

# Precalculus - Exponential Functions and the Number e - Quiz

Common Core F-LE.A.2, F-IF.C.8b, F-LE.B.5, F-IF.C.7e · [maths-pdf.fr/en/](https://maths-pdf.fr/en/)

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_/\_\_\_\_/\_\_\_\_

Pick the best answer for 10 questions on exponential functions, interest and e. Explanations point out common mistakes such as mixing up growth and decay factors.

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

## Questions

### Question 1

Which function models decay?

- A.  $y = 40(1.9)^x$
- B.  $y = 0.9 \cdot 40^x$
- C.  $y = 40(0.9)^x$
- D.  $y = 40x^{0.9}$

### Question 2

What is the growth factor for 6% growth per year?

- A. 0.06
- B. 0.94
- C. 6
- D. 1.06

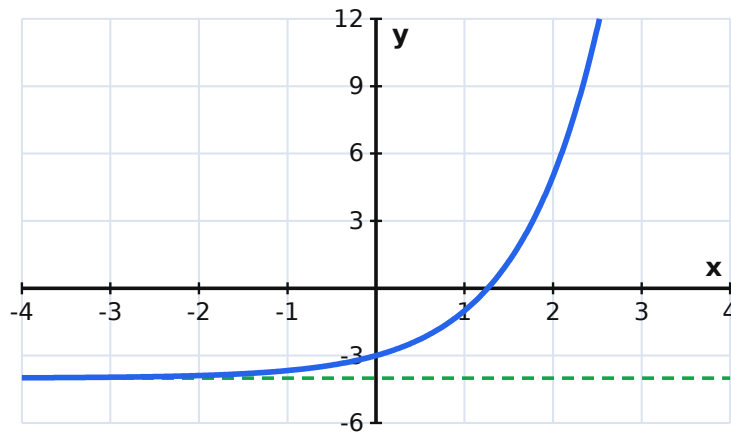
### Question 3

What is  $f(3)$  if  $f(x) = 2 \cdot 5^x$ ?

- A. 250
- B. 1,000
- C. 30
- D. 125

### Question 4

What is the horizontal asymptote of  $y = 3^x - 4$ ?



Exponential graph.

- A.  $y = -4$
- B.  $y = 4$
- C.  $y = 0$
- D.  $x = -4$

### Question 5

An exponential passes through (0,5) and (1,10). What is its equation?

- A.  $y = 10 \cdot 2^x$
- B.  $y = 5 \cdot 2^x$
- C.  $y = 5x + 5$
- D.  $y = 5 \cdot 10^x$

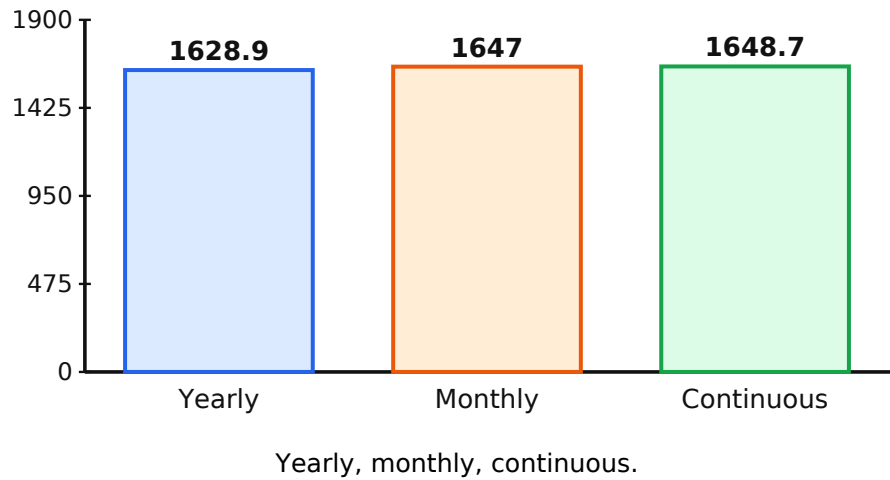
### Question 6

Which formula gives continuous compounding?

- A.  $A = P(1 + rt)$
- B.  $A = P\left(1 + \frac{r}{n}\right)^{nt}$
- C.  $A = Prt$
- D.  $A = Pe^{rt}$

### Question 7

The bar chart compares ways to compound \$1,000 at 5% for 10 years. Which earns the most?



- A. Yearly compounding
- B. Continuous compounding
- C. Monthly compounding
- D. They are all equal

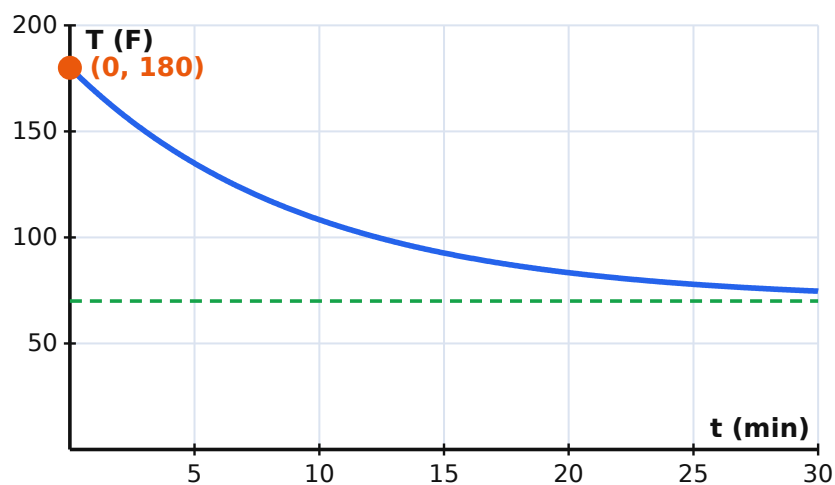
### Question 8

A 100 g sample has half-life 3 days. How much remains after 6 days?

- A. 25 g
- B. 50 g
- C. 12.5 g
- D. 0 g

### Question 9

The graph shows  $y = 70 + 110(0.9)^t$ . What does the output approach?



Cooling graph.

- A. 110

- B. 0
- C. 70
- D. 180

### Question 10

Approximately what is  $e$ ?

- A. 3.141
- B. 2.718
- C. 1.618
- D. 2.5

## Answers

1. **C** - A base between 0 and 1 gives decay. 1.9 would be 90 percent growth.
2. **D** - Growth factor =  $1 + \text{rate} = 1.06$ .
3. **A** -  $5^3 = 125$ , then times 2 gives 250. Computing  $(2 \text{ times } 5)^3 = 1,000$  is a mistake.
4. **A** - The graph is the parent shifted down 4, so the asymptote is  $y = -4$ .
5. **B** -  $a = f(0) = 5$  and  $b = 10/5 = 2$ .
6. **D** - Continuous compounding is the limit of the n-times formula, which gives  $A = Pe^{(rt)}$ .
7. **B** - More frequent compounding earns more, and continuous compounding is the limit.
8. **A** - 6 days is two half-lives: 100, 50, 25. Using one half-life gives 50.
9. **C** - As  $t$  grows,  $0.9^t$  goes to 0, so the output approaches 70.
10. **B** -  $e$  is about 2.71828. The value 3.14 is  $\pi$ .

## Remember

- $f(x) = a b^x$ :  $a = f(0)$  and  $b = \text{growth or decay factor}$ .
- A rate  $r$  per period gives  $b = 1 + r$  (growth) or  $b = 1 - r$  (decay).
- The parent graph has the horizontal asymptote  $y = 0$ ;  $y = a b^{(x - h)} + k$  has asymptote  $y = k$ .
- Compound interest:  $A = P(1 + r/n)^{(nt)}$ ; continuous:  $A = Pe^{(rt)}$ .
- $e$  is about 2.71828, the limit of  $(1 + 1/n)^n$ .