

Algebra 1 · Exponential Growth and Decay · Worksheet

Common Core F-LE.A.1a, F-LE.A.1c, F-LE.A.2, F-LE.A.3, F-IF.C.8b, F-LE.B.5 · mathovore.fr

Name: _____ Date: ____/____/____ Score: _____

These twenty-four problems practice Common Core standards F-LE.A.1, F-LE.A.2, F-LE.A.3, F-IF.C.8b and F-LE.B.5. Compare linear and exponential tables, identify a and b , write $y = a \cdot b^x$, turn percent rates into factors, and work with compound interest.

The last six problems are word problems with growth, decay and savings. Work from easiest to hardest and round money to the nearest cent.

Algebra 1 Common Core: F-LE.A.1a · F-LE.A.1c · F-LE.A.2 · F-LE.A.3 · F-IF.C.8b · F-LE.B.5

Problem 1: Evaluate an exponential function

Let $f(x) = 3 \cdot 2^x$. Find $f(0)$, $f(1)$ and $f(4)$.

Problem 2: Constant factor

The table shows a function. Is it linear or exponential? Give the constant difference or the constant factor.

x	0	1	2	3
y	5	10	20	40

Table A.

Problem 3: Linear or exponential tables

Tell whether each table is linear or exponential. Give the constant difference or factor.

x	0	1	2	3
y	4	7	10	13

Table B.

x	0	1	2	3
y	81	27	9	3

Table C.

Problem 4: Identify a and b

For each function, name the starting value a and the factor b . Then tell whether it shows growth or decay.

- a. $y = 7(3)^x$
- b. $y = 250(0.9)^x$
- c. $y = 0.5(4)^x$

Problem 5: Percent rate from the factor

Each factor b describes a percent change per step. State the percent and whether it is growth or decay.

- a. $b = 1.08$
- b. $b = 0.95$
- c. $b = 1.5$
- d. $b = 0.6$

Problem 6: Factor from the percent rate

Write the factor b for each situation.

- a. A value grows 12% each year.
- b. A value decays 7% each year.
- c. A population grows 100% each year.
- d. A value loses 35% each year.

Problem 7: Equation from a table

Write an exponential function $y = a \cdot b^x$ for the table.

x	0	1	2	3
y	3	15	75	375

Exponential table.

Problem 8: Decay from a table

The values 1000, 600, 360, 216 are the outputs at $x=0,1,2,3$ of an exponential function. Write the function.

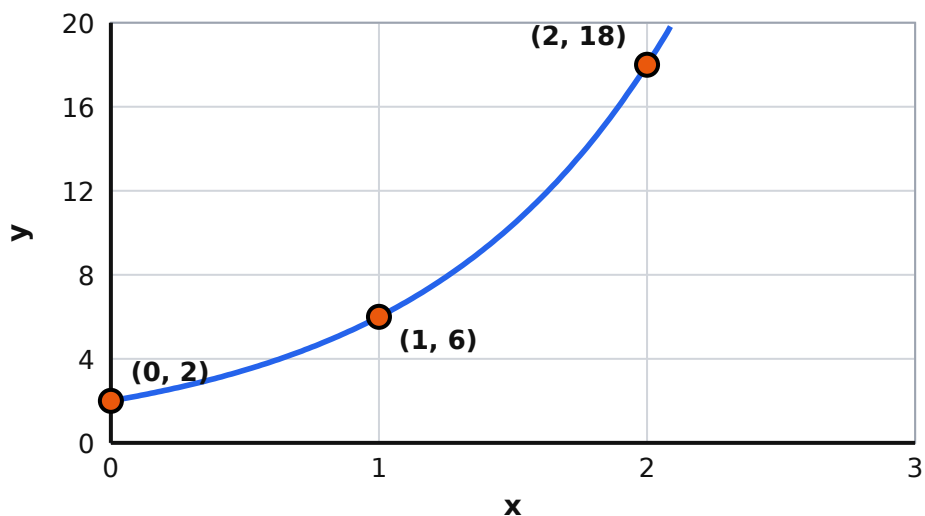
Problem 9: Equation from two points

Write an exponential function whose graph passes through the given points.

- a. (0,5) and (2,45)
- b. (0,96) and (3,12)

Problem 10: Equation from a graph

The graph of an exponential function is shown. Identify a and b and write the equation.



An exponential graph.

Problem 11: Evaluate growth

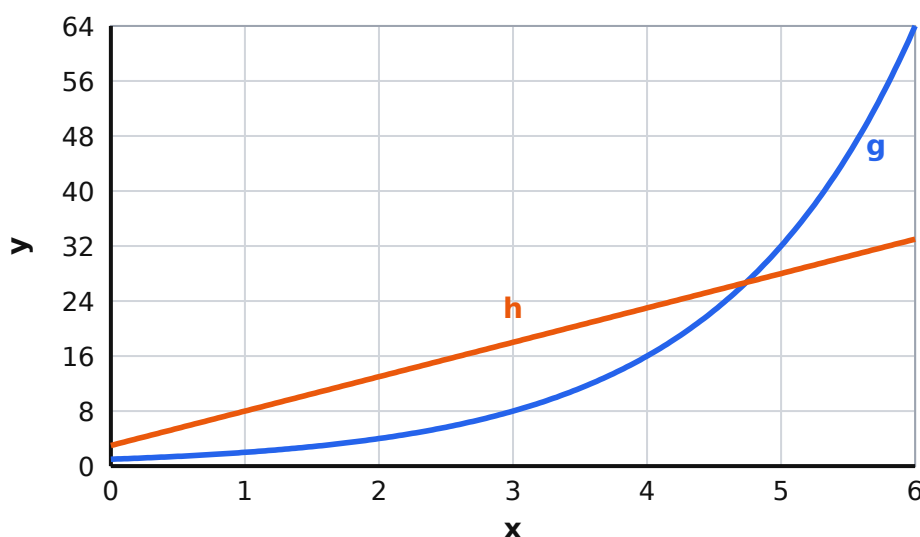
Let $y = 400(1.05)^x$. Find y when $x = 3$. Round to the nearest cent.

Problem 12: Evaluate decay

Let $y = 900(0.8)^x$. Find y when $x = 4$.

Problem 13: Exponential versus linear

The graph shows $g(x) = 2^x$ and $h(x) = 5x + 3$. Make a table of values for whole numbers $x = 0$ to 5. For which whole number x does g first exceed h ?



The graphs of $g(x) = 2^x$ and $h(x) = 5x + 3$.

Problem 14: Interpret the parameters

A town's population is $P(t) = 12000(0.97)^t$, where t is the number of years since 2020. Explain what 12,000 and 0.97 mean. Find the population in 2023, to the nearest person.

Problem 15: Compound interest, yearly

Priya deposits \$2,000 in an account that pays 3% interest compounded yearly. Find the balance after 4 years.

Problem 16: Compounding twice a year

Noah invests \$1,000 at 6% for 2 years. Compare the balance when interest is compounded yearly with the balance when it is compounded twice a year. How much more does he earn with twice a year?

Problem 17: Equivalent forms of an exponential

The value of an account is $y = 300(1.01)^{12t}$, where t is in years. (a) What is the monthly growth rate? (b) Find the yearly growth factor and the yearly growth rate to the nearest tenth of a percent. (c) Find y after 2 years, to the nearest cent.

Problem 18: Half-life model

An 80-gram sample of a substance decays by $y = 80(0.5)^{t/10}$, where t is in years. Find the amount left after 20 years and after 30 years. What is the half-life?

Problem 19: Video views

A video has 150 views on day 0, and the number of views doubles every day. Write a function for the views V after d days. Predict the views on day 7.

d	0	1	2	3
V	150	300	600	1,200

Views by day.

Problem 20: Car depreciation

A new car costs \$24,000 and loses 15% of its value each year. Write a function for its value V after t years. Find the value after 3 years.

Problem 21: Two savings plans

Liam compares two plans. Plan A starts with \$20 and adds \$15 each week: $A(w) = 20 + 15w$. Plan B starts with \$2 and doubles every week: $B(w) = 2 \cdot 2^w$. In which week does Plan B first have more money than Plan A?



Savings in dollars after w weeks.

Problem 22: Medicine in the body

A patient takes a 200 mg dose. The amount in the body falls 12% every hour. Write a function for the amount M after h hours. Find $M(3)$ to the nearest hundredth of a milligram, and find the first whole hour at which less than 100 mg remains.

Problem 23: Growing cell culture

A lab culture starts with 500 cells and grows 20% every hour. Write a function for the number of cells N after t hours. Find the first whole hour when the culture has more than 1,000 cells, and predict $N(5)$ to the nearest whole cell.

Problem 24: Interest: simple versus compound

Priya and Diego each put \$800 in an account. Priya's pays 5% compounded yearly. Diego's pays simple interest of \$40 per year (5% of \$800). Write a function for each balance after t years, and compare the balances after 10 years.