Algebra 1

Write your questions and thoughts here!

7.3 Linear vs. Exponential

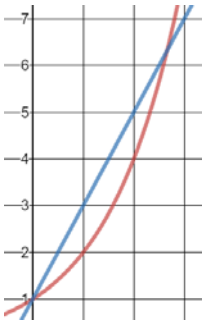
Name:_____

Notes

Recall: Graph the following

$f(x) =$

$g(x) =$



Identify the type of relationship and create a function from the given information.

1. A savings account s has \$500 and accumulates no interest but receives a deposit of \$825 per month m.

2. The value v of a house is \$150,000 and increases by 1.5% per year t.

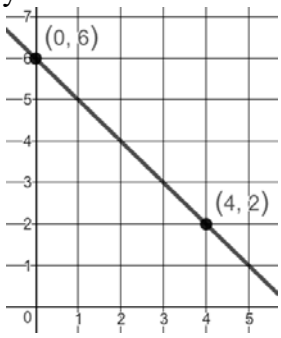
3.

r	0	1	2	3
$A(r)$	15	12	9.6	7.68

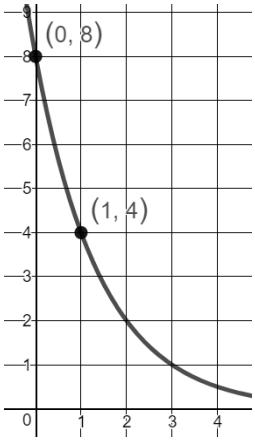
4.

t	0	1	2	3
$s(t)$	10	15	20	25

5. Use x and $f(x)$ for your variables.



6. Use x and $f(x)$ for your variables.



Doubling Time

An initial amount a that doubles every x.

$$f(t) =$$

Write your questions and thoughts here!

Create a function that models each scenario, then answer the question.

7. The number of people p living in a city doubles every 30 years t. If there are currently 7,000 people in the city, how many will live there in 50 years?

8. There are 3 cockroaches c behind Mr. Brust's microwave and their population doubles every 14 days d. How many cockroaches will there be in 40 days?

Half-life

An initial amount a shrinks by half every x.

$$f(t) =$$

Create a function that models each scenario, then answer the question.

9. There is 500 grams g of radioactive material. Its half-life is 5,700 years, t. How many grams will there be in 20,000 years?

10. The rodent population p in a large city is being controlled by a new poison that kills half the population every 6 months m. If there are currently 1700 rodents, how many will there be in 5 years?

Now summarize what you learned!

7.3 Linear vs. Exponential

Algebra 1

Practice

Identify the type of relationship and create a function from the given information.

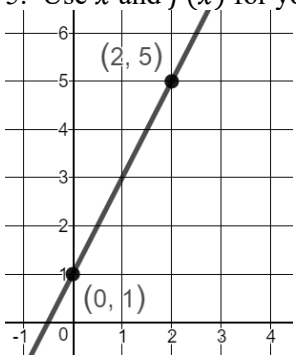
1. The alligator population p is currently 30, and every year t the population is 9/7 of the previous year's population.

2. In the morning, the temperature T is 45 degrees Fahrenheit and it increases by 4 degrees every hour h until 4:00 p.m.

3. There are currently 8 boars roaming around in Mr. Bean's back yard. Each year t, the population p increases by 8.

4. There are 100 rodents in a barn. Every month m, the rodent population p increases by 200%.

5. Use x and $f(x)$ for your variables.



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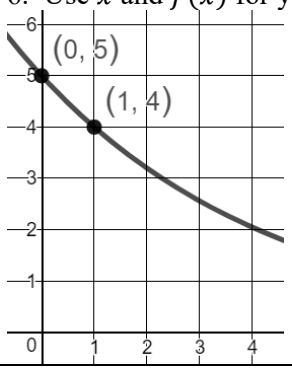

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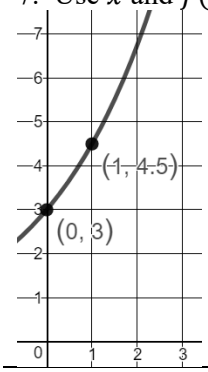
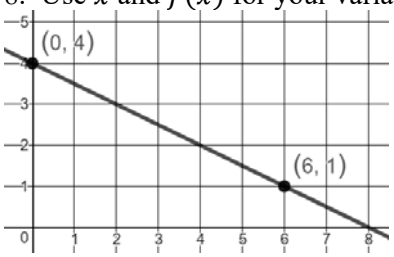


8. Use x and $f(x)$ for your variables.



9.

x	0	1	2	3
$h(x)$	7	9.8	13.72	19.208

10.

h	0	1	2	3
$r(h)$	12	4	$\frac{4}{3}$	$\frac{4}{9}$

11.

t	0	1	2	3
$v(t)$	7	13	19	25

12.

t	0	1	2	3
$a(t)$	4	1	-2	-5

Create a model (equation) for each scenario. Use function notation to answer the question.

13. A population p of 500 people doubles every 35 years t. How many people will there be in 100 years?

14. After a morning coffee, Mr. Brust has 200 mg of caffeine c in his blood. The half-life is 45 minutes m. How much caffeine is in his system after 2 hours and 10 minutes

15. There is 3100 grams g of radioactive material. The half-life of the material is 8,000 years t. How much radioactive material will there be in 10,000 years?

16. A mutual-fund portfolio has a value v of \$1,000 and doubles every 7 years t. How much will the fund be worth in 20 years?

17. A culture of bacteria has 2,500 cells c that doubles every 3 hours h. How many cells of bacteria will there be in 2 hours?

18. A species of animal a is being destroyed by a predator. The half-life is 6 months m. If there are 200,000 animals, how many will there be left in 4 years?

19. Find the product of
$(5p + 1)(p - 1)$

22. Solve: $\frac{x-8}{4} + 3 = 9$

20.

x	y
0	85
2	75
5	65
7	70
14	52
15	50
20	45
23	37

Find the LINEAR regression equation for the data above.

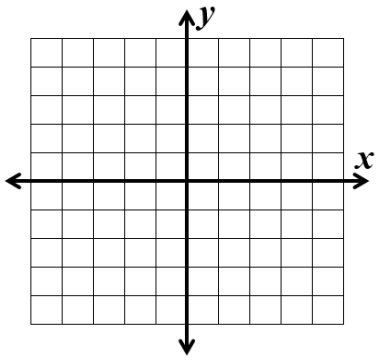
Equation: _____

Correlation Coefficient:

Explain the meaning of the correlation coefficient.

21. Graph the following:

$$\begin{cases} y \geq -2x + 1 \\ y > \frac{1}{2}x - 2 \end{cases}$$



7.3 Linear vs. Exponential

Wrap up

Practice check: The next two questions are just like the practice, but we provide no answers. If you can't do these problems, then you're definitely not ready for a Mastery Check!

23. Your bank account a has \$507 and decreases by \$7 per week w. Write a function to model this scenario.

24. A population p of 15,000 people doubles every 21 years t. How many people will there be in 75 years?

25. If a person takes a given dosage d of a particular medication, then the formula $f(t) = d(0.8)^t$ represents the concentration of the medication in the bloodstream t hours later.

    a. Mr. Bean takes 200 mg of the medication. Write the function that represents the amount of medication in his bloodstream.

    b. If he takes the 200 mg at 6:00 a.m., how much remains in his blood stream at 10:00 a.m.?

26. When you breathe normally, about 12% of the air in your lungs is replaced with each breath. Write an explicit formula for the sequence that models the amount of the original air left in your lungs, given that the initial volume of air is 500 ml. Use your model to determine how much of the original 500 ml remains after 50 breaths.