Investigating Slope on the Geoboard

$$\text{slope} = \frac{\text{vertical change}}{\text{horizontal change}}$$

Activity 1

A. Use a rubber band to connect (1,2) and (7,8). Stretch the rubber band to make a right triangle that has these points as two its vertices. Find the length of the vertical side and the horizontal side. Write the slope of the original line using the definition above.

B. Use a second rubber band to connect (1,2) and (6,8). Stretch the rubber band to make a right triangle that has these points as two its vertices. Find the length of the vertical side and the horizontal side. Is this line steeper or less steep than number 1. Explain why you think this is true. Write the slope of the original line using the definition above.

C. Use a third rubber band to connect (1,2) and (5,4). Stretch the rubber band to make a right triangle that has these points as two its vertices. Find the length of the vertical side and the horizontal side. Is this line steeper or less steep than number 1. Explain why you think this is true. Write the slope of the original line using the definition above.

D. Look at all three lines. Describe the direction (positive or negative) you must move from (1,2) to get to the other point. Describe the direction (positive or negative) you must move from the second point to get to the first point.

E. Since both directions are either positive or negative we say that these lines have a positive slope.

Activity 2

A. Use a rubber band to connect (1,9) and (7,3). Stretch the rubber band to make a right triangle that has these points as two its vertices. Find the length of the vertical side and the horizontal side. Write the slope of the original line using the definition above.

B. Use a second rubber band to connect (1,9) and (5,1). Stretch the rubber band to make a right triangle that has these points as two its vertices. Find the length of the vertical side and the horizontal side. Is this line steeper or less steep than number 1. Explain why you think this is true. Write the slope of the original line using the definition above.

C. Use a third rubber band to connect (1,9) and (9,5). Stretch the rubber band to make a right triangle that has these points as two its vertices. Find the length of the vertical side and the horizontal side. Is this line steeper or less steep than number 1. Explain why you think this is true. Write the slope of the original line using the definition above.

D. Look at all three lines. Describe the direction (positive or negative) you must move from (1,9) to get to the other point. Describe the direction (positive or negative) you must move from the second point to get to the first point.

E. Since both directions are opposite (one negative and one positive) we say that these lines have a negative slope.

Activity 3

A. Use a rubber band to connect (1,3) and a second point whose coordinate is (3,___) so that the slope of the line will be 3 or $\frac{3}{1}$ using the definition at the top of the paper. Could you have chosen a different point so that the slope is still equal to 3? Explain why or why not?

B. Use a second rubber band to connect (1,3) and a second point whose coordinate is (7,___) so that the slope of the line will be $\frac{1}{3}$ using the definition at the top of the paper. Could you have chosen a different point so that the slope is still equal to $\frac{1}{3}$? Explain why or why not?

C. Use a third rubber band to connect (1,3) and a second point whose coordinate is (8,___) so that the slope of the line will be 1 using the definition at the top of the paper. Could you have chosen a different point so that the slope is still equal to ? Explain why or why not?

D. Describe why you know that all three lines have a positive slope.

Activity 4

A. Use a rubber band to connect (2,1) and a second point whose coordinate is (___, 9) so that the slope of the line is equal to 1. How do you know that you are correct?

B. Use a rubber band to connect (2,1) and a second point whose coordinate is (___, 10) so that the slope of the line is greater than 1. What is the slope of your line? How do you know that you are correct?

C. Use a rubber band to connect (2,1) and a second point whose coordinate is (___,4) so that the slope of the line is less than 1. What is the slope of your line? How do you know that you are correct?

Activity 5

A. Use a rubber band to connect (10,10) and a second point whose coordinate is (___,1) so that the slope of the line is equal to 1. How do you know that you are correct?

B. Use a rubber band to connect (10,10) and a second point whose coordinate is (___, 5) so that the slope of the line is steeper than 1. What is the slope of your line? How do you know that you are correct?

C. Use a rubber band to connect (10,10) and a second point whose coordinate is (___,7) so that the slope of the line is less steep than 1. What is the slope of your line? How do you know that you are correct?

Activity 6

A. Use a rubber band to connect two points whose coordinates are of the form (___, 3) and (___,10) so that the line has a slope of 1. How do you know that you are correct?

B. Use a rubber band to connect two points whose coordinates are of the form (1, ___) and (___,10) so that the line has a slope of 2. How do you know that you are correct?

C. Use a rubber band to connect two points whose coordinates are of the form (1, ___) and (___ ,7) so that the line has a slope of 2. How do you know that you are correct?

Activity 7

A. Use a rubber band to connect two points whose coordinates are of the form (___, 9) and (___,2) so that the line has a slope of -1. How do you know that you are correct?

B. Use a rubber band to connect two points whose coordinates are of the form (___, 9) and (___,1) so that the line has a slope of -2. How do you know that you are correct?

C. Use a rubber band to connect two points whose coordinates are of the form (___,9) and (___ ,5) so that the line has a slope of $-\frac{1}{2}$. How do you know that you are correct?

Activity 8

A. Use a rubber band to connect two points so that the line has a slope of 1. How do you know that you are correct?

B. Use a rubber band to connect two points so that the line has a slope of 2. How do you know that you are correct?

C. Use a rubber band to connect two points so that the line has a slope of $\frac{1}{2}$. How do you know that you are correct?

Activity 9

A. Use a rubber band to connect two points so that the line has a slope of -1. How do you know that you are correct?

B. Use a rubber band to connect two points so that the line has a slope of -2. How do you know that you are correct?

C. Use a rubber band to connect two points so that the line has a slope of $-\frac{1}{2}$. How do you know that you are correct?

	Point A	Point B	Sign of Slope	$\frac{\text{vertical change}}{\text{horizontal change}}$
1A				
1B				
1C				
2A				
2B				
2C				
3A				
3B				
3C				
4A				
4B				
4C				
5A				
5B				
5C				
6A				
6B				
6C				
7A				
7B				
7C				
8A				
8B				
8C				
9A				
9B				
9C				