

Function Story Lab

Connect each function to what its numbers mean.

HIGH SCHOOL • HSF-IF.B

CCSS.Math.Content.HSF-IF.B "Interpret functions that arise in applications in terms of the context"

NAME _____

DATE _____

READ THE MODEL

In a function model, the input represents one quantity and the output represents another quantity. Use the context to name the units, decide which inputs make sense, and explain what a rate of change tells you.

WORKED EXAMPLE

A bike shop models a repair cost with $C(h) = 17h + 29$, where h is the number of labor hours. Find $C(6)$ and interpret the result.

1. Substitute $h = 6$: $C(6) = 17(6) + 29$.
2. Multiply: $C(6) = 102 + 29$.
3. Add: $C(6) = 131$.

Answer: $C(6) = 131$. A 6-hour repair costs \$131.

PRACTICE 6 problems

- 1** The function $p(n) = 4n + 15$ gives the cost, in dollars, of buying n game passes. Find $p(8)$ and interpret the result.

ANSWER _____

- 2** The function $g(x) = 84 - 5x$ gives the number of pages remaining in a book after x days. Find $g(7)$ and interpret the result.

ANSWER _____

- 3** An equipment rental costs $R(d) = 26d + 9$ dollars, where d is the number of whole days the equipment is used. A rental must be used for at least 1 day and can last at most 8 days. State the domain of R .

ANSWER _____

- 4** The function $y = t^2 + 3$ gives the height of a model rocket, in inches, t seconds after launch. Find the average rate of change from $t = 1$ to $t = 4$.

ANSWER _____

- 5** The function $L(m) = -3m + 78$ gives a laptop battery level, in percent, after m minutes. Explain what $L(0) = 78$ and the slope -3 mean.

ANSWER _____

- 6** The table gives $F(t)$, the dollars raised in a fundraiser after t hours. Find the average rate of change from $t = 0$ to $t = 4$. t : 0, 2, 4
 $F(t)$: 20, 28, 36

ANSWER _____

APPLY IT Show your work

- 1** A 14-day mobile data cycle begins with 28 GB. The function $D(d) = 28 - 2d$ gives the number of GB remaining after d whole days. Find $D(9)$, interpret it, and state an appropriate domain for d .

WORK SPACE

ANSWER _____

- 2** A student is saving for a concert ticket. The function $S(w) = 7w + 24$ gives the amount saved, in dollars, after w weeks. Find $S(8)$ and the average rate of change from $w = 2$ to $w = 8$. Interpret both results.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

A soccer ball's height is modeled by $h(t) = -3t^2 + 11t$, where h is in meters and t is in seconds. Find the average rate of change from $t = 0$ to $t = 1$ and from $t = 1$ to $t = 2$. Explain what the comparison tells you about the ball's motion.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	The function $p(n) = 4n + 15$ gives the cost, in dollars, of buying n game passes. Find $p(8)$ and interpret the result.	$p(8) = 47$. Eight game passes cost \$47.
2	The function $g(x) = 84 - 5x$ gives the number of pages remaining in a book after x days. Find $g(7)$ and interpret the result.	$g(7) = 49$. After 7 days, 49 pages remain.
3	An equipment rental costs $R(d) = 26d + 9$ dollars, where d is the number of whole days the equipment is used. A rental must be used for at least 1 day and can last at most 8 days. State the domain of R .	d can be 1, 2, 3, 4, 5, 6, 7, or 8.
4	The function $y = t^2 + 3$ gives the height of a model rocket, in inches, t seconds after launch. Find the average rate of change from $t = 1$ to $t = 4$.	5 inches per second.
5	The function $L(m) = -3m + 78$ gives a laptop battery level, in percent, after m minutes. Explain what $L(0) = 78$ and the slope -3 mean.	The battery begins at 78%. Its battery level decreases by 3 percentage points each minute.
6	The table gives $F(t)$, the dollars raised in a fundraiser after t hours. Find the average rate of change from $t = 0$ to $t = 4$. t : 0, 2, 4 $F(t)$: 20, 28, 36	4 dollars per hour.

PART 2 • APPLY IT

- $D(9) = 10$. After 9 whole days, 10 GB remain. An appropriate domain is $d = 0, 1, 2, \dots, 14$.** Substitute 9 for d to get $28 - 18 = 10$. Because the cycle lasts 14 days and d counts whole days, use the integers from 0 through 14.
- $S(8) = 80$, so the student has saved \$80 after 8 weeks. The average rate of change is \$7 per week, so the savings increase by \$7 each week.** Evaluate $7(8) + 24$ to find the amount after 8 weeks. Since the function is linear, its average rate of change over any interval is its slope, 7 dollars per week.

CHALLENGE

From 0 to 1 second, the average rate of change is 8 meters per second. From 1 to 2 seconds, it is 2 meters per second. The ball is still rising from 1 to 2 seconds, but it is rising more slowly.

Accept equivalent interval notation for the domain in problem 3 only if it clearly indicates whole-number inputs from 1 through 8. For average rate of change, accept equivalent unit forms such as dollars/hour or meters per second.