

Algebra 1 · Graphs as Solution Sets, Linear-Quadratic Systems and Exponential Expressions · Worksheet

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

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

These 23 problems practice standards A-REI.D.10, A-REI.C.7, F-IF.C.7e and A-SSE.B.3c. First decide which points are solutions of an equation and so lie on its graph, then solve systems of a line and a parabola by setting expressions equal.

Next, graph exponential functions with intercepts and end behavior, and rewrite exponentials with exponent rules. The last problems use ball paths, savings accounts and populations.

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

Problem 1: Is the point a solution?

Decide whether each ordered pair is a solution of $y = 2x - 1$. (a) (3,5) (b) (1,2)

Problem 2: Points on a parabola

The graph of $y = x^2 + 3$ is a curve. Decide whether $(-2,7)$ and $(3,10)$ are on it.

Problem 3: Find the missing coordinate

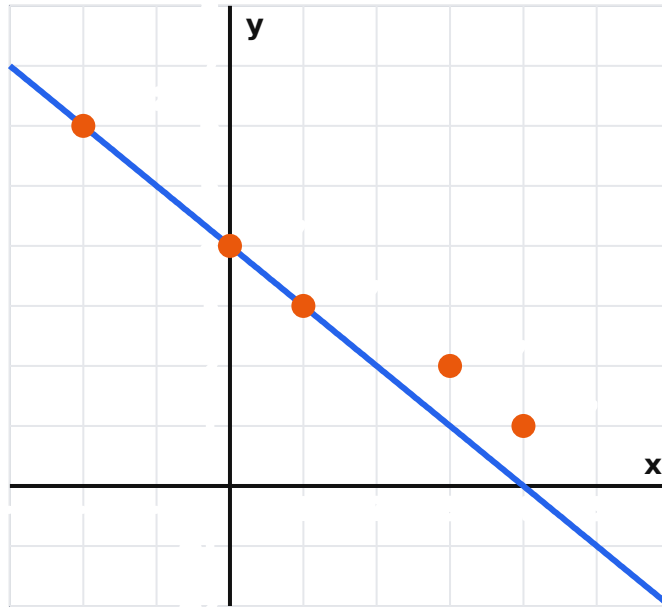
Each point is on the graph of $y = x^2 - 6$. Find k in $(4,k)$, and find both values of m in $(m,3)$.

Problem 4: Intercepts as solutions

Find the x-intercept and the y-intercept of the graph of $y = 2x - 6$ by finding the solutions with $y = 0$ and $x = 0$.

Problem 5: Points and a graph

The line is the graph of $y = -x + 4$. Which of the points A through E are solutions? Check each by substituting.



A line and five plotted points.

Problem 6: Line and parabola: $y = x^2$ and $y = x + 6$

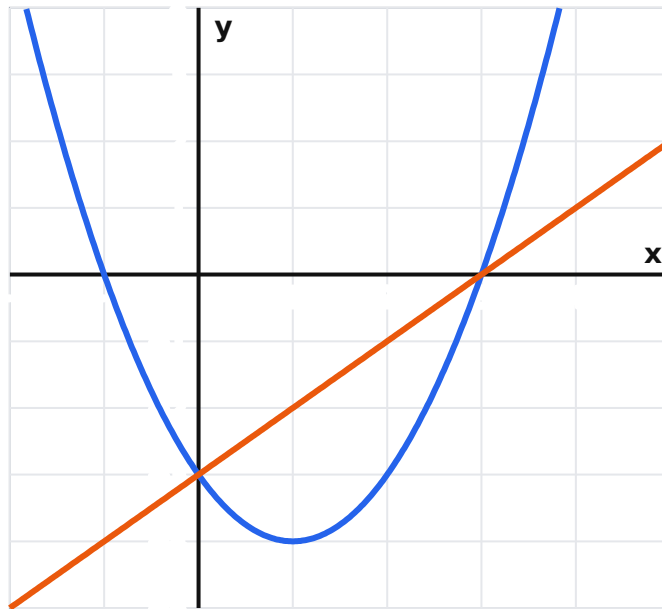
Solve the system $y = x^2$ and $y = x + 6$ algebraically.

Problem 7: System with a trinomial

Solve the system $y = x^2 + 2x - 3$ and $y = x + 3$.

Problem 8: Read and verify

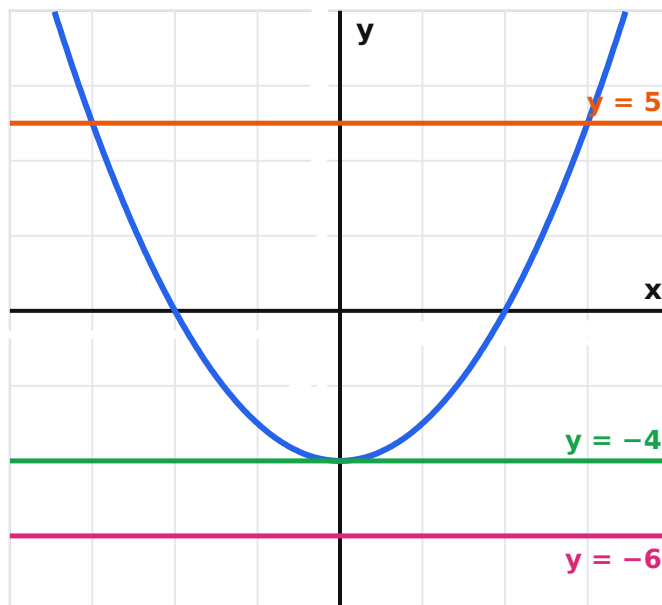
The graph shows $y = x^2 - 2x - 3$ and $y = x - 3$. Estimate the intersection points from the graph, then verify them algebraically.



A parabola and a line.

Problem 9: How many solutions?

The graph shows the parabola $y = x^2 - 4$ and three horizontal lines. For each line, find how many solutions the system has, and find them when they exist: (a) $y = 5$ (b) $y = -4$ (c) $y = -6$.



One parabola, three horizontal lines.

Problem 10: A line that touches the parabola

Solve the system $y = x^2 + 2$ and $y = 2x + 1$, and tell how many solutions it has.

Problem 11: Rearranging before factoring

Solve the system $y = x^2 - 3x$ and $y = 2x - 6$.

Problem 12: Downward parabola

Solve the system $y = -x^2 + 4$ and $y = -x + 2$.

Problem 13: Table for an exponential

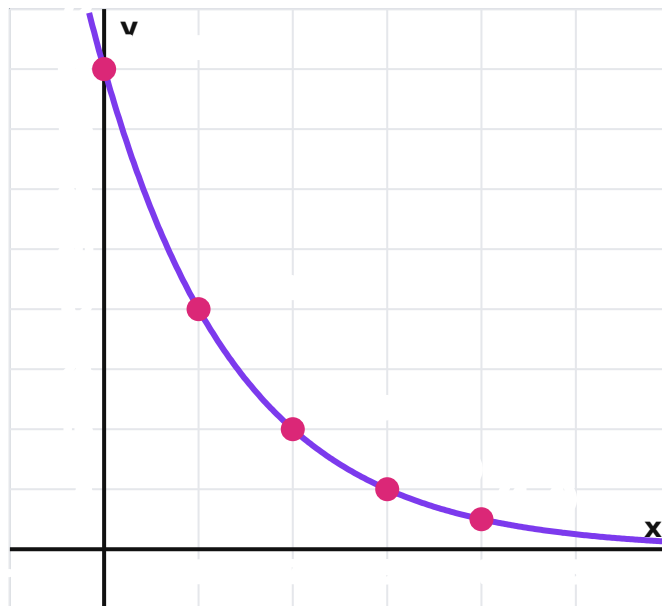
Complete a table for $y = 2^x$ with $x = -2, -1, 0, 1, 2, 3$. Then state the y-intercept and the horizontal asymptote.

Problem 14: Features of a growth function

For $y = 5 \cdot 3^x$, find the intercepts and describe the end behavior as x gets very large and very small.

Problem 15: Exponential decay

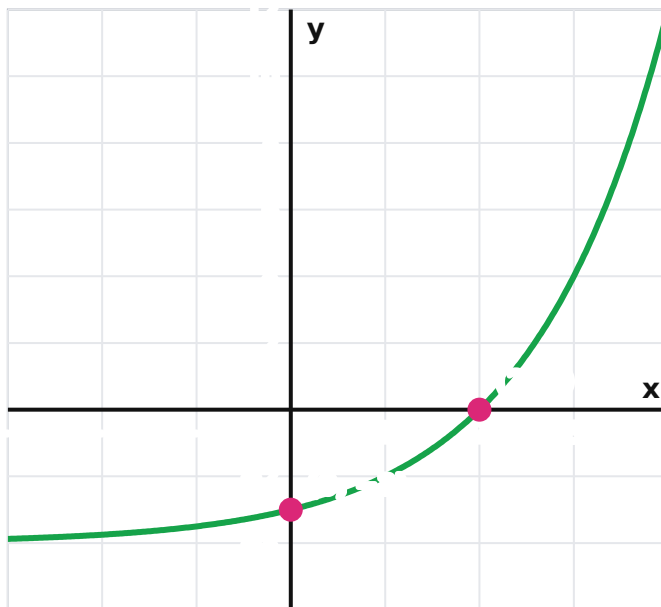
The graph shows $y = 64\left(\frac{1}{2}\right)^x$. State the y-intercept and the end behavior, and find y when $x = 5$.



Each step right halves the value.

Problem 16: A shifted exponential

The graph shows $y = 2^x - 4$. Find both intercepts and the horizontal asymptote.



The graph of $y = 2^x - 4$.

Problem 17: Rewrite with base 2

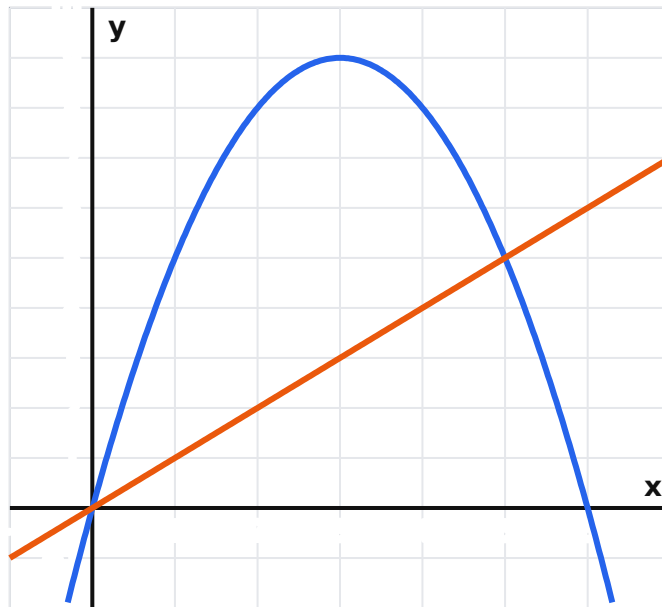
Rewrite each expression as a power of 2: (a) 8^x (b) 4^{3x} (c) $16^{x/2}$.

Problem 18: A two-year factor

A bee colony has $P(t) = 500(1.2)^t$ bees after t weeks. Rewrite it as a function of $\frac{t}{2}$, so that the base is the growth factor for 2 weeks, and check with $t = 2$.

Problem 19: Ball on a hill

Diego kicks a ball from the bottom of a hill. Its path is $y = -x^2 + 6x$ and the hillside is $y = x$, with x and y in feet. Find where the ball lands on the hill.



The path of the ball and the hillside.

Problem 20: Savings account, monthly rate

Sofia's savings account value is $A = 1.06^t$ times her deposit after t years. Rewrite the growth factor as a monthly factor using $1.06^t = (1.06^{1/12})^{12t}$ and give the monthly rate to the nearest hundredth of a percent.

Problem 21: Growth of 15% per year

The number of subscribers to a school podcast grows 15% each year, so $N = 800(1.15)^t$. Rewrite the formula with the months $12t$ in the exponent and find the monthly growth rate to the nearest hundredth of a percent.

Problem 22: Car value each quarter

The value of Liam's car is $V = 22000(0.85)^t$ dollars after t years. Rewrite it with the exponent $4t$ (quarters) and find the percent change per quarter to the nearest tenth of a percent.

Problem 23: Bacteria every 20 minutes

A culture has $N = 100(2)^t$ bacteria after t hours. Rewrite the formula with the exponent $3t$ (20-minute periods) and find the percent growth every 20 minutes to the nearest percent.