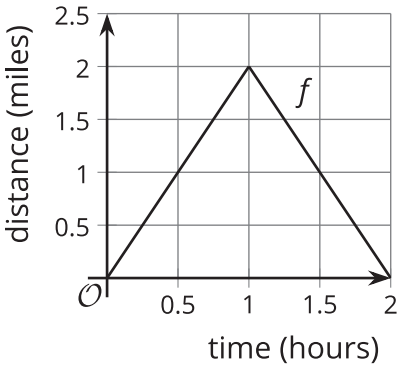
Unit 5 Lesson 9: Scaling the Inputs

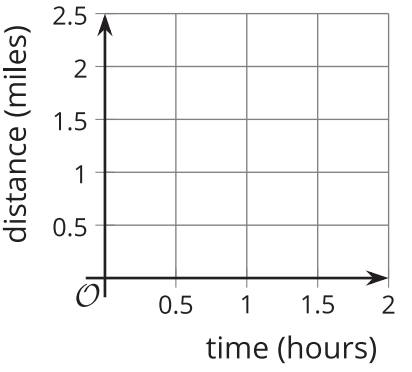
1 Out and Back (Warm up)

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 f that gives her distance $f(t)$, in miles, from home as a function of time t if she walks 2 miles per hour.





1. Sketch a graph of the function g that gives her distance $g(t)$, in miles, from home as a function of time t if she walks 4 miles per hour.

2. Write an equation for g in terms of f. 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 F which gives her height $F(t)$ above the ground, in feet, t seconds after starting her descent from the top. Today Clare tried out two new Ferris wheels.

- The first wheel is twice the height of F and rotates at the same speed. The function g gives Clare's height $g(t)$, in feet, t seconds after starting her descent from the top.
- The second wheel is the same height as F but rotates at half the speed. The function h gives Clare's height $h(t)$, in feet, t seconds after starting her descent from the top.

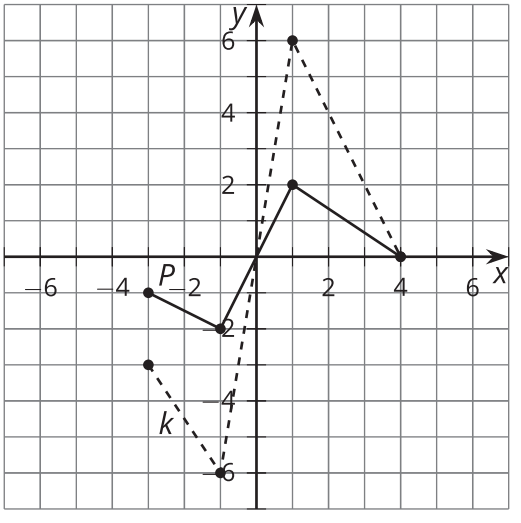
t	$F(t)$	$g(t)$	$h(t)$
0	212		
20	181		
40	106		
60	31		
80	0		

1. Complete the table for the function g.
2. Explain why there is not enough information to find the exact values for $h(20)$ and $h(60)$.
3. Complete as much of the table as you can for the function h, modeling Claire's height on the second Ferris wheel.
4. Express g and h in terms of f. Be prepared to explain your reasoning.

3 The Many Transformations of a Function P

Student Task Statement

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



1. Write an equation for k in terms of P.

2. On the same axes, graph the function m where $m(x) = P(0.75x)$.

3. The highest point on the graph of P is $(1, 2)$. What is the highest point on the graph of a function n where $n(x) = P(5x)$? Explain or show your reasoning.

4. The point furthest to the right on the graph of P is $(4, 0)$. If the point furthest to the right on the graph of a function q is $(18, 0)$, write a possible equation for q in terms of P.