LESSON MAKER PRO

# Build Growth Rules

*Write exponential functions from starting amounts and factors.*

**HIGH SCHOOL · MA.912.AR.5.4**

**MA.912.AR.5.4** "Write an exponential function to represent a relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context."

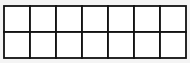
NAME _____ DATE _____

## FUNCTION FORM

An exponential function has the form $f(x)=a(b)^x$. The value of a is the amount when x=0, and b is the factor that multiplies the amount each time x increases by 1.

## WORKED EXAMPLE

The array shows the number of cells when x=0. Each step triples the number of cells. Write f(x).



1. Count the starting cells: a=14.
2. The repeated factor is b=3.
3. Substitute into $f(x)=a(b)^x$.
4. $f(x)=14(3)^x$.

**Answer: $f(x)=14(3)^x$**

## PRACTICE 4 problems

**1** At x=0, a culture has 6 organisms. The number is multiplied by 4 for each increase of 1 in x. Write f(x).

**ANSWER** _____

**2** f(0)=64. For each increase of 1 in x, the output is multiplied by 1/4. Write f(x).

**ANSWER** _____

**3** A savings balance is $11 at x=0 and is multiplied by 5 for each increase of 1 in x. Write f(x).

**ANSWER** _____

**4** An exponential function has f(0)=25 and f(1)=125. Write f(x).

**ANSWER** _____

## APPLY IT Show your work

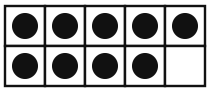
**1** An exponential model for a student livestream has the values in the table after x hours. Write f(x) for the views.

**LIVESTREAM VIEWS**

| x | views |
|---|---|
| 0 | 18 |
| 1 | 90 |

**ANSWER**

**2** The ten-frame shows a new video's views at x=0 hours. Each hour, the number of views is multiplied by 6. Write f(x).



**ANSWER**

## CHALLENGE One step up

An exponential function has f(1)=20 and f(4)=1280. Write f(x), then explain how you found the factor.

WORK SPACE AND ANSWER

**ANSWER KEY**

# Build Growth Rules

**HIGH SCHOOL · MA.912.AR.5.4**

## PART 1 · PRACTICE

| # | PROBLEM | ANSWER |
|---|---|---|
| 1 | At x=0, a culture has 6 organisms. The number is multiplied by 4 for each increase of 1 in x. Write f(x). | **$f(x)=6(4)^x$** |
| 2 | f(0)=64. For each increase of 1 in x, the output is multiplied by 1/4. Write f(x). | **$f(x)=64(1/4)^x$** |
| 3 | A savings balance is $11 at x=0 and is multiplied by 5 for each increase of 1 in x. Write f(x). | **$f(x)=11(5)^x$** |
| 4 | An exponential function has f(0)=25 and f(1)=125. Write f(x). | **$f(x)=25(5)^x$** |

## PART 2 · APPLY IT

1. **$f(x)=18(5)^x$** The starting value is 18. The views are multiplied by 90/18=5 each hour.
2. **$f(x)=9(6)^x$** Count 9 starting views in the ten-frame. Use 6 as the hourly multiplier.

## CHALLENGE

**$f(x)=5(4)^x$. The output factor over 3 steps is 1280/20=64=$4^3$, so the factor per step is 4. Since f(1)=20, the starting value is 20/4=5.**

Accept equivalent exponential notation, including a multiplication dot in place of parentheses. For the challenge, accept a correct explanation that identifies 4 as the per-step factor and 5 as the value at x=0.