

# Unit 4 Lesson 12: Piecewise Functions

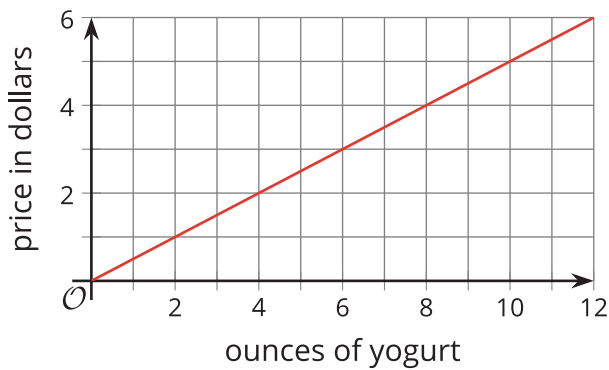
## 1 Frozen Yogurt (Warm up)

### Student Task Statement

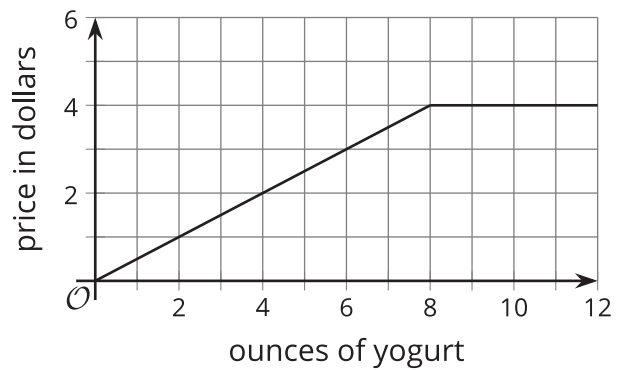
A self-serve frozen yogurt store sells servings up to 12 ounces. It charges \$0.50 per ounce for a serving between 0 and 8 ounces, and \$4 for any serving greater than 8 ounces and up to 12 ounces.

Choose the graph that represents the price as a function of the weight of a serving of yogurt. Be prepared to explain how you know.

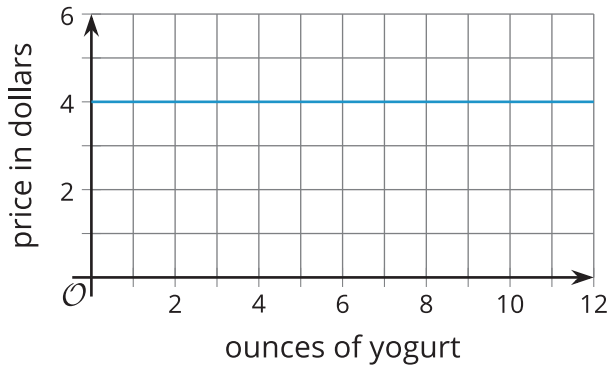
A



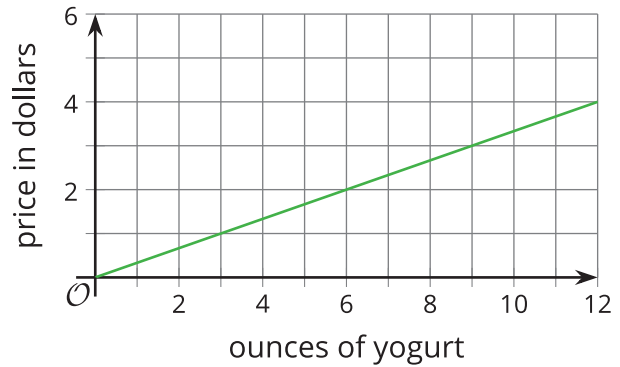
B



C



D

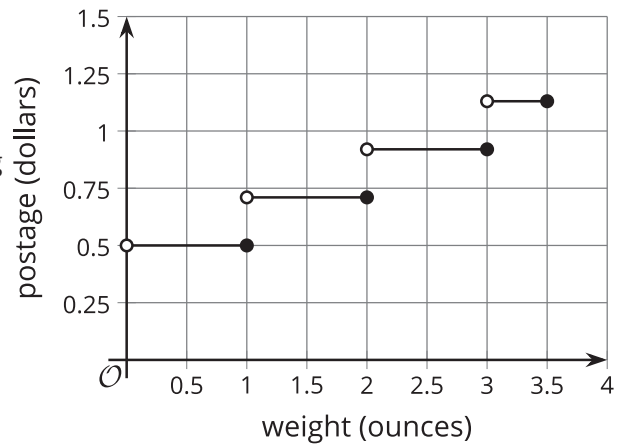


## 2 Postage Stamps

### Student Task Statement

The relationship between the postage rate and the weight of a letter can be defined by a **piecewise function**.

The graph shows the 2018 postage rates for using regular service to mail a letter.



1. What is the price of a letter that has the following weight?
  - a. 1 ounce
  - b. 1.1 ounces
  - c. 0.9 ounce
2. A letter costs \$0.92 to mail. How much did the letter weigh?
3. Kiran and Mai wrote some rules to represent the postage function, but each of them made some errors.

$$K(w) = \begin{cases} 0.50, & 0 \leq w \leq 1 \\ 0.71, & 1 \leq w \leq 2 \\ 0.92, & 2 \leq w \leq 3 \\ 1.13, & 3 \leq w \leq 3.5 \end{cases}$$

$$M(w) = \begin{cases} 0.50, & 0 < w < 1 \\ 0.71, & 1 < w < 2 \\ 0.92, & 2 < w < 3 \\ 1.13, & 3 < w < 3.5 \end{cases}$$

Identify the error in each person's work and write a corrected set of rules.

### 3 Bike Sharing

#### Student Task Statement

Function  $C$  represents the dollar cost of renting a bike from a bike-sharing service for  $t$  minutes. Here are the rules describing the function:

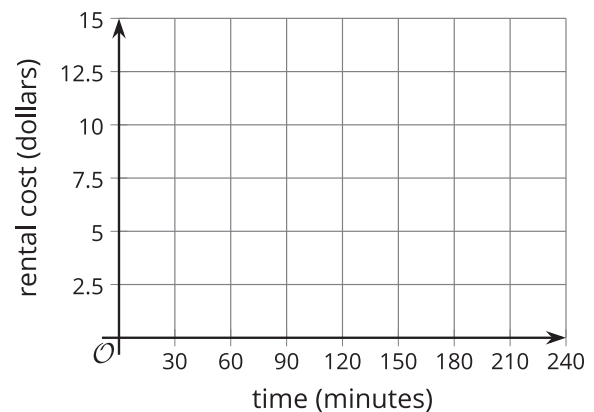
$$C(t) = \begin{cases} 2.50, & 0 < t \leq 30 \\ 5.00, & 30 < t \leq 60 \\ 7.50, & 60 < t \leq 90 \\ 10.00, & 90 < t \leq 120 \\ 12.50, & 120 < t \leq 150 \\ 15.00, & 150 < t \leq 240 \end{cases}$$



1. Complete the table with the costs for the given lengths of rental.

$t$ (minutes)	$C$ (dollars)
0	
10	
25	
60	
75	
130	
180	

- Sketch a graph of the function for all values of  $t$  that are at least 0 minutes and at most 240 minutes.



2. Describe in words the pricing rules for renting a bike from this bike sharing service.
3. Determine the domain and range of this function.

## 4 Piecing It Together (Optional)

### Student Task Statement

Your teacher will give your group strips of paper with parts of a graph of a function. Gridlines are 1 unit apart.

Arrange the strips of paper to create a graph for each of the following functions.

$$f(x) = \begin{cases} -5, & -10 < x < -5 \\ x, & -5 \leq x < 0 \\ 1, & 0 \leq x < 3 \\ x - 2, & 3 \leq x < 8 \\ 6, & 8 \leq x < 10 \end{cases}$$

$$g(x) = \begin{cases} 5.5, & -10 < x \leq -8 \\ 4, & -8 < x \leq -3 \\ -x, & -3 < x \leq 2 \\ -3.5, & 2 < x \leq 5 \\ x - 5, & 5 < x \leq 10 \end{cases}$$

To accurately represent each function, be sure to include a scale on each axis and add open and closed circles on the graph where appropriate.

### Images for Activity Synthesis

