

Graphing Parabolas and Key Features

Grade 9 – Algebra 1 math · Test · Standards: F-IF.C.7a, F-IF.C.8a, F-IF.B.4, A-SSE.B.3b

Name: _____ Date: _____ Class: _____

This test has 9 questions worth 20 points. Allow 45 minutes and work without notes. A calculator is allowed. Show every step, because partial credit is awarded for correct setups and for correct intermediate values.

Standards: F-IF.C.7a, F-IF.C.8a, F-IF.B.4, A-SSE.B.3b · **Level:** Grade 9 Algebra 1

Time: 45 minutes · 9 questions · Total: 20 points · Calculator: as allowed by your teacher

Question 1 Vertex Form Features (2 points)

Consider $y = -3(x + 2)^2 + 7$.

- Name the turning point and the direction of opening. (1 point)
- Give the mirror line and the extreme value of y . (1 point)

Question 2 Vertex from Standard Form (2 points)

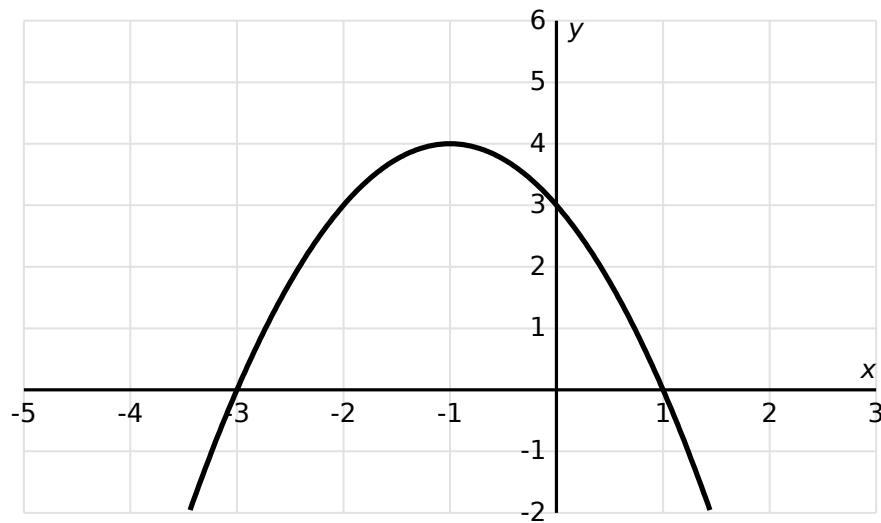
For $y = x^2 - 10x + 7$, find the mirror line, the turning point and the point where the graph meets the y -axis.

Question 3 Complete the Square (2 points)

Complete the square to rewrite $y = x^2 + 12x + 31$, then name the turning point.

Question 4 Features from a Graph (3 points)

Study the parabola drawn below.



Graph of a quadratic function.

- Name its turning point and its mirror line. (1 point)
- Name every point where it meets an axis. (1 point)
- State the domain and the range. (1 point)

Question 5 Factored Form (2 points)

Without expanding, find where $y = (x + 3)(x - 7)$ meets the x-axis and where it turns.

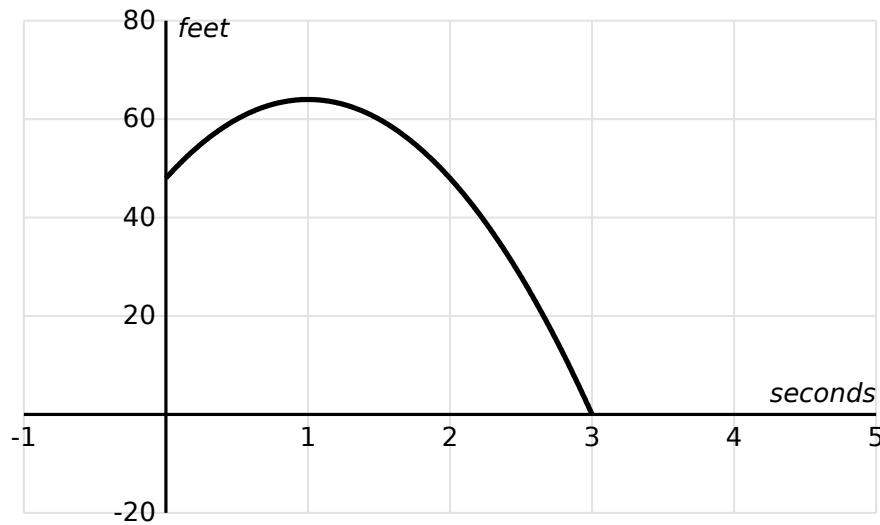
Question 6 Write an Equation (3 points)

A parabola turns at (3, 1) and contains the point (5, 9).

- Find its equation as $y = a(x - h)^2 + k$. (2 points)
- Expand it into standard form. (1 point)

Question 7 Thrown Ball (3 points)

A kicked soccer ball has height $h(t) = -16t^2 + 32t + 48$ feet at t seconds, as graphed.



Height of a thrown ball.

- How high is the ball at the moment of the kick? (1 point)
- When is it highest, and how high is it then? (1 point)
- When does it reach the ground? (1 point)

Question 8 Fenced Pen (2 points)

A horse corral uses 60 feet of rail on all four sides. If the width is w , the length is $30 - w$.

- Write a rule for the area $A(w)$. (1 point)
- Find the largest possible area and the dimensions that produce it. (1 point)

Question 9 Does It Cross the Axis? (1 point)

Without graphing, decide whether the curve $y = 2(x - 1)^2 + 3$ ever touches the x -axis. Justify your answer.