## Unit 5 Lesson 9: Scaling the Inputs

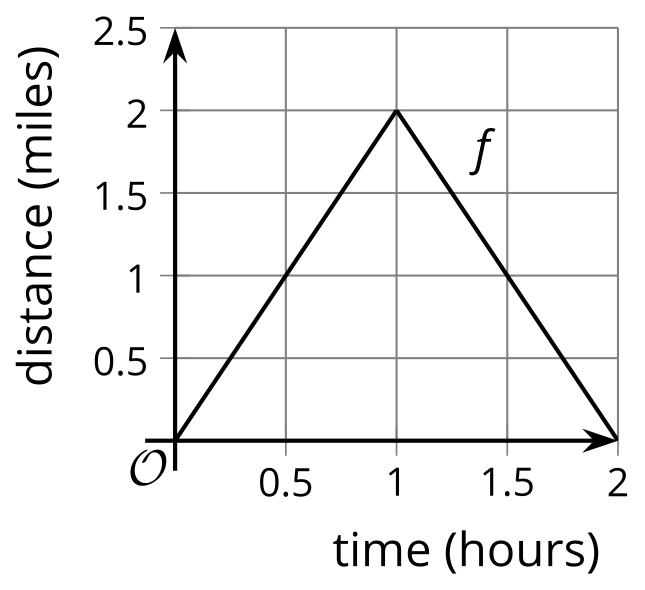
### 1 Out and Back (Warm up)

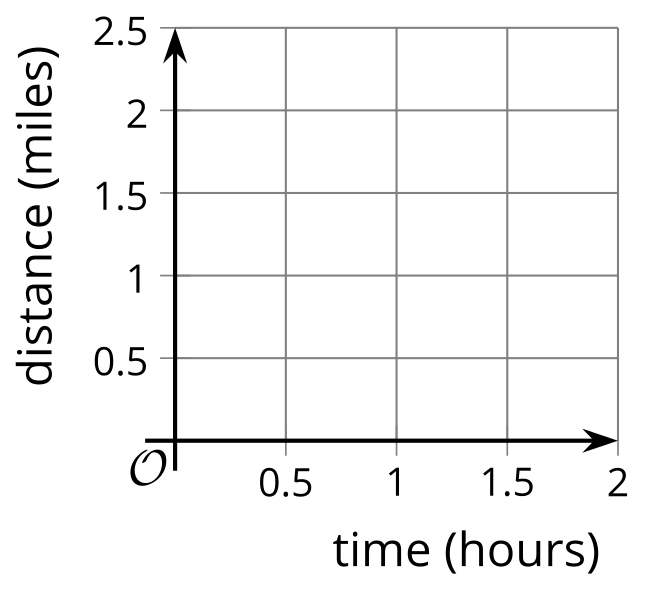
#### Student Task Statement

Every weekend, Elena takes a walk along the straight road in front of her house for 2 miles, then turns around and comes back home. Let’s assume Elena walks at a constant speed.



Here is a graph of the function that gives her distance , in miles, from home as a function of time if she walks 2 miles per hour.





1. Sketch a graph of the function that gives her distance , in miles, from home as a function of time if she walks 4 miles per hour.
2. Write an equation for in terms of . Be prepared to explain why your equation makes sense.

### 2 A New Set of Wheels

#### Student Task Statement

Remember Clare on the Ferris wheel? In the table, we have the function which gives her height above the ground, in feet, seconds after starting her descent from the top. Today Clare tried out two new Ferris wheels.

* The first wheel is twice the height of  and rotates at the same speed. The function gives Clare's height , in feet, seconds after starting her descent from the top.
* The second wheel is the same height as  but rotates at half the speed. The function gives Clare's height , in feet, seconds after starting her descent from the top.

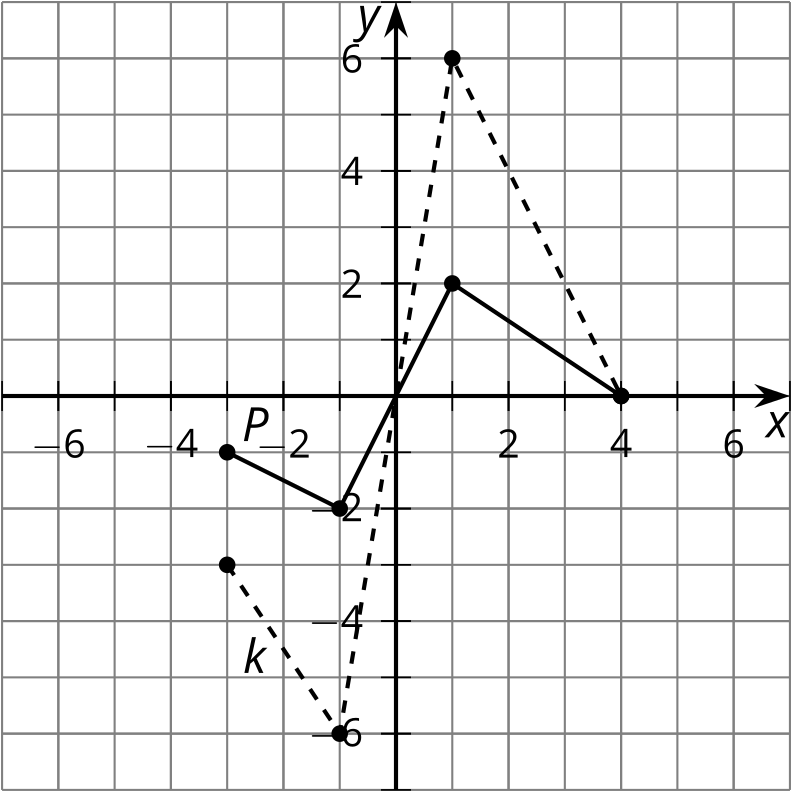
|  |  |  |  |
| --- | --- | --- | --- |
| 0 | 212 |  |  |
| 20 | 181 |  |  |
| 40 | 106 |  |  |
| 60 | 31 |  |  |
| 80 | 0 |  |  |

1. Complete the table for the function .
2. Explain why there is not enough information to find the exact values for  and .
3. Complete as much of the table as you can for the function , modeling Claire's height on the second Ferris wheel.
4. Express and in terms of . Be prepared to explain your reasoning.

### 3 The Many Transformations of a Function

#### Student Task Statement

Function is a transformation of function due to a scale factor.



1. Write an equation for in terms of .
2. On the same axes, graph the function where .
3. The highest point on the graph of is . What is the highest point on the graph of a function where ? Explain or show your reasoning.
4. The point furthest to the right on the graph of is . If the point furthest to the right on the graph of a function is , write a possible equation for in terms of .



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