

Function Rule Forge

Turn rates, patterns, and situations into function rules.

HIGH SCHOOL • AII-F.BF.1

AII-F.BF.1 "Write a function that describes a relationship between two quantities."

NAME _____

DATE _____

BUILD THE RULE

Choose x for the input quantity and $f(x)$ for the output quantity. A constant rate gives rate times x , then add or subtract any starting amount. For repeated percent change, multiply the starting amount by $(1 + \text{rate})^x$.

WORKED EXAMPLE

A school club starts with \$7 and earns \$11 for each poster it sells. Let $f(x)$ be the total dollars after selling x posters. Write $f(x)$.

1. Let x represent the number of posters sold.
2. The club earns $11x$ dollars from poster sales.
3. Add the \$7 starting amount: $f(x) = 11x + 7$.

Answer: $f(x) = 11x + 7$

PRACTICE 6 problems

- 1** A print shop makes 5 stickers each minute. Let $f(x)$ be the number of stickers made in x minutes. Write $f(x)$.

ANSWER _____

- 2** A fitness studio charges a \$14 sign-up fee and \$3 for each class. Let $f(x)$ be the total cost for x classes. Write $f(x)$.

ANSWER _____

- 3** A water tank contains 42 liters and drains 2 liters each minute. Let $f(x)$ be the liters remaining after x minutes. Write $f(x)$.

ANSWER _____

- 4** An account contains \$80 and increases by 10% each month. Let $f(x)$ be the balance after x months. Write $f(x)$.

ANSWER _____

- 5** A rectangular mural is x feet long and 6 feet high. Let $f(x)$ be its area in square feet. Write $f(x)$.

ANSWER _____

- 6** A square has side length x centimeters. Let $f(x)$ be its area in square centimeters. Write $f(x)$.

ANSWER _____

APPLY IT Show your work

- 1** A student compares phone-plan costs. The table shows the total monthly cost $f(x)$, in dollars, for x gigabytes of data. Write a function for the cost.

PHONE PLAN COST

x , gigabytes	$f(x)$, dollars
0	18
1	22
2	26
3	30

ANSWER _____

- 2** A video editor posts a short clip that has 6 shares on day 0. The number of shares doubles each day. Let $f(x)$ be the number of shares after x days. Write $f(x)$.

WORK SPACE

ANSWER _____

CHALLENGE One step up

A bike-share service charges \$19 for a rental of up to 4 whole hours. It charges \$6 for each whole hour after the first 4 hours. Let $f(x)$ be the cost for x whole hours. Write a piecewise function, then explain why the second rule uses $x - 4$.

WORK SPACE AND ANSWER

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	A print shop makes 5 stickers each minute. Let $f(x)$ be the number of stickers made in x minutes. Write $f(x)$.	$f(x) = 5x$
2	A fitness studio charges a \$14 sign-up fee and \$3 for each class. Let $f(x)$ be the total cost for x classes. Write $f(x)$.	$f(x) = 3x + 14$
3	A water tank contains 42 liters and drains 2 liters each minute. Let $f(x)$ be the liters remaining after x minutes. Write $f(x)$.	$f(x) = 42 - 2x$
4	An account contains \$80 and increases by 10% each month. Let $f(x)$ be the balance after x months. Write $f(x)$.	$f(x) = 80(1.1)^x$
5	A rectangular mural is x feet long and 6 feet high. Let $f(x)$ be its area in square feet. Write $f(x)$.	$f(x) = 6x$
6	A square has side length x centimeters. Let $f(x)$ be its area in square centimeters. Write $f(x)$.	$f(x) = x^2$

PART 2 • APPLY IT

1. $f(x) = 4x + 18$ The cost rises by \$4 for each additional gigabyte. The cost is \$18 when $x = 0$, so the starting amount is 18.
2. $f(x) = 6(2)^x$ The starting number of shares is 6. Doubling each day means multiply by 2 once for each day.

CHALLENGE

$f(x) = 19$ when $0 < x \leq 4$; $f(x) = 19 + 6(x - 4)$ when $x > 4$. The expression $x - 4$ counts only the hours beyond the first 4 hours.

Accept equivalent algebraic forms, such as $f(x) = -2x + 42$ for the tank model. For the challenge, accept an equivalent piecewise rule that charges the flat fee through 4 hours and adds \$6 per hour afterward.