GOT SCIENCE? GUIDE | ANSWER KEY

Grades 6-8

Science is everywhere—but not always obvious. Enjoy these scientific discoveries in your Science City adventure.

Please note: Exhibits are sometimes removed temporarily for repair or refurbishment, or may be in use by other groups, so be prepared to be flexible.

Teachers: *Standards for KS and Strands for MO listed on these pages next to the exhibits are intended for guides to understanding or reinforcing concepts addressed by these suggested standards. Follow-up in your classroom about the students' experiences will further enhance the hands-on learning experienced at Science City.*

****The following exhibits are listed in alphabetical order. This is not a recommended flow for exploring the science center. Reference a science center map for assistance.***

Giant Lever

NGSS: MS-ETS1, MS-PS2
MO Strands: 2.2 (5th & 7th), 7.1
CCS ELA Connections: CCSS.ELA-LITERACY.W.6.4, 7.4, 8.4

Guide

Before performing a tug-of-war, observe the difference in point of attachment for each rope on the Giant Lever. *NOTE: One rope is attached two feet above the fulcrum, the other is attached six feet above the fulcrum--or the point at which the lever pivots.*

Activity: Divide your group into two teams of two or more people.

- Try a tug-of-war. Which team won? (The team with rope positioned high on the lever, or low on the lever?)
- Switch sides, keeping the same teams. Did the same team win or not?
- How would you explain these results?

MISTER E. HOTEL

MO Science Strand: 7
CCS ELA Connections: CCSS.ELA-LITERACY.W.6.4, 7.4, 8.4

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FACT **There is an optical illusion (a trick on your brain) in every room.**

Explore carefully so you don't miss the mysteries.

Disappearing Diner: Go into the diner with a partner. One of you should stand behind the diner table.

- What has happened to the lower half of his/her body?
- How does this illusion work?
- Would this illusion work if the panels below the counter were made of shiny steel or a dull material? Why or why not?

Safe Storage: Locate the hidden safe. Try to touch the jewel in the safe.

- Can you explain what you are seeing?

Haunted Washroom: Enter the washroom located behind the black drape.

- Who seems to disappear more in the mirror, a person wearing light clothing or a person wearing dark clothing? A person wearing dark clothing seems to disappear more.
- Why do you think that is?

Warper Room: Find the room with the black and white rotating disk (warper). Stare at the warper for a full 20 seconds, and then look at your hand or an object.

- Describe what is happening to the image at which you are looking? The hand or object should look wavy, as if it is in motion.
- How do you think the warper works?
- Does your theory match the explanation on the sign found next to the Vision Warper?

NATURE CENTER

NGSS: MS-ETS1, MS-LS2
MO Science Strands: 3.1, 4.1
CCS ELA Connections: CCSS.ELA-LITERACY.W.6.4, 7.4, 8.4

THINK! Tapping on the glass or cages frightens the animals. Please be kind to our animals and use quiet voices. Ask a Science City staff member for more information about the animals.

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Ask one of our educators to show you our Crested Gecko, Leonard and tell you how he is helping the medical field create instruments for surgery.

- How does the gecko hang onto smooth surfaces? The tiny, microscopic hairs on the bottom of his feet actually do a "molecular hug" with the surface molecules of the object on which he is holding.

- Why is it important for us to look to nature to help solve some of our human problems? Nature never leaves any waste behind. Many nature's problems are the same problems we have; how to stay cool in the summer, how to stay warm in the winter, how to get rid of trash. But nature does it by using the materials around them or by adapting to their environment. They don't use manmade materials that eventually end up in a landfill.

Our reptiles need a heat lamp over his habitat. The rabbits do not require this device.

- Can you explain why? Reptiles are cold-blooded animals. They will take the air temperature that is around them. They cannot "warm-up" with movement or adding layers, like we can, if the surrounding air is cold. Reptiles must bask in a warm spot to warm up or move to the shade to cool off. The rabbits are mammals and therefore, are warm-blooded creatures. They also have fur to keep them warm in the winter.

- What other differences do you see between the reptiles and the rabbits? Most reptiles have thick, rough skin, which is needed to reduce evaporation of any moisture they take in. This is due to the fact that they live in an arid environment and takes in little water. The rabbits have fur to keep them warm in cold temperatures. The rabbit's ears are large to help with their keen sense of hearing.

Nature Center-*Classification:* Observe these animals; then place them in the correct category below.

- Spiny-tailed lizard
- Bearded dragon lizard
- Leopard frog
- Tree frog
- Salamander
- Box turtle

Amphibian Amphibians have moist, glandular skins. Their toes lack claws.	**Reptile** Reptiles are covered with scales, shields or plates. Their toes have claws.
Leopard Frog	Spiny-tail Lizard
Tree Frog	Bearded Dragon
Salamander	Box Turtle

SCIENCE ON A SPHERE *(Teacher guidance recommended)*

Various standards depending on content

GUIDE

Visit the kiosk inside the Science on a Sphere exhibit area. There are a variety of choices that address various Kansas and Missouri education standards. Select a dataset that best fits the grade level curriculum for your group. Take a seat and observe the many facets demonstrated with this technology.

- What dataset did you watch?
- Record one interesting thing that you learned.
- What other topic would you like to learn about at Science on a Sphere at another visit?

Sky Bike

NGSS: MS-ETS1, MS-PS2, MS-PS3
MO Science Strands: 2.2, 7.1, 8.1
CCS ELA Connections: CCSS.ELA-LITERACY.W.6.4, 7.4, 8.4

Guide

Read the posted information near the entrance to the Sky Bike.

Observe others riding the Sky Bike. Then try it yourself (if you wish).

Which is heavier, the counterweight (the bricks) or the rider? The counterweight is heavier.

- How do the bricks keep the rider from tipping over? They act as a counterweight and bring the center of gravity nice and low. This causes a low balance point.
- Does the rider need to balance himself like on a regular bike? No, he does not.
  Why or why not? Because the bricks are doing this for him. As long as the counterweight weighs more than the rider and the bike weight combined, the rider will not have to balance himself at all!
- Describe what would happen if the rider were heavier than the counterweight of the bike. The bike would flip over. Why would this happen? The center of gravity would be too high and would be located above the cable the bike is balancing on. This would cause a high balance point.
- Name three simple machines that allow a bicycle to work: The wheel, pedals and gears.
- Name three ideas of physics that allow a bicycle to work. FORCE AND MOTION (pedaling to make the bike go, using handbrakes to stop the bike; FRICTION (the wheels acting on the pavement or ground, the chain on the gears if they don't have enough oil on them); GRAVITY (you're actually defying gravity on a bike by using motion to keep from falling over!); INERTIA (an object in motion will stay in motion. Inertia pushes you forward until gravity slows you down or you apply the brakes).
- Which law of physics do you NOT have to worry about while riding the Sky Bike? Gravity! You can stop in the middle of the cable, rock the bike from side to side and gravity will not be an issue.