WEATHER-RELATED HAZARD SOLUTION

differentiated passages

LEXILE

500L

Name: _____ Date: _____

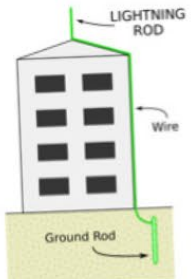
Lightning Rods

Lightning is a flash of electricity. It happens during a thunderstorm. Frozen raindrops bump into each other in thunderclouds. This builds up electric charges. Charges from the cloud and the ground connect. A lightning strike occurs. Lightning usually strikes the tallest object. It can also strike the same spot more than once.

Lightning Strike

One hazard is lightning hitting buildings. Lightning heats the air. This means it can cause a fire. It can flow through metal pipes found in plumbing. Lightning can also go through electrical wires. It can break expensive equipment.

Lightning rods are one solution to stop damage. They are attached to the tops of buildings. Lightning rods are metal. These rods are connected to a wire system. That system runs all the way to the ground. Lightning rods give lightning a safe path to travel. The ground absorbs the electric charge. The building is protected.



Lightning Rod Diagram

Lightning rods must be put in by trained people. Rods that aren't put in correctly can bring risks. Lightning rods can also have a high cost. They don't take up much space, though. They are one good idea for protecting against lightning.

Lightning Rods Questions

...ribe the problem and solution described in the ...cle.

Solution

...nefit from this solution? What data do scientists need to ...here.

...solu... ...s solution is effective at solving ...

...text to support your answer.

MagiCORE

3rd Grade NGSS 3-ESS3-1

ABOUT LEXILE LEVELS

MagiCore is a certified Lexile® Partner. These texts are officially measured and approved by Lexile and MetaMetrics® to ensure appropriate rigor and differentiation for students.

The Lexile Framework® for Reading measures are scientific, quantitative text levels. When the Lexile of a text is measured, specific, measurable attributes of the text are considered, including, but not limited to, word frequency, sentence length, and text cohesion. These are difficult attributes for humans to evaluate, so a computer measures them.

Common Core State Standards uses Lexile level bands as one measure of text complexity. Text complexity ranges ensure students are college and career ready by the end of 12th grade. Lexile measures help educators scaffold and differentiate instruction as well as monitor reading growth.

Grade Band	Lexile® Bands Aligned to Common Core Expectations
K-1	N/A
2-3	420L-820L
4-5	740L-1010L
6-8	1185L-1385L

Keep in mind when using any leveled text that many students will need scaffolding and support to reach text at the high end of their grade band. According to Appendix A of the Common Core Standards, "It is important to recognize that scaffolding often is entirely appropriate. The expectation that scaffolding will occur with particularly challenging texts is built into the Standards' grade-by-grade text complexity expectations, for example. The general movement, however, should be toward decreasing scaffolding and increasing independence both within and across the text complexity bands defined in the Standards."

Weather-Related Hazard Solution

3rd grade

Table of Contents

Each passage set includes two differentiated passages on a third-grade level (one at the beginning of the band, one towards the end) and a question set geared towards comprehension and science mastery. The first question is differentiated to include a fill-in-the-blank diagram (lower complexity) or an open-ended diagram (higher complexity).

How to Use This Resource

This resource was created with the NGSS Science Standards in mind. It includes seven differentiated passages aligned to the following standard:

3-ESS3-1: Weather-Related Hazard Solution

Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard. (Cause and Effect)

Clarification Statement: Examples of design solutions to weather-related hazards could include barriers to prevent flooding, wind-resistant roofs, and lightning rods.

Assessment Boundary: None

Here are some suggestions for using these passages:

- Use as independent work after you have taught an overview of this standard. Assign the different levels based on the passage students can read and comprehend independently.
- Use as a reading center to reinforce key comprehension and science concepts at the same time!
- Use as a homework or review packet.
- Use as an intervention for students who need to revisit science concepts.

480L

Name: _____ Date: _____

Amphibious Homes

The most common natural **hazard** is flooding. Water flows onto the land. It covers places that are usually dry. Storms often cause floods.

Flooded house

Floods can bring lots of damage. Homes can be destroyed. People are often moved to safer places. Drowning is possible. Diseases can also spread. This happens when extra water just sits on the land. It's often hard to get help to people in flooded areas.

We can't get rid of floods. We can be better prepared for them, though. Scientists study patterns in **weather** and **climate**. They are able to find areas in danger of flooding.

One **solution** is building **amphibious** homes. These homes rest on the ground. They rise up when there is a flood. The house floats like a boat. The house lowers back to the land once the waters are gone. These homes cost more than regular houses. It's worth the extra money for people living in flood areas.

There are a few bad sides to these homes. Owners don't have control over the house rising. The house may not stay level when it rises. The system that makes the house float must also be checked often. These homes are still a smart solution.

The number of floods is growing. They are getting stronger, too. Building different kinds of homes is one way to help. Living in areas where floods occur would be less risky.

Amphibious Homes Questions

1. Use the chart below to describe the problem and solution described in the article.

Problem	Solution
The most common natural hazard is flooding. It can damage and even destroy homes.	

2. What kinds of areas would benefit from these types of homes? What data do scientists need to track? Describe the weather there.

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3. What are the downsides to this solution? Do you think the solution is effective at solving the problem? Why or why not? Give examples from the text to support your answer.

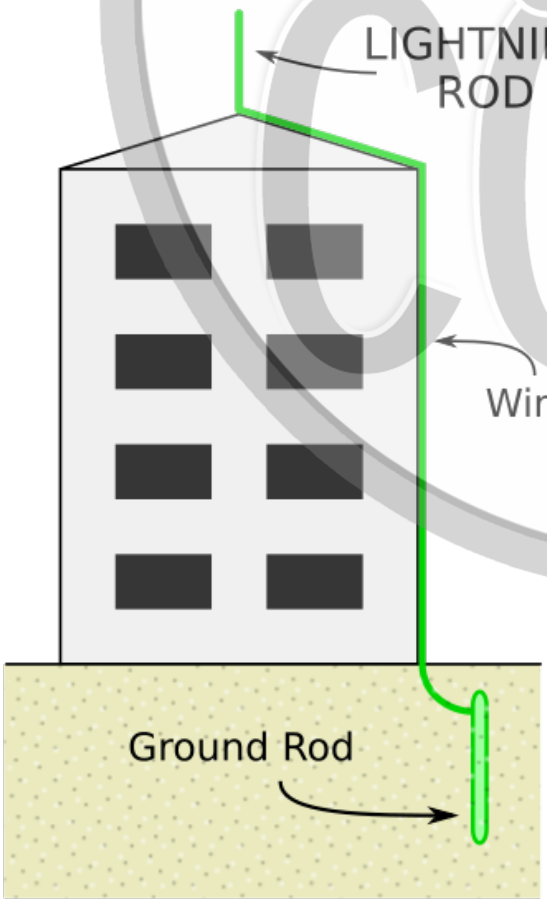
790L

Name: _____ Date: _____

Lightning Rods

According to the National Weather Service, more than 23 million cloud-to-ground lightning strikes occur in the United States each year. Lightning is a flash of electricity that happens during a thunderstorm. Frozen raindrops bump into each other in thunderclouds. This builds up electric charges. Positive charges form at the top of the cloud. Negative charges form at the bottom. A positive charge also builds up on the ground beneath the cloud. When charges from the cloud and the ground connect, a lightning strike occurs. It travels at the speed of light (186,000 miles per second). Lightning usually strikes the tallest object, but this isn't always the case. Lightning can also strike the same spot more than once.

Lightning Strike



Lightning Rod Diagram

One **hazard** of concern is lightning striking buildings. Lightning heats the air it passes through to 50,000°F. That temperature is hotter than the surface of the sun! This means a bolt of lightning can cause a fire when it strikes a building. It can flow through metal pipes found in plumbing. Lightning can also travel through electrical wires. A power surge from a lightning strike has millions of **volts**. It's capable of frying expensive electronic equipment with that much power.

Lightning rods are one **solution** to prevent damage caused by a lightning strike. Lightning rods are metal rods attached to the tops of buildings. They are made of metals that **conduct** electricity such as copper. These rods are connected to a wire system. That wire system runs all the way to the ground. Lightning rods don't stop lightning strikes. Instead, they give the lightning a safe route to travel. The ground absorbs the powerful electric charge. The building is protected from a direct lightning strike and the dangers it can bring.

Lightning rods must be installed by professionals. Incorrectly grounded rods can bring risks beyond those caused by lightning strikes. This solution can also be costly. Lightning rods can be customized to specific buildings, though. They also don't take up much space. That makes them an attractive option for protecting against lightning strikes.

Lightning Rods Questions

1. Use the chart below to describe the problem and solution described in the article.

Problem	Solution

2. What kinds of areas would benefit from this solution? What data do scientists need to track? Describe the weather there.

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3. What are the downsides to this solution? Do you think the solution is effective at solving the problem? Why or why not? Give examples from the text to support your answer.

500L

Name: _____ Date: _____

Levees

Hurricanes are powerful storms. They have high winds. Warm, moist air rises over the water. Cooler air then takes its place. Storm clouds form as the air circles over the water. They grow until a hurricane forms. Wind speeds can be between 75 to 200 miles per hour.

Aerial view of a hurricane

Rain, winds, and waves come with a hurricane. **Storm surges** can be the most damaging part. A storm surge pushes water onto the land. It causes flooding. Flooding destroys buildings. It ruins animal habitats. It kills people and wildlife. Beaches get worn down. Most of the problems during a hurricane happen due to flooding.

Hurricanes are predictable. **Meteorologists** warn people. These people can then prepare. They can leave the area before the hurricane hits. This doesn't save their homes, though. **Levees** are one **solution**. They have worked in the Netherlands. They held back the North Sea. Builders want to bring levees to the United States.

Levee at a beach in France

A levee is a wall. It keeps water from going where it isn't wanted. A levee keeps storm surges from dumping water onto the coast. Natural levees are made of earth. Banks along the water hold it back. Levees made by people are built by piling up soil, sand, or rocks. They may also be made of wood or plastic. Sometimes metal or concrete is used.

Levees do a good job of protecting the coast... when they work. Flooding can still occur if they break. The water may then head on a more dangerous path. The best systems use levees with other structures such as gates.

Levees Questions

1. Use the chart below to describe the problem and solution described in the article.

Problem	Solution
Hurricanes can cause storm surges and flooding that destroys homes and habitats.	

2. What kinds of areas would benefit from this solution? What data do scientists need to track? Describe the weather there.

---

3. What are the downsides to this solution? Do you think the solution is effective at solving the problem? Why or why not? Give examples from the text to support your answer.

490L

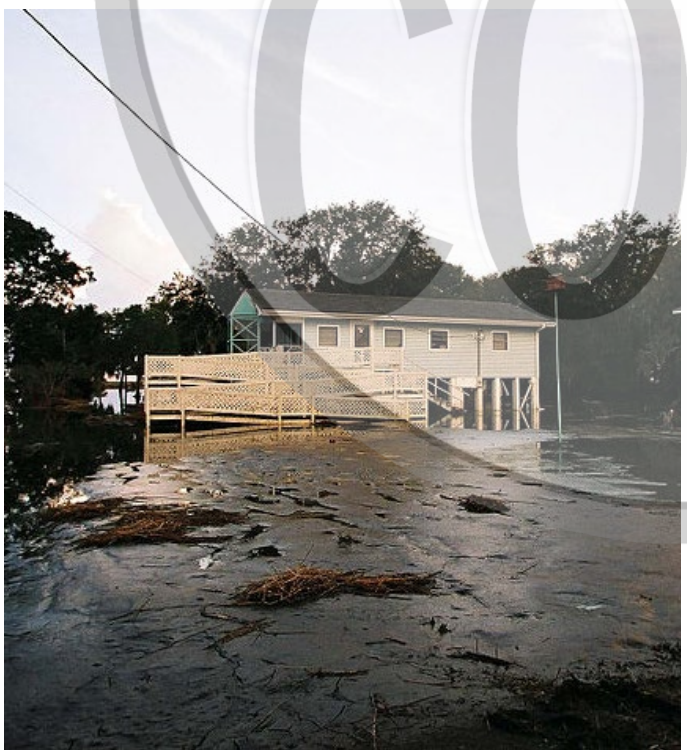
Name: _____ Date: _____

Stilt Houses

Many people can't resist living near the ocean. They love looking at the water. The sound of the waves relaxes them. The climate is perfect for enjoying the beach. This makes people want to build homes near the water. The only trouble is that sometimes the coasts can be dangerous.

Stilt house on beach in California

Storms such as **hurricanes** often beat up the coastline. Rains pound the land. Winds rip through the area. Waves crash onto the shore. They send water gushing where people have built their lives. These storms cause destruction when they hit. Areas get damaged by the wind, rain, and flooding. Human and animal lives are often lost. Hurricanes can be predicted. They can't be stopped, though. What people can do instead is plan.



House that avoided hurricane damage because of stilts

One **solution** is building **stilt** houses. These homes are raised off the ground. The house is built on top of support stakes called piles. These are made from wood. The wood is **resistant** to water. They are driven right into the water or land. Concrete is often poured around the piles for added support. A deck is made on top of the piles. The house is built on the deck. Stilt houses usually rest 10-12 feet off the ground. This allows for high tide. They are designed to avoid water damage.

Stilt houses have many **benefits**. They are easy to construct. These houses can be built in places where other houses can't. Being higher off the ground keeps the house safe from more than just flooding. Unwanted animals are kept out. Air can flow under the house. This keeps the house cooler in hot climates. It also allows the house to take wind gusts. A stilt house is up higher. It can offer owners a better view.

Professionals must be hired to build these homes. Support problems might happen if they aren't built correctly. The right materials also need to be used. These will prevent water damage and cracking. The heights of the pilings must be right, too. Stilt houses are one way for people to enjoy living on the coast.

Stilt Houses Questions

1. Use the chart below to describe the problem and solution described in the article.

Problem	Solution
Houses on the beach have to stand up to wind, waves, and flooding from storms.	

2. What kinds of areas would benefit from this solution? What data do scientists need to track? Describe the weather there.

---

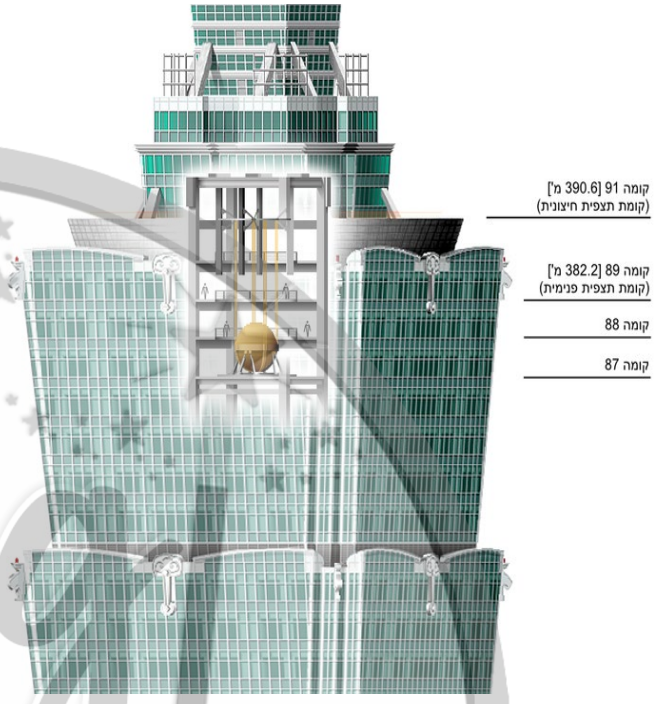
3. What are the downsides to this solution? Do you think the solution is effective at solving the problem? Why or why not? Give examples from the text to support your answer.

750L

Name: _____ Date: _____

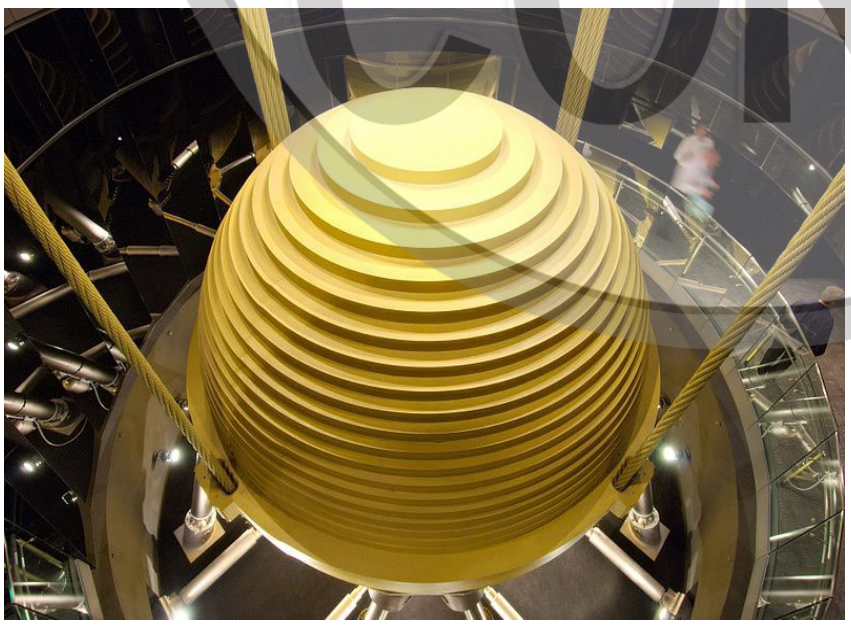
Tuned Mass Dampers

Earthquakes shake the surface of Earth. The Earth's crust is made of pieces called **plates**. These plates shift and move. Sometimes they crash into each other or pull apart. When they do, an earthquake happens. Earthquakes usually occur along fault lines where there are cracks in the Earth's crust. One of the largest fault lines in the world is the San Andreas fault in California.



Drawing of the tuned mass damper in Taipei 101

The ground shaking during an earthquake causes damage. Buildings and bridges can collapse. Services such as gas and electricity can be affected. **Landslides** and **avalanches** can be triggered by earthquakes. Floods, **tsunamis**, and fires are also possible. All of this has the potential to destroy the areas where the earthquake took place. People lose their homes, businesses, and sometimes their lives. Scientists can measure earthquakes after they happen with a **seismograph**. They also know that earthquakes are more likely to happen along fault lines. Scientists can't, however, predict *when* an earthquake will occur.



Earthquakes don't stop people from living and working in areas that are more likely to get hit. In fact, some fault line areas are under big cities. These cities are full of people and buildings. One **solution** to creating **skyscrapers** that won't fall during an earthquake is a tuned mass damper. A tuned mass damper is a device mounted in a building. It prevents swaying due to wind or an earthquake. It is usually a heavy concrete block. This block moves in the opposite direction of the building's sway. It acts like a **pendulum** and creates balance. Tuned mass dampers make the tall building more stable.

Buildings all over the world have tuned mass dampers. One skyscraper, Taipei 101, in Taiwan has one. It hangs between its 87th and 92nd floors. The damper weighs 728 tons. If there are high winds or an earthquake, the tuned mass damper moves to reduce the risk of damage to the building. The damper in Taipei 101 was put to the test in 2005 with a wind gust of 145 miles per hour. The building survived the high winds.

Tuned mass dampers are heavy. They need a big area to move in. Some opinions state they are too sensitive to movement. This may cause them to wear down and need replacing too frequently. They are, however, one possibility in keeping buildings and people safe in the event of an earthquake.

Tuned Mass Dampers Questions

1. Use the chart below to describe the problem and solution described in the article.

Problem	Solution

2. What kinds of areas would benefit from this solution? What data do scientists need to track? Describe the weather there.

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3. What are the downsides to this solution? Do you think the solution is effective at solving the problem? Why or why not? Give examples from the text to support your answer.

760L

Name: _____ Date: _____

Tornado Proof Homes

Tornadoes are a type of storm. They usually develop during a thunderstorm. When warm, wet air from Mexico meets cold, dry air from Canada, an environment ready for tornadoes is created. Powerful winds rotate and form a column. This column reaches down from a cloud to the ground. Tornado winds are the strongest on Earth. They can reach speeds of 300 miles per hour. Some tornadoes only last for a few seconds. Others can travel for miles and last up to fifteen minutes. Tornadoes can happen almost anywhere in the world. The United States has the most tornadoes each year. They are common in an area known as Tornado Alley in the Great Plains region of the country.

Tornado damaged building

The damage a tornado can cause is extensive. They can flatten houses and other buildings. Heavy objects such as cars can get thrown into the air. Trees can be uprooted. Broken glass and other trash get whipped around by the strong winds. Tornadoes can also dig up the earth. They can strip asphalt from roadways. Human lives are sometimes lost when tornadoes hit an area.

The intense nature of tornadoes makes them difficult to study. Scientists are able to warn people if tornadoes are possible in an area, though. Tornado watches are issued if conditions are likely to result in a tornado. Once a tornado is actually spotted, the watch then becomes a warning. Ordinary citizens are often the first to see a tornado and report it. People need to listen to the watches and warnings. They have to take shelter in places such as basements that won't be destroyed by the violent winds. Another possible **solution** to handling tornado damage is to build a tornado-proof house.

Tornado-proof houses use materials that are less likely to be damaged in a tornado. Most houses today are built with frames made of wood that sit on a cement foundation. This wood frame is not strong enough to withstand tornado winds. They are easily torn to shreds when a tornado hits. Some building companies suggest making houses with sturdier materials. One such material is **insulated** concrete forms, or ICFs. Blocks made of plastic foam are stacked to form the outer walls of a house. These blocks are then made stronger with steel. Finally, they are filled with solid concrete. This system creates a strong shell that will protect the house from total destruction in a tornado. Windows may still break, and roofs might need repairing. The basic structure of the house will still be intact, though. ICFs also give a house added insulation. This makes the house more **energy efficient**.

It may cost more to make a house with ICFs. This a more attractive option, however, than building houses completely underground. If people want to live in areas where tornadoes are possible, tornado proofing can keep them safer.

Home being built with ICFs

Tornado Proof Homes Questions

1. Use the chart below to describe the problem and solution described in the article.

Problem	Solution

2. What kinds of areas would benefit from this solution? What data do scientists need to track? Describe the weather there.

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3. What are the downsides to this solution? Do you think the solution is effective at solving the problem? Why or why not? Give examples from the text to support your answer.

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