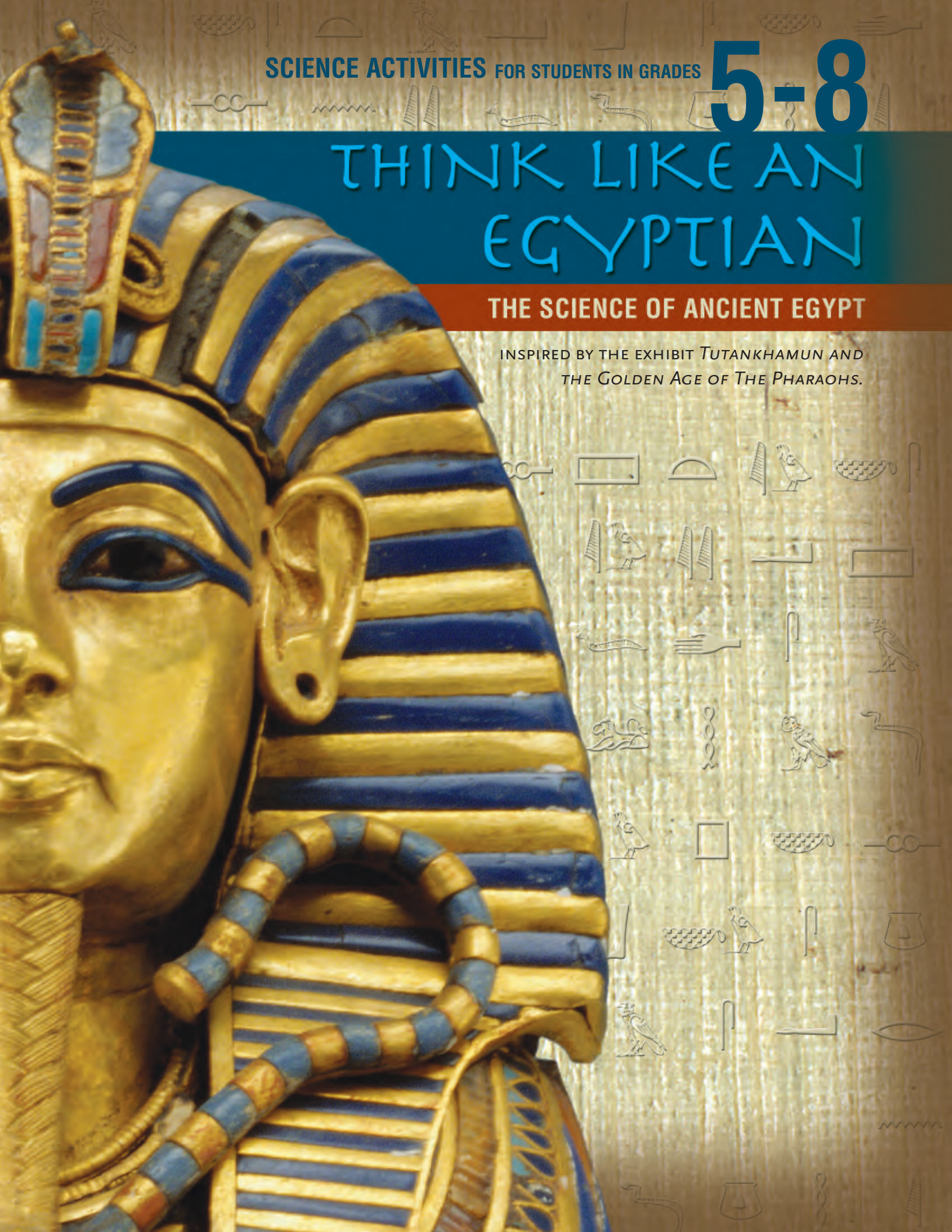


SCIENCE ACTIVITIES FOR STUDENTS IN GRADES 5-8

THINK LIKE AN EGYPTIAN

THE SCIENCE OF ANCIENT EGYPT

INSPIRED BY THE EXHIBIT *TUTANKHAMUN AND THE GOLDEN AGE OF THE PHARAOHS.*

HIEROGLYPHICS

Hieroglyphic writing first began around 5,000 years ago. Egyptians wrote in hieroglyphs up to about 400 AD. Hieroglyphs are like word pictures. There are more than 2,000 hieroglyphic characters.

It has been almost 2,000 years since people used hieroglyphics to communicate. So how do we know how to read the characters? In 1799, in a town in Egypt called Rosetta, a soldier unearthed a large black stone. The stone came to be known as the Rosetta Stone because of where it was found. On the stone, there were three different types of writing that seemed to say the same thing and one was definitely Greek. Even though people could read the Greek words, many years went by before anyone could understand the hieroglyphics. Finally, in 1822, a Frenchman named Jean François Champollion cracked the code.

The Rosetta Stone is 114.4 centimeters high, 72.3 centimeters wide, and 27.9 centimeters thick. It weights approximately 1,676 pounds. Since 1802, the Rosetta Stone has been kept at the British Museum in London, England. If you visit the museum, you can see this incredible artifact on display.

There were a few different types of hieroglyphs. Some stood for entire words, others were used for individual sounds, and still others represented groups of sounds or syllables. Egyptians also used hieroglyphs for math.

The basic hieroglyphs are referred to as the alphabet. Egyptians used them to spell just as we use our alphabet to spell words.

The Rosetta Stone

Let's look at the hieroglyphs used for individual sounds. Sometimes, the same hieroglyph was used for different letters because they sound the same.

P  P = POP

S  W = SAW

T H  = THE

The  could be
a short "a" sound,
a short "e" sound,
or
a short "o" sound.

TRY THIS!

Try these hieroglyphic puzzles. Remember! Think about how the letter sounds when you try to decode the hidden messages. Use the symbols to fill in the blanks.

How did King Tut write his name?

Try writing "The Franklin Institute" in hieroglyphs!

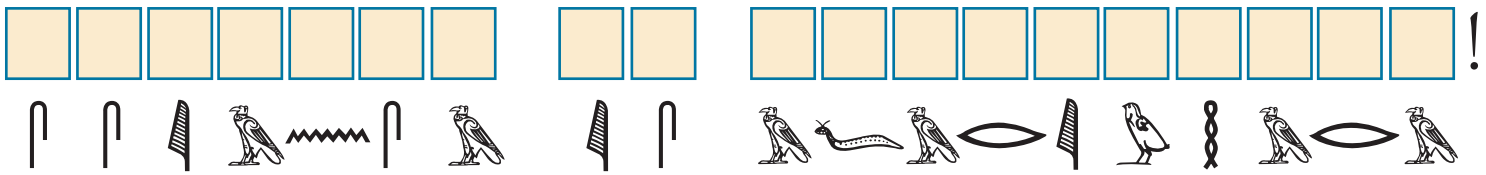
LONG SHORT SHORT SHORT
T U T A N K H A M U N

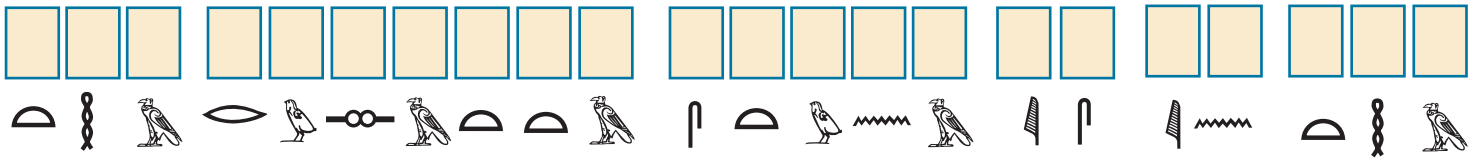
SHORT SHORT SHORT SHORT SOFT SHORT LONG SHORT
T H E F R A N K L I N I N S T I T U T E

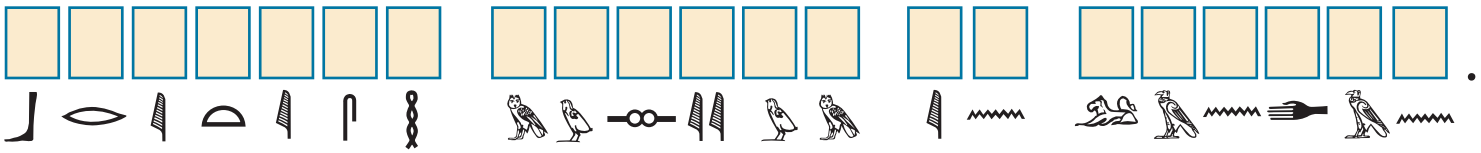
On another sheet of paper, try writing your name in hieroglyphs or use hieroglyphics to create secret messages!

 VULTURE SHORT SHORT SHORT A E O	 ARM LONG A	 LOWER LEG B	 FOLDED CLOTH SOFT SOFT C S	 BASKET WIITH HANDLE HARD C K	 HAND D	 PAIR OF REEDS LONG VOWEL E Y (LONG E)	 VIPER F V
 COBRA SOFT G J	 JAR STAND HARD G	 TWISTED WICK H	 SINGLE REED HARD VOWEL I Y Y (LONG I)	 LION L	 OWL M	 RIPPLE OF WATER N	 CHICK LONG SHORT O U W
 REED MAT P	 BASKET + CHICK Q	 MOUTH R	 DOOR BOLT SHARP S Z	 GARDEN POOL SH	 BUN T	 REED + CHICK LONG U	 BASKET + CLOTH X

Use the hieroglyphs to decode secret messages!

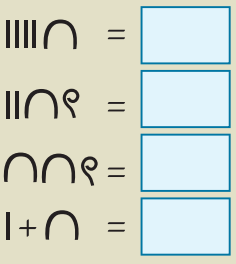


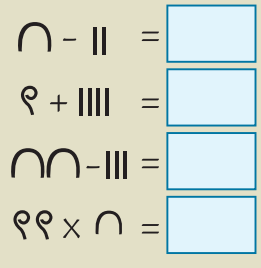


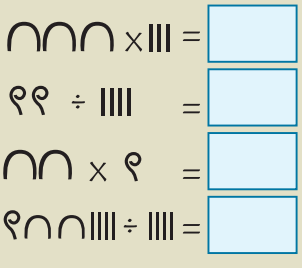


HIEROGLYPHIC MATH

 1	 10	 100







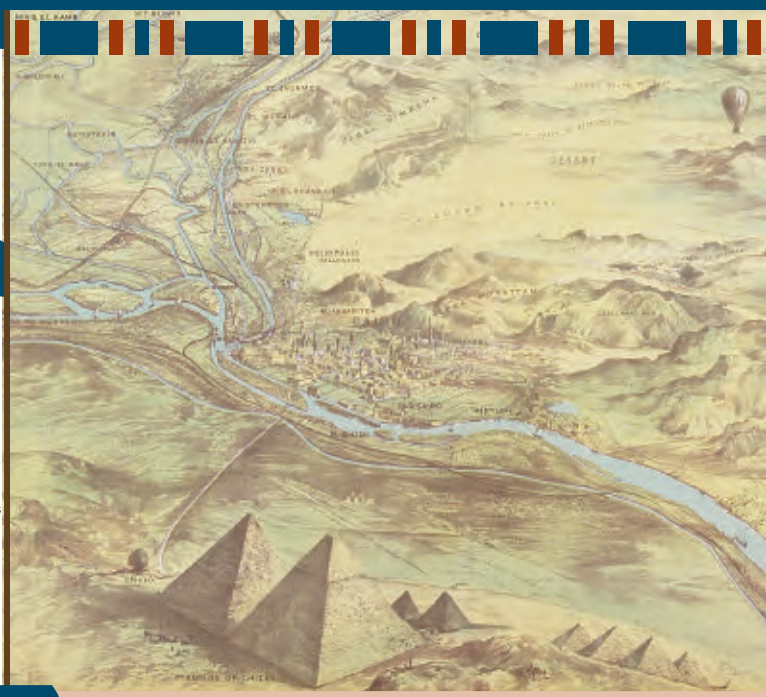
WEATHER

In ancient Egypt, life depended on the Nile River, the longest river in the world. Each year, in early summer, heavy rains came and caused the Nile to overflow its banks. The flood was very good for the soil, allowing the Egyptians to plant their crops of grains, vegetables, and fruits.

Without the rainy weather cycles, the Egyptians might not have been able to eat. It's no wonder that understanding the weather was important to them!

Understanding weather is important today, too. When we can predict the weather, we can save property and lives. Do you know how to predict the weather?

Meteorologists are people who study weather patterns. You may have seen meteorologists on television. They tell us what kind of weather to expect.



BECOME A METEOROLOGIST

How can you get started as a meteorologist?

Meteorologists study the weather by recording and analyzing data. You can get started by building your own weather station and keeping a record of your measurements. After a while, you'll notice the same weather patterns that allow meteorologists to forecast the weather.

Since weather happens outside, you'll need to use a weatherproof box to build your weather station. Find a sturdy plastic or wooden box that can be placed on its side. Before you take the box outside, attach a thermometer to the bottom of the box. Once you turn the box on its side, the thermometer will be in the back of the box, protected from direct weather conditions.

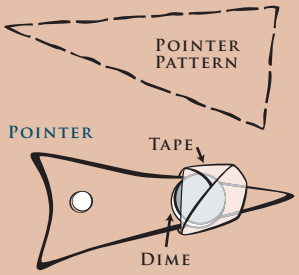
Take your box outside, and find a safe, sturdy location on the north side of the building where it's shadiest. Position the box securely beside the building, perhaps on a brick foundation. Now, you need to make some weather instruments for your station.

TRY THIS!

Make a Hygrometer

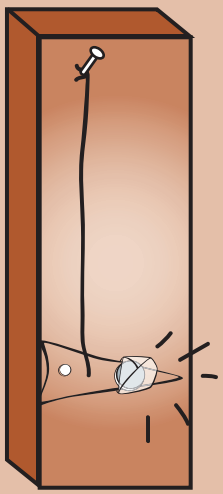
You'll need:

- a scrap piece of wood or flat styrofoam (about 9 inches long and 4 inches wide)
- a flat piece of plastic (about 3 inches long and 3 inches wide) thin enough that you can cut
- 2 small nails
- 3 long strands of human hair (about 8 inches long)
- a dime
- glue
- tape
- hammer
- scissors (strong enough to cut plastic)



First, cut the piece of plastic into a triangular shape (refer to pictures). Then, tape the dime onto the plastic, near the point. Poke one of the nails through the plastic pointer, near the base of the triangle. Wiggle the nail until the pointer moves freely and loosely around the nail. On the plastic pointer, between the dime and the nail hole, glue the hair strands to the plastic.

Position the pointer on the wood or styrofoam base about three quarters of the way down the side. (Refer to picture.) Attach the nail to the base. The pointer must be able to turn easily around the nail. Attach the other nail to the base about one inch from the top of the base, in line with the pointer. Pull the hair strands straight and tight so that the pointer points parallel to the ground. That is, make sure the point of the pointer is perpendicular to the hair. The hair should hang perfectly vertical, and the pointer should point perfectly horizontal. Glue the ends of the hair to the nail. If the hair is too long, trim the ends.



The human hair cells will indicate the level of moisture in the air by expanding and contracting. When the air is moist, the hair will expand and lengthen, making the pointer point down. When the air is dry, the hair will contract and shorten, making the pointer point up. When you make your hygrometer observations each day, you should make a mark to indicate where the pointer points. Over time, you'll be able to see the humidity patterns that will help you forecast the weather.

TRY THIS!

You'll need:

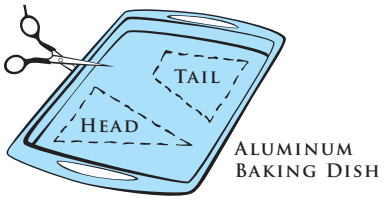
- a long wooden dowel (about the size of a broom stick)
- an aluminum pie plate
- a 12 inch long piece of wood (A sturdy ruler would work)
- nails
- a metal washer
- hammer
- glue
- small saw (or serrated knife)
- wire (for mounting)
- scissors (strong enough to cut aluminum)

Make a Weather Vane

A weather vane is also known as a wind direction indicator. The vane points in the direction from which the wind blows.

Begin with the 12 inch piece of wood. Use the small saw (or serrated knife) to cut a vertical slit at each end of the stick. The slit should be about one half inch deep. At the midpoint (exactly halfway) of the top of the stick, hammer one nail all the way through the stick. Then turn the wood around the nail several times until the stick turns easily around the nail.

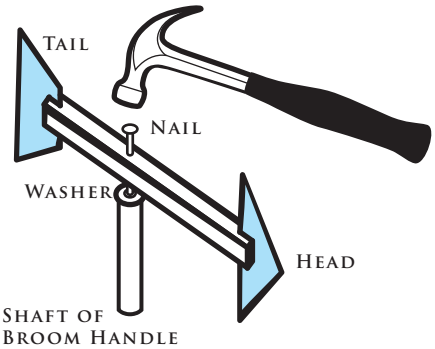
Refer to the pattern picture and cut the head and tail from the aluminum plate. Glue the head into the slot at one end of the wooden stick. Glue the tail into the other end. Allow time for the glue to dry before you take the vane outside.



Attach the weather vane to the long wooden dowel by placing the metal washer on the end of the dowel and then hammering the nail through the wooden stick and into the wooden dowel. (Refer to the picture.) Make sure that the vane moves freely and easily around the nail.

Now you are ready to mount your weather vane outside. If you mounted your rain gauge on a fence, you may want to mount your weather vane near it. Position the wooden dowel beside the fence and secure it with wire. Try to get the vane as high above the fence as you can while still keeping the dowel steady and secure.

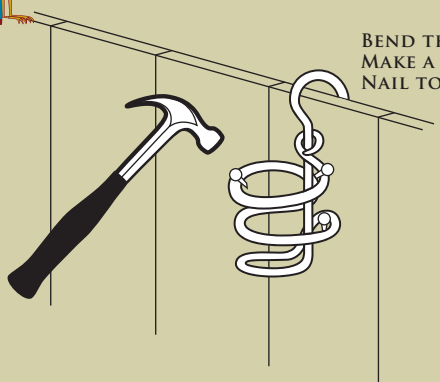
The head of the pointer will always point to the direction from which the wind is blowing. For example, if the head points to the NorthEast, then the wind is blowing from the northeast. It's as simple as that. (A common mistake is to think that the wind is blowing toward the northeast.) Record your wind direction readings in your weather journal.

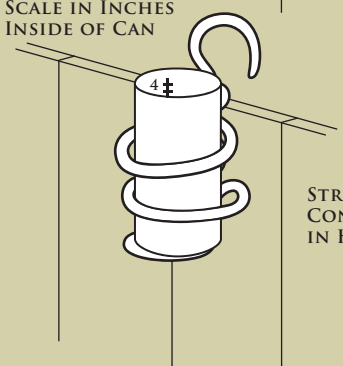


TRY THIS!

You'll need:

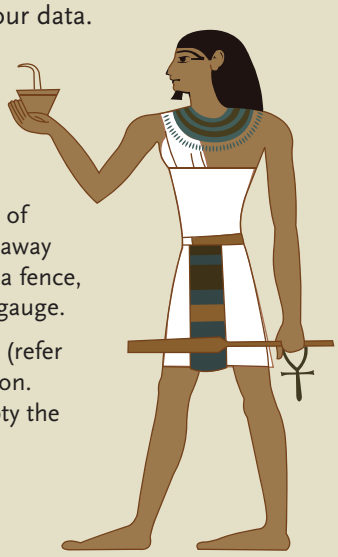
- a glass beaker (or any straight-sided glass that can be marked with a measuring scale)
- a coat hanger or wire (bent to make a holding rack-see picture)
- hammer and nails (to secure the rack)





Make a Rain Gauge

Your rain gauge needs to be kept outdoors, but not inside the weatherproof box. If it's possible, though, you may want to keep them near each other to make it easier to record your data.



Basically, any measuring glass left outside can serve as a rain gauge. However, since most rain showers are usually quite windy, you'll want to fasten your rain gauge somewhere so that it doesn't blow over. Locate a good place for your gauge. There should be nothing overhead, like trees, electric wires, or the edge of a roof. These obstructions can direct rainwater into or away from your gauge, creating a false reading. The edge of a fence, away from the building, is often a good place for your gauge.

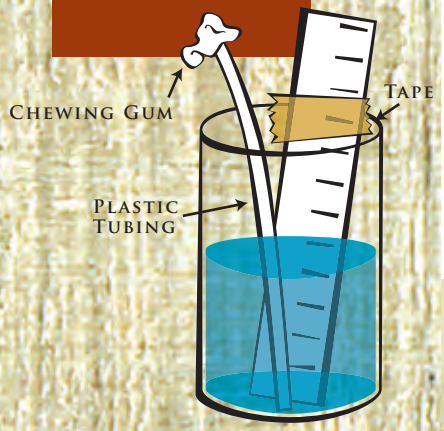
Once you have found the spot, attach the holding rack (refer to picture). Then, slip your measuring glass into position. Wait for rain, then record your measurement, and empty the glass.

WEATHER

TRY THIS!

You'll need:

- a glass or beaker with straight sides
- a ruler (12 inch)
- tape
- one foot of clear plastic tubing
- a stick of chewing gum
- water



Make a Barometer

Since barometers are very sensitive to minor changes in weather conditions, you'll want to keep the barometer indoors to get more accurate readings.

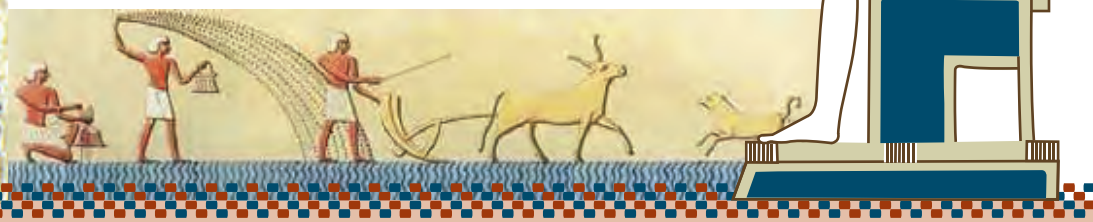
Begin by standing the ruler in the glass and holding it against the side. Tape the ruler to the inside of the glass. Make sure that the numbers on the ruler are visible.

Stand the plastic tube against the ruler in the glass. Make sure that the tube is not touching the bottom of the glass by positioning the tube up a half inch on the ruler. Secure the tube by taping it to the ruler.

Chew the stick of gum so that it is soft. While you're chewing, fill the glass about half way with water. Use the plastic tube like a straw and draw some water half way up the tube. Use your tongue to trap the water in the tube. Quickly move the gum onto the top of the tube to seal it.

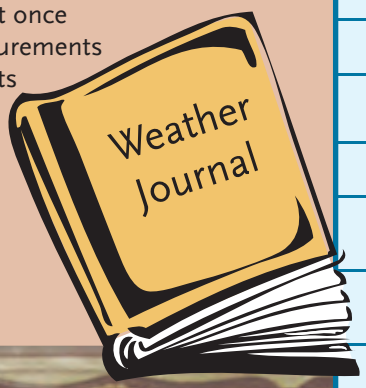
Make a mark on the ruler to record where the water level is in the tube. Each time you notice a change in the water level, make another mark. You'll notice, over time, that the water level rises and falls. Pay attention to the change in weather as the water level changes.

The water in the tube rises and falls because of air pressure exerted on the water in the glass. As the air presses down (increased atmospheric pressure) on the water in the glass, more water is pushed into the tube, causing the water level to rise. When the air pressure decreases on the water in the glass, some of the water will move down out of the tube, causing the water level to fall. The change in barometric pressure will help you to forecast the weather. Decreasing air pressure often indicates the approach of a low pressure area, which often brings clouds and precipitation. Increasing air pressure often means that a high pressure area is approaching, bringing with it clearing or fair weather.



KEEP A WEATHER JOURNAL

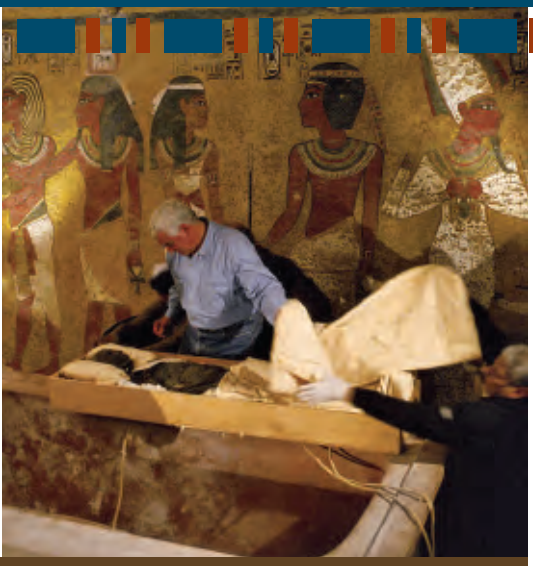
You'll need a notebook to gather your weather station's data and organize it. At least once each day, you should record themeasurements from each of your weather instruments in your weather station. Keep an orderly chart, like the one pictured, so that you'll be able to notice patterns in your weather data.



Date	12/20	12/21	12/22
Time	11:16	1:04	
Temperature	44	46	
Barometric Pressure	30.26	30.32	
Humidity	High	High	
Precipitation Type	None	Rain	
Precipitation Amount	0	1/4 inch	
Wind Direction	W	NW	

MUMMIFICATION

5-8

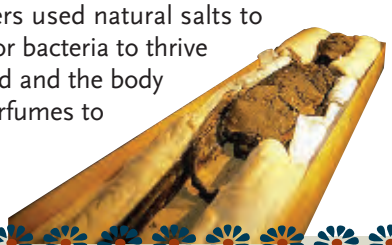


WHAT IS A MUMMY?

A mummy is a corpse whose skin and dried flesh have been preserved by either intentional or accidental exposure to chemicals, extreme cold, very low humidity, or airlessness. Ancient Egyptians used chemicals–natural salts–to dry their corpses. Basically, when all moisture is removed from a corpse, it becomes a mummy. The Egyptians used natron–a naturally-occurring desiccant. A desiccant is a substance that has a high affinity for water and is used as a drying agent.

The earliest known "mummy" dates back to approximately 3300 BC. This mummy is at the British Museum in London, England and has been given the nickname of "Ginger" because of its red hair. "Ginger" was found buried beneath the hot, dry desert sand which preserved the body.

Although mummification existed in other cultures, eternal life was the main focus of ancient egyptian religion. In order to prepare for eternal life, the body needed to be preserved. At first, the Egyptians tried to preserve the entire body. Over time, though, they realized that they needed to remove the internal organs. They crafted special canopic jars to hold the organs. Then, embalmers used natural salts to remove all moisture from the body so that it is difficult for bacteria to thrive inside it and cause decay. Once all moisture was removed and the body fully dried, the mummies were anointed with oils and perfumes to prepare them for their journey to the afterlife.



TRY THIS!

Let's Make an Apple Mummy!

You'll need:

- Small apple
- Two plastic cups (about 10 ounce size)
- One box of baking soda
- One box of table salt
- One-cup measuring cup
- Knife (Ask an adult!)
- Spoon

1. Ask an adult to help you cut the apple in half. Then, cut each half in half again so that you have four quarters. Put one quarter in each of your two plastic cups. (You won't need the other two quarters, so you can eat them.)
2. Fill the measuring cup to the one-third cup level with baking soda. Then, use the salt to continue filling the cup up to the two-thirds level. Use the spoon to gently mix the baking soda and salt together in the cup.
3. Pour the mixture into one of the two plastic cups, covering the apple quarter. Make sure the apple is completely buried.
4. The apple in the other cup is your control sample. Do nothing to it. Leave it exposed to air.
5. Place the two cups side-by-side somewhere dry and away from direct sunlight. (A shelf in a closet or cabinet works well.)
6. Wait seven days. Carefully uncover your buried apple by pouring the baking soda/salt mixture out. Compare the two apples. (Warning: do not eat either apple! Discard both after you finish comparing them.)

MODERN MUMMIES

Have you heard of plastination?

Gunther von Hagens invented the process of plastination while working at the anatomical institute of the University of Heidelberg in 1978. Like in other mummification processes, the water and moisture is removed from the body. In plastination, the fluids are replaced with plastics, taking the space of fluids so that the body retains much of its original form.

The result is a mummy that can be touched, does not smell or decay, and even can continue to resemble the living being–both in appearance and at the cellular level.

If you visited the "BodyWorlds" exhibit at The Franklin Institute, you've seen these modern mummies!

Note to Educators & Parents

All of these activities support the National Science Education Standards. In particular, the activities meet the following objectives.

Content Standard A:
Science as Inquiry
Activities meet this standard when students make accurate measurements, *gather, store, retrieve, and organize data*
and when students understand that *mathematics is essential to asking and answering questions about the natural world.*

Content Standard B:
Physical Science
Activities meet this standard in part when students see that *common materials, such as water, can be changed from one state to another by heating or cooling and that objects have many observable properties, including size, weight, and shape.*

Content Standard C:
Life Science
Activities meet this standard in part when students learn that *organs and tissues* are part of organized structures and systems.

Content Standard D:
Earth and Space Science
Activities meet this standard in part when students learn that *patterns of atmospheric movement influence local weather.*

Content Standard E:
Science and Technology
Activities meet this standard in part when students *design a solution or product and implement a proposed design.*

Content Standard F:
Science in Personal and Social Perspective
Activities meet this standard in part when students see that *science and technology have advanced through contributions of many different people, in different cultures, at different times in history.*

Content Standard G:
History and Nature of Science
Activities meet this standard in part when students realize that *science has been practiced by different individuals in different cultures.*

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Canopic Coffinette of Tutankhamun