

Precalculus - Exponential and Logarithmic Equations - Quiz

Common Core F-LE.A.4, F-BF.B.5, A-REI.D.11 · maths-pdf.fr/en/

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

Pick the best answer for 10 questions on solving exponential and logarithmic equations. Explanations point out typical mistakes such as keeping an extraneous solution.

Precalculus · Common Core State Standards: **F-LE.A.4, F-BF.B.5, A-REI.D.11**

Questions

Question 1

Solve $2^x = 16$.

- A. 8
- B. 2
- C. 4
- D. 14

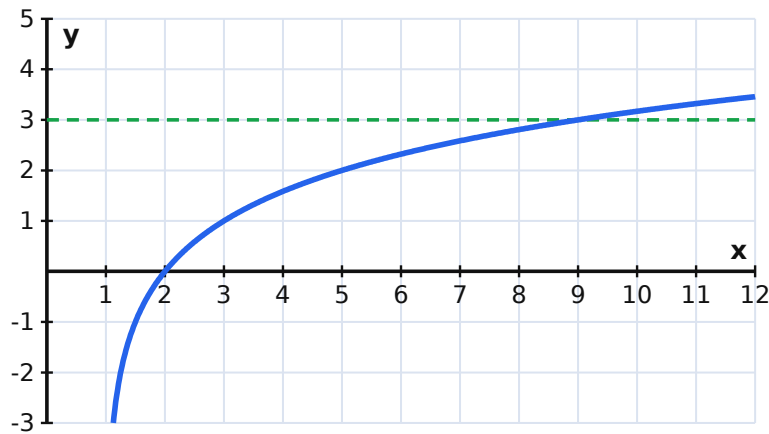
Question 2

Solve $5^x = 40$ using logarithms. Which expression gives x ?

- A. $\frac{\ln 5}{\ln 40}$
- B. $\ln 40 - \ln 5$
- C. $\frac{\ln 40}{\ln 5}$
- D. $\frac{40}{5}$

Question 3

Solve $\log_2(x-1) = 3$. The graph shows both sides.



Curve and line.

- A. 9
- B. 7
- C. 8
- D. 5

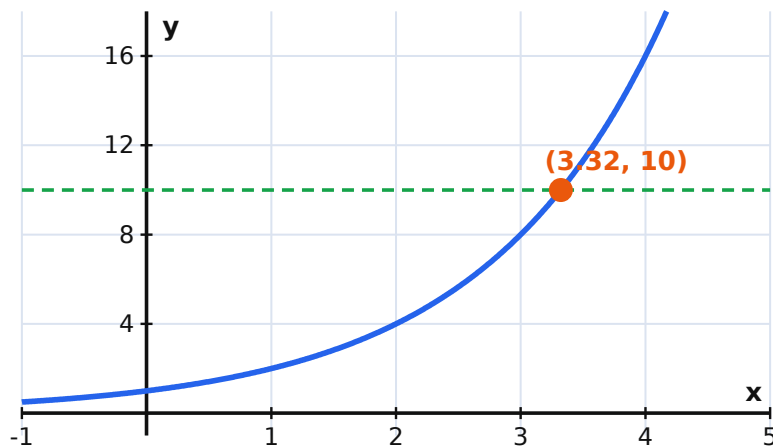
Question 4

Solve $e^x = 7$.

- A. $7e$
- B. $\ln 7$
- C. $\frac{7}{e}$
- D. $\log_7 e$

Question 5

The graph shows $y = 2^x$ and $y = 10$. What is the solution of $2^x = 10$, approximately?



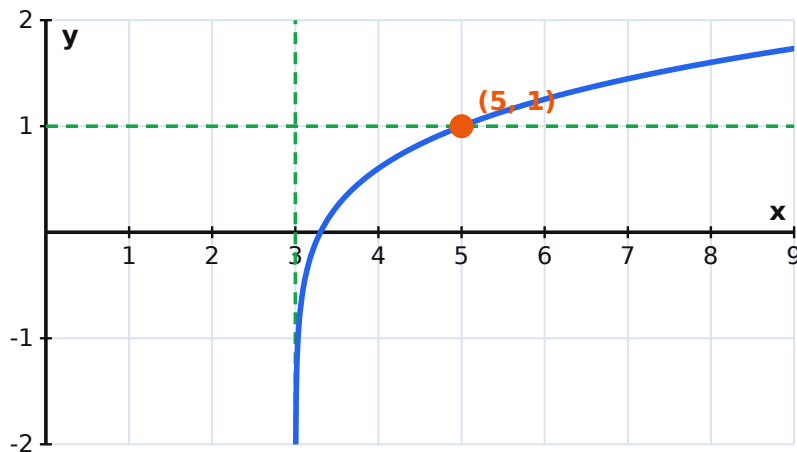
Curve and line.

- A. 3.32

- B. 5
- C. 2.32
- D. 10

Question 6

After solving $\log x + \log(x-3) = 1$ you get $x=5$ and $x=-2$. Which are valid?



Graph of the left side and $y = 1$.

- A. Only -2
- B. Only 5
- C. Both
- D. Neither

Question 7

The doubling time for continuous growth at rate r is...

- A. $\frac{2}{r}$
- B. $r \ln 2$
- C. $\frac{r}{\ln 2}$
- D. $\frac{\ln 2}{r}$

Question 8

How is $\log_3 x + \log_3(x+6) = 3$ rewritten before solving?

- A. $x(x+6) = 27$
- B. $x+x+6 = 9$
- C. $x(x+6) = 9$
- D. $2x+6 = 27$

Question 9

Solve $4^x = 2^{x+3}$.

- A. 2
- B. 3
- C. 1.5
- D. 6

Question 10

A \$1,000 deposit at 5% compounded yearly doubles after about...

- A. 10 years
- B. 20 years
- C. 7.1 years
- D. 14.2 years

Answers

1. **C** - $16 = 2^4$, so $x = 4$. Dividing 16 by 2 would give 8, which is not the exponent.
2. **C** - Take $\ln$ of both sides: $x \ln 5 = \ln 40$, so $x = \ln 40 / \ln 5$.
3. **A** - $x - 1 = 2^3 = 8$, so $x = 9$. Forgetting to add the 1 gives 8.
4. **B** - Take $\ln$ of both sides: $x = \ln 7$.
5. **A** - The curve meets the line near $x = 3.32 = \log \text{ base } 2 \text{ of } 10$.
6. **B** - -2 makes $\log(-2)$ undefined, so it is extraneous. The graph exists only for $x > 3$.
7. **D** - Solve $e^{(rt)} = 2$ to get $t = \ln 2 / r$.
8. **A** - Combine to $\log_3$ of $x(x + 6) = 3$, then $x(x + 6) = 3^3 = 27$.
9. **B** - $4^x = 2^{(2x)}$, so $2x = x + 3$ and $x = 3$.
10. **D** - $1.05^t = 2$ gives $t = \ln 2 / \ln 1.05$, about 14.2. The rule of 72 gives about 14.4.

Remember

- Same base: if $b^m = b^n$ then $m = n$.
- Different bases: take $\ln$ of both sides, then $x \ln b = \ln c$.
- $\log_b u = c$ is equivalent to $u = b^c$.
- Check log solutions: arguments must be positive; reject extraneous values.
- Continuous doubling time is $\ln 2$ divided by the rate r .