Drexel-SDP GK-12 LESSON

Subject Area: Math

Lesson Title
Roller Coaster Slopes

Grade Level 8

Time Required
Lesson time is dependent on student background, but may require up to 1 hour if the concept of slope has not been previously covered.

Summary
This lesson is intended to be reinforcement or review to the concept of slope. It prompts students to think about slope in the application of the ups & downs of a roller coaster. It is particularly useful as a precursor to a larger module on roller coaster math and physics.

Keywords
- slope
- rate of change
- rise/vertical
- run/horizontal
- undefined slope
- no slope

Educational Standards
PA Math 2.5.8B, 2.8.8A-E,G

Learning Objectives
After this lesson, students will be able to…
- identify the value of slope in terms of vertical over horizontal components.

- recognize positive vs negative slope and…
- compare the physical aspect of a roller coaster's motion to each type of slope
- understand the concept of undefined slope and no slope

Introduction / Motivation

The concept of slope has MANY applications. This one physical example to which students should be able to relate based on past experience. This application of slope is perhaps the clearest, most fundamental example available and may be extended to sledding, riding in a car, the trajectory of an airplane, etc.

Associated Activities

Start with a general review discussion of slope. Students should clearly identify at this point that the formula for slope is rise/run, where rise describes the change in the vertical component and run describes the change in the horizontal component.

The six grids presented are not attached to coordinate axes as slope is independent of the origin. Using the bold points drawn on the graph, students should consider the slope of each section of the roller coaster track. Of major importance in this lesson is that (1) slope has many associated applications and that (2) slope may be increasing (positive) or decreasing (negative). It is helpful to note the physical differences of increasing slope (slow down) and decreasing slope (speed up) for the case of the roller coaster.

The slope of the first section is 6/4 which reduces to 3/2.

The slope of the second section is -4/5.

The slope of the third section is -5/3.

The slope of the fourth section is -6/2 which reduces to -3.

The slope of the fifth section is -6/3 which reduces to -2.

The slope of the sixth section is 4/6 which reduces to 2/3.

Students may enjoy considering the question of which portion of the track is the most fun to ride.

Page 2 for **Slope**

The section page of this lesson is intended as homework. There are, however, a few special cases described on this page.

The slope of the first section is 5/6.

The slope of the second section is 0/5 or just 0.

The slope of the third section is -9/4.

The slope of the fourth section is **undefined** or **no slope.**

The slope of the fifth section is -3/9 which reduces to -1/3.

The slope of the sixth section is 1/9.

Assessment

Either of the worksheets themselves may be used for assessment purposes.

Owner

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Contributors

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Roller Coaster Slopes

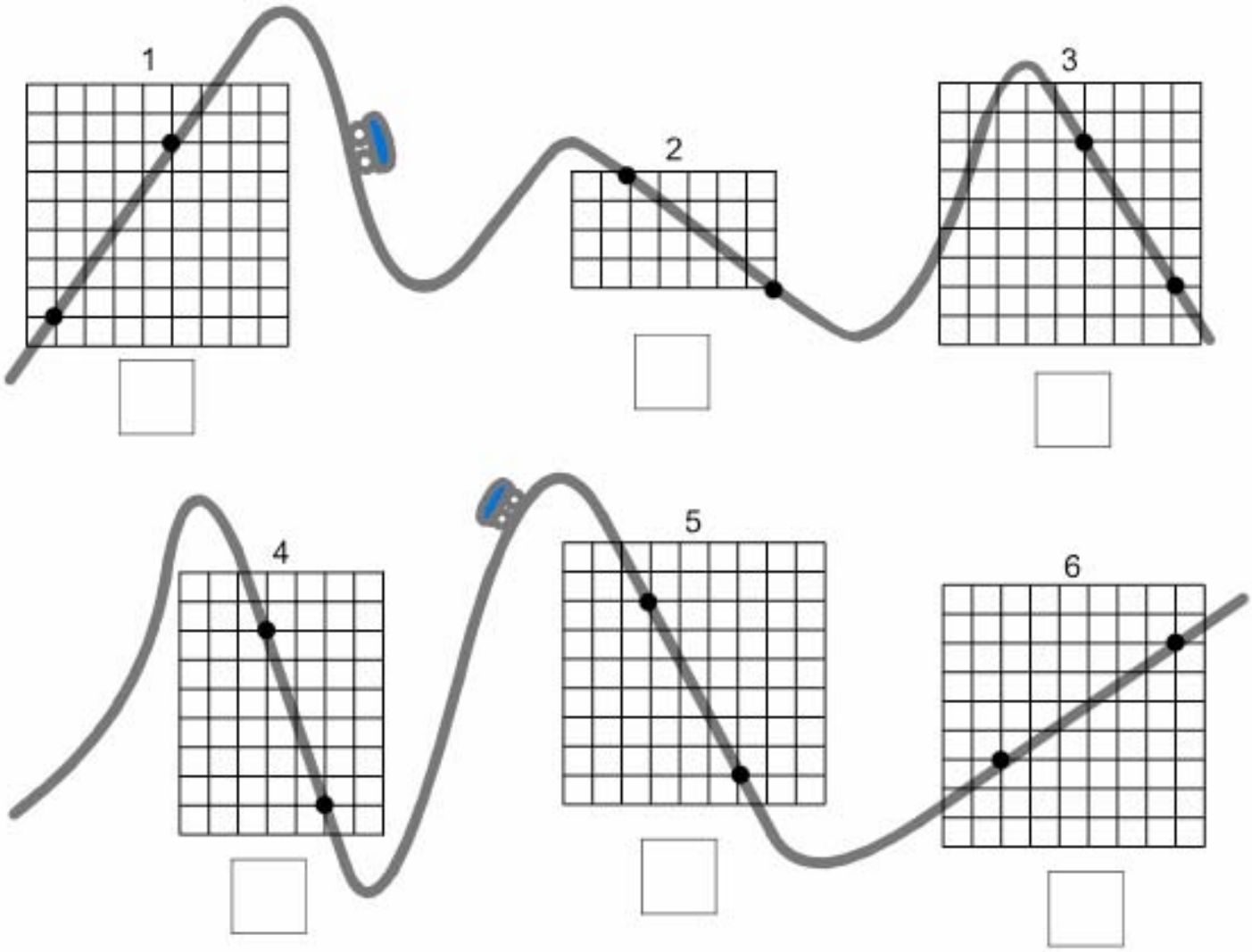
Name: _____ Date: _____

Formula:

$$\text{Slope} = \frac{\text{RISE}}{\text{RUN}}$$

Directions:

Find the slope of the roller coaster between the given points.



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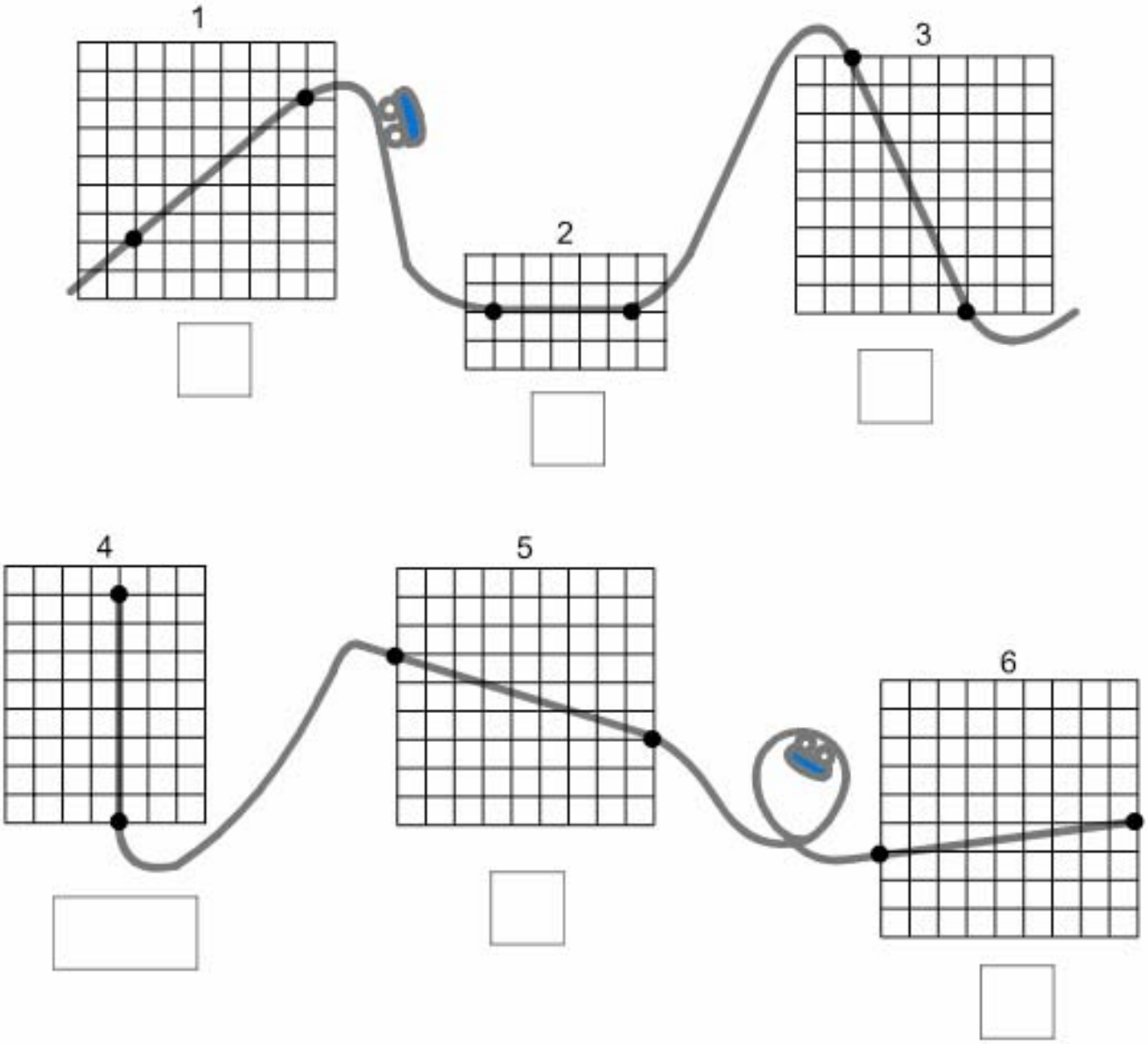
Find the slope of the roller coaster between the given points.