe. Students can create more walls using different materials (cups, blocks, popsicle sticks, books, cardboard, magnet shapes, snap cubes.) Reflect: Which solution worked the best? Extension: Watch the Humpty Dumpty Sesame Street.	Phenomenon: Characters in books have a problem they need to solve. Question to Investigate: What is the problem in the story? Lesson Objective: Students act out a story to have a deeper understanding of the story and the problem. Success Criteria: I can identify a problem in a story. Launch: Read the story, Three Billy Goats Gruff. What is the problem? How did the goats solve the problem? How would YOU solve the problem? Explore: Students act out the story. Make popsicle-stick Three Billy Goats Gruff Puppets using the template or have students draw their own. Optional: Students can use clay to make the goats. Retell the story through song while using the crafted puppets. Reflect: What is the problem in the story The Three Billy Goats Gruff? 

Lesson 10	Lesson 11	Lesson 12 - THEATRE
Phenomenon: Engineers can design bridges in many ways. Question to Investigate: How do engineers design sturdy solutions? Lesson Objective: Students will explore how to make a sturdy bridge with LEGO Duplo bricks. Success Criteria: I can design solutions to problems. Launch: What do you notice? What do you wonder? (bridges) Students will Partner Talk about their prior knowledge about bridges. Explore: Students use LEGO Duplos to explore how to construct a strong and sturdy bridge over “water” (strips of blue paper). Test student bridges with blocks. Tape a picture of each goat on a block as a symbol of the Billy Goats Gruff. Watch What Makes Bridges so Strong? Reflect: How did you try to make your bridge strong or sturdy? Extension: Add pictures of bridges to the block area.	Phenomenon: Engineers can improve their solutions. Question to Investigate: How can we improve our designs? Lesson Objective: Students practice giving and receiving feedback to improve their designs. Success Criteria: I can use feedback to improve my solution. Launch: Introduce new vocabulary: FEEDBACK. Scaffolding game around giving and receiving feedback from others. Explore: What is another solution for the Billy Goats to get to the other side of the river? Students use the Design Process to create new solutions for the 3 Billy Goats using feedback to improve their designs. Allow for creativity (i.e. boat, zipline, buoys, robot, bridge made of other materials.) Reflect: How did you improve your design? Extension: London Bridge song	Phenomenon: Characters in books have a problem they need to solve. Question to Investigate: What is the problem in the story? Lesson Objective: Students act out a story to have a deeper understanding of the story and the problem. Success Criteria: I can identify a problem in a story. Launch: Read the story, Jack and the Beanstalk. What is the problem? How did Jack solve his problem? How would YOU solve the problem? Explore: Students act out the story, making sure to move differently to portray the characters like Jack, the giant, the goose, and the beanstalk. Reflect: What is the problem in the story Jack and the Beanstalk? Extension: Cosmic Kids: Jack and the Beanstalk 

Lesson 13	Lesson 14	Lesson 15
Phenomenon: Engineers use a Design Thinking Process to solve problems. Question to Investigate: How do engineers solve problems? Lesson Objective: Students work in small groups and use a Design Thinking Process to engineer a solution to a problem. Success Criteria: I can work as a team. Launch: Revisit the story Jack and the Beanstalk. Brainstorm ideas for Jack to reach the castle. Chart students' thinking. Explore: Students in groups of 2-3, use cups and index cards to build a beanstalk "tower". Students practice creating, communicating, and improving their design. Reflect: How was your team able to build a sturdy tower? Extension: Plant beans in plastic bags to watch them grow. Make a map of Jack's village. Draw/paint the castle where the giant lives.	Phenomenon: Engineers can design solutions in many ways. Question to Investigate: What other creations can solve Jack's problem? Lesson Objective: Students try other solutions to solve the same problem. Success Criteria: I can imagine more than one solution. Launch: If Jack didn't have magic beans and a beanstalk, what is another way he could reach the castle? Watch this Mystery Science video about the tallest skyscraper for inspiration. Explore: Use the Design Process to plan a way for Jack to reach the castle. Students will create a new solution for Jack to get to the castle. Reflect: Which solution worked best for solving the problem?	Phenomenon: Engineers design solutions to problems. Question to Investigate: How do parachutes work? Lesson Objective: Students make a parachute to learn about parachutes and how they work. Success Criteria: I can persist through challenges. Launch: In the story, Jack climbed down the beanstalk to get away from the giant. Today we are going to build a faster way for Jack to get home, a parachute! Read How Do Parachutes Work on Epic! Explore: Students explore materials that may/may not float. Then make a parachute using a dinner napkin, yarn, and a small cup (some prep work required). Follow the directions to help students make their own parachute. Test the parachutes out on the playground. Reflect: What did you learn about parachutes and how they work? Extension: Add pictures of different towers or skyscrapers to the block area.

Lesson 16 - THEATRE	Lesson 17	Lesson 18
Phenomenon: Characters in books have a problem they need to solve. Question to Investigate: What are the problems in the story? Lesson Objective: Students act out a story to have a deeper understanding of the story and the problem. Success Criteria: I can identify problems. Launch: Read <u>Goldilocks and the Three Bears</u>. What are the problems? Explore: Students act out each scene separately and chart the problem for each. Reflect: Which problem are you most curious about solving? Extension: Watch <u>Cosmic Kids: Goldilocks and the Three Bears</u>. 	Phenomenon: Engineers use a Design Thinking Process to solve problems. Question to Investigate: What can we create to solve a problem from the story? Lesson Objective: Students use a Design Thinking Process to engineer a solution to a problem. Success Criteria: I can design solutions to problems. Launch: There are many problems in the story Goldilocks and the Three Bears. Today as Engineers, you will decide what problem you are curious about. Then you will come up with a solution for the characters in the book Explore: Students will use the <u>Design Process</u> to plan a solution to one of the problems. They might build a lock for the door, a new chair, or a bed for Goldilocks. (<i>Save creations.</i>) Reflect: How did your solution solve the problem?	Phenomenon: Engineers use a Design Thinking Process to solve problems. Question to Investigate: How can we improve our designs? Lesson Objective: Students use a Design Thinking Process to improve a solution to a problem. Success Criteria: I can use feedback to improve a solution. Launch: Yesterday you were curious about a problem (refer to chart) from the story Goldilocks and the Three Bears. Today you will decide if you need to improve on your solution or start a new creation (to the same problem or a different one). Explore: Students will improve upon their solution from the previous lesson or start a new design. Give students time to plan, design, and construct as well as experiment and test their creations. Reflect: How did you improve the solution to the problem?

Lesson 19 - Final Product	Lesson 20 - Final Product	Lesson 21 - Final Product
Phenomenon: Engineers create things to solve problems. Question to Investigate: What could be Harry the Puffball's problem? Lesson Objective: Students identify possible problems through brainstorming. Success Criteria: I can identify problems. Launch: Read <u>The Little Red Fort</u>. Students will work in teams to help a friend that has a problem. Introduce Harry the Puffball (Prep poms with eyeballs glued on before the lesson). Explore: Harry, like the other characters in the stories we have read, has a problem. Brainstorm some problems Harry the Puffball could have. (Possible ideas: Can't see, Can't get across the river, Doesn't have a place to sleep) Make a plan and decide on materials. Reflect: Which problem are you most curious about solving?	Phenomenon: Engineers create things to solve problems. Question to Investigate: How can your team work together to solve the problem? Lesson Objective: Groups of students use a Design Thinking Process to engineer a solution to a problem. Success Criteria: I can work with a team to design a solution to a problem. Launch: Team building practice: Read <u>What Should Darla Do?</u> How do teams work together to make a choice? Explore: Look at the Design Thinking Process before you begin your creation. Each team will solve a problem for Harry the Puffball. Students will create and build a solution to solve the problem. Reflect: How did you work together as a team to solve a problem?	Phenomenon: Engineers create things to solve problems. Question to Investigate: What problems do you see in the world? Lesson Objective: Students communicate their solution to the problem by presenting to a group. Success Criteria: I can communicate my solution with others. Launch: Watch: <u>How to be an Inventor by Kid President</u>. Brainstorm ways students can help the world as an engineer. Students have been practicing how to be engineers by solving problems. Explore: Students will share their creations with the class, explaining the problem and how their creation solves the problem. <i>Optional: Record group presentations or share with other classrooms.</i> Reflect: How did you communicate your solution to the world? Then read <u>Boxitects</u>, give each student their own Harry the Puffball, and encourage them to continue creating solutions to problems.