

Algebra 2 · Exponential Functions and the Number e · Quiz

Common Core F-IF.C.8b, F-LE.A.4, F-LE.B.5 · mathovore.fr

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

Ten multiple-choice questions on exponential growth and decay, compound interest, the number e, half-life, and doubling time. Choose the single best answer. Each explanation shows the key step and the most common mistake.

Algebra 2 Common Core: **F-IF.C.8b · F-LE.A.4 · F-LE.B.5**

Questions

Question 1

A quantity grows 7% each year. What is the yearly growth factor b ?

- A. $b = 0.07$
- B. $b = 0.93$
- C. $b = 1.07$
- D. $b = 7$

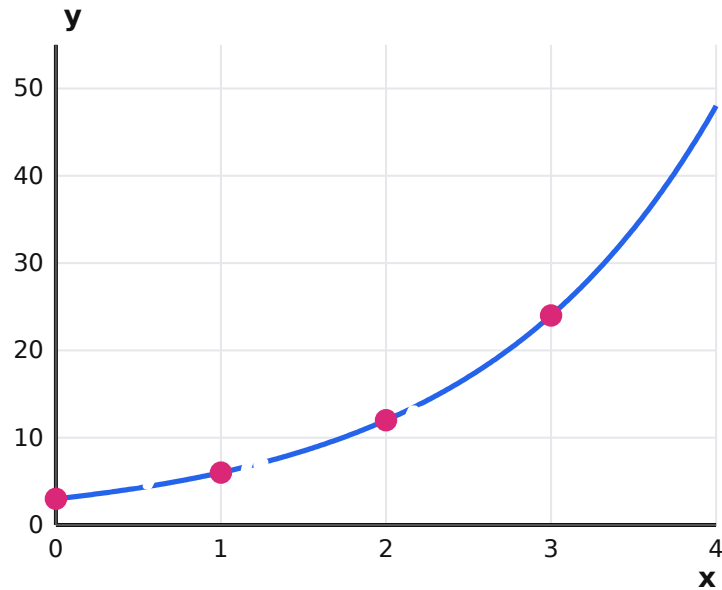
Question 2

A medicine loses 12% of its concentration each hour. What is the hourly factor b ?

- A. $b = 1.12$
- B. $b = 0.88$
- C. $b = 0.12$
- D. $b = 12$

Question 3

Which equation matches the graph?



The graph of an exponential function.

- A. $y = 3 \cdot 2^x$
- B. $y = 2 \cdot 3^x$
- C. $y = 3 \cdot 0.5^x$
- D. $y = 3x + 3$

Question 4

Find the balance of 0 at 6% compounded annually for 3 years.

- A. 0.00
- B. 5.51
- C. 8.34
- D. 1.24

Question 5

Which value is closest to the number e ?

- A. about 3.142
- B. about 1.618
- C. about 2.178
- D. about 2.718

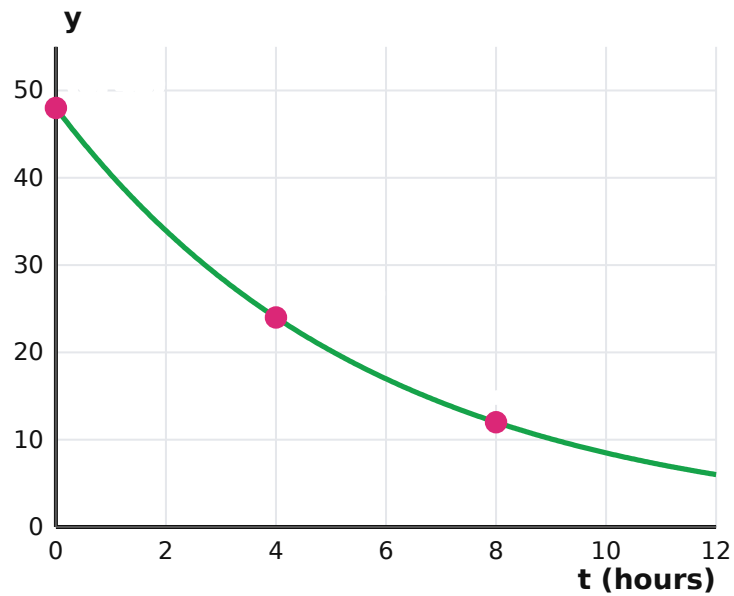
Question 6

Which formula gives the balance with continuous compounding?

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

Question 7

What is the half-life of the quantity shown?



A decaying quantity.

- A. 8 hours
- B. 4 hours
- C. 24 hours
- D. 12 hours

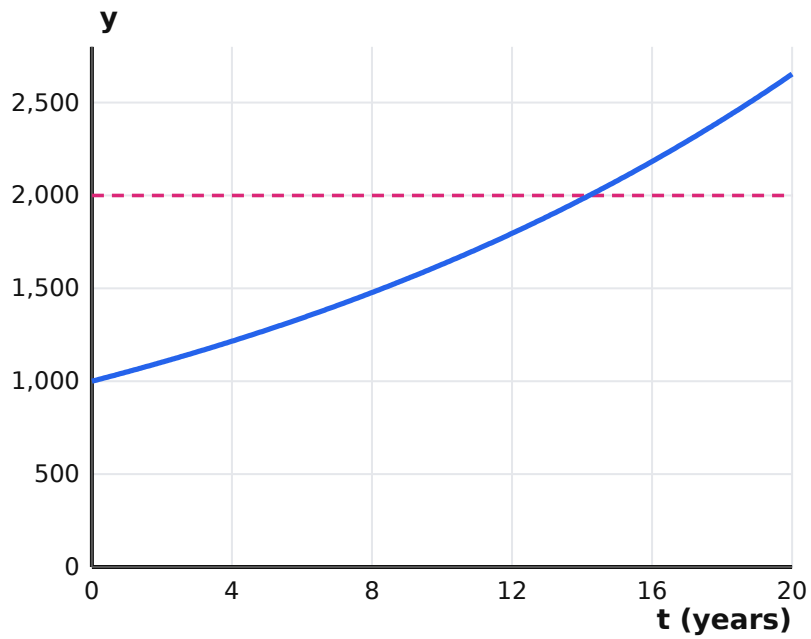
Question 8

How long does it take money to double at 3% interest compounded yearly?

- A. 23.45 years
- B. 33.33 years
- C. 24.00 years
- D. 66.67 years

Question 9

About how long does the balance in the graph take to reach ,000?



A balance $A(t) = 1,000(1.05)^t$ and the line $A = 2,000$.

- A. about 7 years
- B. about 20 years
- C. about 14 years
- D. about 28 years

Question 10

Solve $5 \cdot 3^t = 45$ for t .

- A. $t = 9$
- B. $t = 3$
- C. $t = 2$
- D. $t = 15$

Answer key

1. **C** - Growth by $r=0.07$ gives $b=1+r=1.07$. The value 0.93 would be a 7% decrease.
2. **B** - Decay by $r=0.12$ gives $b=1-r=0.88$. The factor 1.12 would describe 12% growth.
3. **A** - The graph starts at 3 and doubles each step, so $a=3$ and $b=2$. The line $y=3x+3$ adds 3 instead of multiplying.
4. **B** - $500(1.06)^3 = 5.51$. Simple interest 0.00 ignores interest on interest.
5. **D** - The number e is about 2.71828. The value 3.142 is π and 1.618 is the golden ratio.
6. **D** - Continuous compounding uses the base e : $A = Pe^{rt}$. The second formula needs a finite number n of periods.
7. **B** - The amount falls from 48 to 24 in 4 hours. The value 24 is an amount, not a time.
8. **A** - Solve $1.03^t = 2$: $t = \frac{\ln 2}{\ln 1.03} \approx 23.45$. The value 33.33 is $\frac{1}{0.03}$, which ignores the exponent.
9. **C** - The curve meets the dashed line near $t=14.2$, since $\frac{\ln 2}{\ln 1.05} \approx 14.2$. Doubling time is not half of 28 years.
10. **C** - Divide by 5: $3^t = 9 = 3^2$, so $t=2$. The value 9 is 3^2 , not t .

Remember:

- $y = a \cdot b^t$: a is the initial value and b is the factor per period.
- Percent rate r gives $b = 1 + r$ for growth and $b = 1 - r$ for decay.
- Compound interest: $A = P(1 + r/n)^{nt}$; continuous: $A = Pe^{rt}$ with $e \approx 2.71828$.
- Half-life model: $A = A_0(1/2)^{t/h}$; doubling time at rate r is $\ln 2 \div \ln(1 + r)$.
- To solve $a \cdot b^t = d$ for t , isolate b^t and take a logarithm: $t = \ln(d/a) \div \ln b$.