LESSON MAKER PRO

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. Assume the plan charges a fixed fee plus the same amount for each gigabyte.

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

ANSWER KEY

Function Rule Forge

HIGH SCHOOL · AII-F.BF.1

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 <= 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.