Day 5: Slope of a Line

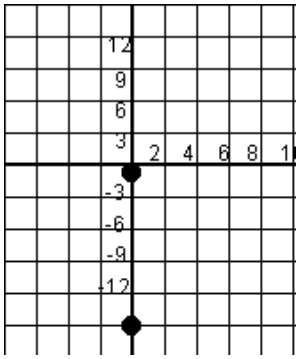
Math

Complete this sheet on Calculating the slope of the hills of Mars for the Curiosity Rover.

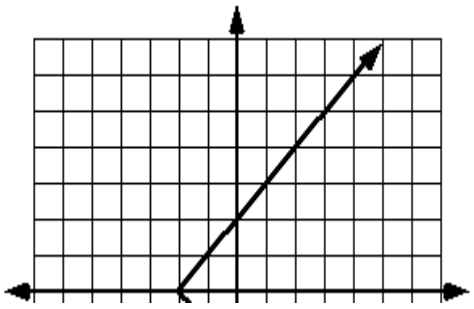
Slope of a line

Materials:

- Calculator
- Pencil



In Math, the slope of a line describes how steep the line is. You can find that but using 2 points (also called ordered pairs) on a graph. For example, on this graph, the ordered pairs would be (0,-1) for the top point and (0,-15) for the bottom point. When we write the ordered pair, we always write it (x,y).



In order to find the slope of a line, we take the change in the y-values over the change in the x-values. That means we would write it like this:

$(y_2 - y_1) / (x_2 - x_1) = \text{slope}$

On the graph to the right, what would the ordered pair be (assuming each block is 1)?

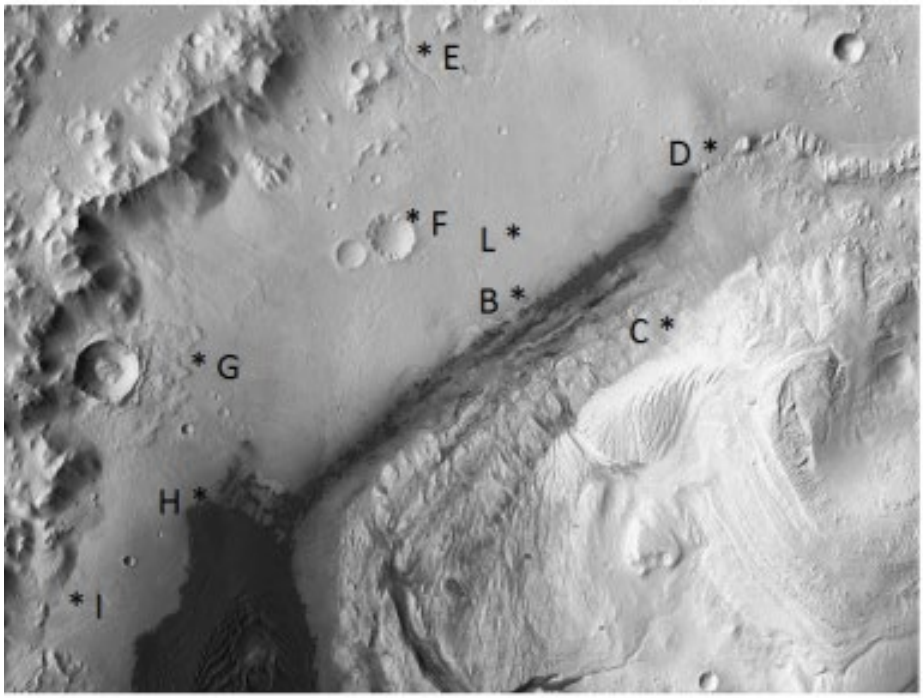
If you said (-2,0) and (5,7), then you would be correct. Now, what would be the slope of that line?

$(y_2 - y_1) / (x_2 - x_1) = \text{slope}$

$(7 - 0) / (5 - -2) =$

$(7) / (7) =$ **Slope = 1**

Important: If the slope of a line is NEGATIVE, that means the numerical value, when you calculate it, will be negative!



The table below gives the coordinates for the locations to be visited by the Curiosity Rover shown in the figure above. The X and Y coordinates are given in kilometers and the Y coordinate is the elevation about the lowest point. All x coordinates are measured the distance from the landing area. You will need to find slope using the formula slope = (change in y) / (change in x). You will need 2 points and find the difference in Y (subtract one from the other) and do the same for the x values of those points.

Label	Name	(X,Y)	Label	Name	(X,Y)
L	*Landing Area*	*(0,25)*	F	Crater Wall	(18,23)
B	Layered Wall	(50,35)	G	Mudslide	(62,30)
C	Alluvial Fan	(40,102)	H	Dark Sands	(87,12)
D	Summit Access	(45,40)	I	Mystery Valley	(105,0)
E	River Bed	(47,58)			

***Always use the Landing Area as the 1st ordered pair.*

Problem 1 – Curiosity needs to travel to the highest point but can not go above a slope of 1. Prove that it either can or can not go from the Landing area to the highest point directly.

Problem 2 – Which places have a slope going downward? Name those places.

Problem 3 – Calculate the slope for each location from the Landing Area.

Name	*Slope*	Name	*Slope*
Landing Area		Crater Wall	
Layered Wall		Mudslide	
Alluvial Fan		Dark Sands	
Summit Access		Mystery Valley	
River Bed			

Space Math adapted from http://spacemath.gsfc.nasa.gov

Day 5: Comparing and Contrasting Earth & Mars Part 2

Science

- Using the chart from Day 4 Science, finish collecting data for the chart to compare the Earth & Mars.

- Summarize whether or not you believe humans could live on Mars and why in your science journal, use examples from your chart to justify your claim.

- Keep your Planet Chart for Day 6 Science!

Day 5: Cold War and the Space Race

Social Studies

1. Analyze the origin of the Space race
2. Examine the Cold War Space Race terms:
3. Read the background information sheet on the Cold War and Space Race:
4. Write a journal entry answering the following: *after reading Document B, how might Sputnik have changed America's perception of the Soviet Union?*

Cold War Space Race Terms

- **arms race**—a race between hostile nations to accumulate or develop weapons broadly; a competition between nations for superiority in the development and accumulation of weapons, especially between the United States and the former Soviet Union during the Cold War
- **duck and cover**—a measure that was widely practiced as part of air-raid drills in the United States during the Cold War in which civilians would kneel and face the floor below a desk or other inside space and cover their heads with their hands; preparing in this way was supposed to provide personal protection against the effects of a nuclear explosion, although in reality this would have done little against the heat, force, or radiation from such an attack
- **hydrogen bomb**—a nuclear bomb in which energy is released from the fusion of hydrogen atoms; its enormous explosive power results from an uncontrolled, self-sustaining chain reaction; also called a thermonuclear bomb
- **national security**—a country's ability to protect itself from the threat of violence or attack
- **nuclear blast**—the initial high-speed destructive wave of compressed air resulting from the rapid release of energy of a nuclear explosion
- **propaganda**—information or media that deliberately attempts to influence people's thoughts, opinions, and actions with a specific purpose or goal in mind
- **satellite**—in space technology, a manufactured object or vehicle designed to orbit Earth or another celestial body; satellites typically collect or communicate information Sputnik—the name given to a series of Earth-orbiting satellites launched by the Soviet Union beginning in 1957; Sputnik 1 was the first human-made object put into Earth's orbit; the Russian word sputnik translates as "a traveling companion"

Sputnik's Launch Begins the Space Race | Chasing the Moon
Background Reading

At the end of World War II, competing visions for the postwar world emerged. The Soviet Union pictured a spread of revolutions in the Russian model that would one day produce a Communist utopia. The United States believed in democracy, with private enterprise at the core of capitalist economies. With their worldviews at odds, U.S.–Soviet cooperation, which was key to the Allied victory in the war, devolved into combative rhetoric. The Cold War, a state of political hostility and

military tension between the U.S.-led Western bloc and the Soviet-led Eastern bloc, would span nearly 50 years.

During the Cold War, the two superpowers competed in several arenas. Each side sought to prove its superiority not only in politics and economics but also in athletics and scientific research. For example, success in the Olympic Games offered a way for one country to score literal and figurative points against the other. Competition also spurred technological advancements. The era introduced jet planes, chemical and biological weapons, long-range missiles, and spy satellites. Inventions with non-military uses included microwave ovens, GPS, supercomputers, and ARPANET—a network that would become the basis of the Internet.

The United States had used its atomic bomb on Hiroshima and Nagasaki in 1945. When the Soviet Union had test-detonated its own atomic bomb in 1949, a new competition began. The “arms race” was dedicated to the buildup of nuclear weapons, especially those that could be propelled into enemy territory. As military rocket technology improved, the superpowers adjusted their sights on reaching—and ultimately controlling—space. The “space race” was a race to be the first: first to launch a satellite, first to orbit Earth, first to send a person into space, and first to land on the Moon.

To the public, the space program was a purely scientific and intellectual effort. But both U.S. president Dwight Eisenhower and Soviet leader Nikita Khrushchev recognized its potential strategic value. An Earth-orbiting satellite could observe anything on the ground, including military movements and weapons stockpiles. Moreover, a satellite would be safe from attack—unlike a spy plane, which could be shot down from the sky. Both nations worked hard to build their satellites and be the first to launch. By 1957, the United States, which had recently endured both the Great Depression and the Second World War, had a burgeoning middle class.

As social changes were beginning to transform the country into a more egalitarian society, confidence was high and many Americans were optimistic about the future. In October of that year, however, the Soviet Union sent Sputnik into orbit. By doing so, the Soviets had won the first leg of the space race. While President Eisenhower, a Republican, played down the significance of the event, the Democratic Senate majority leader, Lyndon B. Johnson, sensed a political opportunity for the Democrats. Johnson played up the security implications of the Soviets winning the space race.

This contributed to John F. Kennedy’s election as president in 1960. During the election campaign, the Kennedy–Johnson ticket emphasized the Republican administration’s role in creating a “space gap” (in addition to a “missile gap”). Following the election, with a new national priority given to scientific research, Johnson would lead the American space program—first as Kennedy’s vice president and later as president.

Reprinted from PBS LearningMedia: Sputnik’s Launch Begins the Space Race |Chasing the Moon
https://www.pbslearningmedia.org/resource/amex31ctm-soc-sputnikspacerace/sputniks-launch-begins-the-space-race/

Document B

Source: Robert D. Launius. (n.d.). Sputnik and the Origins of the Space Age. In *NASA History Division*. Retrieved September 2, 2009, from http://history.nasa.gov/sputnik/sputorig.html.

On that same evening of 4 October, Senate Majority Leader Lyndon B. Johnson ...heard the announcement of Sputnik 1's launch on the radio...Johnson's mind kept returning to the heavens as he pondered the Soviet triumph. He recollected, “Now, somehow, in some new way, the sky seemed almost alien. I also remember the profound shock of realizing that it might be possible for another nation to achieve technological superiority over this great country of ours.”

...One of Johnson's aides, George E. Reedy, summarized the feelings of many Americans: “the simple fact is that we can no longer consider the Russians to be behind us in technology. It took them four years to catch up to our atomic bomb and nine months to catch up to our hydrogen bomb. Now we are trying to catch up to their satellite.”

Full source is: https://www.nasa.gov/pdf/466719main_AP_ED_Hist_RacetoSpace_09-17-09.pdf

Day 6: Comparing Themes Across Texts

English Language Arts

- Analyze the primary source quotes of Apollo 1 astronauts prior to their tragic deaths. Attempt to find a common theme that relates to the previous themes
- Additional Resource
  Video: Apollo 1 Mission Results in Space Changes https://bit.ly/2DXV9gs

The Apollo 1 Mission

Videos of Quotes from the Apollo 1 Astronauts: https://ctm.americanexperience.org

Directions: Consider the words of the following NASA astronauts who were scheduled to lift off in Apollo 1 on February 21, 1967.

- Virgil "Gus" Grissom: **There's always** a possibility that you can have a **catastrophic failure**, of course. This can happen on any flight. It can happen on the last one as well as the first one. You just plan as best you can to take care of all these eventualities, and you get a well-trained crew, and you go fly.
- Ed White: "I think you have to understand the feeling that a pilot has, that a test pilot has, that I look forward a great deal to making the first flight. There's a great deal of pride involved in making a first flight." (The New York Times, January 29, 1967, p. 48.)
- Roger Chaffee: "Oh, I don't like to say anything scary about it. Um, there's a lot of unknowns of course and a lot of problems that could develop, might develop. And they'll have to be solved and that's what we're there for."
- During a test launch approximately a month before their scheduled launch into space, these men suffered a tragic death when they were locked inside of their command module when a fire broke out aboard the ship.

In reading their quotes, what **theme** again presents itself?

1. How is this similar to the theme(s), if at all, that you selected previously for Jefferson and Kennedy's speeches? Explain.