Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Investigate This!

**How Snakes Move:**

Snakes have four ways of moving and you are going to try them all out! Using the container of sand and the string (your snake) try moving your snake each way.

**Serpentine:** When snakes move this way, they move in a wavy motion. To move this way, start your snake at the back of the container and pull it forward in a wavy motion (with the tail following you along.)

**Sidewinding:** Because snakes cannot use the serpentine method on slippery surfaces, they use the sidewinding method. To do this, snakes throw their heads forward and the rest of the body follows. Try it: pick up your snake’s head and move it forward. Pretend the rest of the body follows and lift it up and place it sideways.

**Concertina:** This difficult method is used when snakes are in tight places. The snake uses its back portion to brace itself and pushes its front portion forward. The rest of the body follows. Try it: squish your snack into the corner of the container and throw the head forward, letting the tail follow.

**Rectilinear**: With this method, the snake moves in a forward straight movement. It uses the scales on its belly to grip the ground and push forward. This is similar to the way a caterpillar moves. Try it: pick up your snake’s tail and move it up and toward the middle. Pick up the middle and move it up toward the head.

QUESTION:

What did you observe about the tracks your snake left when you tried each type of movement? What did each type of movement’s tracks look like? (Draw a picture below for each movement) How could this information benefit you?

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Let’s Talk Numbers

Take out the bag labeled “reticulated python.” Unroll it to see how long the reticulated python is. This snake is one of the world’s largest at 30 feet long!

What object can you compare to the length of a reticulated python? (You can add objects together if needed.)

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Investigate This!

How do baby turtles know where to swim to in the ocean? How do they find their way home? Let’s find out:

Sea turtles, as well as other animals, can detect the natural magnetic field around them and through this they can identify their location and navigate to their destination.

Place the magnets on a table and cover them with the box lid. Pick up your turtle (on the turtle’s belly I have attached an item that responds to magnets.) Hold your turtle by the string over the box (close but not touching the top) and slowly move it around.

What happens?

\*Please be aware of the small parts used during this investigation.

QUESTION

What did you observe when you slowly moved the magnet over the top of the box? How is this similar to how turtles navigate?

Let’s Talk Numbers

Take out the bag labeled “leatherback sea turtle.” Unroll it to see how long the leatherback sea turtle is. This turtle is one of the world’s largest at almost 7 feet long! (It also weighs over 1,400 pounds!)

What object can you compare to the length of a leatherback sea turtle? (You can add objects together if needed.)

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Investigate This!

Have you ever watched ants marching in a line? How do they know where to go exactly?

As ants walk, they release a chemical known as pheromones. The ants follow this pheromone, which has its own scent.

Try it: Pretend you are the leader ant. The black dots in the bag are your pheromone. Can you mark your trail with your “pheromone” so that your family members can follow you?

QUESTION

What did you discover when you were the leader ant? Did you have any challenges? Explain.

Let’s Talk Numbers

Take out the bag labeled “anthill.” Unroll it to see how deep ants can tunnel into the ground while making their home. That’s right – some ants can tunnel 25 feet below the ground!

What object can you compare to the length of how deep into the ground ants tunnel? (You can add objects together if needed.)

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Investigate This!

Paleontologists have uncovered many dinosaur fossils. They carefully use shovels, drills, hammers, and chisels to uncover these treasures – being sure they do not break any bones. Think you have what it takes to be a paleontologist?

Take out the chocolate chip cookies and toothpicks. (Each of your family members can give this a try.) Using the toothpicks, carefully chisel away the dirt (cookie part) to reveal your dinosaur bones (chocolate chips.)

\*Please wear the protective eyewear when using the toothpicks.

QUESTION

How was your investigation similar to that of a paleontologist’s job? What were the challenges involved with this task?

Let’s Talk Numbers

Take out the bag labeled “T. Rex tooth.” Unroll it to see how long a T. Rex tooth was – 12 inches long! Can you imagine how big a cheeseburger would have to be for that mouth?

What object can you compare to the length of a T. Rex tooth? (You can add objects together if needed.)

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Investigate This!

You’ve just built the perfect spider web and caught a big juicy bug. As a spider, how do you eat your prey? Let’s find out.

Take out the sugar cube and place it on a plate. Fill your dropper with water and slowly drop 3-5 drops of water on the sugar cube. Observe it for one minute.

What happened?

In order to eat a tasty meal, a spider first emits digestive fluid over its prey. It then chews up the prey, sucking the juices in with the meat.

QUESTION

What did you discover during your investigation? (How was your investigation similar to how a spider prepares its prey?) Explain.

Let’s Talk Numbers

Take out the bag labeled “Goliath Bird-Eating Tarantula.” Unroll it to see how long this giant spider is! That’s right – 12 inches long! Its fangs are one inch long!

What object can you compare to the length of the Goliath Bird-Eating Tarantula? (You can add objects together if needed.)

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Investigate This!

Frogs do not drink water – so how do they stay hydrated? Let’s find out. Take out the bag of little beads and place ½ of them into a cup with water. Wait an hour and then observe the difference between the beads in the water and the beads and the bag. What do you notice?

Frogs absorb the water they need through their skin. If they do not keep their skin moist, they cannot receive oxygen through their skin, and will die.

\*For this investigation, please wear protective eyewear and gloves before, during, and while cleaning up.

QUESTION

What did you observe? How could we use your results to help plants grow? Explain.

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Let’s Talk Numbers

Take out the bag labeled “Goliath Frog.” Unroll it to see how long this giant frog is! That’s right – 12.5 inches long! It weighs a whopping 7 pounds!

What object can you compare to the length of the Goliath frog? (You can add objects together if needed.)

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Investigate This!

AAAHHH! You were walking in the grass and all of a sudden realized there’s a snake!! How did you not notice it? Let’s find out.

Take out the container of “bugs.” Pick a bug to try and find. Set a time for one minute and try to collect as many of that type of bug as you can. Try again with a different bug.

What did you notice?

Snakes, like many animals and insects, use camouflage.

Can you spot the snake?

\*Please be aware of small parts included in this investigation.

QUESTION

What did you observe during your investigation? How could you use camouflage to benefit you? Explain.

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Let’s Talk Numbers

Take out the bag labeled “Barbados threadsnake.” Unroll it to see how long this tiny snake is! That’s right only 4 inches long! It is as thin as a spaghetti noodle!

What object can you compare to the length of the Barbados threadsnake? (You can add objects together if needed.)

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Investigate This!

What does it mean to be cold-blooded? Take out the putty and divide it in half. Place one half in the refrigerator while you hold the other half in your hands. After 20 minutes, compare the two. What do you notice? What happens when you put the refrigerated putty in your hands and hold it for at least 5 minutes?

Cold-blooded animals cannot regulate their temperature that’s why you see crocodiles and alligators “sun-bathing.” They are trying to get warm.

\*Please wear gloves while handling the putty.

QUESTION

What did you observe during your investigation? How could this information benefit someone?

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Let’s Talk Numbers

Take out the bag labeled “American alligator and crocodile.” Unroll it to see how long these creatures are! That’s right 15 feet long!

What object can you compare to the length of the American alligator or crocodile? (You can add objects together if needed.)

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Investigate This!

Is that your lizard belly rumbling? Time for a tasty meal, but how do lizards catch their food? Let’s find out.

Take out the letter cards and the sticky hand. Using the hand, see if you can “catch” your food and spell out “LIZARD.”

A lizard’s tongue is sticky and can project forward to capture their prey.

QUESTION

What did you observe during your investigation? How could you use the information you gathered to help you invent something to make your life easier? Explain.

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Let’s Talk Numbers

Take out the bag labeled “Komodo Dragon.” Unroll it to see how long the Komodo Dragon is! That’s right 8.5 feet long!

What object can you compare to the length of the Komodo Dragon? (You can add objects together if needed.)

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Investigate This!

Are bats super creatures? Well, they can see with their ears by using echolocation. What is that you ask? Let’s find out.

Place water about half-way inside of a bowl. Place the items in the bowl (they will float.) Drop the coin inside the bowl. What did you notice? Poke the water with your finger. Observe how the water creates waves. What happens to the objects when there is movement in the water?

Echolocation is defined as the location of objects by reflected sound.

\*Please be aware of the small parts used in this investigation.

QUESTION

What did you observe? How could you use this information to better someone’s life? Explain.

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Let’s Talk Numbers

Take out the bag labeled “Golden-capped Fruit Bat.” Unroll it to see how long the wingspan of the Golden-capped Fruit Bat is! That’s right 5.5 feet long!

What object can you compare to the length of the wingspan of this bat? (You can add objects together if needed.)

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Investigate This!

Do they drive cars on Mars? Not exactly, but they do use rovers. If you were to get around on Mars, what would your rover look like?

Try it! Using the materials provided, create your own rover. Be sure to take a picture of it to share ☺

\*Please be aware of the small parts used in this investigation.

QUESTION

Describe your Mars rover. Why did you choose to design it this way? How does it help you to achieve your goal of exploring Mars? Explain.

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Let’s Talk Numbers

If NASA sent a probe in a straight line to Mars, it would take 942 hours to get to Mars. How many days is this? Show your calculations.

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Investigate This!

Have you ever noticed that after a storm, you can sometimes see a rainbow? How does this happen? Let’s try it.

Fill a clear glass 2/3 of the way full with water. Place a sheet of white paper underneath of the paper. Shine the flashlight onto the glass and move it around until you see a rainbow on the white paper.

A rainbow is caused by the bending and dispersion of light inside of water droplets.

\*Please be cautious when using glassware.

QUESTION

Thinking about your investigation, would you predict that a rainbow caused by sunlight appears directly opposite of the sun? Explain.

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Let’s Talk Numbers

Every minute there are about 2,000 rainstorms on Earth. Using this information, how many rainstorms would there be in ten minutes? Show your calculations.

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Investigate This!

It takes Earth about 365 days to make a revolution around the sun, but what does this mean? Let’s find out.

Take a piece of clay and push down into the center of the pie plate. Place the Earth (marble) in the pie plate and gently move the plate to make Earth revolve around the sun.

Does the size of planets make a difference in how quickly they rotate? Try it out the different planets (marbles and bouncy balls). Using the same speed of movement, observe how the different planets move.

\*Please wear the protective eyewear and mask during this investigation. Also, be aware of the small parts included in this investigation.

QUESTION

What did you observe? Did the size of the planets affect how they moved around the sun? Explain.

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Let’s Talk Numbers

List the planets in order of greatest size to smallest size:

Venus 6052 km Mars 3390 km

Saturn 58232 km Earth 6371 km

Mercury 2440 km Uranus 25362 km

Neptune 24622 km Jupiter 69911 km

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Investigate This!

What would it be like to observe a volcano? Let’s find out!

First, put on the safety glasses and gloves. Using the volcano model, add 2 tablespoons of baking soda to the center opening. Place the volcano in the container (to catch the “lava.”) Next, add one tablespoon of vinegar to the center opening. Stand back and watch!

\*Please wear gloves and protective eyewear while setting up, completing, and during clean-up of the investigation.

QUESTION

Thinking about your investigation results, why do you think it is important to keep watch on active volcanoes? Explain.

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Let’s Talk Numbers

The world’s largest volcano is Mauna Loa on Hawaii’s big Island at 56,000 feet from the base to the top. One of the world’s smallest volcanoes is Mount Taal at 1,660 feet. What is the difference in size of the two volcanoes. Please show your work.

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Investigate This!

In the Wizard of Oz, Dorothy saw a tornado up close. Now here’s your chance to see how a tornado forms.

Fill one of the 2L bottle ½ way full with water. Screw the connecting piece to the bottle. Turn the other 2L bottle upside-down and screw it into the connecting piece. Flip the bottles over so that the water filled bottle is now on top and gently rotate the top of the bottle in a clockwise motion. What happens?

As you swirl the water in the bottle, a vortex is formed as gravity pulls water through the opening of the connector to form a rotating tornado.

\*Please wear the protective eyewear during the investigation.

QUESTION

What did you observe? How could this information benefit others? Explain.

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Let’s Talk Numbers

In 1972, a blizzard dumped 8 meters of snowfall on an area in Iran. How much snow is that? Take out the bag labeled “Blizzard.” Unroll it to see how deep the snow during that blizzard was! That’s right 8 meters of snow!

What object can you compare to the length of the snow? (You can add objects together if needed.)

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Investigate This!

Meteors can make quite an impact as they collide with the surface of a planet. Want to make a crater? Good – let’s get started.

This investigation can get a little messy, so you may want to put down newspaper or something under the container of flour.

Hold up one of the bouncy balls 6 inches from the top of the container. Drop the bouncy ball. Remove the bouncy ball and observe the crater. Try the same process with the different sizes of bouncy balls. Try increasing the height of your drop. What did you notice?

\*Please wear the protective eyewear during this investigation.

QUESTIONS

Did the size of the bouncy ball affect the size of the crater? How would this compare to the size of craters on planets? Explain.

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Let’s Talk Numbers

Meteors can enter Earth’s atmosphere at speeds as fast as 160,000 miles per hour or a little slower at 25,000 miles per hour. What is the difference in the two speeds? Show your work.

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Investigate This!

Let’s rock and roll and we investigate how the rock cycle works.

Take out three different colors of Starburst and unwrap them. Cut them into as many small pieces as you can and then pile the pieces together. You just made a **sedimentary rock.**

Next, take your sedimentary rock and warm it in your hands for about 3-5 minutes. Place the warm sedimentary rock on the wax paper and then put another piece of wax paper over it. Either push down on the sedimentary rock or stack some books on top of it for about a minute or two. Take the materials off your rock and fold it over once and press down again. You just made a **metamorphic rock.**

Heat the rock in a microwave for 5 seconds or use a blow dryer to heat it up for about 10-20 seconds. You just made an **igneous rock.**

QUESTION

How did your investigation results compare to actual types of rocks pictured? Explain.

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Let’s Talk Numbers

Some gems are quite expensive! List the following gems in order from the most costly to least costly:

Black Opals $15700 per carat Blue Garnet $1500000 per carat

Jadeite $3000000 per carat Painite $60000 per carat

Diamond $10000 per carat Rubies $15000 per carat

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Investigate This!

The water we drank today has been on the earth for millions of years! How? Let’s find out.

Add hot water to the “stop here” line on the jar. Turn the lid upside down and place ice cubes in the lid. In about an hour observe what happens.

When you add warm water to the jar, some of the water turns to vapor and rises to the top of the jar. Here is comes into contact with the cold air. It begins to condense and then rain down.

If you want to see a cloud form, after you place the ice cubes in the lid, wait 20 seconds and then spray some hairspray (aerosol) into the jar and put the lid back on. Observe a cloud forming. When you have observed a large cloud, open the lid and watch the cloud float away. The cloud is made because the water vapor condenses to the hairspray. In nature, water vapor can condense to dust and other particles.

\*Please use caution when using glassware. Also, when using hairspray, please use the face mask.

QUESTION

What did you discover about the water cycle in nature during your investigation? Explain.

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Let’s Talk Numbers

An average American family uses about 100,000 gallons of water a year. If we had 20 students in our class, how much water would the families from our class use in one year? Show your work.