6th Grade

Instructional Packet

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6th Grade
Week 1
March 23, 2020

Please work with your child to complete the activities in the packet.

Your child may do these on their own or you may support them as needed.

"Seven Minutes of Terror," Eight Years of Ingenuity

by ReadWorks

"Sometimes when we look at it, it looks crazy," remarked Adam Steltzner, an engineer who works for the National Aeronautics and Space Administration-known more commonly to the world as NASA. "It is the result of reasoned engineering thought. But it still looks crazy."

In a video story entitled "Seven Minutes of Terror," Steltzner was joined on camera by an eloquent cast of entry-descent-landing engineers (or "EDL Engineers"). Working from the Jet Propulsion Laboratory (JPL) in California, their team introduced the world to one of the most daring, inventive feats of engineering the world had ever witnessed: the pinpoint landing of NASA's Curiosity rover on Mars.

The seven minutes explored in that story-and experienced by the world in early August 2012-took place after seven years of engineering, one year of space flight, and countless hours of collaboration on the perfect landing. Dubbed the Mars Science Laboratory ("MSL"), this mission brought together more than 7,000 people, working in organizations from all over the world, to accomplish its goals. MSL is one of the greatest technological accomplishments of human history.

The most impressive thing about MSL is that no mission this ambitious had ever been attempted in the past. The landing presented problems that could not be compared directly to anything done before. But thanks to the rigorous work of hundreds of engineers, NASA ended up making a new mark on Mars.

The Launch

The MSL launch took place on November 26, 2011. Blasting from the Earth at a speed of 12,582 miles per hour, the rockets that broke free of Earth's orbit and sent the Mars-bound spacecraft with the rover on its way were the most routine part of the mission. For decades NASA has specialized in space launches, drawing on some of the brightest minds on the planet to determine what it takes to bring a spacecraft to the stars.

Planning the rover's trip to the red planet (Mars's nickname, due to its color)-a voyage lasting about 36 weeks at maximum cruise velocity-was also not exactly a new challenge for engineers working on the MSL mission. NASA had already landed two rovers, named "Spirit" and "Opportunity," on the surface of the red planet. Based on the principles of astronomy, the launch engineers at JPL had very precise requirements for making the journey from Earth to Mars.

The key to these requirements was an understanding of orbits. Although Mars is significantly farther from the sun than Earth, both planets orbit the same star. Their distance from each other changes during each cycle, but Earth comes into alignment with Mars once every 26 months-"lapping" it in a perpetual race around the sun. Observing this pattern, astronomers can work with engineers to pinpoint the optimal month, day, and time for a spacecraft to leave Earth on a speedy one-way trip.

Drawing on centuries of knowledge of the laws of physics, scientists designed rockets and a spacecraft to accommodate Curiosity. Years of calculation, construction, careful planning and computer modeling resulted in a vessel that cruised purposefully through space, reaching the orbit of Mars at just the right time to attempt a landing.

Through it all, the margin for error was nearly non-existent. The movement of interplanetary bodies in space is much more demanding than the movement of cars on a highway, or even airplanes in the stratosphere. Miscalculating a vector or failing to account for any aspect of the orbits could lead to a $2 billion failure.

Fortunately, NASA had taken on this challenge before. Its engineers had both the experience and the tenacity to succeed again. What came after the launch was a different story.

The Landing

Spirit and Opportunity, the two NASA rovers that landed on Mars in 2004, used a combination of parachutes, rockets, and hi-tech airbags to protect themselves. Much like launch and spaceflight, each step of the landing sequence was planned and simulated to the very last detail. Learning from a prior Mars mission, EDL engineers were able to recreate some of the same maneuvers used in that sequence.

Unfortunately, the specific requirements of MSL made it difficult to depend on past experience. While NASA had constructed the biggest supersonic parachute ever made, parachuting was far from enough. Since the atmosphere of Mars is 100 times thinner than the atmosphere of Earth, the parachute alone could not reduce the speed of descent past 200 miles per hour-a breakneck speed that would surely damage Curiosity upon landing.

Curiosity outweighed any earlier rover and contained over 150 pounds of sensitive scientific devices, so an airbag solution was ruled out. Instead, EDL engineers designed a maneuver that would allow the entry capsule to turn sharply and activate powerful rockets to finish the job. Once this maneuver was complete, the capsule could attempt a vertical landing.

Successfully executing the switch from a parachute entry to a controlled, rocket-fueled descent was a feat that could have gone wrong at any moment. Still, even this was not enough to succeed. Once the parachute was cut, and a full radar system was online to guide Curiosity to the surface, the force from the rockets could kick up so much dust that the dust itself would damage the rover.

Eternally thinking one step ahead, EDL engineers designed a device called a "sky crane" to complete the final step of the landing sequence. When the sky crane was 20 feet above Martian soil, it lowered Curiosity onto the surface with a set of cables.

Moving from 13,000 miles per hour to zero miles per hour in just seven minutes, Curiosity finally touched down. The capsule, with all rockets still firing, blasted back into the sky and crash-landed elsewhere on the planet. The landing was a success.

The Ongoing Mission

NASA states that the MSL mission "is part of NASA's Mars Exploration Program, a long-term effort of robotic exploration of the red planet." The most popular inquiry is whether Mars may have supported life at any point in its long history. The search for these signs, however, is one piece of a much greater picture.

The mission has eight scientific objectives, each one broken into specific goals and all coming together to form a more detailed understanding of all things Mars. Curiosity, a rover the size of a station wagon, contains advanced instruments that help it probe, sample, record, and analyze its way through Martian terrain. NASA is preparing for the next space flight to Mars by collecting evidence on the biological, geological, chemical, and radiological profile of the red planet. Another rover mission, building on the work of Curiosity, is planned to launch in 2020.

Ultimately, scientists hope to learn enough about Mars to bring human beings to the surface for a manned research mission. Some, working with entrepreneur Elon Musk, are even devising a plan to colonize the planet by 2030. Skeptics debate whether or not such a seemingly outrageous idea could ever be made into reality.

Looking back at NASA's solutions to the great technical challenge of the Curiosity landing, it's hard to feel too skeptical about humankind's ability to reach for the stars.

From the Earth to Outer Space

by ReadWorks

Many years ago, people here on Earth decided that they wanted to go into outer space.

This is something people had imagined for a very long time, in books and movies and stories grandparents told to their grandchildren. However, in the 1950s, people decided they really wanted to do it. There was just one problem: how would they get there?

One of the earliest movies about flying to the moon was made by Georges Méliès and released in 1902. It was called *A Trip to the Moon*. In this movie, the moon was made up of a man's face, covered in cream, and a whole tribe of angry natives lived there. That part was not very realistic. However, the spaceship didn't seem too far-fetched: it was a small capsule, shaped like a bullet, that the astronauts loaded into a giant cannon and aimed at the moon.

This movie was based on a book that came out many years earlier by an author named Jules Verne. One of the fans of the book was a Russian man, Konstantin Tsiolkovsky. The book made him think. Could you really shoot people out of a cannon and have them get safely to the moon? He decided you couldn't, but it got him thinking of other ways you could get people to the moon. He spent his life considering this problem and came up with many solutions.

Some of Tsiolkovsky's solutions gave scientists in America and Russia (where Tsiolkovsky lived) ideas when they began to think about space travel. They also thought about airplanes they and other people had made, and even big bombs that could fly themselves very long distances. How could they take all these ideas and make them into one thing that would safely get astronauts into space?

Many scientists spent years working together to solve the problem. They drew and discussed different designs until they agreed on the ones that were the best. Then, they built small models of those designs, and tested and tested them until they felt ready to build even bigger models. They made full-scale rockets, which they launched without any people inside, to test for safety. Often the rockets weren't safe, and they exploded right there on the launch pad, or shot off in crazy directions like a balloon that you blow up and release without tying it first. After many, many tests, they started to send small animals into space. Only after a long time did they ever put a person inside a rocket and shoot him into space.

Even after they began sending people into space, during the Gemini program in the 1960s, scientists were still trying to improve the shape of the rockets. The design changed many times, and eventually ended up looking like a half-rocket and half-airplane. This rocket, called the space shuttle, was used for many years. Now, the government lets private companies try their own designs for spaceships, and they have come up with many different, crazy-looking machines.

There is no single solution for sending a person into space. Thanks to the imaginations of people like Jules Verne and Konstantin Tsiolkovsky, and the hard work of the scientists who built and tested rockets over the years, humanity has developed reliable technology for space travel. Still, the work continues. Every day, the people who work on this problem share new designs, build test models, and try to imagine better ways to explore the vast deep mystery that is outer space.

Name: ______________________________ **Date:** ______________

Use the article "From the Earth to Outer Space" to answer questions 1 to 3.

1. According to the article, where did people on Earth decide they wanted to go many years ago?

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2. What problem does this article discuss?

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3. Summarize the series of events that led to people going into outer space.

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Use the article ""Seven Minutes of Terror," Eight Years of Ingenuity" to answer questions 4 to 6.

4. To which planet did the rover Curiosity travel?

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5. What is one of the problems this article discusses?

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6. Summarize the series of events that led to Curiosity landing on Mars.

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Use the articles ""Seven Minutes of Terror," Eight Years of Ingenuity" and "From the Earth to Outer Space" to answer questions 7 to 9.

7. Compare the series of events that led to people going into outer space with the series of events that led to Curiosity landing on Mars.

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8. Contrast the series of events that led to people going into outer space with the series of events that led to Curiosity landing on Mars.

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9. Which mission was more difficult: sending people into outer space or sending Curiosity to Mars? Support your answer with evidence from both articles.

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WRITING PROMPT

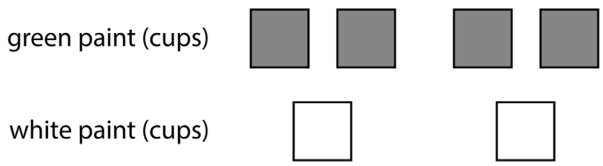
Week 1:

Imagine a giant box is delivered to your doorstep with your name on it. What’s inside and what happens when you open it.

NAME DATE PERIOD

6.RPA.1- Understand the concept of a ratio and use ration language to describe a ratio relationship between two quantities.

1. Here is a diagram that describes the cups of green and white paint in a mixture.



Select **all** the statements that accurately describe this diagram.

A. The ratio of cups of white paint to cups of green paint is 2 to 4.

B. For every cup of green paint, there are two cups of white paint.

C. The ratio of cups of green paint to cups of white paint is $4: 2$.

D. For every cup of white paint, there are two cups of green paint.

E. The ratio of cups of green paint to cups of white paint is $2: 4$.

2. To make a snack mix, combine 2 cups of raisins with 4 cups of pretzels and 6 cups of almonds.

a. Create a diagram to represent the quantities of each ingredient in this recipe.

b. Use your diagram to complete each sentence.

i. The ratio of ___________________ to ___________________ to ___________________ is ________ : ________ : ________.

ii. There are ________ cups of pretzels for every cup of raisins.

iii. There are ________ cups of almonds for every cup of raisins.

3.

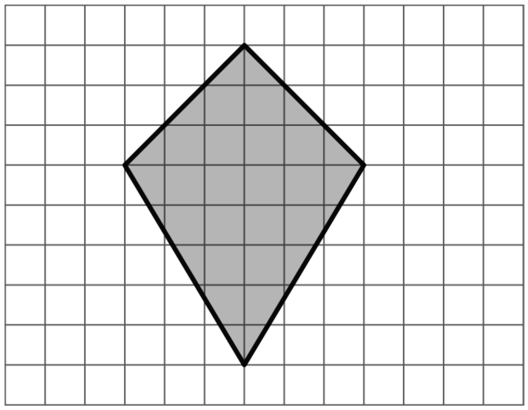
a. A square is 3 inches by 3 inches. What is its area?

b. A square has a side length of 5 feet. What is its area?

c. The area of a square is 36 square centimeters. What is the length of each side of the square?

4. Find the area of this quadrilateral. Explain or show your strategy.

NAME DATE PERIOD



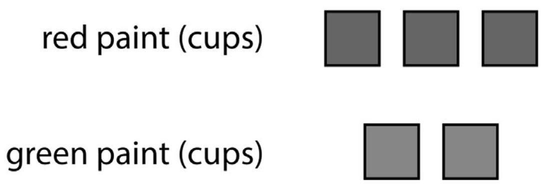
5. Complete each equation with a number that makes it true.

   a. $\frac{1}{8} \cdot 8 =$ _______
   b. $\frac{3}{8} \cdot 8 =$ _______
   c. $\frac{1}{8} \cdot 7 =$ _______
   d. $\frac{3}{8} \cdot 7 =$ _______

NAME DATE PERIOD

6.RPA.1- Understand the concept of a ratio and use ration language to describe a ratio relationship between two quantities.

1. Here is a diagram showing a mixture of red paint and green paint needed for 1 batch of a particular shade of brown.



Add to the diagram so that it shows 3 batches of the same shade of brown paint.

2. Diego makes green paint by mixing 10 tablespoons of yellow paint and 2 tablespoons of blue paint. Which of these mixtures produce the same shade of green paint as Diego's mixture? Select **all** that apply.

   A. For every 5 tablespoons of blue paint, mix in 1 tablespoon of yellow paint.

   B. Mix tablespoons of blue paint and yellow paint in the ratio $1:5$.

   C. Mix tablespoons of yellow paint and blue paint in the ratio 15 to 3.

   D. Mix 11 tablespoons of yellow paint and 3 tablespoons of blue paint.

3. To make 1 batch of sky blue paint, Clare mixes 2 cups of blue paint with 1 gallon of white paint.

   a. Explain how Clare can make 2 batches of sky blue paint.

   b. Explain how to make a mixture that is a darker shade of blue than the sky blue.

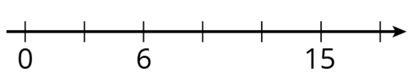
   c. Explain how to make a mixture that is a lighter shade of blue than the sky blue.

4. A smoothie recipe calls for 3 cups of milk, 2 frozen bananas and 1 tablespoon of chocolate syrup.

   a. Create a diagram to represent the quantities of each ingredient in the recipe.

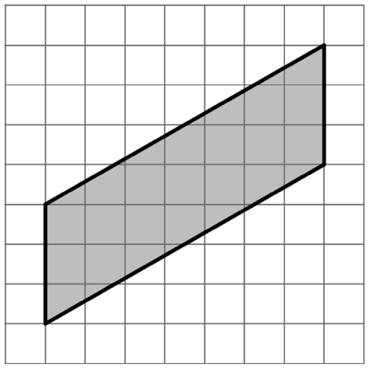
   b. Write 3 different sentences that use a ratio to describe the recipe.

5. Write the missing number under each tick mark on the number line.



6. Find the area of the parallelogram. Show your reasoning.

NAME DATE PERIOD



7. Complete each equation with a number that makes it true.

   a. $11 \cdot \frac{1}{4} =$ _______
   b. $7 \cdot \frac{1}{4} =$ _______
   c. $13 \cdot \frac{1}{27} =$ _______
   d. $13 \cdot \frac{1}{99} =$ _______
   e. $x \cdot \frac{1}{y} =$ _______
   (As long as y does not equal 0.)

NAME DATE PERIOD

6.RPA.1- Understand the concept of a ratio and use ration language to describe a ratio relationship between two quantities.

1. Each of these is a pair of equivalent ratios. For each pair, explain why they are equivalent ratios or draw a diagram that shows why they are equivalent ratios.

   a. $4:5$ and $8:10$

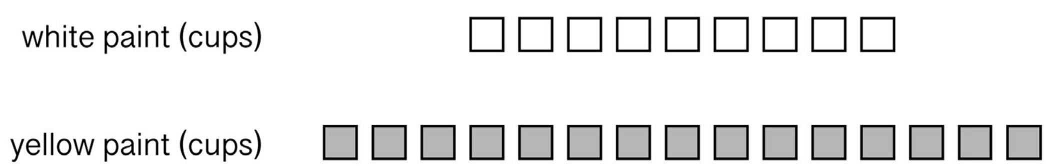
   b. $18:3$ and $6:1$

   c. $2:7$ and $10,000:35,000$

2. Explain why $6:4$ and $18:8$ are not equivalent ratios.

3. Are the ratios $3:6$ and $6:3$ equivalent? Why or why not?

4. This diagram represents 3 batches of light yellow paint. Draw a diagram that represents 1 batch of the same shade of light yellow paint.



5. In the fruit bowl there are 6 bananas, 4 apples, and 3 oranges.

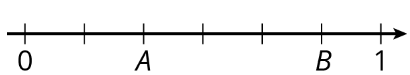
   a. For every 4 ___________________, there are 3 ___________________.

   b. The ratio of ___________________ to ___________________ is $6:3$.

   c. The ratio of ___________________ to ___________________ is 4 to 6.

   d. For every 1 orange, there are ______ bananas.

6. Write fractions for points A and B on the number line.



Texbooks:

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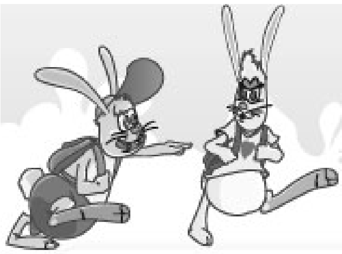
http://www.classzone.com/books/ml_sci_life/page_build.cfm?content=audio_read&state=none



Name:_ _ _ _ _ _ _ _ _ Class:_ _ _ _ _ _ _ _ _ _

Extinction of species

1. When a plant or animal species is in danger of becoming extinct it is reffered to as ________.
   a. specimen
   b. an endangered species
   c. insecure species
   d. delicate species

2. If a species is extinct, it means that _______.
   a. it exists only in certain regions
   b. its exists in captivity
   c. it no longer exists
   d. it can only be found in zoos

3. Why are some animal species extinct ?
   a. due to over hunting
   b. due to destruction of animal habitats
   c. climate change and destruction of ecosystems
   d. all of the above

3. Identify an extinct species from the following list.
   a. mammoth
   b. elephant
   c. lion
   d. tiger

4. How is man dealing with the problem of extinction and endangered species ?
   a. educating people about the ills of environmental problems
   b. attending meetings and conferences
   c. through environmental protection and conservation
   d. creating more roads and bridges

5. Some countries like the USA have taken steps to protect endangered species through an act. What is the act called ?
   a. Environmental Protection Law
   b. The Ramsar Convention on Wetlands
   c. Endangered Species Act
   d. Animal Protection Act

6. In some Indian villages, there have been situations in which tigers attacked people at their homes. What is one reason for such attacks ?
   a. the tigers went out of the zoo
   b. villages have been built close to tiger habitats
   c. tigers do not like people
   d. the tiger population has increased

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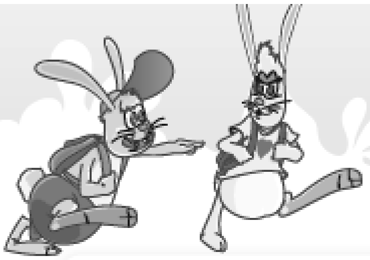
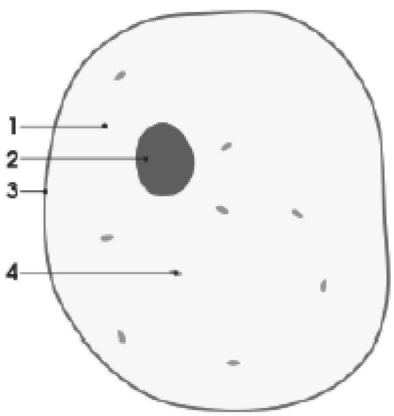


Name:_ _ _ _ _ _ _ _ _ _ Class:_ _ _ _ _ _ _ _ _ _ _

Cells

1. 

Label the parts of the cell against the numbers below.

1. ______________________
2. ______________________
3. ______________________
4. ______________________

2. The basic structural units of organisms are called _____.
   - a. cell wall
   - b. atoms
   - c. cells
   - d. nucleus

3. What is the role of the nucleus ?
   - a. acts as the control center of the cell
   - b. functions as a water storage
   - c. a storage for enzymes
   - d. absorbs nutrients

4. Identify an organism below that has cells that have a cell wall.
   - a. octopus
   - b. shark
   - c. rat
   - d. pear plant

5. Cells are known to reproduce by _______.
   - a. ionizing
   - b. dividing
   - c. subtracting
   - d. cracking

What is Geography? -- A Visualization Exercise

Geography is the study of the earth’s landscapes, peoples, places, and environments. It is, quite simply, about the world in which we live.

Draw a picture of what geography means to you.

Geography is unique in bridging the social sciences (human geography) with the natural sciences (physical geography). Human geography concerns the understanding of how people live (lifeways), whereas physical geography concerns the understanding of physical landscapes and the environment.

List some things that come to mind about you to distinguish human and physical geography.

Human Geography (My Lifeways)	Physical Geography (The World Around Me)

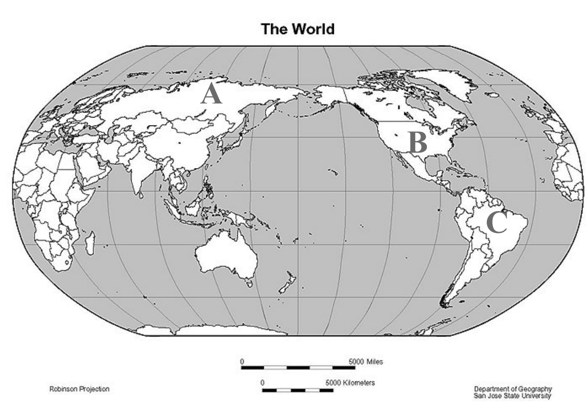
Geography puts the understanding of humans and their physical world within the context of places and regions. Geography focuses on the great differences in cultures, political systems, economies, landscapes, and environments across the world, and the links between them. Understanding the causes of differences and inequalities between places and groups of people underlie much of the newer developments in geography.

Look at A, B, and C on the map.

1. How might these places differ?

2. How might the people in these places differ?

3. In what ways may the people in these places be alike?

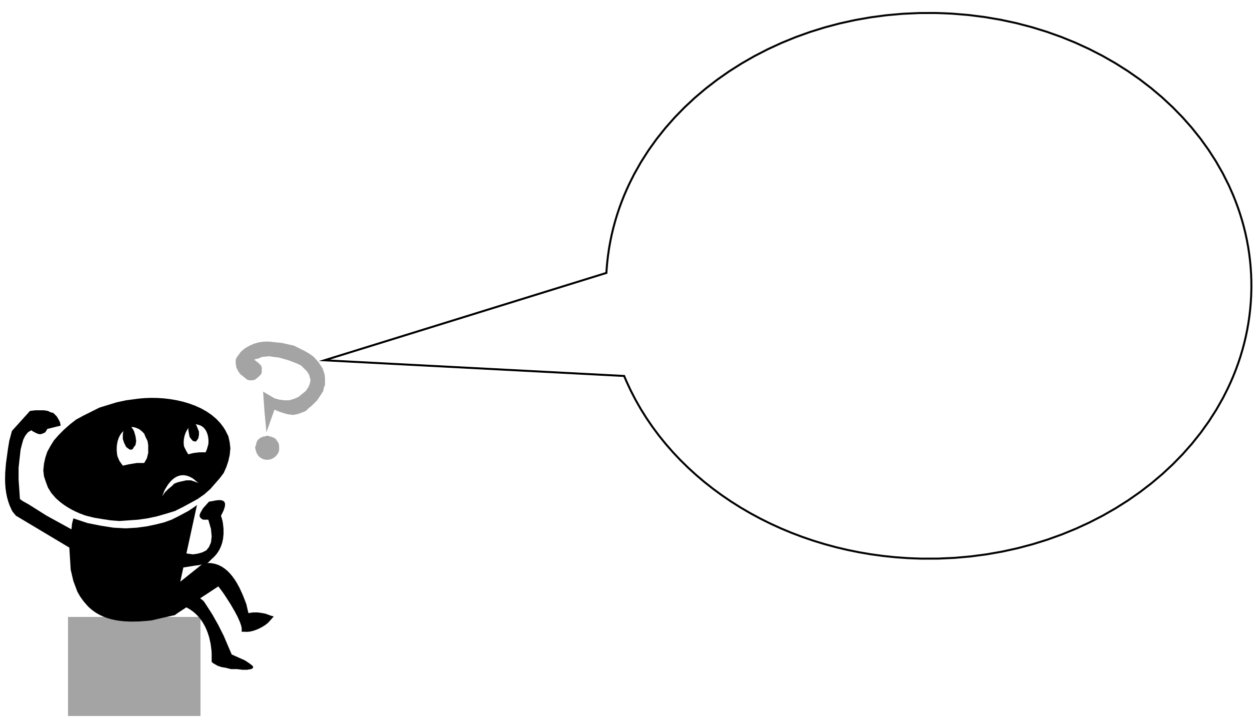


Geography is, in the broadest sense, an education for life and for living. Learning through geography – whether gained through formal learning or experientially through travel, fieldwork, and expeditions – helps us all to be more socially and environmentally sensitive, and informed and responsible citizens and employees.

Geography informs us about:

- The places and communities in which we live and work;
- Our natural environments and the pressures they face;
- The interconnectedness of the world and our communities within it;
- How and why the world is changing, globally and locally;
- How our individual and societal actions contribute to those changes;
- The choices that exist in managing our world for the future; and
- The importance of location in business and decision-making.

Fill in the bubble with one question related to geography that interests you.



Source: "What is Geography"? Royal Geographical Society Website. 11 August 2015 <http://www.rgs.org/geographytoday/what+is+geography.htm>.

What is Where and Why is it There?

Grade	Geographic Area	Human Characteristic	Where is it?	Why is it there?
2	Our local community			
3	Michigan	Mackinac Bridge		
3	Michigan	the Michigan Capitol building		
4	United States	Hoover Dam		
4	United States	Statue of Liberty		
5	The Early U.S.	Jamestown		

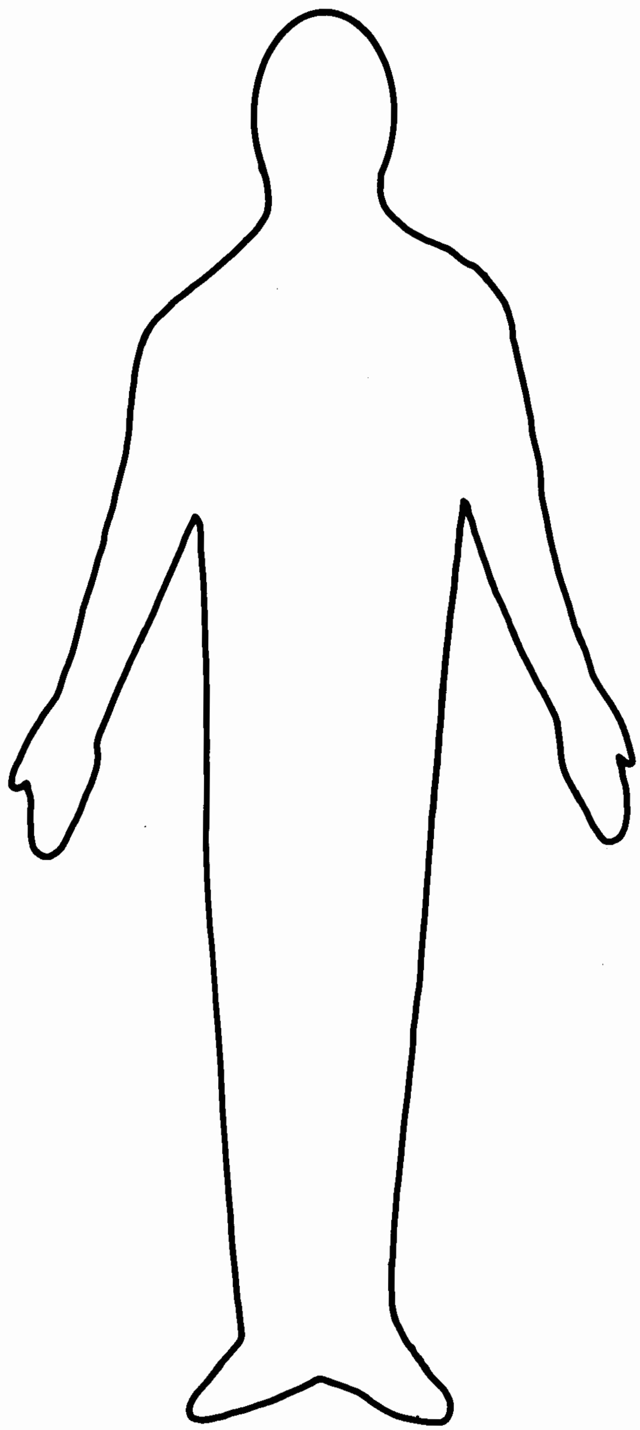
What is Where and Why is it There? – Sample Answers

Grade	Geographic Area	Human Characteristic	Where is it?	Why is it there?
2	Our local community			
3	Michigan	Mackinac Bridge	*At the Straits of Mackinac between the Upper and Lower Peninsulas*	*It was built there to connect the two peninsulas.*
3	Michigan	the Michigan Capitol building	*In Lansing, Michigan*	*It was built there because Lansing is in the middle of the Lower Peninsula and people wanted the capitol to be centrally located.*
4	United States	Hoover Dam	*In Nevada along the Colorado River.*	*Water was needed in the region so a dam was placed on the Colorado River (the water was diverted to Las Vegas and the Imperial Valley of California).*
4	United States	Statue of Liberty	*Near New York City in the harbor*	*It was placed where immigrants coming into New York City and Ellis Island could see it.*
5	The Early U.S.	Jamestown	*Along the James River in Virginia*	*Early settlers wanted to build their settlement along a river and a few miles up the river to be safe from the Spanish.*

Name ______________________________ Date ______________

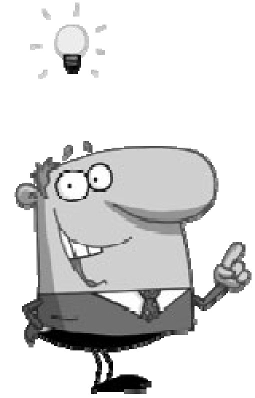
Choose an Occupation

Decorate the figure below for any occupation you choose. Then on the back of this sheet, list at least five responsibilities or things that this person must do for the job you have selected.



Name ______________________ Date ____________________

One Day of Anything Writing Prompt



Sometimes we wake up wishing we didn't have to go to school-that we could do anything we wanted. If you could spend tomorrow doing whatever you wanted to do and could go wherever you wanted to go, how would you spend the day?

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Name ________________________ Date _____________________

I Am Proud…

We all do things we should be proud of. What are some things you've done that you are proud of?

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