

Take Home Project

Successful completion of this task will earn score of 1, 2, 3 or 4 on the standard F.IF.8:

Instructions:

- Print (or write on notebook paper) the task below.
- **READ THE PROMPT AND QUESTIONS FULLY AND CAREFULLY!**
- Fully and completely provide answers and solutions to each prompted question (the more information you provide, the more evidence I have to find complete solutions).
- You can only use this project to earn credit for F.IF.8, not any other standard.

Standard:

F.IF.8a – Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.

- Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.

Success Criteria:

- Students can factor, complete the square or use the quadratic formula to find zeros of quadratic functions.
- Explain the meanings of vertex and zeros in the context of a real-life application.
- Recognize patterns or symmetry in graphical or tabular representations.

A Note on Cheating and Plagiarism:

Purdue University's Online Writing Laboratory (<https://owl.english.purdue.edu/owl/>) features Preventing Plagiarism as one of its resource areas. OWL lists the following common types of plagiarism

- Excessive repetition (poor paraphrasing of another's words)
- Improper citation (failure to cite properly)
- Improper idea borrowing (failure to cite another's ideas)
- Fraud (creation of false sources)
- Forgery (turning in another person's work as your own)

Please consider the following guidance on identifying and avoiding Improper Citation, Improper Idea Borrowing, and Forgery.

Improper Citation

- Identifying characteristics: Missing, incomplete, or incorrect citation, either intentionally or unintentionally, of any source of text, media, etc. used in an assignment, assessment, report, project, or paper.
- Remedy: Follow the specified style sheet (e.g. APA or MLA) to both identify the source where it is placed in your document and give the full reference on your "Works Cited" or "References" page. If a style sheet is not specified, follow the rules of the one you know.
- Example: use the full URL of a Website.

Improper Idea Borrowing

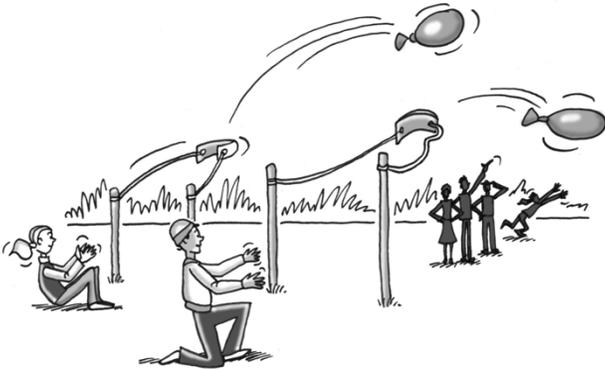
- Identifying characteristics: Ideas, concepts, thoughts, or insights gained from media, conversations, demonstrations, lectures, friends, family, tutors, etc.
- Remedy: Follow the specified style sheet if one can be applied, otherwise state who, when, and what the other person contributed. For example, help received on a homework problem would be addressed with a statement like "Trillian helped me with question 2. b) by showing me how to complete the square so I could factor the polynomial."

Forgery

- Identifying characteristics: Copying another person's work, either by scan, photo copy, by hand, or any other method. Merely stating "I copied this from _____" does not absolve the copier from the commission of plagiarism.
- Remedy: Do not copy!

The Water Balloon Contest

READ THE DIRECTIONS! It is important to get the context of problem in this lesson.



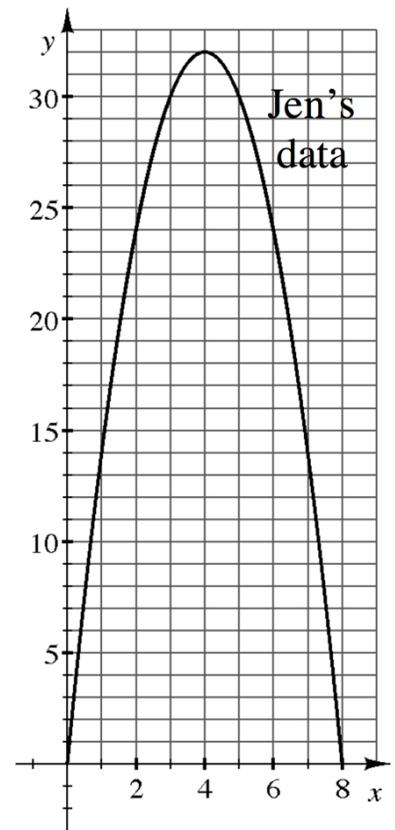
Every year, Mr. Sinamreg’s class holds a water balloon competition during their halftime homecoming game. Each contestant uses a catapult to launch a water balloon from the ground on the football field. This year, you are the judge! You must decide which contestants win the prizes for Longest Distance and Highest Launch. Fortunately, you have a computer that will collect data for each throw. The computer uses x to represent horizontal distance in yards from the goal line and y to represent the height in yards.

The announcer shouts, “Maggie Nanimos, you’re up first!” She runs down and places her catapult at the 3-yard line. After Maggie’s launch, the computer reports that the balloon traveled along the parabola represented by the quadratic equation $y = -x^2 + 17x - 42$.

Then you hear, “Jen Erus, you’re next!” Jen runs down to the field, places her catapult at the goal line, and releases the balloon. The tracking computer reports the path of the balloon with the graph at the right.

The third contestant Imp Ecable, accidentally launches the balloon before you are ready. The balloon launches, you hear a roar from the crowd, turn around and ... SPLAT! The balloon soaks you and your computer! You only have enough time to write down the following partial information about the balloon’s path before your computer fizzles:

x (yards)	2	3	4	5	6	7	8	9
y (yards)	0	9	16	21	24	25	24	21



Finally, the announcer calls for the last contestant, Al Truistic. With your computer broken, you decide to record the balloon’s height and distance by hand. Al releases the balloon from the 10-yard line. The balloon reaches a height of 27 yards and lands at the 16-yard line.

Group Task:

2. Complete the table (attached) of this page to determine which player has the longest distance and the highest throw. (You will likely need to return to this question when you are finished with the back).
 - a. Longest distance: _____ (total distance) _____
 - b. Highest throw: _____ (total height) _____

3. Find the x -intercepts of each parabola.

Jen's Toss:

Maggie's Toss:

Imp's Toss:

Al's Toss:

First x -intercept:

First x -intercept:

First x -intercept:

First x -intercept:

Second x -intercept:

Second x -intercept:

Second x -intercept:

Second x -intercept:

4. What information do these x -intercepts tell us about each balloon toss?

5. Find the *vertex* of each parabola. What information does the vertex tell you about each balloon throw?

Jen's Toss

Maggie's Toss

Imp's Toss

Al's Toss

Vertex Point:

Vertex Point:

Vertex Point:

Vertex Point:

(____, ____)

(____, ____)

(____, ____)

(____, ____)

6. What information does this vertex point tell us about each balloon toss?

7. Determine the interval for values that of the possible horizontal area of the (all possible x -values) that the water balloon could be.

$$\underline{\hspace{2cm}} \leq x \leq \underline{\hspace{2cm}}$$

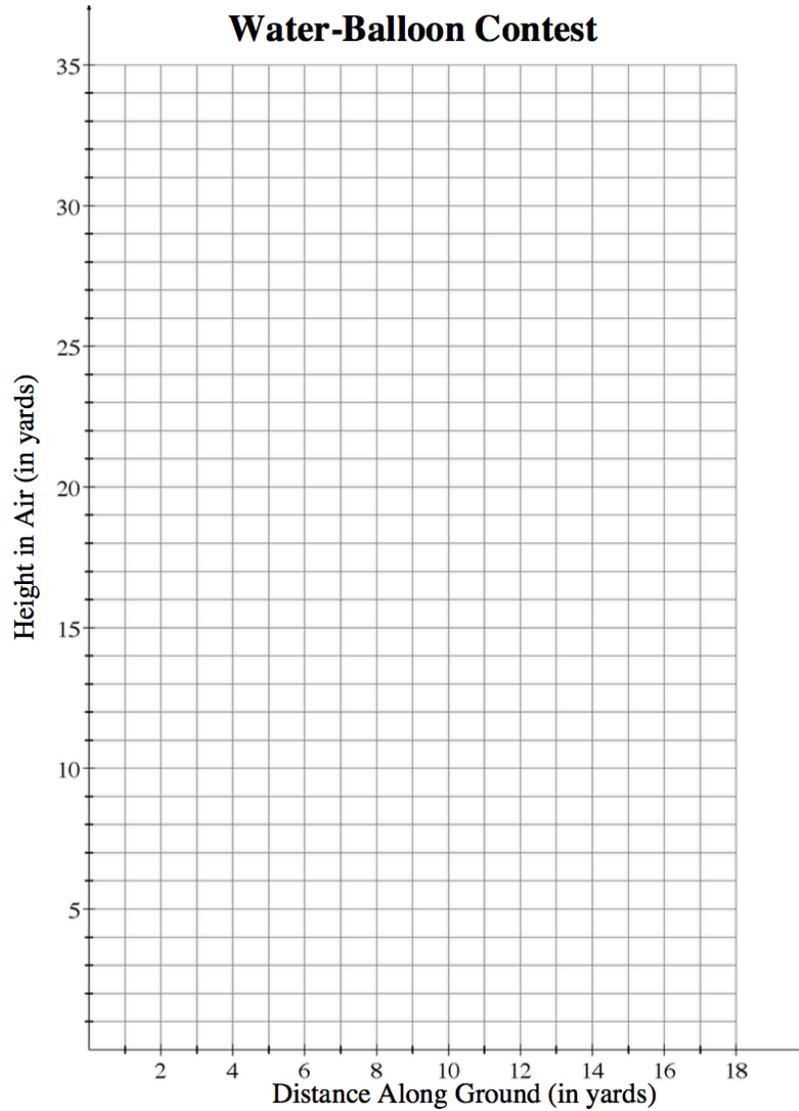
This interval of values is called the domain of the function.

8. Determine the interval for values that of the possible vertical area of the (all possible y -values) that the water balloon could be.

This interval of values is called the range of the function.

$$\underline{\hspace{2cm}} \leq y \leq \underline{\hspace{2cm}}$$

Graph each balloon trajectory using a different color per the data presented in the problem.



Maggie's Toss		Jen's Toss		Imp's Toss		Al's Toss	
<i>x</i>	<i>y</i>	<i>x</i>	<i>y</i>	<i>x</i>	<i>y</i>	<i>x</i>	<i>y</i>

9. What is the line of symmetry for Maggie's Toss?