

Global Precipitation Measurement Mission

Name- _____ Date- _____ Period- _____

Weather and Climate IQuest: Student Capture Sheet

Go to <http://pmm.nasa.gov/education/interactive/weather-climate-iquest> and use the links to help you explore the wild and changing world of weather and climate. Record your answers on this capture sheet. Before we get started, take a few minutes to think about what you already know about weather and climate. Use your background knowledge to answer the questions below to the best of your ability. After you finish the IQuest, you can look back at your responses and see if your knowledge has changed.

- What is your definition of “weather”? _____

- What is the weather like today in your location? _____
- What was the weather like yesterday in your location? _____
- What is your definition of “climate”? _____

- What is the climate in your area like? _____

- How are weather and climate similar? _____

- How are weather and climate different? _____

→ Go to <http://www.weather.gov> and take a look at today’s weather in the United States.

- What are some of the different kinds of hazardous weather that are listed in the map key? _____
- Click on the blue tab above the map that says “FORECAST”. Then look down at the orange headings that show various types of forecast maps. By looking at these categories, **list four of the types of data** that meteorologists collect related to weather:
 1. _____
 2. _____
 3. _____
 4. _____
- Take a few minutes to explore some of these maps to see the different types of data that collected in order to forecast the weather. Based on the different types of data, explain why it is difficult for weather forecasters to be accurate when they are making predictions about the weather for the next few days. _____

Global Precipitation Measurement Mission

→ To find out the difference between a “warning” and a “watch”, here is a short (2:44) video clip from NOAA that explains the differences: <http://youtu.be/x3V3HZBs1Y4>.

- What is issued when weather is about to strike? _____
- What does a “watch” tell you about the potential danger weather? _____
- What should you do when a “watch” is issued? _____

→ The video NASA Con²ect: “Plane Weather” (7:09) discusses the basics of meteorology and the impact of weather forecasting on aviation. Answer the questions below using the information from the video at <http://youtu.be/y0-uVQOc4oU>.

- What types of weather do we experience in US? _____
- Why is aviation impacted by weather conditions more than other forms of transportation? _____
- What is solar radiation? _____
- Why doesn’t the Sun warm all parts of the Earth equally? _____
- Why don’t land and water absorb solar radiation evenly? _____
- In which layer of the atmosphere does most weather take place? _____
- What type of pressure system is associated with low air pressure? _____
- What makes wind flow? _____
- What determines what type of precipitation will fall during the winter? _____

→ We will now move on and look at one of the variables about which we collect data when we are looking at the weather: temperature. Before we visit the next website, answer these questions to the best of your ability:

- What do you think “temperature” is? _____
- What causes the temperature to change during the day? _____
- What causes the temperature to change throughout the year? _____
- Where do you think the hottest place on Earth is? Why? _____

Global Precipitation Measurement Mission

→ Go to the article about the hottest place on Earth at: <http://go.nasa.gov/1dNbc88>

- What were the three characteristics of the hottest place on Earth, according to Steve Running and his colleagues? _____

- Why aren't there ground-based instruments in the world's hottest locations? _____

- What types of instruments can fill in and take measurements in these locations? _____

→ You can see the dynamic motion of the oceanic and atmospheric flow patterns in the data animation here: <http://go.nasa.gov/1yjy18D>

- In the second animation, what direction do the clouds appear to be moving in at the equator? _____
- Does the wind direction appear to follow a consistent pattern? _____

- How do you think these weather patterns may affect the climate in a location such as northern Africa? _____

- What do you think the climate might be like in Central America, based on its geographical location and the atmospheric flow patterns? _____

→ We've spent time looking at weather, now we will take a closer look at climate. Watch this video called "Melting Ice, Rising Seas" (4:31) <http://go.nasa.gov/1BpMF7v>

- Why is the sea level rising? _____

- What is happening to the ice sheets and glaciers in Greenland? _____

- What types of consequences would sea level rise have for people across the globe? _____

- Why is it hard to predict the exact amount the sea level will rise in the future? _____

Global Precipitation Measurement Mission

→ Read the article called "Global Warming vs. Climate Change" at <http://go.nasa.gov/1mZft0l>

- What does the term, "global warming" describe to a scientist? _____

- What is the definition of "climate change"? _____

- Other than an increase in global surface temperature, what other variables are expected to occur with climate change? _____

- Why is "global climate change" the more scientifically accurate term, rather than "global warming"? _____

→ Go to this site: "Global Climate Change: Vital Signs of the Planet"- <http://climate.nasa.gov>

- What are some of the "vital signs" that a doctor might check on a patient? _____

- What are the six "vital signs" that NASA is monitoring on Earth? _____

→ Hover over each of the vital signs (just under the main cycling images) and look at the explanatory text that appears. For each of the vital signs, write that information below.

- Carbon dioxide: _____

- Global temperature: _____

- Arctic ice minimum: _____

- Land ice: _____

- Sea level: _____

- Forest cover: _____

Global Precipitation Measurement Mission

→ Select **one** of these vital signs to learn more about. Click to expand and make more information visible to answer the following questions about the vital sign you select. For additional details, click on the “full vital sign” link at the lower right of the pop-up box.

- Vital sign: _____
- Why is this a “vital sign” for Earth? How will its change impact us? _____

- What type of data is being collected on this vital sign? _____
- Use the data to explain, both qualitatively and quantitatively, how this vital sign is changing over time. _____

→ Look at the time series map for your data.

- What time period does it cover? _____
- What variable is being measured over time? _____
- Describe the changes you note occurring as you move the slider from the past toward the present or as you look at the graph over time. _____

Now let’s look at the evidence for each of the vital signs that scientists have determined are changing. Use this information to answer these questions.

→ Go to <http://climate.nasa.gov/evidence> (Or “Evidence” on the “Facts” at the top of the screen.)

- When did the last ice age end? _____
- What were most of the climate changes before human civilization caused by? _____

- How have technological advances allowed us to learn more about climate change? _____

→ Select **one** piece of evidence for rapid climate change and use it to answer the following:

- Evidence for rapid climate change: _____

- Qualitative and quantitative data that describes this change: _____

Global Precipitation Measurement Mission

→ Click on “Causes” under the “Facts” heading near the top of the screen, and use that information to answer these questions.

- What are the “greenhouse gases”? _____

- What is the impact of the layer of greenhouse gases to Earth? _____

- Is the greenhouse effect a good thing or a bad thing? Explain your response. _____

- Could we survive on Earth without the greenhouse gases? _____

- What kinds of human activities are increasing the carbon dioxide concentration? _____

- What four consequences are most likely to occur as a result of changing the natural balance of the greenhouse gases?
 1. _____

 2. _____

 3. _____

 4. _____

→ Go to the “Climate Change Machine” at <http://climatekids.nasa.gov/time-machine/>

- Approximately what percent of the Arctic sea ice has melted just since satellites started observing around 30 years ago? _____
- Name two cities that will be under water if sea level rises by 20 feet. _____

- By how many parts per million has the amount of greenhouse gas carbon dioxide increased in the air between 2003 and 2009? (Pick an area, such as the eastern U.S., to look at for the two time points to make the calculation easier.) _____
- About how much has temperature risen (the temperature difference) in the western U.S. in just a little over 100 years? _____
