F-IF Oakland Coliseum

Alignments to Content Standards

- Alignment: F-IF.B.5

Tags

• *This task is not yet tagged.*

Oakland Coliseum, home of the Oakland Raiders, is capable of seating 63,026 fans. For each game, the amount of money that the Raiders' organization brings in as revenue is a function of the number of people, n, in attendance. If each ticket costs $30.00, find the domain and range of this function.

Commentary

This deceptively simple task asks students to find the domain and range of a function from a given context. The function is linear and if simply looked at from a formulaic point of view, students might find the formula for the line and say that the domain and range are all real numbers. However, in the context of this problem, this answer does not make sense, as the context requires that all input and output values are non-negative integers, and imposes additional restrictions. This problem could serve different purposes. It's primary purpose is to illustrate that the domain of a function is a property of the function in a specific context and not a property of the formula that represents the function. Similarly, the range of a function arises from the domain by applying the function rule to the input values in the domain. A second purpose would be to illicit and clarify a common misconception, that the domain and range are properties of the formula that represent a function. Finally, the context of the task as written could be used to transition into a more involved modeling problem, finding the Raiders' profit after one takes into account overhead costs, costs per attendee, etc.

Task based on a problem by Jerry Morris, Sonoma State University. Used with permission.

Solutions

Solution: Paying attention to the context

Let r represent the revenue that the Raider's organization makes, so that $r = f(n).$ Since n represents a number of people, it must be a nonnegative whole number. Therefore, since 63,026 is the maximum number of people who can attend a game, we can describe the domain of f as follows:

$$\text{Domain} = \{n : 0 \leq n \leq 63{,}026 \text{ and } n \text{ is an integer}\}$$

The range of the function consists of all possible amounts of revenue that could be earned. To explore this question, note that $r = 0$ if nobody comes to the game, $r = 30$ if one person comes to the game, $r = 60$ if two people come to the game, etc. Therefore, r must be a multiple of 30 and cannot exceed $30 \cdot 63{,}026 = 1{,}890{,}780,$ so we see that

$$\text{Range} = \{r : 0 \leq r \leq 1{,}890{,}780 \text{ and } r \text{ is an integer multiple of } 30\}.$$

Note that the representations used above are just sample ways of writing down the domain and range, using set-builder notation. Other options for writing down descriptions of the same sets abound.