READING MATERIAL

Read About Extreme Weather

DEFINITION OF EXTREME WEATHER

Extreme weather is any weather that falls outside of normal patterns. This includes heavy winds, thunderstorms, floods, heat waves, tornados, hurricanes, hail, and blizzards.

To better understand the different types of extreme weather...

LET'S BREAK IT DOWN!

Extreme weather is a result of natural processes.

All over the globe, weather is something people experience every day. However, there are some types of weather that are so intense that they deserve special mention. This type of weather is known as **extreme** weather.

Extreme weather causes a lot of damage. Unfortunately we can't eliminate this natural hazard, but we can reduce its impact. One way to lessen the impact is by being prepared.

For example, based on data collected over centuries, we know that the period of time between June 1st and November 30th of each year is when hurricanes are expected to develop in the Atlantic Ocean.

So each year, the people that live near the coast know they should get prepared. Also, engineers develop solutions to protect us from extreme weather, such as with new building methods or inventions to help lessen the damage.

Engineering solutions for coastlines.

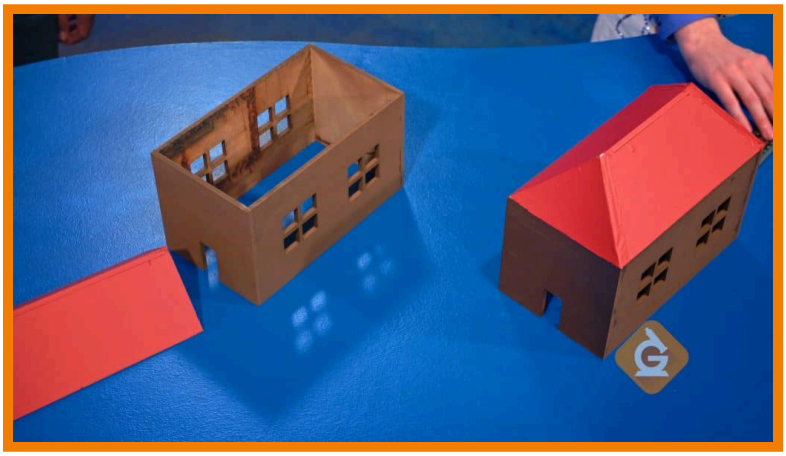
Coastal areas experience high waves from extreme weather events such as hurricanes. There are several techniques engineers use to protect coastal areas from flooding or erosion.

Seawalls are concrete walls built along beaches that experience large waves. These physical barriers can block water and prevent flooding as water rises up from storms near the coast.

Seawalls with a curved surface, known as recurved walls, not only block waves but also send waves back out toward the ocean.

Engineers have found that recurved walls are one of the more effective ways to reduce flooding on the coast. Another way to protect against flooding is to construct buildings on stilts or on top of garages to keep water from entering homes.

Engineering solutions for high winds.



Engineers have designed homes with roofs that can stand up to high winds. It is well-known that gable roofs do not hold up well in high winds.

Gable roofs have sides that are straight up and down. When wind hits a gable roof, the wind can push directly against its surface. The force of the wind against the flat roof may push the roof completely off a home.

Engineers recommend a different kind of roof for areas that receive high winds, called a *hip roof* which has sides that are all slanted up. Instead of the wind pushing directly against the side, it

gets deflected up.

Engineering solutions for lightning.

Benjamin Franklin, a founding father of the United States, is famous for using a lightning rod. He wanted to capture electricity to better understand it. He discovered that lightning is electricity moving through the air. When lightning strikes homes, it can damage homes and appliances. We can't prevent lightning, but we can direct its energy into the ground to prevent an electrical surge, which can damage electronics. Lightning rods are made of metal and used to transfer the energy of a lightning bolt to the ground through wires. This directs the electricity through the rod and then straight to the ground, instead of through the building.

Engineering solutions for tornadoes.

Tornadoes are columns of air that spin violently. Tornado winds can reach up to 300 miles per hour, which is strong enough to destroy houses and make trees fly. Engineers are coming up with ways to reduce their destruction. For example, they have developed special building panels that can withstand the winds of a tornado.

EXAMPLES OF EXTREME WEATHER

Special building panels can withstand the winds of a tornado. They can be used to build a safe room in your home. So even if a tornado destroys the house, the room will be intact.

Painting over roads with reflective white paint is one strategy to lower temperatures on paved surfaces. This is one way to lessen the impact of high heat in urban areas.

Tornado Alley stretches from Texas to North Dakota. This area of the United States is known for having more tornadoes than any other area.

EXTREME WEATHER & SOLUTIONS VOCABULARY

Extreme Weather	Any weather that falls outside the realm of normal patterns.
Patterns	A series of repeating events.
Engineering Solutions	New inventions and building methods that can help reduce the effects of extreme weather.
Gable Roof	A type of roof in which two sides form an "A" shape.
Hip Roof	A type of roof in which ALL sides slope down.
Lightning Rod	A metal rod mounted on or near a building that protects it against electrical surges. It redirects the electrical energy into the ground.

EXTREME WEATHER & SOLUTIONS DISCUSSION QUESTIONS

Can extreme weather be predicted? Explain.

Sometimes. By looking at patterns of where and when different types of extreme weather occurred in the past, we can predict the most likely times and places it will occur again. For example, we know that hurricane season in the Atlantic Ocean occurs each year between June and September because that's when hurricanes have hit that area in the past. However, predicting exactly when a tornado will touch down is very difficult.

How can predicting extreme weather reduce its impact?

By knowing when, where and what kind of extreme weather might occur, people can be prepared and hopefully reduce the impact when an event does happen.

What different types of solutions for flooding did the team test out with the water wave machine and how was each designed to address the problem of flooding?

Dr. Jeff, Izzy and Zoe tested out a high sea wall to block more water from coming over, rocks to slow the speed of the water by spreading out the energy of the waves and a recurved wall which redirected the energy of the wave back out to sea.

What evidence did the team find that some engineering solutions for flooding might work better than others?

Dr. Jeff, Izzy and Zoe tested three possible solutions to reduce flooding using the water wave machine. The evidence that helped them determine which worked best was the amount of water that flooded the area representing land. Without any barrier, they collected over 1000 mL of water. The high sea wall was better, but 300 mL was collected. With the rocks, only 100 mL flooded and even less water flooded with the recurved wall.

What evidence did the team find to support the idea that the shape of a roof can reduce the impacts of high winds?

Dr. Jeff, Izzy and Zoe built models of two types of roofs and tested them using a powerful air blower to represent strong winds. They observed what happened when testing their models. They saw that hip roofs, which have angled ends, stand up better to strong winds than gable roofs, which have flat ends.

What evidence did the team find to support the idea that metal rods placed alongside a house and into the ground can reduce the impact of lightning?

The team built models of two homes with lights on inside. One house had a lightning rod and the other did not. They then simulated a lightning strike on both houses. The evidence they found to support that lightning rods reduce the impact of lighting is that the lights stayed on in the home with the lightning rod. In the house without the lightning rod, the lights were blown out.