7.2 Exponential Growth and Decay

PRACTICE

Tell whether the equation represents an exponential **growth** or an exponential **decay** function. Also, state the growth/decay factor, if possible.

1. $F(x) = -2(3.2)^x$

GROWTH

Growth Factor $= 3.2$

2. $F(x) = 5\left(\frac{1}{3}\right)^x$

DECAY

DECAY FACTOR $= \frac{1}{3}$

3. $F(x) = 6\left(\frac{5}{3}\right)^x$

GROWTH

Growth Factor $= \frac{5}{3}$

4. $F(x) = -3\left(\frac{1}{9}\right)^{-x}$ $\rightarrow \left[\left(\frac{1}{9}\right)^{-1}\right]^x = 9^x$

GROWTH

Growth Factor $= 9$

5. $F(x) = 8(x)^4$

NEITHER!

6. $F(x) = 3(0.2)^x$

DECAY

DECAY FACTOR $= 0.2$

7. $F(x) = -\frac{1}{2}(6.3)^x$

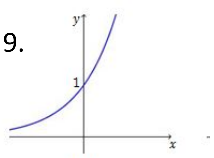
GROWTH

Growth Factor $= 6.3$

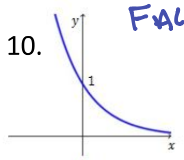
8. $F(x) = 12(0.8)^{-x}$ $\rightarrow \left[(.8)^{-1}\right]^x$

GROWTH

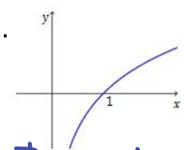
Growth Factor $= 1.25$

9. 

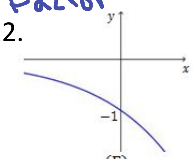
GROWTH

10. 

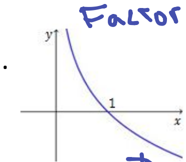
DECAY

11. 

DECAY

12. 

GROWTH

13. 

DECAY

14. The number of mosquitos at a lake where the time is measured in days is modeled by the equation:

$$m(d) = 1000(4.25)^d$$

a. How many mosquitos are at the lake when the initial count was taken? 1000

b. If this rate continues, how many mosquitos will there be 10 days from now.

```
1000(4.25)^10
                1922601605
```

15. Mr. Sullivan bought a new trailer for a lot at his favorite trailer park. It cost him $35,000. Unfortunately, each year the value is nine-tenths the value of the previous year.

a. Write a model for the value of the trailer home.

$F(x) = 35000(0.9)^x$

b. How much will the trailer home be worth in 13 years?

```
35000(.9)^13
                8896.530399
```

16. The number of downloads per week of Sully's new pop-song doubles every 3 weeks. The first week, there were 2 downloads.

a. Use the doubling formula to create a function that models the situation.

$F(x) = 2(2)^{\frac{x}{3}}$

b. If this rate continues, how many downloads will there be in ~~1 year~~? → 52 WEEKS

```
2(2)^52/3
                330280.7437
```

17. Mr. Brust loves jacuzzis! In fact, as soon as he moved to Sigonella, he bought a brand new $1500 model with disco lights. After 5 years, it was worth $800. Find the decay factor for the value of the jacuzzi by substituting into the equation: $V(x) = ab^x$. Then, write the decay function that models the value of the jacuzzi.

$V(x) = 1500\,b^x$

$\frac{800}{1500} = \frac{1500\,b^5}{1500}$ ← 5 yrs

$(0.53)^{1/5} = (b^5)^{1/5}$

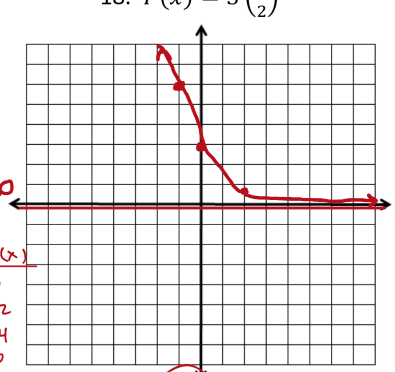
$\boxed{.88 = b}$

$\boxed{V(x) = 1500(.88)^x}$

```
800/1500
                0.5333333333
Ans^(1/5)
                0.8818602062
```

Sketch the graph of each exponential function by doi[ng …] [asym]ptote, label at least **two distinct** **coordinate points** on each graph, and write the dom[ain …]

18. $F(x) = 3\left(\frac{1}{2}\right)^x$



$y=0$

x	F(x)
0	3
1	3/2
2	3/4
-1	6

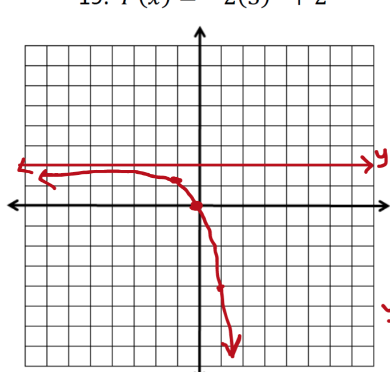
Growth or Decay?

Domain: $\mathbb{R}$

Range: $F(x) > 0$

Asymptote $y=2$

19. $F(x) = -2(3)^x + 2$



$y=2$

Growth or Decay?

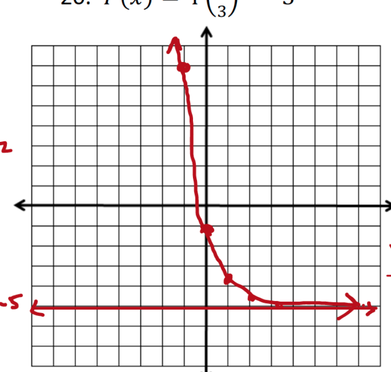
Domain: $\mathbb{R}$

Range: $F(x) < 2$

x	F(x)
0	0
1	-4
2	-16
-1	1.3

Asymptote $y=-5$

20. $F(x) = 4\left(\frac{1}{3}\right)^x - 5$



$y=-5$

X	F(x)
0	-1
1	-3.7
2	-4.5
-1	7

Growth or Decay?

Domain: $\mathbb{R}$

Range: $F(x) > -5$