

DO NOW

Decide whether the table represents a linear or exponential function. Then, write the function formula.

x	0	1	2	3	4
y	12	8	4	0	-4

Linear or Exponential? $y = -4x + 12$

x	-1	0	1	2	3
y	40.5	27	18	12	8

Linear or Exponential? $y = 27 \cdot \left(\frac{2}{3}\right)^x$

Jan 2-1:01 PM

Homework Answers

- | | |
|----------------------------------|-------------------------------------|
| (a) Linear
$y = 3x + 7$ | (d) Linear
$y = -16x$ |
| (b) Exponential
$y = 2(3)^x$ | (e) Exponential
$y = 16(1.25)^x$ |
| (c) Exponential
$y = 8(.5)^x$ | (f) Linear
$y = -20x + 180$ |

2. (1)

Jan 16-7:10 AM

Exponential Growth and Decay

Increasing and decreasing exponentially

Exponential growth -- when a quantity increases by a certain factor over time.

EX: compound interest or population increase

To find exponential growth use the formula:

$$f(t) = a(1 + r)^t$$

'a' is the initial amount

'r' is the rate expressed as a decimal

't' is the # of time intervals

Jan 2-11:45 AM

Jack deposits \$1000 into an account that pays 5% compound interest. How much will Jack have in her account after 5 years?

$$a = 1000$$

$$r = .05$$

$$t = 5$$

$$f(t) = a(1+r)^t$$

$$f(5) = 1000(1+.05)^5$$

$$f(5) = 1000(1.05)^5$$

$$f(5) = 1276.2815 \dots$$

$$\boxed{\$1276.28}$$

Jan 7-12:51 PM

Exponential decay -- a quantity decreases by a certain factor over time

EX: a car's value depreciating (going down) over time.

Use the formula to find exponential decay:

$$f(t) = a(1 - r)^t$$

EX: If your parents buy a car for \$25,000 and it depreciates at a rate of 12% each year, you can find the car's value after 5 years using the formula above.

$a = 25000$
 $r = .12$
 $t = 5$

$f(t) = a(1 - r)^t$
 $f(5) = 25000(1 - .12)^5$
 $f(5) = 25000(.88)^5$
 $f(5) = 13193.297$
 $\$13193.30$

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Tell whether the function is an exponential growth function or exponential decay function, and find the constant percentage rate of growth.

Exercise 3: $P(t) = 3.5(1.09)^t$

$r + 1 = 1.09$
 $r = .09$

- a. ~~Exponential Decay, 3.5%~~
- b. ~~Exponential Decay, 9%~~
- c. Exponential Growth, 9%
- d. Exponential Growth, .09%

Exercise 4: $P(x) = 200(.85)^x$

- a. Exponential Decay, 85%
- b. Exponential Decay, 15%
- c. ~~Exponential Growth, 85%~~
- d. ~~Exponential Growth, 200%~~

~~$(1 - r) = .85$~~
 ~~-1~~ ~~-1~~

 $-r = -.15$
 $r = .15$

Jan 30-9:41 AM