6.4 Exponential Growth & Decay DAY TWO

Essential Question:

What are some of the characteristics of exponential growth and exponential decay functions?

What You Will Learn:

- Use and identify exponential growth & decay functions
- Interpret & rewrite exponential growth & decay functions.
- Solve real-life problems involving exponential growth & decay.

Core Vocabulary:

exponential growth

exponential growth function

exponential decay

exponential decay function

compound interest

Dec 23-9:16 AM

COMPOUND INTEREST FORMULA

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

rate

ending amount

original amount (principal)

(r must be changed from percent to decimal 5% = .05)

times compounded each year

Feb 2-9:38 AM

Example

$500 invested ... 12% interest rate ... 7 years

How much $$ after 7 years?

$y = a(1+r)^x$

$a = 500$
$r = 0.12$
$x = 7$

$y = 500(1.12)^7 = \$1{,}105.34$

What if it is **compound interest**... compounded monthly?

$A = P\left(1+\frac{r}{n}\right)^{nt}$

$P = 500$
$r = 0.12$
$n = 12$
$t = 7$

$A = 500\left(1+\frac{0.12}{12}\right)^{12 \cdot 7}$

$= \$1{,}153.36$

```
500(1+(0.12/12))^
                84
      1153.361372
```

Dec 23-9:53 AM

1. In 2005, there were 100 rabbits in Polygon Park. The population increased by 11% each year.

a

r

$+$

a) Write an exponential growth function that represents the population t years after 2005.

$y = a(1+r)^x \Rightarrow y = 100(1+0.11)^t$

b) What will the population be in 2025? Round your answer to the nearest whole number.

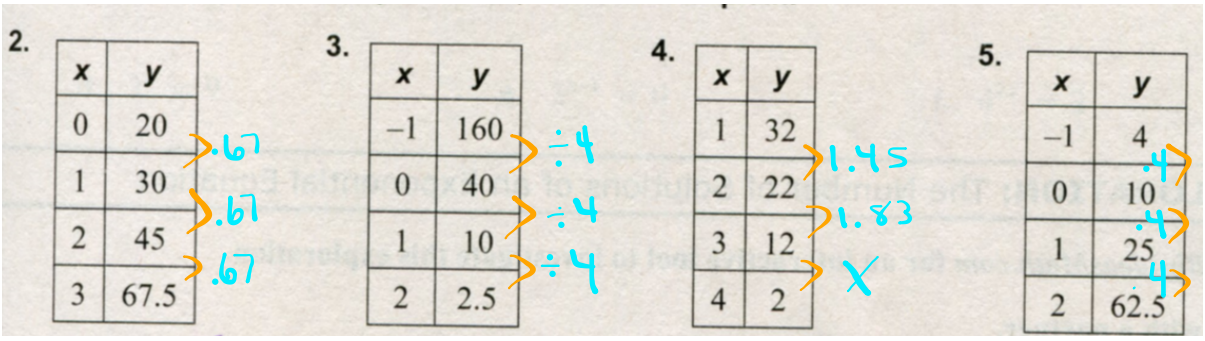
$t = 20$

$y = 100(1+0.11)^{20}$

```
100(1.11)^20
      806.2311536
```

806 people

In exercises 2 - 5, determine whether the table represents an exponential growth function, an exponential decay function, or neither. EXPLAIN.



2.

x	y
0	20
1	30
2	45
3	67.5

×.67, ×.67, ×.67

exponential growth by 0.667

20/30 .6666666667
30/45 .6666666667
45/67.5 .6666666667

3.

x	y
−1	160
0	40
1	10
2	2.5

÷4, ÷4, ÷4

exponential decay by 1/4

160/40 4
40/10 4
10/2.5 4

4.

x	y
1	32
2	22
3	12
4	2

1.45, 1.83, X

neither

32/22 1.454545455
22/12 1.833333333

5.

x	y
−1	4
0	10
1	25
2	62.5

×4, ×4, ×4

exponential growth by 0.4

4/10 .4
10/25 .4
25/62.5 .4

Feb 2-9:33 AM

In Exercises 6 - 8, determine whether each function represents exponential growth or exponential decay. Identify the percent rate of change, r.

6. $y = 4\,(0.95)^t$

↑ decay $r < 1$

$r = 0.05$

5%

7. $y = 500\,(1.08)^t$

↑ growth $r > 1$

$r = 0.08$

8%

8. $w(t) = \left(\frac{3}{4}\right)^t$

↑ decay $r < 1$

$r = 0.25$

25%

In Exercises 9 & 10, write a function that represents the balance after t years. $A = P(1 + \frac{r}{n})^{nt}$

9. $3,000 deposit that earns 6% annual interest compounded quarterly.

$P = 3000$
$r = 0.06$
$n = 4$

$A = 3000(1 + \frac{0.06}{4})^{4 \cdot t}$

10. $5,000 deposit that earns 7.2% annual interest compounded monthly.

$P = 5000$
$r = 0.072$
$n = 12$

$A = 5000(1 + \frac{0.072}{12})^{12t}$

6.4 DAY TWO Assignment:

pg. 319: 57 - 62