

Precalculus - Exponential Functions and the Number e - Worksheet

Common Core F-LE.A.2, F-IF.C.8b, F-LE.B.5, F-IF.C.7e · maths-pdf.fr/en/

Name: _____ Class: _____ Date: ____/____/____

These 20 problems practice exponential functions and the number e (Common Core F-LE.A.2, F-IF.C.8b, F-LE.B.5 and F-IF.C.7e). You will classify growth and decay, write models, graph transformations and use compound interest formulas.

Precalculus · Common Core State Standards: **F-LE.A.2, F-IF.C.8b, F-LE.B.5, F-IF.C.7e**

Exercise 1 - Growth or decay?

Tell whether each function models growth or decay and give the percent rate: (a) $y = 5(1.08)^x$; (b) $y = 200(0.85)^x$.

Exercise 2 - Evaluate

Evaluate $f(x) = 3 \cdot 2^x$ at $x = 0, 1, 4$.

Exercise 3 - Equation from two points

Write the exponential function through (0,5) and (1,15).

Exercise 4 - Equation from points two apart

Write the exponential function through (1,6) and (3,24).

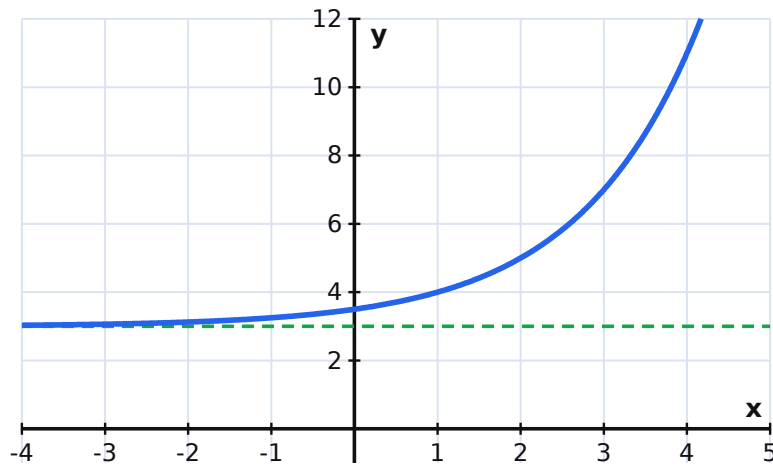
Exercise 5 - Town population

A town of 4,000 people grows 3% per year. Write $P(t)$ and find the population after 10 years, rounded to the nearest person.

Exercise 6 - Half-life

A 80 mg sample loses half its mass every 5 days. Write $A(t)$ and find the mass after 15 days.

Exercise 7 - Transformed exponential



Graph of $y = 2^{(x-1)} + 3$.

For $y = 2^{x-1} + 3$ find the asymptote, domain, range and y -intercept.

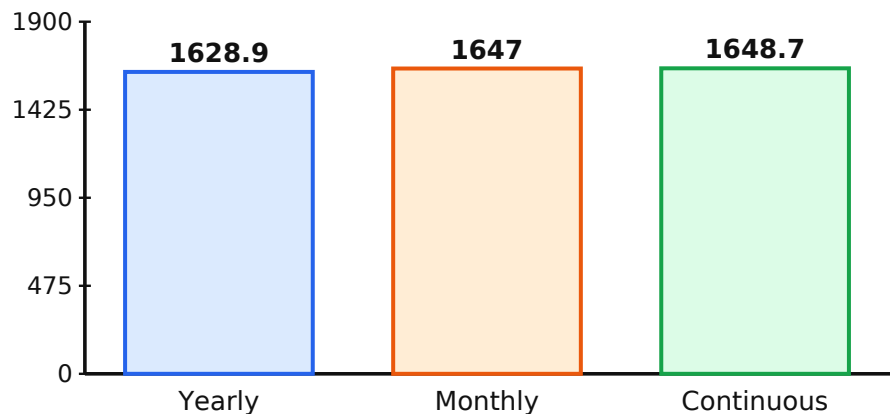
Exercise 8 - Equal bases

Solve $2^x = 32$.

Exercise 9 - Quarterly compounding

Find the value of \$2,000 invested at 4% compounded quarterly for 6 years.

Exercise 10 - Compare compounding



Three ways of compounding.

Find the value after 10 years of \$1,000 at 5% compounded yearly, monthly and continuously.

Exercise 11 - Continuous growth

Find the value of \$500 invested at 3.5% compounded continuously for 8 years.

Exercise 12 - Approach e

n	1	10	100	1,000	10,000
$(1+1/n)^n$	2.0000	2.5937	2.7048	2.7169	2.7181

Table of $(1 + 1/n)^n$.

Compute $(1 + \frac{1}{100})^{100}$ and compare it with $e \approx 2.71828$.

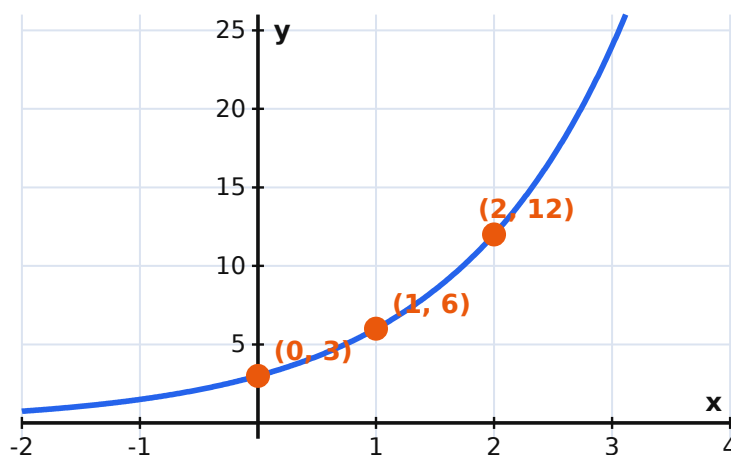
Exercise 13 - Bacteria

A culture of 500 bacteria triples every 4 hours: $N(t) = 500 \cdot 3^{t/4}$. Find $N(12)$ and the time when $N = 1,500$.

Exercise 14 - Car depreciation

A car worth \$22,000 loses 12% of its value each year. Write $V(t)$ and find its value after 3 years.

Exercise 15 - Equation from a graph



Exponential graph through three points.

The graph passes through (0,3), (1,6) and (2,12). Write its equation and find $f(5)$.

Exercise 16 - Linear versus exponential

x	1	2	3	4
$100(1.5)^x$	150	225	337.5	506.25
$100 + 60x$	160	220	280	340

Plan A (exponential) and Plan B (linear).

Compare $f(x) = 100(1.5)^x$ and $g(x) = 100 + 60x$ for $x = 1, 2, 3, 4$. After which x does f stay above g ?

Exercise 17 - Constant percent growth

A club grows from 1,200 to 1,728 members in 2 years with the same percent growth each year. Find the yearly growth rate.

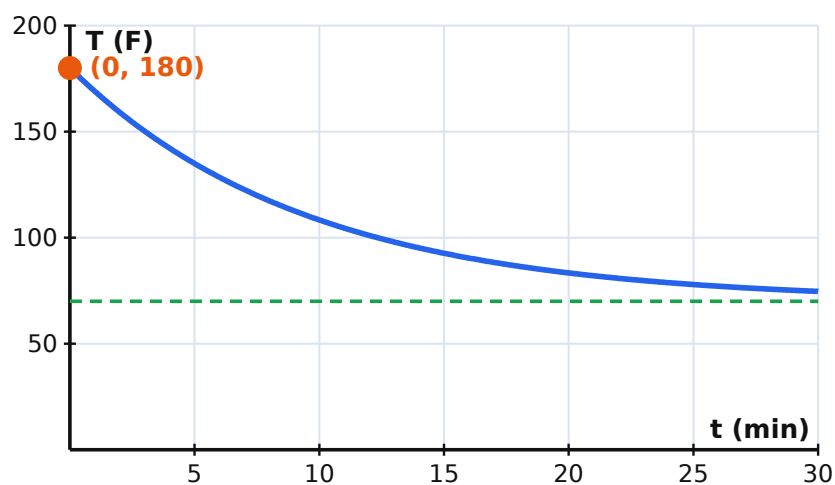
Exercise 18 - Find the principal

After 3 years at 6% compounded yearly, an account holds \$1,191.02. Find the amount originally deposited.

Exercise 19 - Doubling time

At 7% interest compounded yearly, how many whole years does it take for an investment to at least double?

Exercise 20 - Cooling coffee



Temperature of Maya's coffee.

Maya's coffee cools as $T(t) = 70 + 110(0.9)^t$ degrees Fahrenheit after t minutes. Find the starting temperature, the temperature after 5 minutes to the nearest tenth, and the temperature the

coffee approaches.