1. Sean and Ayla were talking about their Algebra II homework. They had just found the inverse of \( y = x^2 - 6 \) when Ayla said, “Don't forget there are two parts to the inverse.” Sean scoffed, “You don't need two parts! I can show you on my graphing calculator that I can graph it with just one equation.” Explain who is right by finding the inverse and writing an argument either for one or for two parts for the graph.

2. Dr. Uchizono was late for work 10% of the time last year. Determined to discover variables that are associated with his tardiness, he noticed that it rained on 25% of his working days last year. Also, he discovered that 5% of the time he was late and it rained. Construct a two-way table using weather as the independent variable.

3. When astronomers measure the peak wavelength of light emitted from two different stars, a lower wavelength may be an indication that one star is moving away from Earth faster than another. Eighteen wavelength measurements were taken (in angstroms) for each of two stars in our galaxy during the year.

   **Alpha Star:**
   
<table>
<thead>
<tr>
<th>4317</th>
<th>4495</th>
<th>4421</th>
<th>4588</th>
<th>4438</th>
<th>4417</th>
<th>4506</th>
<th>4454</th>
<th>4657</th>
</tr>
</thead>
<tbody>
<tr>
<td>4571</td>
<td>4629</td>
<td>4482</td>
<td>4585</td>
<td>4307</td>
<td>4530</td>
<td>4641</td>
<td>4415</td>
<td>4460</td>
</tr>
</tbody>
</table>

   **Omega Star:**
   
<table>
<thead>
<tr>
<th>4551</th>
<th>4488</th>
<th>4585</th>
<th>4619</th>
<th>4559</th>
<th>4556</th>
<th>4531</th>
<th>4506</th>
<th>4581</th>
</tr>
</thead>
<tbody>
<tr>
<td>4649</td>
<td>4622</td>
<td>4472</td>
<td>4615</td>
<td>4600</td>
<td>4625</td>
<td>4432</td>
<td>4579</td>
<td>4682</td>
</tr>
</tbody>
</table>

   a. Find the five number summary and create a boxplot for each star. Use a single scale for easy comparison.
   b. Compare the center, shape, spread, and outliers of the wavelengths data collected from these stars.
   c. Based on the shape of the plots, which measure of center and variation would be appropriate for each plot.
   d. If the plots were skewed right or left, which measure of center and variation would be appropriate?

4. A student wonders if he will do better on a test when he has had lots of sleep the night before, or when he has very little sleep the night before the test. He records his scores on ten tests following lots of sleep as well as recording ten scores on test following very little sleep. The five number summaries follow:

   1 - Scores following lots of sleep: (72, 80, 88, 91, 96) percent
   2 - Scores following very little sleep: (67, 77, 85, 89, 100) percent

   On the same set of axes on grid paper, create a boxplot for each set of scores. Compare the center, shape, spread, and outliers of scores on test after lots of sleep and scores on test after very little sleep.
Find the inverse of each function.

5. \( f(x) = x^2 + 2 \)  
6. \( f(x) = \sqrt{x + 2} \)  
7. \( f(x) = 3x^2 - 2 \)  
8. \( f(x) = \frac{5-3x}{2} \)

9. Solve the systems of equations algebraically. Be sure to write all points of intersection as ordered pairs.
   a. \( x^2 = 2y + 10 \) \( 3x - y = 9 \)
   b. \( x + y = 2 \) \( y = x^2 - 4x + 4 \)

10. Solve and check.
    a. \( 5\sqrt{x} = 3\sqrt{2x + 7} \)
    b. \( \sqrt{3x + 2} + 2 = 3 \)
    c. \( 2\sqrt{5x + 1} - 2 = 10 \)

11. Describe how each has transformed from the parent function.
    a. \( f(x) = \frac{1}{2}(x + 1)^2 + 3 \)
    b. \( g(x) = |x + 5| - 2 \)
    c. \( h(x) = -3\sqrt{x} - 1 \)

12. Tom has been earning some extra pocket money by washing cars. In each hour block he has managed to wash 4 cars, 5 cars, 3 cars, 4 cars and 4 cars. What is the mean number of cars Tom has washed each hour? In order to increase his mean to 5 cars per hour, how many cars does Tom need to wash in the next hour?

13. Find the domain and range of each function.
    a. \( f(x) = -2(x - 3)^2 + 2 \)
    b. \( g(x) = \sqrt{2x + 4} - 5 \)
    c. \( h(x) = -\sqrt{-x - 6} + 1 \)

14. Mrs. Rife graded a recent 20-point quiz. Class 1 had a mean score of 16.12 and a standard deviation of 3.05. Class 2 had a mean score of 17.21 and a standard deviation of 3.26. Class 3 had a mean score of 18 and a standard deviation of 1.66.

What can Mrs. Rife conclude from the data collected for the quiz?

15. You should also be prepared to find the following:
    - measures of center (mean, median and mode)
    - any outliers and their effect on the measures of center
    - the most effective measure of center to use to describe the data based on the data set
    - standard deviation given a data set

16. You should also be prepared to complete all tasks related to quadratics:
    - How to factor quadratics
    - How to solve quadratic
    - How to graph quadratic equations
    - How to write a quadratic equation
    - How to change Standard Form into Vertex Form
    - How to use the discriminant to identify the number of solution a quadratic has
    - Quadratic Word Problems (Area Problem)
    - Quadratic Word Problems (Projectile Problem)
1. This inverse has two parts: $y = \pm \sqrt{x + 6}$

2. Of the days it rained he was late $5/25 = 20\%$ of those days. Of the days it did not rain he was late $5/75 = 6.7\%$.

<table>
<thead>
<tr>
<th></th>
<th>Rain</th>
<th>No Rain</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Late</td>
<td>5</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>On-time</td>
<td>20</td>
<td>70</td>
<td>90</td>
</tr>
<tr>
<td>Total</td>
<td>25</td>
<td>75</td>
<td>100</td>
</tr>
</tbody>
</table>

3. 

![Boxplot](image)

a: Alpha Star: min = 4307, Q1 = 4421, med = 4488, Q3 = 4585, max = 4657 angstroms; Omega Star: min = 4432, Q1 = 4531, med = 4580, Q3 = 4619, max = 4682 angstroms, see graph above; b: Both boxplots look reasonably symmetric with no outliers. The center of the Alpha Star’s measurements is lower with a median of 4488 angstroms compared to the Omega Star’s 4580 angstroms. The Alpha Star’s measurements were less consistent with a range of 350 angstroms and IQR of 164 angstroms as compared to a range of 250 angstroms and IQR of 88 angstroms from the Omega Star’s wavelength measurements. c: Since both plots are fairly symmetrical, the mean and standard deviation should be used to describe the data sets. d: Skewed data should be described using median and five-number summary.

4. The student tends to do better when he gets lots of sleep.

5. $f^{-1}(x) = \sqrt{x - 2}$

6. $f^{-1}(x) = x^3 - 2$

7. $f^{-1}(x) = \sqrt{\frac{x+2}{3}}$

8. $f^{-1}(x) = \frac{2x-5}{-3}$

9. a. (4, 3), (2, -3) b. (2, 0), (1, 1)

10. a. $x = 9$ 
    b. $x = -1/3$ 
    c. $x = 43$

11. a. Vertical shrink by $\frac{1}{2}$, left 1, up 3
    b. left 5, down 2
    c. Vertical stretch by 3, reflected in the x axis, down 1

12. He has averaged 4 cars/hour. Tom would need to wash 10 cars in the next hour to raise the mean to 5.

13. a. D: ARN; $y \leq 2$
    b. $x \geq -2; y \geq -5$
    c. $x \leq -6; y \leq 1$

14. Class 3 had the highest average and was less spread out, with most students scoring within 1.66 points of the mean. Class 2 had the greatest spread of the data with most students scoring within 3.26 points of the mean.