

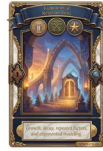
Exponential Relationships

Growth, decay, repeated factors, and exponential modeling.

Name _____ Date _____

32 main 2-up grid 3 pages

Completion Reward



Shown here as a small pack artifact, not a preview destination.

1. What makes a pattern exponential?

- A. It changes by the same difference each step
- B. It changes by the same factor each step
- C. It always forms a straight line
- D. It never increases

2. If a quantity grows by a factor of 1.25 each step, what happens each step?

- A. The quantity increases by 1.25 units each step.
- B. The quantity is multiplied by 1.25 each step.
- C. The quantity is divided by 1.25 each step.
- D. The quantity gains 125% of the original every step.

3. In the model $y = 50(1.2^x)$, what does 50 represent?

- A. The growth factor
- B. The x-intercept
- C. The initial value
- D. The percent increase

4. A quantity grows by 12% each step. What is the growth factor?

- A. 0.12
- B. 12
- C. 1.12
- D. 1.2

5. Which pattern is exponential?

- A. 6, 12, 18, 24
- B. 6, 10, 14, 18
- C. 6, 12, 24, 48
- D. 6, 9, 12, 15

6. Which equation represents exponential decay?

- A. $y = 30(1.2^x)$
- B. $y = 30(0.8^x)$
- C. $y = 30 + 0.8x$
- D. $y = 0.8x + 30$

7. Which pattern is exponential: 5, 8, 11, 14 or 5, 10, 20, 40?

- A. 5, 8, 11, 14
- B. Both
- C. Neither
- D. 5, 10, 20, 40

8. A student says 5 percent decay means multiply by 1.05 each step. What is wrong?

- A. Percent change should always be added, never multiplied.
- B. Decay of 5 percent means multiply by 0.95, not 1.05.
- C. The factor should be 5.0.
- D. Decay means multiply by -0.05.

9. What is the growth factor in the table?

Step	Value
0	3
1	6
2	12
3	24

Exponential tables are identified by a constant multiplicative change from one row to the next, not by a constant difference.

- A. 3
- B. 2
- C. 6
- D. 12

10. Which statement about the table is true?

x	y
0	5
1	10
2	20
3	40

When each output is a fixed multiple of the previous output, the table shows exponential behavior.

- A. The relation is linear because it adds 5 each time
- B. The relation is decreasing
- C. The output stays constant
- D. The relation is exponential because it multiplies by 2 each time

11. A table starts with 4 at $x = 0$ and doubles each time x increases by 1. Which model matches the table?

- A. $y = 2x + 4$
- B. $y = 4x + 2$
- C. $y = 4(2^x)$
- D. $y = 8(2^x)$

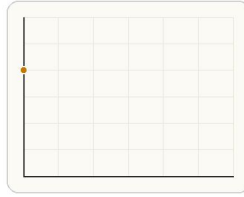
12. A table begins with 6 at $x = 0$ and shows 12, 24, and 48 for the next three x -values. Which model matches?

- A. $y = 12(2^x)$
- B. $y = 6x + 2$
- C. $y = 6(2^x)$
- D. $y = 2x + 6$

13. Which recursive rule matches the pattern 5, 10, 20, 40, ...?

- A. $a_0 = 5$ and $a_n = a_{(n-1)} + 2$
- B. $a_0 = 10$ and $a_n = 5a_{(n-1)}$
- C. $a_0 = 5$ and $a_n = 2a_{(n-1)}$
- D. $a_0 = 5$ and $a_n = a_{(n-1)} - 2$

14. In $y = 200(1.05)^x$, what does 200 represent?



On an exponential graph, the initial value is the y-value before any growth steps occur.

- A. The starting amount
- B. The growth factor
- C. The number of time steps
- D. The percent increase

15. In $y = 200(1.05)^x$, what does 1.05 represent?



A factor greater than 1 means the output grows by the same percent each step instead of by the same number.

- A. A 105 percent increase each step
- B. The initial amount
- C. A 5 percent increase each step
- D. The output when $x = 0$

16. Which rule matches the table?

x	y
0	4
1	8
2	16
3	32

The output starts at 4 and doubles each time x increases by 1.

- A. $y = 4(2^x)$
- B. $y = 4 + 2x$
- C. $y = 2(x + 4)$
- D. $y = 4x^2$

17. A student says an amount that doubles each day is linear because it keeps getting bigger. What is wrong?

- A. Doubling means multiplying by the same factor, which is exponential, not linear.
- B. Anything that increases is always linear.
- C. Exponential patterns must get smaller.
- D. Linear patterns use multiplication more than exponential patterns do.

18. A student says 5, 10, 15, 20 is exponential because the values keep increasing. What is wrong?

- A. Exponential patterns must decrease
- B. The pattern adds a constant amount, so it is linear, not exponential
- C. Exponential patterns can never use whole numbers
- D. Nothing is wrong

19. A student says 10 percent growth means add 0.10 each step. What is wrong?

- A. 10 percent growth means multiply by 1.10 each step
- B. 10 percent growth means subtract 0.10 each step
- C. 10 percent growth means multiply by 10
- D. Nothing is wrong

20. A student models 8 percent growth with $y = 500(0.08)^x$. What is wrong?

- A. Growth models never use exponents
- B. 0.08 means keeping only 8 percent, not growing by 8 percent
- C. The initial value should be negative
- D. Nothing is wrong

21. At $x = 2$, which value is larger: $3(2^x)$ or $3x + 3$?

- A. $3x + 3$
- B. They are equal
- C. There is not enough information
- D. $3(2^x)$

22. If $y = 7(3^x)$, find y when $x = 2$. Answer with a number.

23. A quantity starts at 4 and triples each step. What is the value at step 3? Answer with a number.

24. Find y when $y = 200(1.1^2)$. Answer with a number.

25. A quantity starts at 40 and doubles three times. What is the value after 3 steps? Answer with a number.

26. A quantity starts at 200 and decreases by 25% in one step. What is the new value?

27. A machine starts with 80 units of battery and loses 15 percent each hour. Which model gives y after x hours?

- A. 125
- B. 175
- C. 225
- D. 150

- A. $y = 80(1.15^x)$
- B. $y = 65x$
- C. $y = 80 - 15x$
- D. $y = 80(0.85^x)$

28. A population starts at 640 and halves every hour. Which model gives y after x hours?

29. Savings start at \$50 and grow by 20 percent each month. Which model gives y after x months?

30. A savings balance starts at 500 dollars and grows 8 percent each year. Which model fits?

- A. $y = 640(0.5^x)$
- B. $y = 640(2^x)$
- C. $y = 320x$
- D. $y = 640 - 0.5x$

- A. $y = 50(0.2^x)$
- B. $y = 20x + 50$
- C. $y = 50(1.2^x)$
- D. $y = 50 + 20x$

- A. $y = 500 + 8x$
- B. $y = 8(500)^x$
- C. $y = 500(1.08)^x$
- D. $y = 500x + 1.08$

31. A bacteria culture starts at 100 cells and doubles every hour. Write the model for y after x hours. Answer in the form $y = \dots$

32. A phone battery retains 90 percent of its charge each hour and starts at 100 percent. Write the model. Answer in the form $y = \dots$