twig Science | TOOLS

INDEPENDENT STUDY LESSON PACKET

Including

twig Science | REPORTER

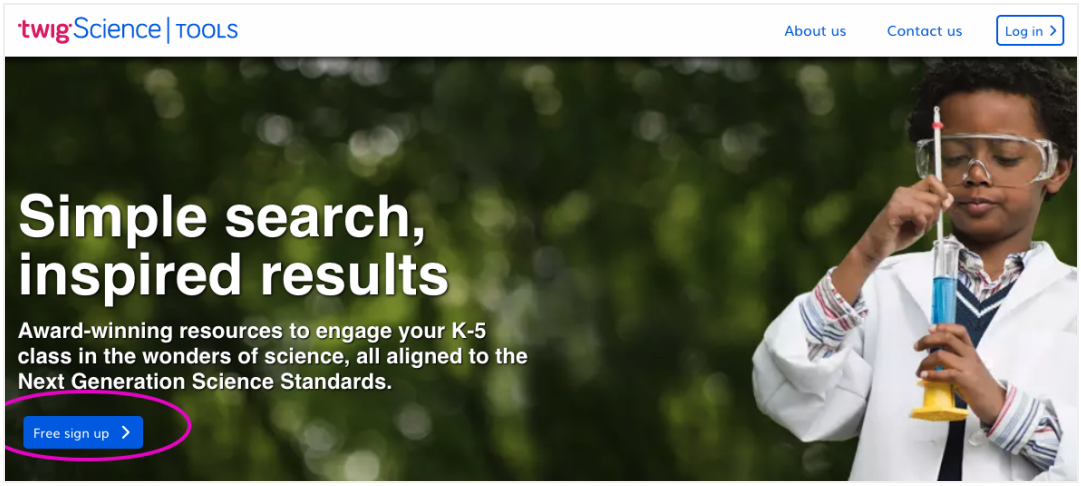
SCIENCE NEWS UPDATES

GRADE 4

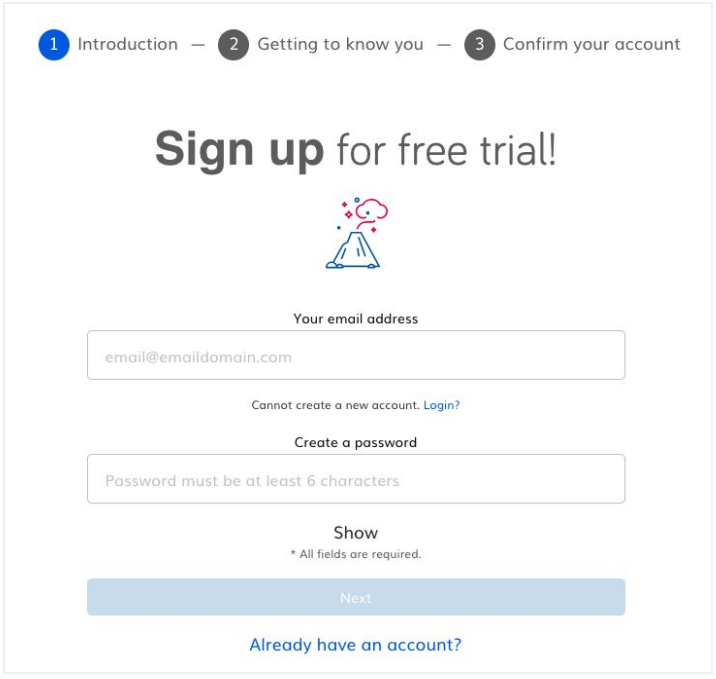
Science Distance Learning—Grade 4

Get Started With twig Science | TOOLS

1. To begin, navigate to: https://www.twigsciencetools.com/.



2. Select Free Sign Up and complete the following form.



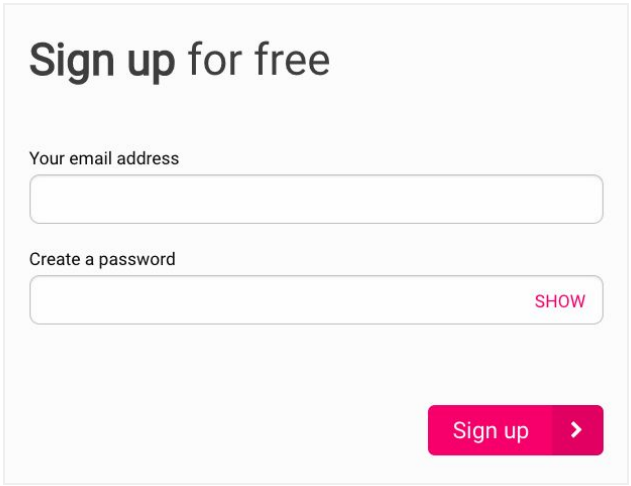
If asked, save your user name and password in your browser.

3. Continue to the Independent Learning packets or Twig Science Tools website. When you click on a digital activity (video or another type of media), you should be logged in. If not, use the above credentials to access digital activity.

Get Started With twig Science | REPORTER

1. To begin, navigate to: https://www.twigsciencereporter.com/.

2. Select Sign Up and complete the registration form.



If asked, save your user name and password in your browser

3. Continue on to Independent Learning Packets, or Twig Science Reporter website. When you click on a digital activity (video or another type of media), you should be logged in. If not, use the above credentials to access digital activity.

Science Distance Learning—Grade 4

NGSS Performance Expectations

4-ESS2-1. Earth's Systems: Processes that Shape the Earth

Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.

4-ESS3-1. Energy

Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.

Why Do Mountains Explode?

You will consider what you know about volcanoes, watch a video about how volcanic mountains are formed and what happens when they erupt, and then order the different stages of a volcanic eruption.

You will:

Understand that mountains sometimes explode in volcanic eruptions when there is high pressure and liquid magma is forced through the Earth's crust.

You will use:

Digital:

- Exploding Mountains video
  https://www.twigsciencetools.com/video/exploding-mountains-VVNFTlRXRTIwNzgy

Instructions

1. Play the Exploding Mountains video.

2. Answer the following questions in complete sentences.

- What happened at Mount St Helens in Washington in 1980?

- What are the different layers deep inside the Earth?

- Why does the liquid magma rise towards the Earth's surface?

- What happens to the mantle at an extremely high pressure and temperature?

- What happens when the magma can't find a way up?

- What happens if more and more magma gathers in the magma chamber?

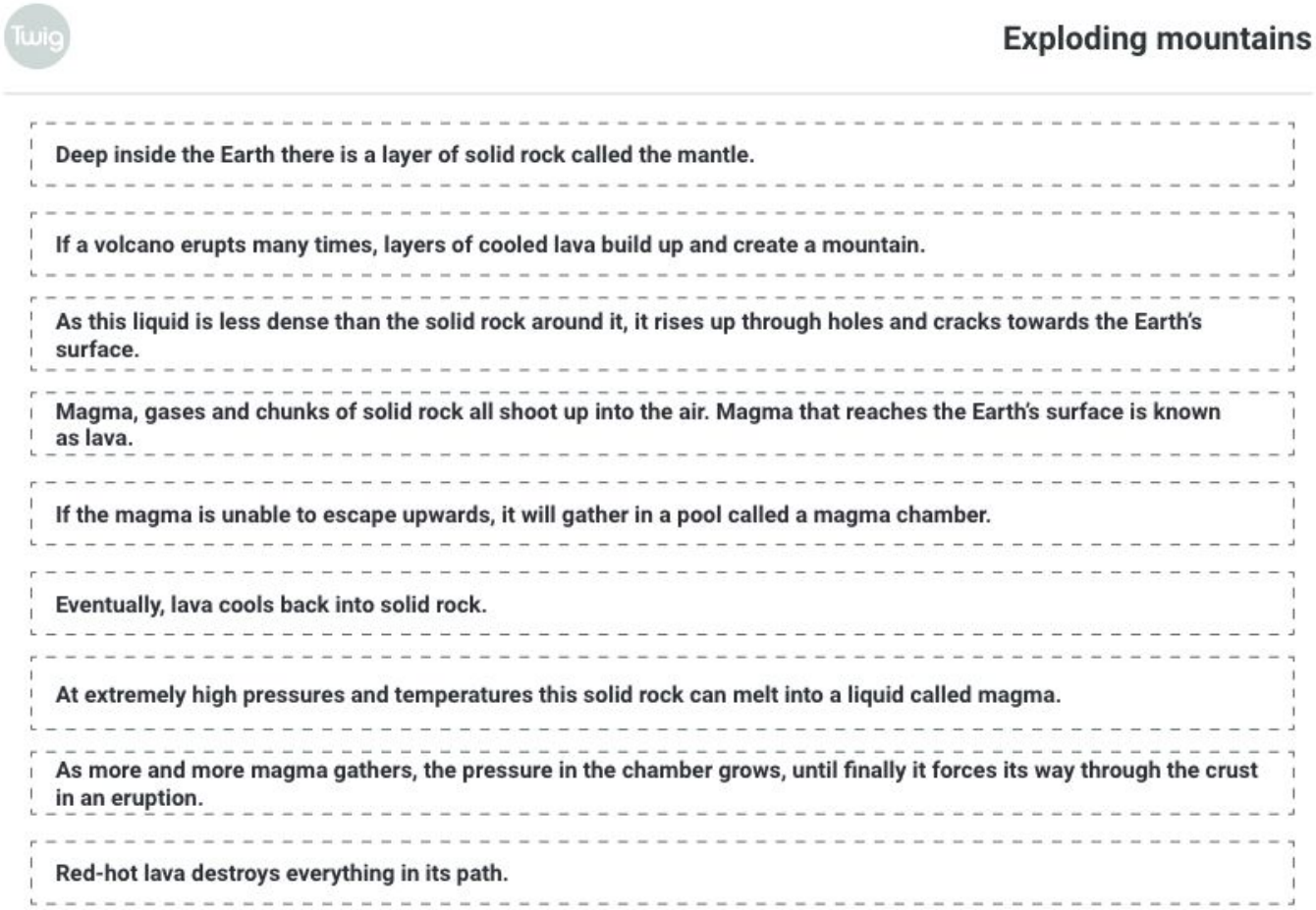
- What do we call the molten rock that reaches the Earth's surface?

- What happens if a volcano erupts many times?

- Which volcanic mountains were mentioned in the video?

3. Read all the statements below aloud.

   Number the statements in order of how they would occur during a volcanic eruption. 1 is first to occur, 9 is last to occur—place the number in front of the statement.



What is the Water Cycle?

You will watch a video about the water cycle, complete a labeled diagram, and then explain how different weather conditions affect the process of evaporation.

You will:

Understand how the water cycle works and can explain how weather affects it.

You will use:

Digital

- Water Cycle video
  https://www.twigsciencetools.com/video/water-cycle-VVNFTlRXRTIwMDc1

Instructions

1. Play the Water Cycle video.

2. Answer the following questions in complete sentences.

    - In what state is water found in lakes, rivers and seas?

- What is evaporation?

- What is this gaseous form of water called?

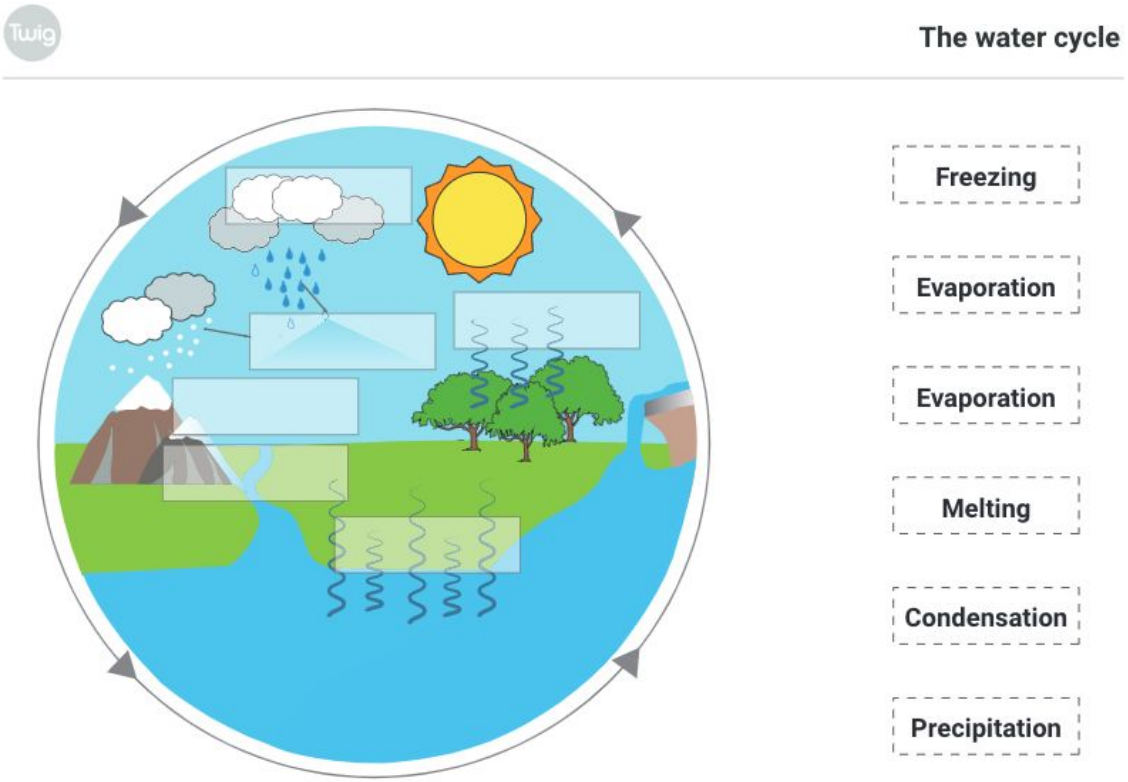
- What happens when water vapor cools?

- What is condensation?

- What can be produced from the cooling clouds?

- In the video, all three states of water are mentioned. Can you give an example for each of these states?
    - Solid:
    - Liquid:
    - Gas:
- What happens to snow before it can be recycled as part of the water cycle?

3. Fill in the blanks on the diagram below using words from the word bank.



- Explain the processes taking place in the water cycle and whether the water exists in a solid, liquid or gas state in each.

4. Many factors can affect the water cycle. Look at each scenario and explain how it can affect the water cycle.

    - Scenario 1: A period of extremely high temperatures.

    - Scenario 2: A period of extremely cold temperatures.

- Scenario 3: A period of heavy rainfall.

How Do Floods Affect Places?

You will evaluate how floods affect people, and then write news reports about the flooding that occurred in Pakistan in 2010.

You will:

Understand that floods are natural disasters that can affect people by disrupting transport routes, damaging homes, and endangering lives.

You will use:

Digital

- Floods video
  https://www.twigsciencetools.com/video/floods-VVNFTlRXRTIwNzMz

Materials

- Pencils

Instructions

1. Play the Floods video.

2. Answer the following questions in complete sentences.

- What do we call the period of heavy rain that affects Pakistan every summer?

- When are floods most likely to happen?

- What is the floodplain?

- Does flooding only occur in areas next to rivers?

- What effect can flooding have on people and the environment?

3. Imagine that you have gone back in time to 2010. You are a journalist in Pakistan and have been asked to produce a news report about the severe flooding that has just taken place there.

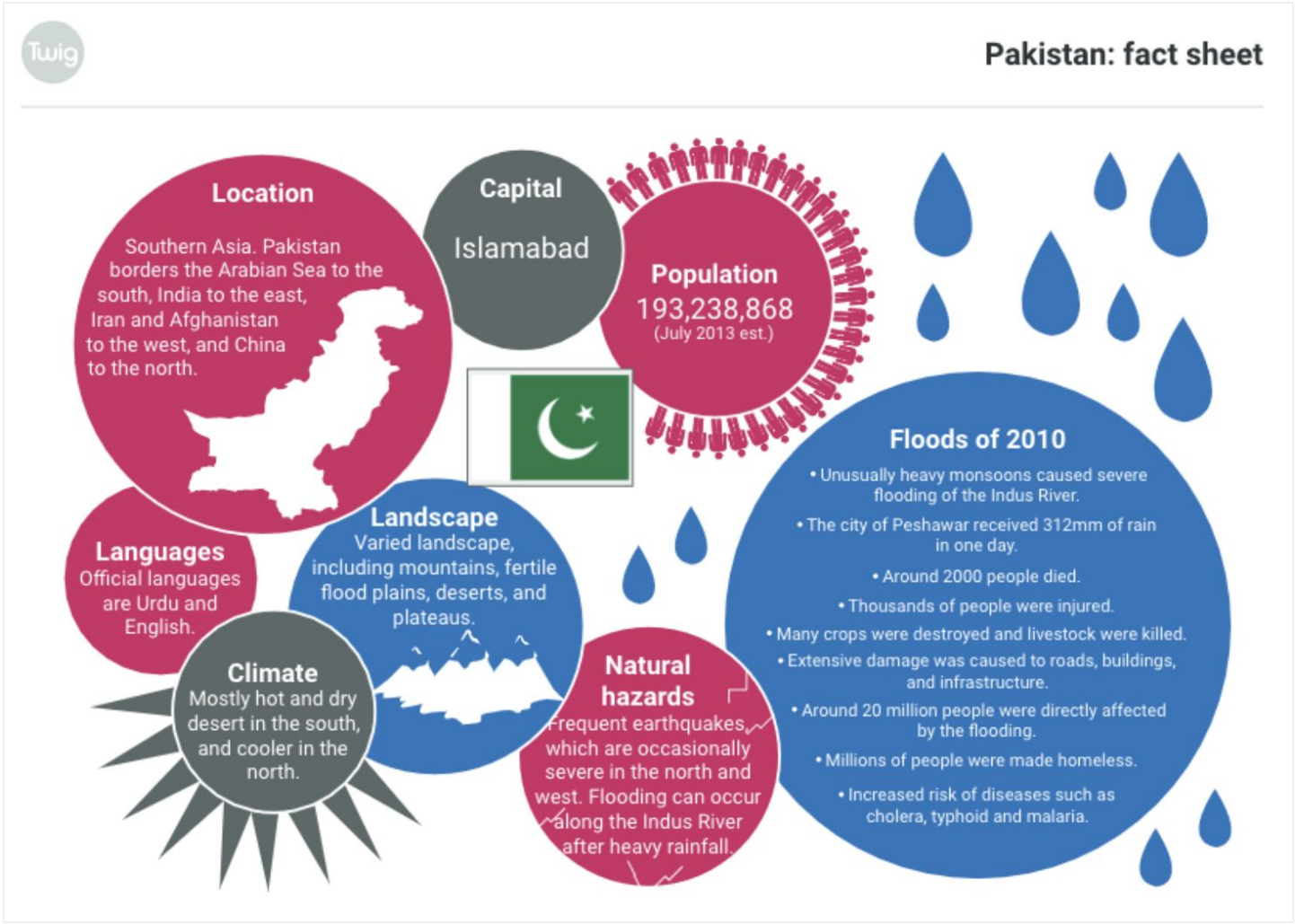
   Your job is to produce a newspaper article based on the flooding. Research the following to include in your article:

   1. Some background about the country.
   2. The causes of the flooding.
   3. The short- and long-term effects of the flooding.
   4. Eyewitness accounts.
   5. The response to the flooding by different people, communities and organizations and their thoughts about what the future holds.

   Use the safe internet practices you have learned to research your article. Look for sites ending in .edu and .org for your information.

   You may use the information sheet below, which provides some information about Pakistan and the 2010 floods.

   Include in your news article:
   - maps
   - diagrams
   - photographic evidence



Editor _____ Date _____

How Does Water Pollution Affect the Environment?

You will watch a video about the causes and effects of water pollution, and then create a mind map of how human activity can cause water pollution that affects plants and animals.

You will:

Understand that human activity can cause water pollution.

You will use:

Digital

- Water Pollution video
  https://www.twigsciencetools.com/video/water-pollution-VVNFTlRXRTIwNjA1
- Water Pollution—Clip video
  https://www.twigsciencetools.com/video/polluting-our-water-clip-VVNFTlRXRTIwNjQ0

Instructions

1. Think about the following questions and make notes.
   - What do we use water for?
   - Where do we get our water from?
   - How important is water to humans?
   - Is water important to other living things?
   - How does water become polluted?

- What human activities can pollute water?

2. Play the Water Pollution video.

3. Answer the following questions in complete sentences.
    - How do fertilizers cause water pollution?
    - How does sewage affect water supplies?
    - How can we stop sewage from polluting our water?

4. Imagine a large river or lake. This might be in the local area or somewhere you have visited. Think about the different ways that humans might use this river or lake. Consider leisure activities, food and drink, and transport. Also consider the animals and plants that might be found there.

   Create a mind map below to record your ideas, include drawings and text. You will be adding information to this later.

5. Play the Water Pollution—Clip video.

6. Now extend your mind map on the previous page to include information about how the human activities you have recorded might affect the animals and plants that live in the river or lake.

How Did Early Explorers Find Their Way Home?

You will watch a video that explains how early explorers navigated the seas before they had maps to guide them, and model using the dead reckoning method to calculate your walking speed.

You will:

Understand that early explorers used dead reckoning and chronometers to calculate longitude, which were less accurate than the GPS used by sailors today.

You will use:

Digital

- Early Explorers video
  https://www.twigsciencetools.com/video/early-explorers-VVNFTIBSTTAwODI3

Materials

- String or rope
- Timer

Instructions

1. Think about the following questions and make notes.
    - What is longitude?
    - How did early explorers calculate their longitude?
    - Why do we use the term "knots" to refer to the speed of boats?

2. Play the Early Explorers video.

3. Answer the following questions in complete sentences.

    - What was one of the biggest challenges facing early explorers?

    - What method did they use in the 15th century for estimating speed and longitude?

    - What three pieces of information are used in dead reckoning?

    - How did sailors measure how fast their ship was traveling?

    - What was the name of the timekeeping instruments used by early explorers?

4. Follow the instructions below to complete the Knots per Seconds activity.

    1. Find a timer— a cell phone or kitchen timer.

    2. Find a length of rope or string—tie knots at evenly spaced intervals.

    3. Go out in the yard, or find a large enough area for you to move around in. Mark a starting point on the ground and lay the rope end on it.

    4. Set the timer to 10 seconds—hold the other end of the rope and walk forward from the starting point for 10 seconds.

    5. Count the number of knots that you have passed from the starting point. Divide the results by 10 to calculate walking speed in “knots per second.”

    6. Complete activity sheet below.

Speed in knots:		
How did you come by these results?		

What Features Does A Map Need?

You will watch a video about how a map can be used to plan a day at a theme park, and then plot a route on a map.

You will:

Be able to use a map to plot a route around a theme park, and identify what features make a map easier to understand.

You will use:

Digital

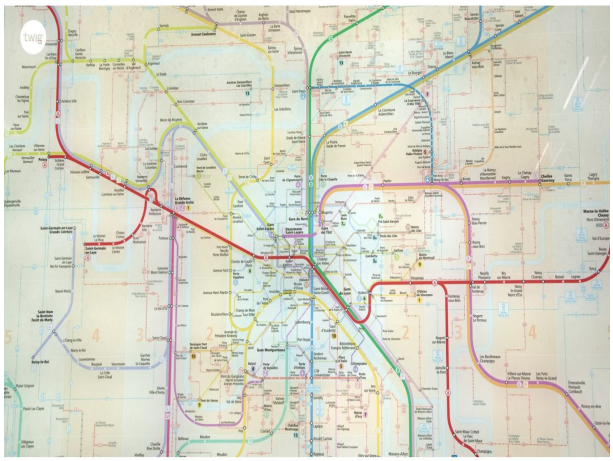
- Day Out at a Theme Park video https://www.twigsciencetools.com/video/day-out-at-a-theme-park-VVNFTlBSTTAwNzk1

Materials

- Pencils

Instructions

1. Think about the following questions and make notes.
    - What is a map scale?
    - Why are maps not to scale?
    - How do you know the scale of a map?
    - How do you use the scale on a map?



Some maps are not drawn to scale in order to make them easier to understand.

2. Play the Day Out at a Theme Park video.

3. Answer the following questions in complete sentences.

    - Why are the Lopez family using a map at the theme park?

    - Was the theme park map drawn to scale?

    - What makes theme park maps easy to read and understand?

    - Why do you think the theme park map on the next page isn't drawn to scale?

    - What other information could be added to the map to make it more useful?

4. Using the map on page 28, select four attractions that you would want to visit if you were at the theme park.

   Draw a star next to each of the attractions, and then plot a route around the theme park that allows you to visit them all. You must include lunch at the food court and a trip to the restrooms.

   Label the following:

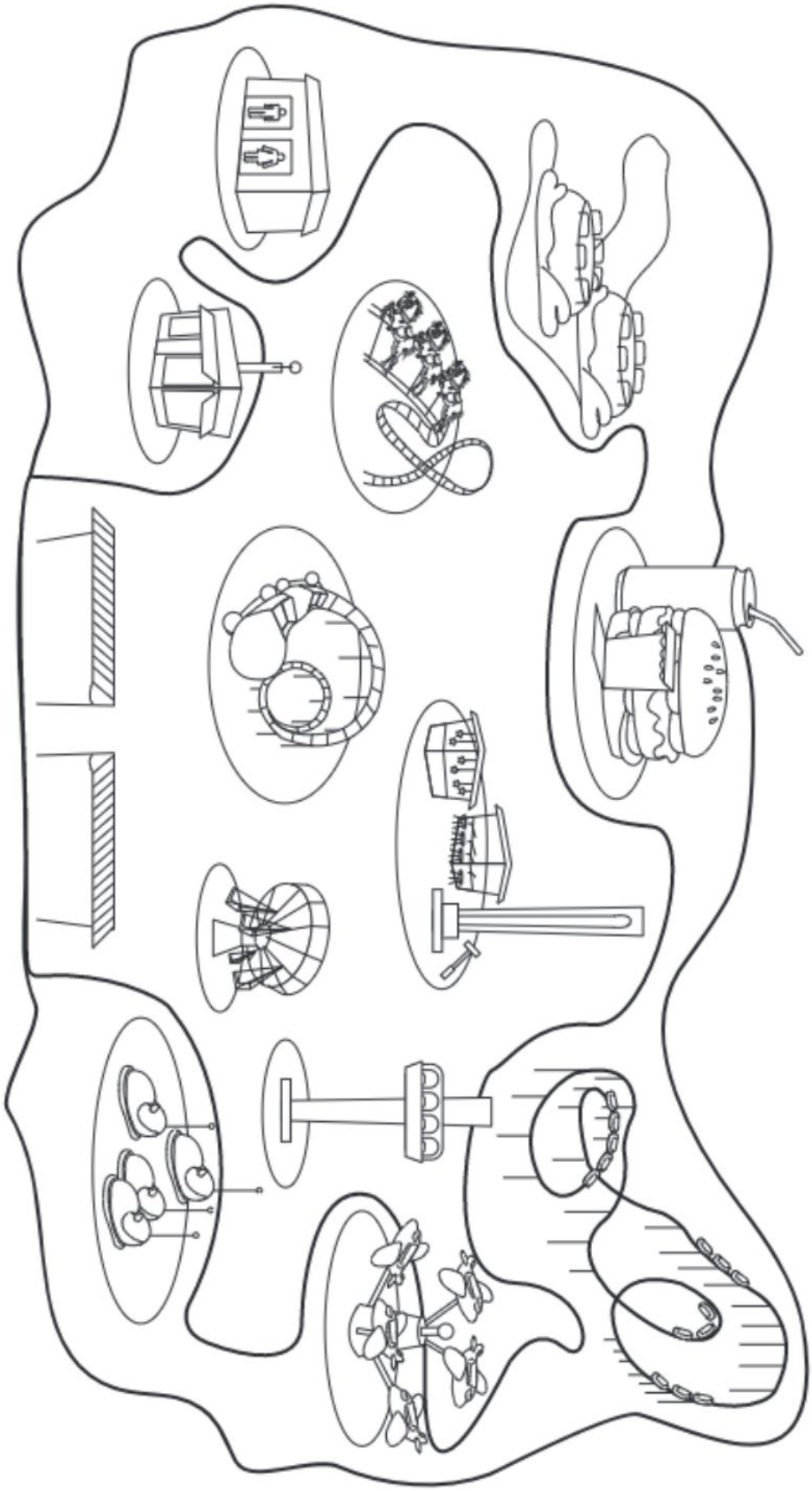
   - entrance
   - exit
   - name of each attraction

   Make a key to show what the following symbols mean:

   - restrooms
   - information point

   Add any additional useful information to the map:

   - benches
   - water fountains
   - stroller stations
   - handicap entrances
   - souvenir stand



What are Potential Energy Stores?

You will consider what potential energy stores are, watch a video about how a windup radio works and why it is useful in remote parts of the world, and then create a mind map of activities that require potential energy stores.

You will:

Understand that potential energy can be stored and then used later in a number of different ways.

You will use:

Digital

- Wind-up Radio video
  https://www.twigsciencetools.com/video/windup-radio-VVNFTlRXRTIwMDUy

Instructions

1. Think about the following questions. Make notes below.
    - What is an energy store?
    - How can potential energy be stored?
    - Why is it useful to store potential energy?
    - What are some examples of potential energy stores?

2. Play the Wind-up Radio video.

3. Answer the following questions in complete sentences.

    - What is it in batteries that produces the electrical energy needed to power a machine?

    - What happens to batteries when the chemicals are used up?

    - Why is this a problem for people in remote parts of the world?

    - Who invented the world's first wind-up radio?

    - What does a wind-up radio use instead of a battery?

- How does this mechanism transfer energy?

- What energy transfers happen to make the wind-up radio work?

What Are the Pros and Cons of Different Energy Sources?

You will watch a video about the energy debate, and then sort cards to identify arguments for and against a number of energy sources.

You will:

Understand and be able to explain how different sources of energy affect the environment.

You will use:

Digital

- Energy Debate video
  https://www.twigsciencetools.com/video/energy-debate-VVNFTlRXRTIwNTk4

Instructions

1. Think about the following questions. Make notes below.
    - What are nonrenewable energy sources?
    - What are renewable energy sources?

- What nonrenewable energy sources are used to generate electricity?

- What renewable energy sources are used to generate electricity?

2. Play the Energy Debate video.

3. Answer the following questions in complete sentences.

    - Why is burning nonrenewable fossil fuels, such as coal and natural gas, harmful to the environment?

    - Why are renewable energy sources, such as wind power, solar power, and hydroelectric power, less efficient?

- What other environmental risks are posed by nonrenewable energy sources?

- Which will run out first, nonrenewable or renewable energy sources? Explain your answer.

The Energy Debate Card Sorting Activity

You will sort cards, and consider arguments for and against nonrenewable and renewable energy resources.

You will:

Understand the advantages and disadvantages for both nonrenewable and renewable energy resources.

You will use:

Materials

- Energy Sources Cards https://www.twigsciencetools.com/activity-sheet/energy-sources-cards-VVNFTkZJTEUwMzgyMg==
- Scissors

Instructions

1. Look at the Energy Sources Cards. Use scissors to cut out each card.

   The cards have the names of different types of energy sources, renewable and nonrenewable labels, and two arguments for and two arguments against each energy source.

2. Start by separating the cards that have the energy sources written on them. You should then decide whether each is a renewable or nonrenewable energy source.

3. Sort the cards so that each energy source has a nonrenewable or renewable label, and two arguments for its use and two arguments against its use.

   Think about the following questions.

   - How does the energy source generate electricity?
   - Where does the energy source come from?

- Is it a renewable or nonrenewable energy source?
- What are the arguments for using the energy source?
- What are the arguments against using the energy source?

HYDROELECTRIC POWER	Constant flow of water provides constant source of energy	Cheap electricity produced once built	Requires a lot of land and may require river to be re-routed	Damage to existing habitats through flooding to build reservoir
BIOMASS	Sources (plants, waste) readily available	Can often be used where fossil fuels are used (e.g. in cars, power stations)	Often requires fossil fuels to produce it (e.g. in harvesters and other machinery)	Land used to produce it may be taken from other purposes (such as forests or food crops)
FOSSIL FUELS	Efficient at producing electricity	Produce relatively cheap electricity	Produce carbon dioxide (CO_2) when burned – contributes to greenhouse effect	Produce pollutants on land and in atmosphere
NUCLEAR POWER	Efficient at producing electricity so electricity is relatively cheap	Clean – no waste gases produced	Large amounts of waste radioactive material must be stored	Risk of radioactive material escaping into atmosphere
Renewable	**Renewable**	**Renewable**	**Renewable**	**Non-renewable**
Renewable	**Renewable**	**Renewable**	**Renewable**	**Non-renewable**

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SOLAR PANELS	No pollution produced	Sunlight is available everywhere on Earth, and especially effective in regions near the equator	Cloud cover reduces supply	Need a lot of panels to produce sufficient hot water
SOLAR CELLS	No pollution produced	Sunlight is available everywhere on Earth, and especially effective in regions near the equator	Not very efficient at present	Expensive to produce
GEOTHERMAL ENERGY	Can be non-polluting	Running costs are low so electricity cheap to produce	Can only be found in some areas where Earth's crust is thin and hot rocks are near surface	In some regions, high levels of pollutants are produced in same region as hot water
WIND ENERGY	No pollution produced	Becoming more efficient so electricity becoming cheaper	Does not provide a constant source as winds vary	May be thought of as unsightly/ugly and noisy
WAVE ENERGY	No pollution produced	Quiet and does not affect wildlife	Does not provide a constant source as waves vary	May be thought of as unsightly/ugly
TIDAL ENERGY	No pollution produced	Tides are predictable and not affected by weather	Cannot produce a lot of electricity at present	May alter water flow and affect wildlife habitats

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What are the Advantages and Disadvantages of Wind Power?

You will watch a video about wind turbines, and then research, write and present a report on how efficient wind turbines are at generating energy.

You will:

Understand the advantages and disadvantages of wind power as an energy source.

You will use:

Digital

- Wind Turbines video
  https://www.twigsciencetools.com/video/wind-turbines-VVNFTlRXRTIwNTk5

Instructions

1. Think about the following questions.
    - Is wind power a renewable or nonrenewable energy source?
    - How do we get electricity from wind power?
    - Why might wind power be unreliable?
    - What are the disadvantages of wind power?

2. Play the Wind Turbines video.

3. Answer the following questions in complete sentences.

    - How tall are wind turbines?

    - How do wind turbines work?

    - What are the advantages of wind power?

    - What are the disadvantages of wind power?

3. Imagine that you have been hired as an engineer working on a proposal to set up or not set up a new wind farm in your community.

   Your job is to write a one page report assessing how efficient wind farms are at generating electrical energy, highlighting the advantages and disadvantages of wind power. The report should conclude with a recommendation as to whether building a wind farm is a good or bad idea.

   - Paragraph 1—How wind farms work
   - Paragraph 2—Advantages of wind power
   - Paragraph 3—Disadvantages of wind power
   - Paragraph 4—Recommendation

Twig Science Reporter News Update 01/30/2020

You will watch a news story update and reflect on the story.

You will:

Reflect on scientific developments and understand their effects.

You will use:

Digital

- Twig Science Reporter News Update https://www.reachoutreporter.com/news-update/record-breaking-snow-parrots-show-kindness-and-glowing-algae/

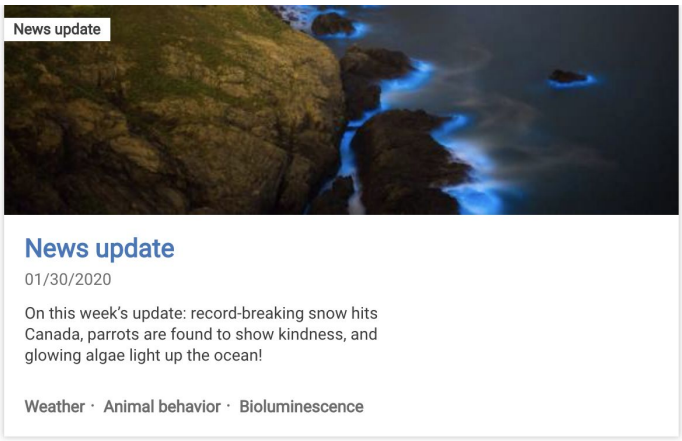
Materials

- Paper and pencil
- Optional: crayons/markers

Instructions

1. Play the Twig Science Reporter News Update.

2. Complete the Video Viewing Guide on the following page.



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Video Viewing Guide

Big Ideas	Drawings to Help Me Remember

Questions I Have

Connections to What I Already Know