

Algebra 1 · Graphs as Solution Sets, Linear-Quadratic Systems and Exponential Expressions · Test Answer Key

Common Core A-REI.D.10, A-REI.C.7, F-IF.C.7e, A-SSE.B.3c · mathovore.fr

Each worked solution is followed by a scoring guide. Give credit for a correct method even when a later slip occurs, but give no credit for answers without work. The test totals 20 points, and the graphs in the answers mark the intersection points.

Algebra 1 Common Core: A-REI.D.10 · A-REI.C.7 · F-IF.C.7e · A-SSE.B.3c

Question 1: Points on a graph (2 points)

- a. $(-3)^2 - 5 = 9 - 5 = 4$, so yes, $(-3, 4)$ is on the graph.
- b. $2^2 - 5 = -1 \neq 1$, so no, $(2, 1)$ is not on the graph.

Scoring: 1 point for each correct decision supported by substitution.

Question 2: Solutions on a line (2 points)

- a. P and R lie on the line: $-2(1) + 3 = 1$ and $-2(-1) + 3 = 5$. **P and R**
- b. For Q: $-2(2) + 3 = -1$, not 0, so Q is not a solution. (For S: $-2(0) + 3 = 3 \neq 2$.)

Scoring: 1 point for naming exactly P and R; 1 point for a correct substitution showing a mismatch.

Question 3: Line and parabola system (3 points)

$x^2 - 6x + 8 = 2x - 7$ gives $x^2 - 8x + 15 = 0$, so $(x - 3)(x - 5) = 0$ and $x = 3$ or $x = 5$. Then $y = 2(3) - 7 = -1$ and $y = 2(5) - 7 = 3$.

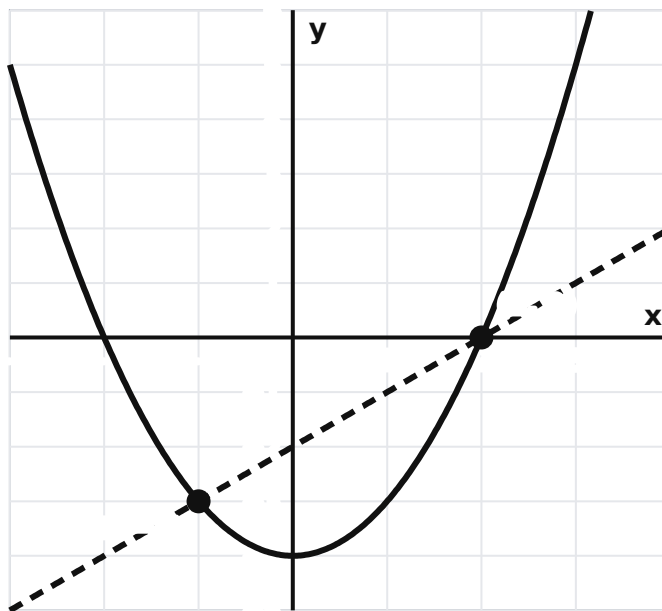
Solutions: $(3, -1)$ and $(5, 3)$. Check: $9 - 18 + 8 = -1$ and $25 - 30 + 8 = 3$.

Scoring: 1 point for setting the expressions equal and reaching a correct equation equal to 0; 1 point for the x-values; 1 point for both y-values written as ordered pairs.

Question 4: Reading a system graph (3 points)

- a. The graphs meet at $(-1, -3)$ and $(2, 0)$.
- b. $x^2 - 4 = x - 2$ gives $x^2 - x - 2 = 0$, so $(x - 2)(x + 1) = 0$ and $x = 2$ or $x = -1$. Then $y = 0$ and

$y = -3$, which matches the graph.



The intersection points.

Scoring: 1 point for both points read from the graph; 1 point for the correct quadratic and factoring; 1 point for the y -values and agreement with the graph.

Question 5: How many solutions? (2 points)

- a. $x^2 + 1 = 1$ gives $x = 0$: one solution, $(0, 1)$.
- b. $x^2 + 1 = 0$ gives $x^2 = -1$, which has no real solution: none.

Scoring: 1 point for each correct count with supporting algebra.

Question 6: Features of an exponential (3 points)

- a. $f(0) = 4 \cdot 1 = 4$, so $(0, 4)$.
- b. 2^x is always positive, so $4 \cdot 2^x$ is never 0.
- c. As x gets very large, $f(x)$ gets very large; as x gets very small, $f(x)$ approaches 0.

Scoring: 1 point per part; part (c) needs both directions.

Question 7: Rewrite exponentials (3 points)

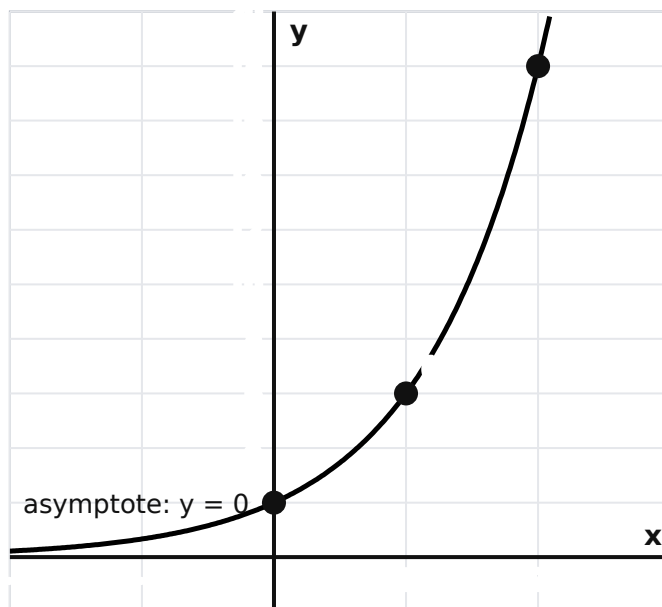
(a) $16^x = (2^4)^x = 2^{4x}$.

(b) $1.07^{12} = (1.07^{1/12})^{12} \approx (1.0057)^{12}$, a monthly rate of about 0.57%.

Scoring: 1 point for (a); in (b), 1 point for the exponent rewrite and 1 point for the rate 0.57%.

Question 8: Find the exponential (2 points)

- a. The y-intercept gives $a=2$, and each step right multiplies y by 3, so $y=2 \cdot 3^x$.
- b. As x gets very small, y approaches 0 (the x-axis is a horizontal asymptote).



The x-axis is the asymptote.

Scoring: 1 point for the equation with both a and b correct; 1 point for the end behavior.

Total
20 points