



# Allegiant Stadium

## Lesson Plan

Season 2, Episode 1: (13:05–26:46)

[bit.ly/steamcamp-s2-ep1](http://bit.ly/steamcamp-s2-ep1)

Engineers from McCarthy Building Companies and Kimley-Horn explain the math involved in building Allegiant Stadium.

### Nevada Academic Content Standards/Common Core State Standards in Mathematics:

**2.MD.A.1** Measure the length of an object by selecting and using appropriate tools such as ruler, yardsticks, meter sticks, and measuring tapes.

**2.MD.D.9** Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.

**3.MD.B.4** Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.

**3.MD.D.8** Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.

### Nevada Academic Content Standards/Next Generation Science Standards:

**K-2-ETS1-2** Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

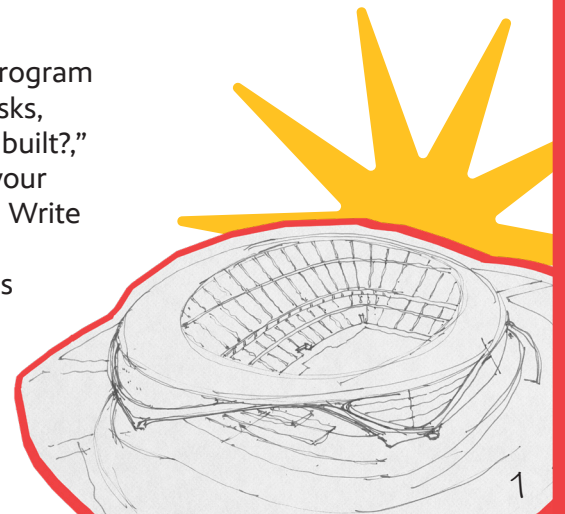
**4.MD.A.2** Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.

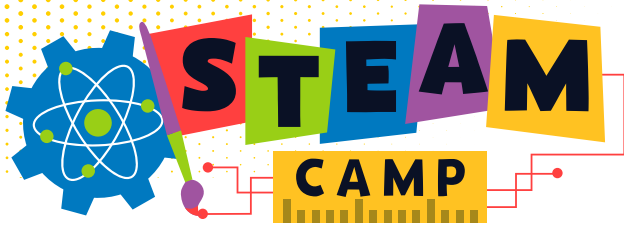
### Materials

- At least three cereal boxes
- Pencil
- Ruler
- Tape measure
- Markers
- Scissors
- Construction paper
- Glue
- Tape

### Engage:

Share the beginning of the program with students. After Royce asks, "How was Allegiant Stadium built?," pause the program and ask your students the same question. Write this essential question down and record student responses to reveal students' current knowledge, connections to the topic, and further questions they have.





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### Explain:

**Introduce** the words: **measurement, scale, proportion, sight lines.**

- Have students guess their meaning and record their ideas.
- Ask students to listen for the words as they watch the video clip, featuring engineers who designed Allegiant Stadium.
- When they hear one of words, encourage students to make a gesture, such as wiggling their fingers.

**Pause** the video at key spots to ask questions that strengthen comprehension and help children make connections.

- After Jody's segment, review what things engineers needed to fit onto Allegiant Stadium's 62-acre property. (the stadium, sidewalks, parking, landscaping, and drive aisles)
  - How did engineers use math to fit 2,400 parking stalls onto the site? (by measuring, using length and width)
- After Paul's segment, review what scale is. (it shrinks down real life measurements to a smaller length)
  - Why are scale models useful? (they help architects create plans for buildings at a much smaller size, to fit on paper or a computer screen)
- After Bailey's segment, review what sight lines are. (an imaginary line from your eye to the field)
  - Why are they important? (to make sure all spectators have a good view)
  - Why are there different amounts of seats in each row of Allegiant Stadium? (due to the stadium's oval shape)

**Reflect** on the new knowledge students have acquired.

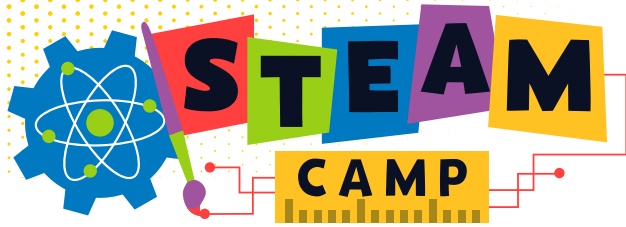
- Revisit the essential question and have children answer it by incorporating the vocabulary words; ask children to share any new information they acquired or additional questions they have.
- Ask children to name some buildings that have been constructed recently in their neighborhood. Do they think engineers and architects of those buildings used measurement, scale, and sight lines to construct those buildings? Why or why not?

### Explore:

View the at-home activity segment to guide students through the engineering design process to create a floorplan of their bedroom or other nearby space:

**Define the Problem:** Think like an engineer and build a scale model of your bedroom, or other nearby indoor space.

**Imagine and Plan:** Gather the materials needed for the activity, including cereal boxes, a ruler, measuring tape, and pencil. Have students work together to measure the length and width of the walls in the chosen room, to the nearest foot. Record the measurements. How are they going to use scale to shrink down every foot in real life so their floorplan fits on the cereal box?



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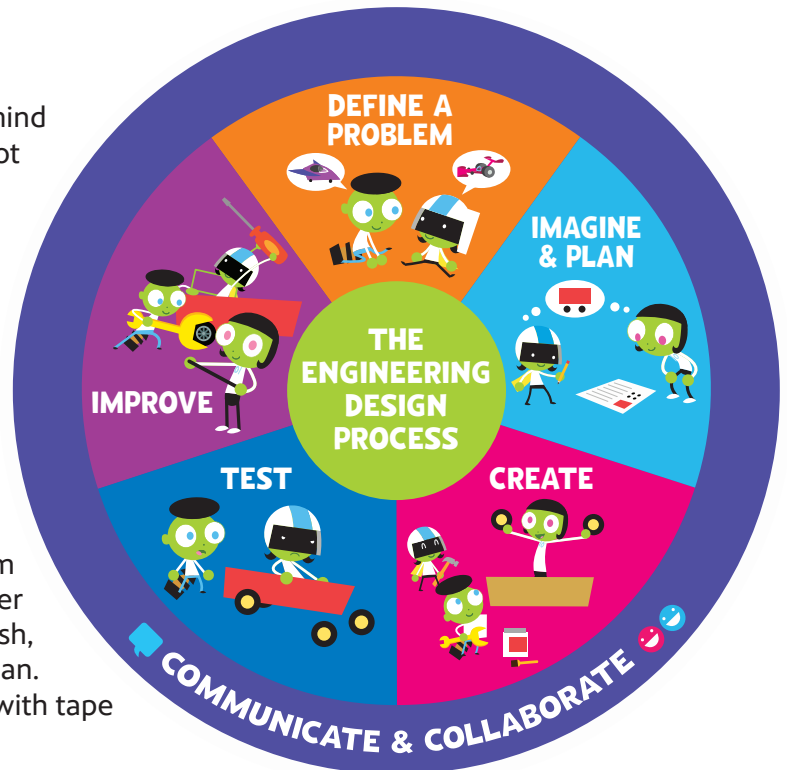
### Explore, continued:

**Create:** The next step is to create a floorplan. Remind students every inch on their ruler will equal one foot in real life. If walls have a window or door, have them measure where it starts and stops and add it to their floorplan.

**Test:** Cut out the floorplan. Is it the same shape of the room? Are the windows and doors in the right place?

**Improve:** Have students build upon the floorplan to make a three-dimensional scale model of the room. Measure the height of each of the walls with the tape measure, then use scale to draw cardboard walls and cut them out. Encourage them to add windows and doors out of construction paper and glue them to the inside of their models! To finish, tape each wall to the matching edge of the floor plan. Then, lift up the walls and connect them together with tape around the corners.

**Communicate and Collaborate:** Have students share their designs. For this project, students used a 1" = 1' scale. Discuss what scales they could have used to make their model bigger, and what scales they could have used to make their model smaller. Help students make connections between anything they learned in the video and this activity. What new questions do students have? Encourage students to share photos and videos of their at-home challenges with Vegas PBS at [bit.ly/steamcamp-share](http://bit.ly/steamcamp-share).



### Extend:

View the book talk with Marisa, a Young People's Librarian. If possible, check out the books Marisa shared with students:

- **Iggly Peck, Architect** by Andrea Beaty
- **The Illustrated Atlas of Architecture and Marvelous Monuments** by Alexandre Verhille and Sarah Tavernier

Encourage students to continue exploring measurement, proportion, and scale by accessing the following PBS KIDS resources:

- **Cyberchase: In a Land of Giants:** [bit.ly/cyberchase-giants](http://bit.ly/cyberchase-giants)
- **Cyberchase: Island of the Little:** [bit.ly/cyberchase-island](http://bit.ly/cyberchase-island)
- **Proportion: Let's Learn:** [bit.ly/pbs-proportion](http://bit.ly/pbs-proportion)

### Share:

Visit [vegaspbs.org/steamcamp](http://vegaspbs.org/steamcamp) to upload photos or videos of student projects, or share them with us on social media by tagging [@vegaspbs](https://twitter.com/vegaspbs).

Keep in mind, if you are submitting a video, make sure we can see what students are doing and hear what they are saying! Also, please keep videos to one minute or less.