

Name: _____

Date: _____

Bellwork!

1. What is the vertex of the parabola $y = x^2 + 8x + 5$?

☐ (A) $(4, -11)$

☐ (B) $(-4, -11)$

☐ (C) $(-4, 5)$

☐ (D) $(4, 5)$

2. What is the vertex form of the function $y = 3x^2 - 12x + 17$?

☐ (F) $y = 3(x - 2)^2 + 5$

☐ (H) $y = 3(x - 2)^2 + 11$

☐ (G) $y = 3(x - 2)^2 + 17$

☐ (I) $y = 3(x + 2)^2 + 5$

AGENDA

Bellwork:

Homework Review:

Lesson: Modeling With Quadratic Functions

Objective: To model data with quadratic functions.

Essential Understanding Three noncollinear points, no two of which are in line vertically, are on the graph of exactly one quadratic function.

Problem 1 Writing an Equation of a Parabola

Problem 2 Using a Quadratic Model

Problem 3 Using Quadratic Regression

Teacher Directed: Problems 1, 2, 3

Student Centered: Lesson Quiz

Homework: Problem Set G “select problems”

4-3 Modeling With Quadratic Functions

When you know the vertex and a point on a parabola, you can use vertex form to write an equation of the parabola. If you do not know the vertex, you can use standard form and any three points of the parabola to find an equation.

Essential Understanding Three noncollinear points, no two of which are in line vertically, are on the graph of exactly one quadratic function.



Problem 1 Writing an Equation of a Parabola

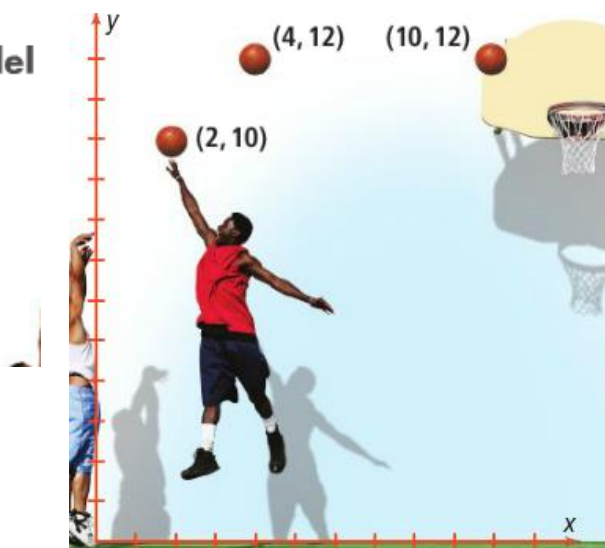
A parabola contains the points $(0, 0)$, $(-1, -2)$, and $(1, 6)$. What is the equation of this parabola in standard form?

Got It? 1. What is the equation of a parabola containing the points $(0, 0)$, $(1, -2)$, and $(-1, -4)$?

Problem 2 Using a Quadratic Model

Basketball A player throws a basketball toward the hoop. The basketball follows a parabolic path through the points shown. If the center of the hoop is at $(12, 10)$, will the ball pass through the hoop? (You can think of the units as feet.)

Step 1 Find a quadratic model.



Step 2 Use the quadratic model to see if the player makes the basket.

- Got It?** 2. a. The parabolic path of a thrown ball can be modeled by the table.
The top of a wall is at (5, 6). Will the ball go over the wall? If not, will it hit the wall on the way up, or the way down?
- b. **Reasoning** What is a reasonable domain and range for the function that models the path of the ball?

x	y
1	3
2	5
3	6

Problem 3 Using Quadratic Regression

The table shows a meteorologist's predicted temperatures for an October day in Sacramento, California.

- A** What is a quadratic model for this data?

Step 1 Enter the data.
Use the 24-hour clock to represent times after noon.

L1	L2	L3	3
8	52	
10	64		
12	72		
14	78		
16	81		
18	76		
.....		
L3 =			

Sacramento, CA

Time	Predicted Temperature (°F)
8 A.M.	52
10 A.M.	64
12 P.M.	72
2 P.M.	78
4 P.M.	81
6 P.M.	76

Step 2 Use **QuadReg**.

Step 3 Graph the data and the function.

- B** Use your model to predict the high temperature for the day. At what time does the high temperature occur?

- Got It?** 3. The table shows a meteorologist's predicted temperatures for a summer day in Denver, Colorado. What is a quadratic model for this data? Predict the high temperature for the day. At what time does the high temperature occur?

Denver, CO

Time	Predicted Temperature (°F)
6 A.M.	63
9 A.M.	76
12 P.M.	86
3 P.M.	89
6 P.M.	85
9 P.M.	76

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4-3 Lesson Quiz

1. Write in standard form the equation of the parabola that contains the points $(0, 0)$, $(-1, -5)$, and $(2, -2)$.

2. You throw a ball toward a trashcan. The ball follows a parabolic path through $(10, 10)$, $(14, 10)$, and $(20, 7)$. Will the ball pass through the center at $(0, 3)$?

3. **Do you UNDERSTAND?** The table shows predicted temperatures for a fall day in Orlando, Florida.

- a. Find a quadratic model for the data.
- b. Use your model to predict the high temperature for the day. At what time does the high temperature occur?

Time	Predicted Temperature (°F)
8 A.M.	74
11 A.M.	81
2 P.M.	83
5 P.M.	81
8 P.M.	77
11 P.M.	74