Hello Students,

This resource packet includes a project that you can work on independently at home. You should also have project packets for some of the other courses you are enrolled in. Each project can be completed over multiple days, and the projects can be completed in any order.

High school project packets are available for the following courses:

- English 1
- Algebra
- Biology
- US History
- English 2
- Geometry
- Chemistry
- World Studies
- English 3
- Algebra 2
- Physics
- Civics
- English 4

Additional enrichment activities are also available and organized into Read, Write, Move, Design, and Solve categories to engage you in learning in many different ways while at home. Please be sure to also pick up an enrichment packet for access to these activities.

Use the table of contents on this page to navigate through the project packet.
High School Algebra 1 Project: Down the Drain

<table>
<thead>
<tr>
<th>Estimated Time</th>
<th>225 minutes of project time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade Level Standard(s)</td>
<td>Interpreting Categorical and Quantitative Data: S.ID.1-3: Summarize, represent, &amp; interpret data on single count of measurement variable</td>
</tr>
<tr>
<td>Caregiver Support Option</td>
<td>Caregivers can offer support in creating a chart to gather the data and read/discuss answers where students need to explain their thinking.</td>
</tr>
<tr>
<td>Materials Needed</td>
<td>Pencil and paper.</td>
</tr>
<tr>
<td>Question to Explore</td>
<td>How much water do you use? How much water does your household use?</td>
</tr>
<tr>
<td>Student Directions</td>
<td>This project is about gathering data in your home, displaying that data to show your results and help you come to a conclusion about the data you collect.</td>
</tr>
</tbody>
</table>

Activity 1: Analyzing Data

Three ways of displaying data are below. The dot plot, histogram, and box plot summarize the hours of battery life for 26 cell phones constantly streaming video.

1. What do you notice? What do you wonder?

![Dot plot](chart.png)

![Histogram](chart.png)

![Box plot](chart.png)
2. Which one doesn’t belong? Give one explanation for why each dot plot doesn’t belong in the set.

A. 

B. 

C. 

D. 

The box plot represents the distribution of the number of points scored by a cross country team at 12 meets.

3. If possible, find the mean. If not possible, explain why not.

4. If possible, find the median. If not possible, explain why not.

5. Did the cross country team ever score 30 points at a meet?

Activity 2: Making Predictions

Make a prediction about how many gallons of water are used by a person in your household every day.

Person 1 uses _____ gallons of water per day. _________ per week?

Person 2 uses _____ gallons of water per day. _________ per week?

Person 3 uses _____ gallons of water per day. _________ per week?

Person 4 uses _____ gallons of water per day. _________ per week?

Person 5 uses _____ gallons of water per day. _________ per week?

Person 6 uses _____ gallons of water per day. _________ per week?

Visitor 1 uses _____ gallons of water per day. _________ per week?

Visitor 1 uses _____ gallons of water per day. _________ per week?

Add more people as needed...
Activity 3: Collect Your Data
Based on data you collect, you will analyze your household’s water usage, write observations and make conclusions about water usage.

1. Based on your predictions from activity 2, estimate how many gallons of water your household uses over two week.

2. Keep a record of daily water usage for each person in your household for two weeks.

You may use this example to gather data or you can create your own!!

<table>
<thead>
<tr>
<th>Date</th>
<th>Person</th>
<th>Activity*</th>
<th>Minutes using water multiplied by ____ OR how many gallons used</th>
<th>Total gallons used</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Activity by minute: Shower = minutes multiplied by 5, Faucets = minutes multiplied by 3.
*Activity by gallon: Bath = 40 gal, Flush Toilet = 5 gal, Dishwasher = 15 gal, Laundry = 55 gal.

3. Create a dot plot, a histogram, OR a box plot displaying your data.

4. What is your household’s average use of water per day? Per week?

5. What is the daily average of water use for each person in your household?

6. What person in your household uses the most water? Uses the least?

7. If possible, compare your data with a reputable source online and draw conclusions about your household’s water usage.

8. Write out your conclusion on the water usage in your home and share possible methods for water conservation with your household.

Activity 4: Reflection

1. How does the data you collected compare to your original predictions?

2. How does the display method you choose help others understand the data?

3. Is any of the data surprising to you?

Cross Content Connection:
Economics: The amount of water we use in our homes is measured by the City of Chicago. The city then mails a water bill out once enough information has been gathered.

1. Do you think your water bill will be higher or lower this month than other months? Why?

2. What companies might be busier in April than other months?
The table shows a list of the number of minutes people could focus on a task before needing a break. 50 people of different ages are represented.

<table>
<thead>
<tr>
<th>19</th>
<th>7</th>
<th>1</th>
<th>16</th>
<th>20</th>
<th>2</th>
<th>7</th>
<th>19</th>
<th>9</th>
<th>13</th>
<th>3</th>
<th>9</th>
<th>18</th>
<th>30</th>
<th>20</th>
<th>8</th>
<th>3</th>
<th>14</th>
<th>3</th>
<th>2</th>
<th>8</th>
<th>5</th>
<th>17</th>
<th>7</th>
<th>18</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>8</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>2</td>
<td>20</td>
<td>7</td>
<td>7</td>
<td>10</td>
<td>7</td>
<td>6</td>
<td>19</td>
<td>3</td>
<td>18</td>
<td>8</td>
<td>19</td>
<td>7</td>
<td>13</td>
<td>20</td>
<td>14</td>
<td>6</td>
<td>3</td>
<td>19</td>
<td>4</td>
</tr>
</tbody>
</table>

In a situation like this, it is helpful to represent the data graphically to better notice any patterns or other interesting features in the data. A dot plot can be used to see the shape and distribution of the data.

**Making Dot Plot Connections:**

Q: How many people need 19 minutes to focus?
A: If you look at the graph, you will see the number 19 five times.

Look at the dot plot under 19 minutes.
Q: How many dots are there?
A: So 5 people needed 19 minutes to focus.

How many people needed 10 minutes to focus?

A histogram also shows the shape and distribution of the same data. When creating histograms, each interval includes the number at the lower end of the interval but not the upper end. For example, the tallest bar displays values that are greater than or equal to 5 minutes but less than 10 minutes. In a histogram, values that are in an interval are grouped together.

**Making Histogram Connections:**

Q: How many people needed 0 - 4 minutes to focus?
A: If you go to the graph above, count how many people needed 0, 1, 2, 3, 4 (not 5) minutes? Did you count 9 people?

Here is a box plot that represents the same data.

**Making Box Plot Connections:**

Q: Locate and label the min, median, max, Q₁ and Q₃ on the diagram.

Thinking Outside the Box: If there was a Q₂, which value would it be equal to?
Creating and Interpreting Box Plots

**Box plots** are created using the five-number summary. These values split the data into four sections each representing approximately one-fourth of the data. The important values are the minimum, maximum, median, $Q_1$, and $Q_3$.

**Median:** The median is one way to measure the center of a data set. It is the middle number when the data set is listed in order. (NOTE: Below is our data set from the previous page in order)

1. Start at the first number. and find the 25th number in our data. You should get 8.
2. Now start at the last number, and find the 25th number going backwards. You should get 8 as well.
3. Take the mean (average) of the two numbers by adding them up and dividing by 2.  
$$\frac{8 + 8}{2} = 8$$

| Median       | There are 50 numbers in our data set, so to find the middle you divide by 2: $\frac{50}{2} = 25$. So the median is the 25th number (not 25 itself).  
1.) Start at the first number, and find the 25th number in our data. You should get 8.  
2.) Now start at the last number, and find the 25th number going backwards. You should get 8 as well.  
3.) Take the mean (average) of the two numbers by adding them up and dividing by 2. 

| $Q_1$        | $Q_1$ represents the first quartile, the middle number in the first half of our data set. There are 25 numbers in the first half of our data set. In the middle is number 6, since there are 12 numbers on its left (1,2,2,...) and 12 numbers on the right (8,8,8,7...).  
$Q_1 = 6$  

| $Q_3$        | $Q_3$ represents the third quartile, the middle number in the second half of our data set. There are 25 numbers in the second half of our data set. In the middle is number 18, since there are 12 numbers on its left (8,8,9,...) and 12 numbers on the right (30,20,20,20...)  
$Q_3 = 18$  

| Min          | Min represents the minimum, the smallest number in our data set. The smallest value in our data set is 1, so the Min = 1.  

| Max          | Max represents the maximum, the largest number in our data set. The largest value in our data set is 30, so the Max = 30.  