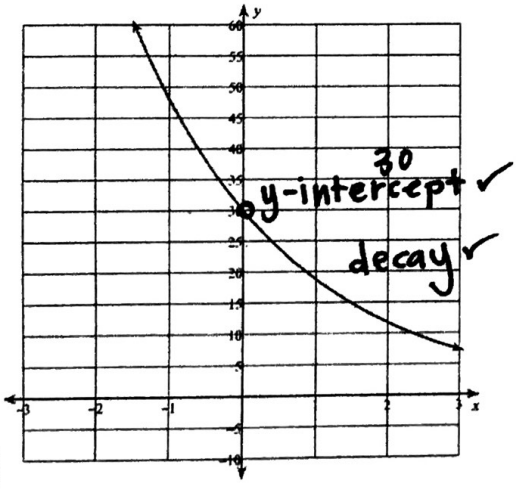
Unit 4 Review 1 Parts of Functions

Consider the following exponential function:

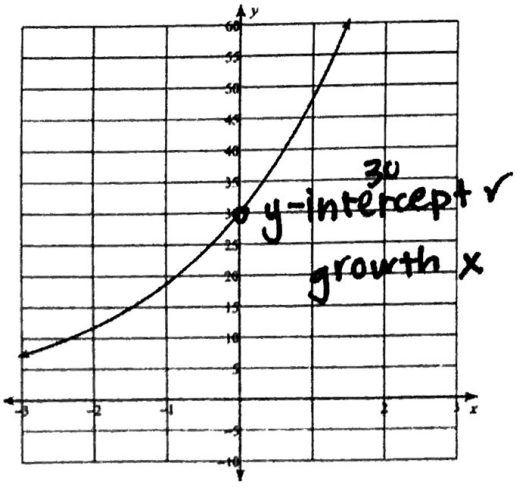
$$f(x) = 30\left(\frac{5}{8}\right)^x = 30(0.625)^x = 30(1-0.375)^x$$

1. What is the initial value of the function f(x)?
   a. 30
   b. 18.75
   c. 0.625
   d. 0.375
2. What is the growth/decay factor of f(x)?
   a. 30
   b. 18.75
   c. 0.625
   d. 0.375
3. What is the growth/decay rate f(x)?
   a. the growth rate is 62.5%
   b. the growth rate is 37.5%
   c. the decay rate is 62.5%
   d. the decay rate is 37.5%
4. Which of the following is the graph of f(x)?

a.



b.

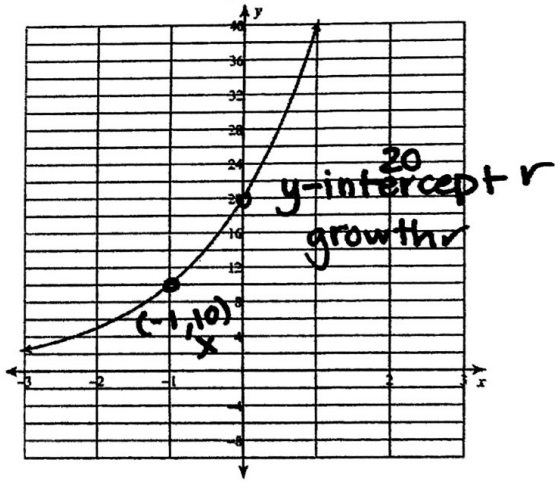


Consider the following exponential function

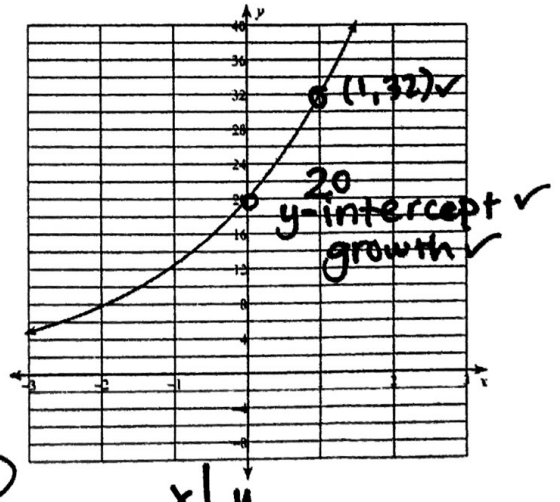
$$g(x) = 20\left(\frac{8}{5}\right)^x = 20(1.6)^x = 20(1+.60)^x$$

5. What is the initial value of the function g(x)?
   a. 0.6
   b. 1.6
   c. 20
   d. 32
6. What is the growth/decay factor of g(x)?
   a. the growth factor is 20
   b. the growth factor is 1.6
   c. the decay factor is 0.6
   d. the decay factor is 0.625
7. What is the growth/decay rate of g(x)?
   a. the growth rate is 40%
   b. the growth rate is 60%
   c. the decay rate is 40%
   d. the decay rate is 60%
8. Which of the following is the graph of g(x)?

a.



b.



x	y
-1	12.5
0	20
1	32

Unit 4 Review 2 Applications

9. A particular country/hip-hop fusion single has gone viral. At the beginning of the year, it only had 200,000 streams, but the number of streams quadrupled each month. Around how many streams would you expect it to have accumulated by the time we get out of school, five months into the year?
   a. 800,000 streams
   b. 1,000,000 streams
   c. 50,000,000 streams
   (d.) 200,000,000 streams

$a = 200000$
$b = 4$
$x =$ # of months
$y =$ # of streams
$y = ab^x$
$y = 200000(4)^x$
$y = 200000(4)^5$
$y = 204,800,000$

10. You buy a used car worth $10000 when you're 18 after you graduate high school. If it depreciates at the standard rate of 15% per year, how much will it be worth when you graduate college four years later?
   a. $17,490
   (b.) $5,220
   c. $5,063
   d. $4,000

$a = 10000$
$r = 15\% = 0.15$
$x =$ # of years
$y =$ value of car
$y = a(1 \pm r)^x$
$y = 10000(1-.15)^x$
$y = 10000(1-.15)^4$
$y = 5220$

11. Suppose you start saving for retirement right when you graduate high school at the age of 18 by putting $1000 away in an account earning 5% interest compounded semiannually. How much will that account be worth when you retire at age 60 if you never add any money to it again?
   a. $7,762
   (b.) $7,958
   c. $18,679
   d. $19,358

$A = P(1 + \frac{r}{n})^{nt}$
$P = 1000$
$r = 5\% = 0.05$
$n = 2$
$t = 60 - 18 = 42$
$A = 1000(1 + \frac{.05}{2})^{2(42)}$
$A = 7958.01$

12. The equation $p(d) = 3(1.135)^d$ may be used to model the population of Georgia in millions for the past 100 years where d represents decades since 1920. Which of the following is the correct interpretation of the equation?
   a. In 1920, Georgia had a population of 3 million people and grew at a rate of 113.5% per decade.
   b. In 1920, Georgia had a population of 1.135 million people and grew at a rate of 3% per decade.
   (c.) In 1920, Georgia had a population of 3 million people and grew at a rate of 13.5% per decade.
   d. In 1920 Georgia had a population of 1.315 million people and grew at a rate of .03% per decade.

start $\rightarrow$ 1 ; $1 + r$ $\rightarrow$ $1 + 13.5\%$ $\rightarrow$ $1 + .135$

13. A website is becoming more popular over time. Its visitors are counted every day since it's been live. The table below shows how many visitors the website had on particular days. Which of the following best represents the growth rate of this website?

t	42	43	44	45
Visitors	11,000	12,100	13,310	14,641

   (a.) 10%
   b. 11%
   c. 90%
   d. 110%

$\frac{12100}{11000} = 1.1$
$1 + r$
$1 + .10$
$1 + 10\%$

14. Plutonium-238 is a material that generates steady heat due to decay and is used in power systems for some spacecraft. It has a half-life of around 88 years. A scientist has a 100 milligram sample of plutonium-238. If the scientist needs at least 10 milligrams, how long will his sample last?
   a. 88 years
   b. 176 years
   (c.) 264 years
   d. 352 years

$a = 100$
$b = 1/2$
$x =$ groups of 88 years
$y =$ mg of Plutonium
$y = 100(1/2)^x$

x	y
0	100
1	50
2	25
3	12.5
4	6.25

3 groups of 88 years is 264 years
too long
still more than 10
less than 10

Unit 4 Review 3 Sequences

15. Which of the following is the explicit formula for the table below?

x	y
1st	17
2nd	51
3rd	153
4th	459

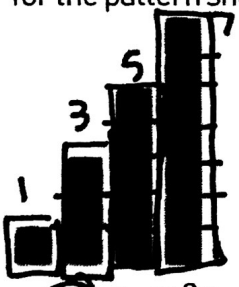
$\cdot 3$ $\cdot 3$ $\cdot 3$

$a_n = a_1 \cdot r^{n-1}$

$a_n = 17(3)^{n-1}$

a. $a_n = n + 1$
b. $a_n = 3n$
c. $a_n = 17 + 3(n-1)$
(d.) $a_n = 17(3)^{n-1}$

16. Which of the following is the explicit formula for the pattern show below?



$a_n = a_1 + d(n-1)$

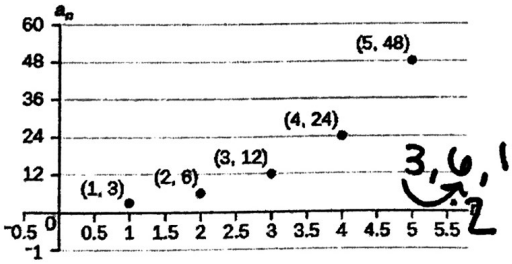
$a_n = 1 + 2(n-1)$

$a_n = 1 + 2n - 2$

$a_n = 2n - 1$

(a.) $a_n = 2n - 1$
b. $a_n = 2n + 1$
c. $a_n = n + 2$
d. $a_n = -n + 2$

17. Which of the following is the recursive formula for the sequence shown below?



3, 6, 12, 24, 48, ...

a. $a_n = 3a_{n-1}$
b. $a_n = a_{n-1} + 3$
(c.) $a_n = 2a_{n-1}$
d. $a_n = 2a_{n-1} + 3$

$a_n = r a_{n-1}$

$\begin{cases} a_n = 2a_{n-1} \\ a_1 = 3 \end{cases}$

-5 -5 -5

18. Consider the sequence 50, 45, 40, 35, ... What would be the 30th term?

a. 200
b. 195
(c.) -95
d. -100

$a_n = a_1 + d(n-1)$

$a_{30} = 50 - 5(30-1)$

$a_{30} = -95$

19. After a knee surgery, you need to return to your exercise regimen slowly. The first week you start exercising again you are to walk/jog for 12 minutes. Each week thereafter you are to increase your exercise routine by 6 minutes of activity. Which two formulas model this situation?

+6

$a_n = 12 + 6(n-1)$

$12 + 6n - 6$

$6n + 6$

a. $a_n = 6a_{n-1}$ and $a_n = 12 + 6n$
b. $a_n = 6a_{n-1}$ and $a_n = 6 + 6n$
(c.) $a_n = a_{n-1} + 6$ and $a_n = 6 + 6n$
d. $a_n = a_{n-1} + 6$ and $a_n = 12 + 6n$

20. In science class, you're studying how bacteria grow. A colony of bacteria in a petri dish measure 1 cm across the first day of your experiment. Every day in your experiment, the colony doubles in size. How big would the colony be after a week of the experiment?

7th day

a. 128 cm
(b.) 64 cm
c. 15 cm
d. 13 cm

$a_n = a_1 \cdot r^{n-1}$

$a_7 = 1(2)^{7-1}$

$a_7 = 1(2)^6$

$a_7 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$