

# Answer Key: Think FUNCTIONally

## Activity Sheet: Representing Functions

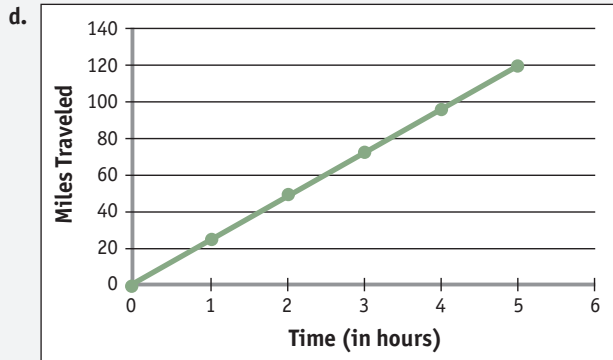
### "A Well-Functioning Research Mission"

- 1 a. Yes, the relationship is a function. There is only one output for each input.

b.

Time (hours)	1	2	3	4	5
Distance (miles)	24	48	72	96	120

- c.  $d = 24t$ , where  $d$  = distance in miles and  $t$  = time in hours



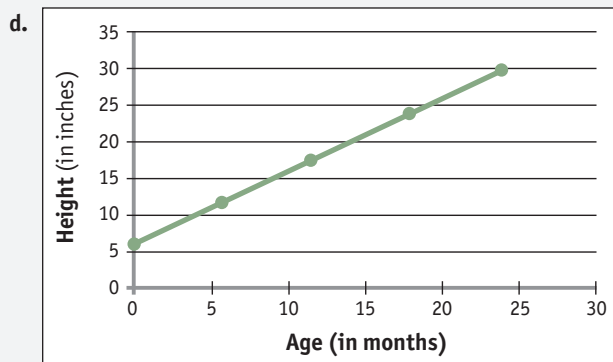
- e. The distance traveled in 1.5 hours can easily be found by using the formula  $d = 24t$ . Using 1.5 for  $t$ , distance = 36 miles.

- 2 a. Yes, the relationship is a function. There is only one output for each input.

b.

Age (in months)	0	6	12	18	24
Height (in inches)	6	12	18	24	30

- c.  $h = a + 6$ , where  $h$  = height in inches and  $a$  = age in months



- e. Although the formula  $h = a + 6$  could theoretically be used to find a value for  $a$  when  $h = 36$ , this would not be the right thing to do given the real-world context of the problem. The Mini-Emperor matures when it is two years (24 months) old and 30 inches high, so it never reaches 36 inches in height.

## Activity Sheet: Using Functions to Model Relationships Between Quantities

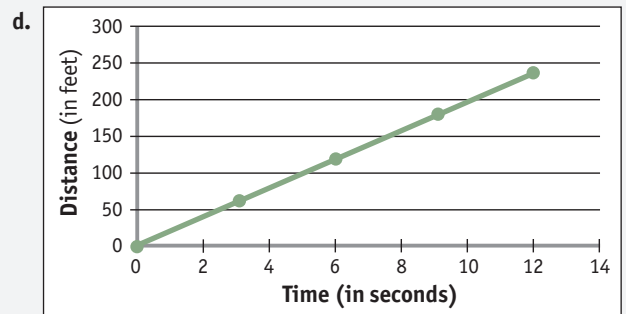
### "That's Some Slippery Slope!"

- 1 a. 20 feet per second. Use the points (3, 60) and (6, 120) to calculate the rate of change. The change in  $y = 120 - 60$ , therefore  $y = 60$ . The change in  $x = 6 - 3$ , therefore  $x = 3$ . The change in  $y$  divided by the change in  $x = 60/3$ , therefore  $x = 20$  feet per second.

b.

Time (in seconds)	0	3	6	9	12
Distance (in feet)	0	60	120	180	240

- c.  $d = 20t$ . If we know that one of the points is (3, 60) and that the rate of change is 20 feet per second, we can use  $y = mx + b$  to determine that  $60 = 3(20) + b$ . Solving for  $b$ , the initial value is 0. This makes sense since a penguin wouldn't travel any distance in the instant it started its trip. Note, however, that the function only applies for the length of the hill (600 feet). After that, the ground flattens and the penguin stops.



- e. The hill is only 600 feet long, so the answer is 600 feet. Even though the formula is  $d = 20t$ , and it would seem that a time of 45 seconds would correspond to a distance of 900 feet, the formula only applies on the hill itself, and the penguin would stop after traveling 600 feet.

- 2 a. The rate of change is \$5. The problem states that the admission fee per visitor would be \$5.
- b. The cost to build the facility is \$200,000. Using the formula  $y = mx + b$ , the rate of change of \$5, and the point (50,000, 50,000), we can determine that  $50,000 = 50,000 \times 5 - b$ . Solving for  $b$ , we find that the initial cost was \$200,000.

- c. The formula is  $p = 5n - 200,000$ , where  $p$  = profit,  $n$  = the number of visitors, and 200,000 is the initial cost.

