City Slopes

Every week new students are moving into your city and joining your class. To help them feel comfortable and know how to get around the city, the class decides to make a map. The map shows locations on a grid.

Activity 1: Graph the Locations

Activity 2: Find the Slope of the Paths between each Location

Activity 3: Find the Equation that best represents the path between locations.

Activity 4: Find the Distance between each Location

Activity 5: Create a set of word problems represented by the map.

Activity 1: Plot the Location of the favorite "hang-outs" in the city

Use graph paper. Mark the axes from −12 to 12. Label each point.

Destination From	Ordered Pair	Destination To	Ordered Pair
Your School	(-4, 12)	Public Library	(0, 11)
Public Library	(0, 11)	Favorite Coffee Shop	(3, 5)
Favorite Coffee Shop	(3, 5)	Bowling Alley	(11, 1)
Bowling Alley	(11, 1)	Movie Theater	(7, -11)
Movie Theater	(7, -11)	Favorite Donut Shop	(0, -12)
Favorite Donut Shop	(0, -12)	Art Museum	(-2, -8)
Art Museum	(-2, -8)	Skating Rink	(-8, -12)
Skating Rink	(-8, -12)	Best Tacos in Town	(-11, 0)
Best Tacos in Town	(-11, 0)	Shopping Mall	(-7, 6)
Shopping Mall	(-7, 6)	Recreation Center	(-6, 10)
Recreation Center	(-6, 10)	Your School	(-4, 12)

Activity 2: Find the Slopes of the Paths between Locations

Follow the path from the school around the city and back to school. Identify the "rise" and "run" to determine the slope between each point.

Destination From	Ordered Pair	Destination To	Ordered Pair	Rise	Run	$\frac{rise}{run}$
Your School	(-4, 12)	Public Library	(0, 11)			
Public Library	(0, 11)	Favorite Coffee Shop	(3, 5)			
Favorite Coffee Shop	(3, 5)	Bowling Alley	(11, 1)			
Bowling Alley	(11, 1)	Movie Theater	(7, -11)			
Movie Theater	(7, -11)	Favorite Donut Shop	(0, -12)			
Favorite Donut Shop	(0, -12)	Art Museum	(-2, -8)			
Art Museum	(-2, -8)	Skating Rink	(-8, -12)			
Skating Rink	(-8, -12)	Best Tacos in Town	(-11, 0)			
Best Tacos in Town	(-11, 0)	Shopping Mall	(-7, 6)			
Shopping Mall	(-7, 6)	Recreation Center	(-6, 10)			
Recreation Center	(-6, 10)	Your School	(-4, 12)			

Activity 3: Find the Equation that best represents the path between locations.

Identify the slope between points; identify the y-intercept. Write the equation of the line between points.

Destination From	Ordered Pair	Destination To	Ordered Pair	Slope	Y-Intercept	Equation of Line
Your School	(-4, 12)	Public Library	(0, 11)			
Public Library	(0, 11)	Favorite Coffee Shop	(3, 5)			
Favorite Coffee Shop	(3, 5)	Bowling Alley	(11, 1)			
Bowling Alley	(11, 1)	Movie Theater	(7, -11)			
Movie Theater	(7, -11)	Favorite Donut Shop	(0, -12)			
Favorite Donut Shop	(0, -12)	Art Museum	(-2, -8)			
Art Museum	(-2, -8)	Skating Rink	(-8, -12)			
Skating Rink	(-8, -12)	Best Tacos in Town	(-11, 0)			
Best Tacos in Town	(-11, 0)	Shopping Mall	(-7, 6)			
Shopping Mall	(-7, 6)	Recreation Center	(-6, 10)			
Recreation Center	(-6, 10)	Your School	(-4, 12)			

Activity 4: Find the distance between each location

Assume that the scale on the paper for each block is 1 city block. What is the distance between locations in city blocks? (Alternate: Assume the scale for each block is 1 mile. What is the distance between locations in miles?
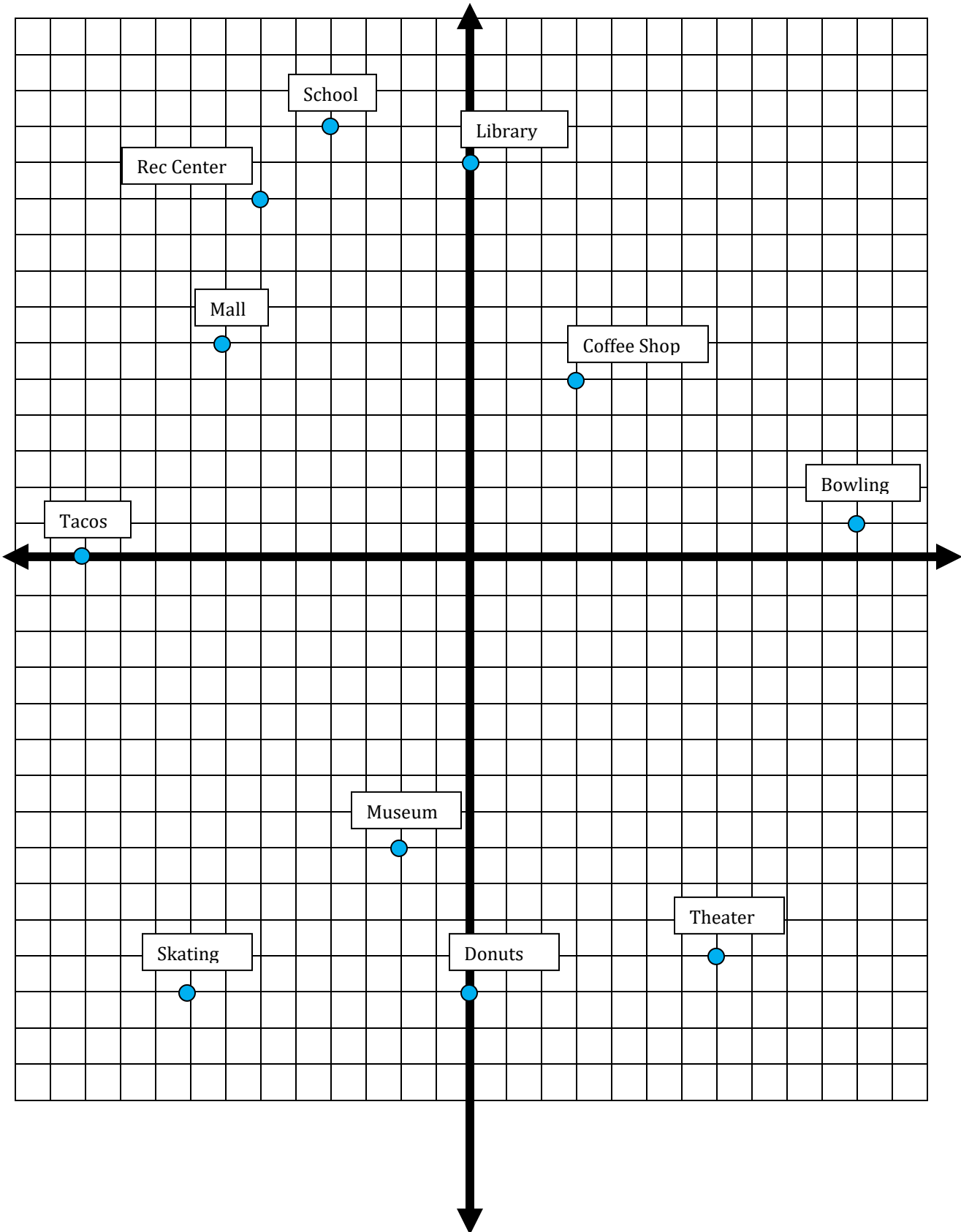
Destination From	Ordered Pair	Destination To	Ordered Pair	Distance
Your School	(-4, 12)	Public Library	(0, 11)	
Public Library	(0, 11)	Favorite Coffee Shop	(3, 5)	
Favorite Coffee Shop	(3, 5)	Bowling Alley	(11, 1)	
Bowling Alley	(11, 1)	Movie Theater	(7, -11)	
Movie Theater	(7, -11)	Favorite Donut Shop	(0, -12)	
Favorite Donut Shop	(0, -12)	Art Museum	(-2, -8)	
Art Museum	(-2, -8)	Skating Rink	(-8, -12)	
Skating Rink	(-8, -12)	Best Tacos in Town	(-11, 0)	
Best Tacos in Town	(-11, 0)	Shopping Mall	(-7, 6)	
Shopping Mall	(-7, 6)	Recreation Center	(-6, 10)	
Recreation Center	(-6, 10)	Your School	(-4, 12)	

Activity 5: Create a set of word problems represented by the map.

Challenge Question: If on the average 16 city blocks = 1 mile and the average person can walk 1 mile in 20 minutes, how long would it take to walk from the school to the donut shop?

Create a set of 5 word problems represented by the map. Write each problem clearly on the front of one sheet of paper. Write a detailed solution on a second sheet of paper and staple the two together.

KEY ... GRAPH

Activity 2: Find the Slopes of the Paths between Locations

Identify the "rise" and "run" to determine the slope between each point.

Destination From	Ordered Pair	Destination To	Ordered Pair	Rise	Run	$\frac{rise}{run}$
Your School	(-4, 12)	Public Library	(0, 11)	-1	4	-1/4
Public Library	(0, 11)	Favorite Coffee Shop	(3, 5)	-6	3	-2
Favorite Coffee Shop	(3, 5)	Bowling Alley	(11, 1)	-4	8	-1/2
Bowling Alley	(11, 1)	Movie Theater	(7, -11)	-12	-4	3
Movie Theater	(7, -11)	Favorite Donut Shop	(0, -12)	-1	-7	1/7
Favorite Donut Shop	(0, -12)	Art Museum	(-2, -8)	4	-2	-2
Art Museum	(-2, -8)	Skating Rink	(-8, -12)	-4	-6	2/3
Skating Rink	(-8, -12)	Best Tacos in Town	(-11, 0)	12	-3	-4
Best Tacos in Town	(-11, 0)	Shopping Mall	(-7, 6)	6	4	3/2
Shopping Mall	(-7, 6)	Recreation Center	(-6, 10)	4	1	4
Recreation Center	(-6, 10)	Your School	(-4, 12)	2	2	1

Activity 3: Find the Equation that best represents the path between locations.

Identify the slope between points; identify the y-intercept. Write the equation of the line between points.

Destination From	Ordered Pair	Destination To	Ordered Pair	Slope	Y-Intercept	Equation of Line
Your School	(-4, 12)	Public Library	(0, 11)	-1/4	(0,11)	y = -1/4x + 11
Public Library	(0, 11)	Favorite Coffee Shop	(3, 5)	-2	(0,11)	y = -2x + 11
Favorite Coffee Shop	(3, 5)	Bowling Alley	(11, 1)	-1/2	(0, 6.5)	y = -1/2x + 6.5
Bowling Alley	(11, 1)	Movie Theater	(7, -11)	3	(0, -32)	y = 3x - 32
Movie Theater	(7, -11)	Favorite Donut Shop	(0, -12)	1/7	(0,-12)	y = 1/7x - 12
Favorite Donut Shop	(0, -12)	Art Museum	(-2, -8)	-2	(0,-12)	y = -2x - 12
Art Museum	(-2, -8)	Skating Rink	(-8, -12)	2/3	(0, -20/3)	y = 2/3x – 20/3
Skating Rink	(-8, -12)	Best Tacos in Town	(-11, 0)	-4	(0, -44)	y = -4x – 44
Best Tacos in Town	(-11, 0)	Shopping Mall	(-7, 6)	3/2	(0, 16.5)	y = 3/2x + 16.5
Shopping Mall	(-7, 6)	Recreation Center	(-6, 10)	4	(0, 34)	y = 4x + 34
Recreation Center	(-6, 10)	Your School	(-4, 12)	1	(0, 16)	y = x + 16

Activity 4: Find the distance between each location

Assume that the scale on the paper for each block is 1 city block. What is the distance between locations in city blocks?

Destination From	Ordered Pair	Destination To	Ordered Pair	Distance
Your School	(-4, 12)	Public Library	(0, 11)	4.12 city blocks
Public Library	(0, 11)	Favorite Coffee Shop	(3, 5)	6.71 city blocks
Favorite Coffee Shop	(3, 5)	Bowling Alley	(11, 1)	8.94 city blocks
Bowling Alley	(11, 1)	Movie Theater	(7, -11)	12.65 city blocks
Movie Theater	(7, -11)	Favorite Donut Shop	(0, -12)	7.07 city blocks
Favorite Donut Shop	(0, -12)	Art Museum	(-2, -8)	4.47 city blocks
Art Museum	(-2, -8)	Skating Rink	(-8, -12)	7.21 city blocks
Skating Rink	(-8, -12)	Best Tacos in Town	(-11, 0)	12.37 city blocks
Best Tacos in Town	(-11, 0)	Shopping Mall	(-7, 6)	7.21 city blocks
Shopping Mall	(-7, 6)	Recreation Center	(-6, 10)	4.12 city blocks
Recreation Center	(-6, 10)	Your School	(-4, 12)	2.83 city blocks

Challenge Question: If on the average 16 city blocks = 1 mile and the average person can walk 1 mile in 20 minutes, how long would it take to walk from the school to the donut shop? Answer: about 30 minutes.