

Unit 5 Lesson 8: Scaling the Outputs

1 Notice and Wonder: Arch You Glad to See Me? (Warm up)

Student Task Statement

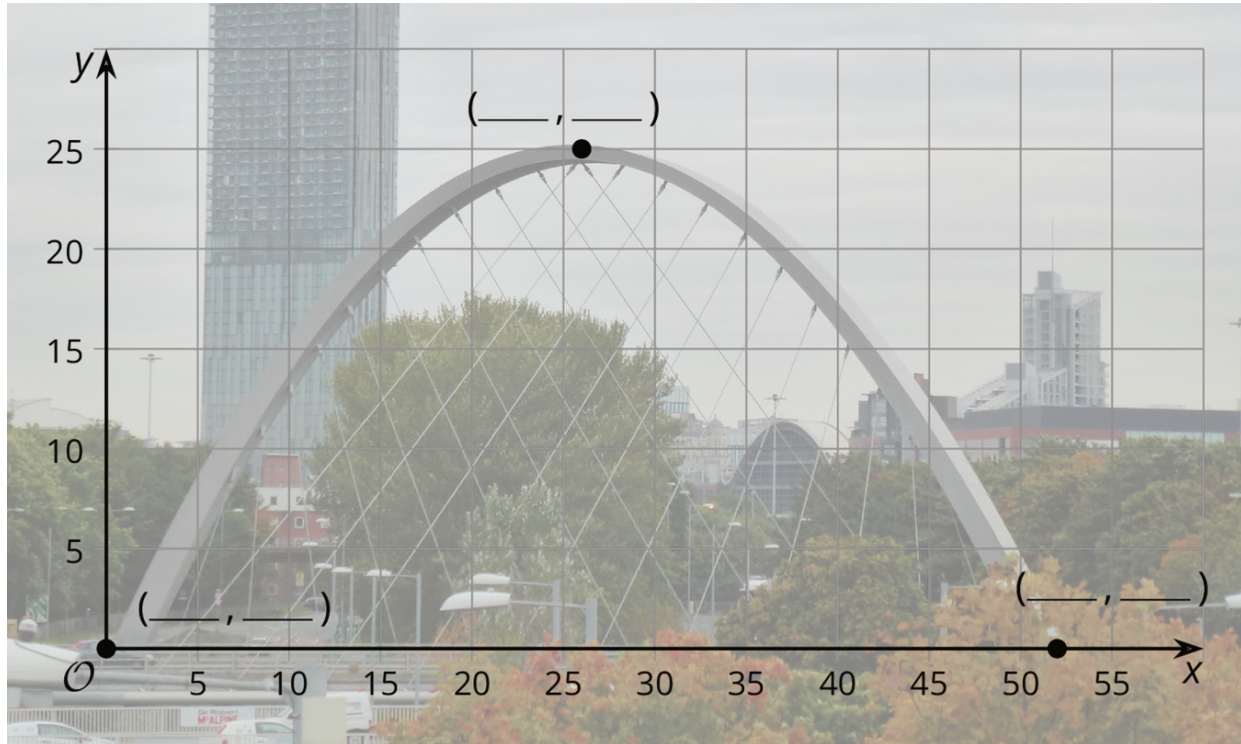
What do you notice? What do you wonder?



2 The Hulme Arch Bridge

Student Task Statement

The Hulme Arch Bridge in Manchester, England is shaped like a parabola. The ends of the arch are 52 meters apart, and it is 25 meters high.



1. Use the description to help you label the 3 coordinates on the graph.
2. Han wants to model the shape of the arch with the graph of a function, and he chooses $H(x) = x(52 - x)$, where $H(x)$ is the height in meters above a point x meters along the base of the arch from the left end.
 - a. For the x -coordinates of the three points, what are the corresponding points on the graph of H ?
 - b. What aspects of the shape does Han's function model well, and what parts does it not model well?
 - c. Compare the height of Han's graph with the height of the Hulme Arch Bridge. How can you change the outputs of H to make it fit better? What would the revised version of $H(x)$ be?

3 Feed the Dog

Student Task Statement

A certain brand of dog food gives the minimum daily amount of food a dog needs depending on its weight. We want to model the relationship between the amount of food and the dog's weight with a function F , where $F(w)$ is the amount of food, in grams, needed by a dog weighing w pounds.

weight (pounds)	food (grams)
5	50
10	75
20	130
40	230
60	305
80	375
100	435

1. Use graphing technology to find a linear function, $F(w) = mw + b$, that fits the data.
2. What aspects of the data does your function model well and what aspects does it not model well?
3. The graph of $f(w) = w^{\frac{2}{3}}$ has a general shape that fits the data. Use graphing technology to find a scale factor k so that $F(w) = kf(w)$ fits the data.