Math 1 **Name:** KEY

Unit 4.5 Exponential functions PRACTICE

Period: _____

Determine whether each Function or Equation represents an exponential function or equation. Explain.

1. $f(x) = 3^x$

   Yes, it is in the $y = ab^x$ form

2. $f(a) = 5 \cdot 0.9^a$

   Yes, it is in the $y = ab^x$ form

3. $y = 5 \cdot 2^x$

   Yes, it is in the $y = ab^x$ form

4. $y = 6 \cdot x^3$

   no, the exponent is not a variable

5. $y = 3x - 8$

   no, the exponent is not a variable

6. $y = 4 \cdot 0.3^x$

   Yes, it is in the $y = ab^x$ form

Evaluate each function for the given value.

7. $f(x) = 5^x \quad for\ when\ x = 4$

   625

8. $h(t) = 3 \cdot 4^t \quad for\ when\ t = -3$

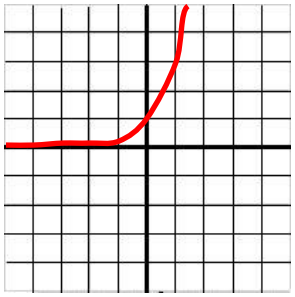
   $\frac{3}{64}$

9. $y = 8 \cdot 0.7^x \quad for\ when\ x = 3$

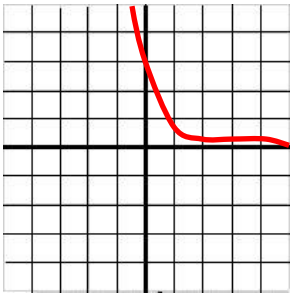
   $\frac{343}{125}$ or 2.744

Graph each exponential function.

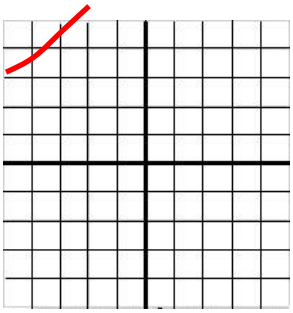
10. $f(x) = 3^x$



11. $y = 3 \cdot 0.25^x$



12. $y = 8 \cdot 1.2^x$



13. An investment of $8000 in a certain Certificate of Deposit (CD) doubles in value every seven years. The function that models the growth of this investment if $f(x) = 8000 \cdot 2^x$, where x is the number of doubling periods. If the investor does not withdraw any money from this CD, how much money will be available for withdrawal after 28 years?

    Find x by $\frac{28}{7} = 4$ $8000 \cdot 2^4 = \$128{,}000$

14. A population of amoebas in a petri dish will triple in size every 20 minutes. At the start of an experiment the population is 800. The function $y = 800 \cdot 3^x$, where x is the number of 20 minute periods, models the population growth. How many amoebas are in the petri dish after 3 hours?

    Find x by $\frac{3*60}{20} = 9$ $800 \cdot 3^9 = 15{,}746{,}400\ amoebas$

15. A new car cost $15,000 to build in 2010. The company's financial analysts expect costs to rise by 6% per year for the 10 years they are planning to build the car. The cost to build the car can be modeled by the function $f(t) = 15{,}000(1.06)^t$, where t is the number of years after 2010. How much will it cost the company to build the car in 2017?

    Find t by $2017 - 2010 = 7$ $15{,}000 \cdot (1.06)^7 = \$22{,}554.45$

Evaluate each function over the domain $\{-2, -1, 0, 1, 2, 3\}$.
As the values of the domain increase, do the values of the range increase or decrease?

16. $f(x) = 3^x$ $f(-2) = \frac{1}{9}$ $f(-1) = \frac{1}{3}$ $f(0) = 1$

$f(1) = 3$ $f(2) = 9$ $f(3) = 27$

Range increases or decreases? (Circle one)

17. $f(x) = 4.2^x$ $f(-2) = \frac{25}{441}$ $f(-1) = \frac{5}{21}$ $f(0) = 1$

$f(1) = \frac{21}{5}$ $f(2) = \frac{441}{25}$ $f(3) = \frac{9261}{125}$

Range increases or decreases? (Circle one)

18. $f(x) = 0.3^x$ $f(-2) = \frac{100}{9}$ $f(-1) = \frac{10}{3}$ $f(0) = 1$

$f(1) = \frac{3}{10}$ $f(2) = \frac{9}{100}$ $f(3) = \frac{27}{1000}$

Range increases or decreases? (Circle one)

19. $f(x) = 4 \cdot 3^x$ $f(-2) = \frac{4}{9}$ $f(-1) = \frac{4}{3}$ $f(0) = 4$

$f(1) = 12$ $f(2) = 36$ $f(3) = 108$

Range increases or decreases? (Circle one)

20. $f(x) = 50 \cdot 0.1^x$ $f(-2) = 5000$ $f(-1) = 500$ $f(0) = 50$

$f(1) = 5$ $f(2) = \frac{1}{2}$ $f(3) = \frac{1}{20}$

Range increases or decreases? (Circle one)

Solve each equation.

21. $3^x = 81$

$x = 4$

22. $5 \cdot 2^x = 40$

$x = 3$

23. $4^x + 4 = 68$

$x = 3$

24. $3 \cdot 2^x - 16 = 80$

$x = 5$

25. $\frac{1}{3} \cdot 5^x + 1 = \frac{76}{75}$

$x = -2$

26. $1 - 3(7^x - 2) = 4$

$x = 0$