

Function Story Decoder

Read each number as part of the situation.

HIGH SCHOOL • AII-F.LE.5

AII-F.LE.5 "Interpret the parameters in a linear or exponential function in terms of a context."

NAME _____

DATE _____

PARAMETERS TELL THE STORY

In a linear function $y=mx+b$, b is the starting amount when $x=0$, and m is the amount added or removed for each 1 increase in x . In an exponential function $y=a(b)^x$, a is the starting amount and b is the factor multiplied each time x increases by 1. A factor greater than 1 shows growth, while a factor between 0 and 1 shows decay.

WORKED EXAMPLE

A museum membership fund is modeled by $y=12x+140$, where x is the number of weeks. Interpret the parameters 12 and 140.

1. Set $x=0$: $y=12(0)+140$.
2. The fund starts with 140 dollars.
3. The coefficient 12 means the fund increases by 12 dollars each week.

Answer: 140 is the starting amount, and 12 is the number of dollars added each week.

PRACTICE 6 problems

- 1** A car wash fundraiser is modeled by $y=7x+45$, where x is the number of cars washed. Interpret 7 and 45.

ANSWER _____

- 2** A plant's height is modeled by $y=32(1.25)^x$, where x is the number of weeks. Interpret 32 and 1.25.

ANSWER _____

- 3** A phone's trade-in value is modeled by $y=86-4x$, where x is the number of months after today. Interpret -4 and 86.

ANSWER _____

- 4** The amount of caffeine in a drinker's body is modeled by $y=75(0.8)^x$, where x is the number of hours after drinking it. Interpret 75 and 0.8.

ANSWER _____

- 5** A campus newspaper has 63 subscribers and gains 9 subscribers each month. Write a linear function for the number of subscribers y after x months.

ANSWER _____

- 6** A game account has 48 coins at level 0, and the number of coins triples at each new level. Which function fits the situation: $y=48+3x$ or $y=48(3)^x$? State what the 3 means.

ANSWER _____

APPLY IT Show your work

- 1** A student is selling custom stickers to pay for a concert ticket. They already have 27 dollars and earn 6 dollars for each sheet of stickers sold. The amount of money is modeled by $y=6x+27$. Interpret both parameters, then find y when $x=11$.

WORK SPACE

ANSWER _____

- 2** A student posts art videos online. The views on a video are modeled by $y=160(3/2)^x$, where x is the number of weeks after the first week. Interpret 160 and $3/2$, then find y when $x=3$.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Two savings plans begin with 80 dollars. Plan A is modeled by $y=20x+80$. Plan B is modeled by $y=80(3/2)^x$, where x is the number of months. Find the value of each plan when $x=2$. Then explain how the parameters show why the plans change differently.

WORK SPACE AND ANSWER

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	A car wash fundraiser is modeled by $y=7x+45$, where x is the number of cars washed. Interpret 7 and 45.	45 dollars is the amount already collected before any cars are washed. The fundraiser earns 7 dollars for each car washed.
2	A plant's height is modeled by $y=32(1.25)^x$, where x is the number of weeks. Interpret 32 and 1.25.	32 is the plant's starting height. The height is multiplied by 1.25 each week, so it increases by 25% each week.
3	A phone's trade-in value is modeled by $y=86-4x$, where x is the number of months after today. Interpret -4 and 86.	86 dollars is the phone's value today. The value decreases by 4 dollars each month.
4	The amount of caffeine in a drinker's body is modeled by $y=75(0.8)^x$, where x is the number of hours after drinking it. Interpret 75 and 0.8.	75 milligrams is the starting amount of caffeine. Each hour, 80% of the previous amount remains, so the amount decreases by 20% each hour.
5	A campus newspaper has 63 subscribers and gains 9 subscribers each month. Write a linear function for the number of subscribers y after x months.	$y=9x+63$
6	A game account has 48 coins at level 0, and the number of coins triples at each new level. Which function fits the situation: $y=48+3x$ or $y=48(3)^x$? State what the 3 means.	$y=48(3)^x$; 3 means the number of coins is multiplied by 3 at each level.

PART 2 • APPLY IT

- 27 dollars is the starting amount, and 6 dollars is earned per sheet sold. When $x=11$, $y=93$, so the student has 93 dollars.** The constant 27 is the amount at $x=0$, and 6 is the amount added for each sheet. Compute $6(11)+27=93$.
- 160 is the number of views in the first week. The factor $3/2$ means the views increase by 50% each week. When $x=3$, $y=540$ views.** The initial value is 160, and multiplying by $3/2$ each week represents 50% growth. Compute $160(3/2)(3/2)(3/2)=540$.

CHALLENGE

At $x=2$, Plan A has 120 dollars and Plan B has 180 dollars. Both plans start with 80 dollars. Plan A adds 20 dollars each month, while Plan B multiplies the balance by $3/2$ each month, which is a 50% increase.

Accept equivalent wording for starting amount, rate of change, growth factor, and decay factor. For exponential interpretations, accept either "multiplies by $3/2$ " or "increases by 50%," and either "multiplies by 0.8" or "decreases by 20%."