Big Idea(s)/ Topic(s)

- Draw inferences about populations based on samples.

Standard(s) Alignment

- **MGSE7.SP.1** Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.

- **MGSE7.SP.2** Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples of the same size to gauge the variation in estimates or predictions.

Diagnostic Assessment

Every sixth person in the school cafeteria line was asked what was their favorite drink. Fifteen chose chocolate milk, 10 chose vanilla milk, 9 chose water and 5 chose a drink from the vending machine. Suppose there are 663 students at Julia’s school.

Predict how many students prefer each drink.

<table>
<thead>
<tr>
<th>Drink</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>vanilla milk</td>
<td>70 &lt; x &gt; 170</td>
</tr>
<tr>
<td>water</td>
<td>170 students</td>
</tr>
<tr>
<td>chocolate milk</td>
<td>About 250</td>
</tr>
<tr>
<td>vending machine</td>
<td>23%</td>
</tr>
</tbody>
</table>
### Instructional Design

**Overview**
- In this performance task, students will draw inferences from random samples of rolled dice. Students will use proportional reasoning to make predictions and inferences.

**Instructional Details**
- **Materials:**
  - Electronic device to explore Desmos activity
  - Digital and hard copies of the diagnostic assessment
  - Hard Copies of questions and images from desmos
  - Dice

- **Teacher Directions:** Use the diagnostic assessment to measure students prior knowledge. The Desmos activity may take up to 45 minutes. Provide students with the Desmos activity or hard copy of the activity.

- **Description of Learning:** Throughout the activity students will use a sample to make inferences about a population. Students will practice independently to make inferences and draw conclusions from a random sample of a population using and proportions to solve.
Desmos Activity:  **Grade 7 Inferences**

**Engage**

How many weather balloons will it take to float the adult person?

Enter your answer in the table.

Then press "Try It" to see if the person floats.

**Teacher Moves**

Consider pacing this screen. Complete during a classroom discussion while pacing the activity to highlight student responses. Use the teacher dashboard to identify students who may need additional support with proportional reasoning and making predictions.

**Sample Responses**

- 22 weather balloons

Set up a proportion:

\[
\frac{176}{24} = \frac{x}{3}
\]

- **Synchronous**- Restrict students to screen 1 and highlight student responses. Then add the following screen. Allow whole group discussion after students first work independently. Make sure the learners can set up a proportion to solve for the weather balloon problem.

- **Asynchronous**- Introduce the problem to students in a virtual platform; this can be done via e-document or video. Students who struggled should be provided support prior to the following screens. A discussion board could be created highlighting students’ correct and incorrect responses. Challenge students to identify, describe and correct any error via the discussion post.

- **Unplugged/ Offline**- Provide the image and table from screen 1 for students to engage in the task. Have students share ideas through email/text/phone. Provide feedback to learners who need it and share work between online and offline students.
Explore

2 Sample

Roll the dice 3 times!
Record your how many times you see each number in the table below.

Teacher Moves

Consider pacing this screen.
Have students read the titles of the rows and columns and make predictions of what they will have to do.

Explain to students to click the roll button and read the dice that are shown.
Tell students to record the results in the table given.
They will repeat this process two more times.

Allow students time to work through the slide independently.

Sample Responses

Answers will vary.

3 Dice and Percent

Use the table to fill in the blanks.

Teacher Moves

Allow students time to work through the screen independently.

Customize
Consider duplicating slides and chunking directions as an accommodation.

- **Synchronous**- Pace to screen 2 and follow Teacher Moves guidance. Give students time to complete the table and stop pacing after students have answered screen 2. Ensure that enough time is provided for students to participate and respond to your feedback and edit responses as needed.
- **Asynchronous**- Use a video tool to model how to record the problem in the table. Address misconceptions and accuracies in a later video.
- **Unplugged/Offline**- Provide paper/electronic versions of the images and questions on the second and third screens and dice. Cross share student work between online and offline students. Provide feedback and time to address teacher feedback.
Apply

4 Samples

Do you think the percentages of each number shown on the dice is the same as other groups? Why or why not?

**Teacher Moves**

Students should realize answers will vary from group to group. Cultivate talking points centered around the vocab "random".

**Sample Responses**

Answers may vary.

5 Other Groups Random

**Teacher Moves**

Students should use this image to adjust results.

**Sample Responses**

1 is shown 6 more times
2 is shown 8 more times
3 is shown 6 more times
4 is shown 4 more times
5 is shown 8 more times
6 is shown 4 more times

6 Using results from all...

**Teacher Moves**

Remind students a larger image is on the prior screen. Students should complete the new total column and create estimates using proportions from the sample.

Allow students time to interpret their solutions and create an inference.

**Sample Responses**

Estimates and inferences will vary.
A group of seventh-graders were asked what music they enjoyed listening to the most. The results are in the table.

- One can predict one-tenth of 7th graders will choose K-pop as the music they enjoy the most.

- One can predict 135 out of 900 7th graders will choose Rock and Roll as the music they enjoy the most.

- Thirty-five percent of 7th graders will choose Country, or Rap, or Jazz as the music they enjoy the most.

- A quarter of 900 7th graders will choose Other as the music they enjoy the most.

a) One statement is true.
b) Two statements are true.
c) Three statements are true.
d) Four statements are true.

**Teacher Moves**

Allow independent thinking time and time to prove which statements are true. Then ask students to share in groups how they found their answers.

**Sample Responses**

\[
\begin{align*}
\frac{k-p}{total} &= \frac{8}{80} = \frac{1}{10} \\
\frac{rock \ & roll}{total} &= \frac{12}{80} = \frac{135}{900} \\
\frac{country + rap + jazz}{total} &= \frac{28}{80} = \frac{35}{100} \\
\frac{other}{total} &= \frac{20}{80} = \frac{1}{4}
\end{align*}
\]

- **Synchronous** - Using the teacher dashboard in Desmos, review students' work. Give students time to complete the screens and provide feedback. Ensure that enough time is provided for students to participate and respond to your feedback and edit responses as needed. Follow *Teacher Moves* guidance. Before group work, use screen 7 as an assessment of student understanding.

- **Asynchronous** - Consider using a collaborative document or discussion post for students to work through the assignment together. Plan to review students' work in a later video. Use slide 7 as an assessment.

- **Unplugged/ Offline** - Provide students with the images and questions for the screens. Allow students to apply their knowledge in skills throughout the tasks. Ask students to complete the questions and have them submit responses via email/text/phone. Provide feedback, share these responses with
other students, and share other students’ responses with them. Use screen 7 as an assessment.

Reflect

<table>
<thead>
<tr>
<th>8 Lesson Wrap-Up</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3-2-1:</strong></td>
</tr>
<tr>
<td>List three things you learned in this lesson, two things you want to know more about, and one thing you are confused about.</td>
</tr>
</tbody>
</table>

Teacher Moves

- **Synchronous** - Follow Teacher Moves and allow students work independently to answer the questions on the screen. Next, students engage in a large group discussion to discuss their answers.
- **Asynchronous** - Students could share their responses to the 3-2-1 summarizer on a shared document or an online bulletin board such as linoit.com or a video response via Flipgrid.
- **Unplugged/Offline** - Students can write their answers to the 3-2-1 lesson wrap up on a sticky note or in their math journals.

**Evidence of Student Success**

Screen 7 houses students’ ability to construct mathematical arguments. Students who can justify all responses as being true show mastery. See sample response picture in Desmos screen shot. Students should come up with two true and one false statement using the information from screen 7. Students should then prove their statements mathematically. Students could also complete the diagnostic assessment again after the activity and compare pre- and post-growth.

**Student Learning Supports**

At all grades, the mathematics big ideas encourage students to reason mathematically, to evaluate mathematical arguments both formally and informally, to use the language of mathematics to communicate ideas and information precisely, and to make connections among mathematical topics and to other disciplines. The following strategies are intended to support students who are struggling to progress towards this goal:
Conceptual Processing:

Utilize the **Concrete-Representational-Abstract** instructional sequence to support students in making connections among mathematical ideas, facts and skills, and reflecting upon and refining one’s own understanding of relationships, generalizations and connections.

**Establish mathematics goals to focus learning.**
- Make instructions and expectations clear for the activities.
- Make explicit connections between current and prior lessons or units.

**Support productive struggle in learning mathematics.**
- Offer outlines and other scaffolding tools and share tips that might help students learn.
- Provide feedback using a feedback feature within activities and offer corrective opportunities.
- Consider the pacing of the lesson.

**Elicit and use evidence of student thinking.**
- Anticipate any misconceptions or questions students might have about the task, materials or technology. You may need to adjust sample size to a factor of 500 in the Desmos and provide percent to fraction conversion chart. Also screen 5 may need to be projected larger.

### Engaging Families

- Use the [practice link](#) and [practice link check](#) to deepen the understanding of inferences.
- To extend the concept of drawing inference click this practice [link](#). The link serves as virtual guided practice. Families are encouraged to work on the problems together. Student accounts are free, but not necessary to access practice questions and tutorials.
Every sixth person in the school cafeteria line was asked what was their favorite drink. Fifteen chose chocolate milk, 10 chose vanilla milk, 9 chose water and 5 chose a drink from the vending machine. Suppose there are 663 students at Julia’s school.

Predict how many students prefer each drink.

<table>
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<tr>
<th>Drink preference</th>
<th>True or False, Justify</th>
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<tr>
<td>Vanilla Milk</td>
<td>70 &lt; x &gt; 170</td>
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<tr>
<td>Chocolate Milk</td>
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Determine if the matches above are true or false then justify your thinking.