LESSON MAKER PRO

Parabola Clues

Read graphs and use equations to find key features.

HIGH SCHOOL · A2.F.1.3

A2.F.1.3 "Graph a quadratic function. Identify the domain, range, x- and y-intercepts, maximum or minimum value, axis of symmetry, and vertex using various methods and tools that may include a graphing calculator or appropriate technology."

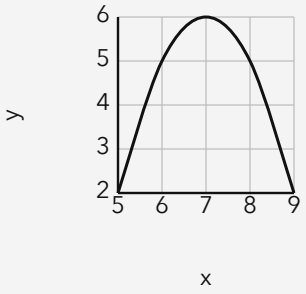
NAME _____ DATE _____

FIND THE KEY FEATURES

A parabola's vertex is its highest or lowest point, and the axis of symmetry passes through it. Use where the graph crosses an axis to find an intercept. A parabola continues beyond the part shown on a grid, so use its opening to find its range.

WORKED EXAMPLE

Use the graph to find the vertex, axis of symmetry, maximum value, and range.



1. The highest point is the vertex, (7, 6).
2. The axis passes through the vertex: x = 7.
3. The maximum is 6, so the range is y <= 6.

Answer: Vertex: (7, 6); axis: x = 7; maximum: 6; range: y <= 6.

PRACTICE 4 problems

1 For $y = (x - 4)^2 + 2$, find the vertex and axis of symmetry.

ANSWER _____

2 For $y = -(x + 2)^2 + 9$, find the maximum value and range.

ANSWER _____

3 Find the x-intercepts of $y = x^2 - 6x + 8$.

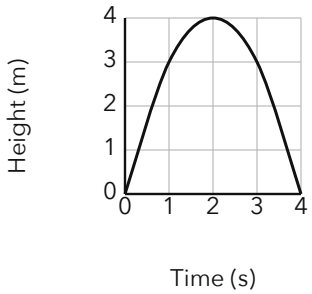
ANSWER _____

4 For $y = 2(x - 3)^2 - 8$, find the minimum value and y-intercept.

ANSWER _____

APPLY IT Show your work

1 The graph shows a tossed basketball's height. What is its greatest height? When does it hit the floor after release?



ANSWER _____

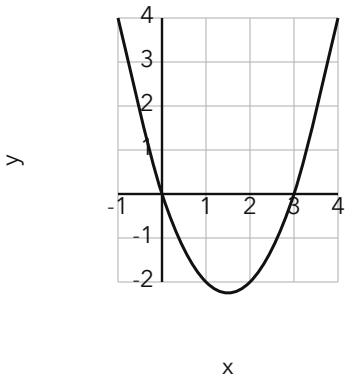
2 A game club sells passes for $x each. Its revenue is $R(x) = -2(x - 3)^2 + 18$ dollars, where $0 <= x <= 6$. What price gives the most revenue, and how much is it?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Write an equation for the graphed parabola. Find its exact minimum value, and explain how you found it.



WORK SPACE AND ANSWER

ANSWER KEY

Parabola Clues

HIGH SCHOOL · A2.F.1.3

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	For $y = (x - 4)^2 + 2$, find the vertex and axis of symmetry.	**Vertex: (4, 2); axis: x = 4.**
2	For $y = -(x + 2)^2 + 9$, find the maximum value and range.	**Maximum: 9; range: y <= 9.**
3	Find the x-intercepts of $y = x^2 - 6x + 8$.	**(2, 0) and (4, 0).**
4	For $y = 2(x - 3)^2 - 8$, find the minimum value and y-intercept.	**Minimum: -8; y-intercept: (0, 10).**

PART 2 · APPLY IT

1. **Greatest height: 4 m; hits the floor at 4 s.** Read the greatest height at the vertex. The second time the graph meets the time axis is 4 s.
2. **Price: $3; maximum revenue: $18.** The parabola opens downward, so its vertex gives the maximum. At x = 3, R(3) = 18.

CHALLENGE

$y = x^2 - 3x$; minimum: -9/4. The x-intercepts are 0 and 3, so $y = ax(x - 3)$. The point (1, -2) gives a = 1. The axis is halfway between the intercepts at x = 3/2; substituting gives y = -9/4.

Accept equivalent equations and equivalent forms of the range. The challenge minimum may be written as -2.25.