Name: _____

mystery science

Third Grade

Student Booklet
With Anchor Layer

mystery science

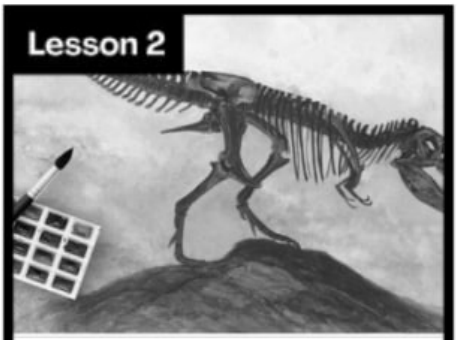
Fossils & Changing Environments

3rd Grade • NGSS • Unit Worksheets

Lesson 1

Where can you find whales in a desert?

Lesson 2



How do we know what dinosaurs looked like?

Lesson 3

Can you outrun a dinosaur?

I am also curious about...

See-Think-Wonder Chart

Name: _____

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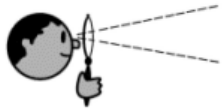
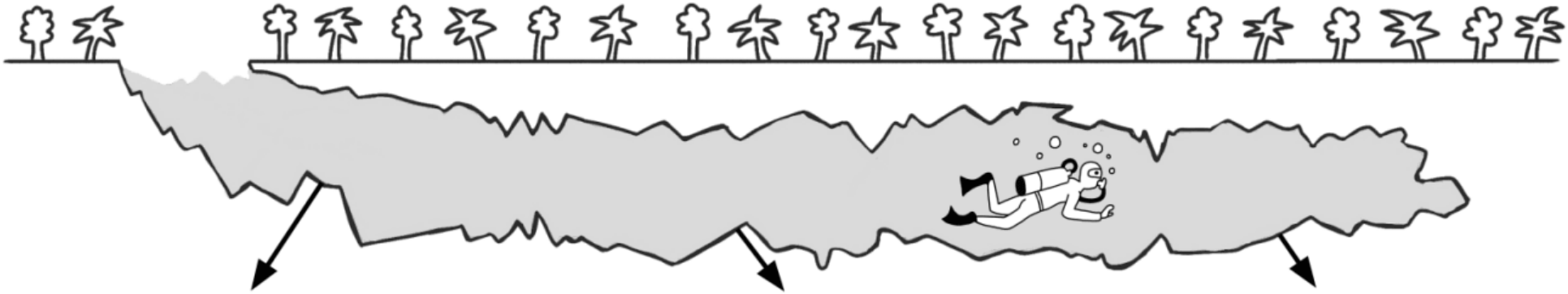
See	Think	Wonder
What did you observe? 	How can you explain what is happening? 	What questions do you have? 

Watery Cave

Name: _____



Shapes in the ground

How do you think these shapes were made?

_____

_____

_____

How do you think these shapes ended up deep in a watery cave?

_____

_____

_____

Black, crumbly wood and ash

Why do you think this wood is black, crumbly, and surrounded by ash?

_____

_____

_____

How do you think this wood and ash ended up deep in a watery cave?

_____

_____

_____

Bones

What kind of animal do you think this was?

_____

_____

_____

How do you think these bones ended up deep in a watery cave?

_____

_____

_____

Fossil Dig Worksheet

Name: _____

1) In Layer A, examine each fossil and then fill in the answers below.

	One trait this fossil has is...
Fossil 1	
Fossil 2	
Fossil 3	

2) I think the fossils found in Layer A lived **ON LAND** / **IN THE WATER** when they were alive. I think this because… _____

_____

_____

3) For each fossil in Layer B, fill in the blanks below.

	One trait this fossil has is...
Fossil 4	
Fossil 5	
Fossil 6	

4) I think the habitat **DID** / **DID NOT** change between Layer A and Layer B. I think this because...

_____

_____

_____

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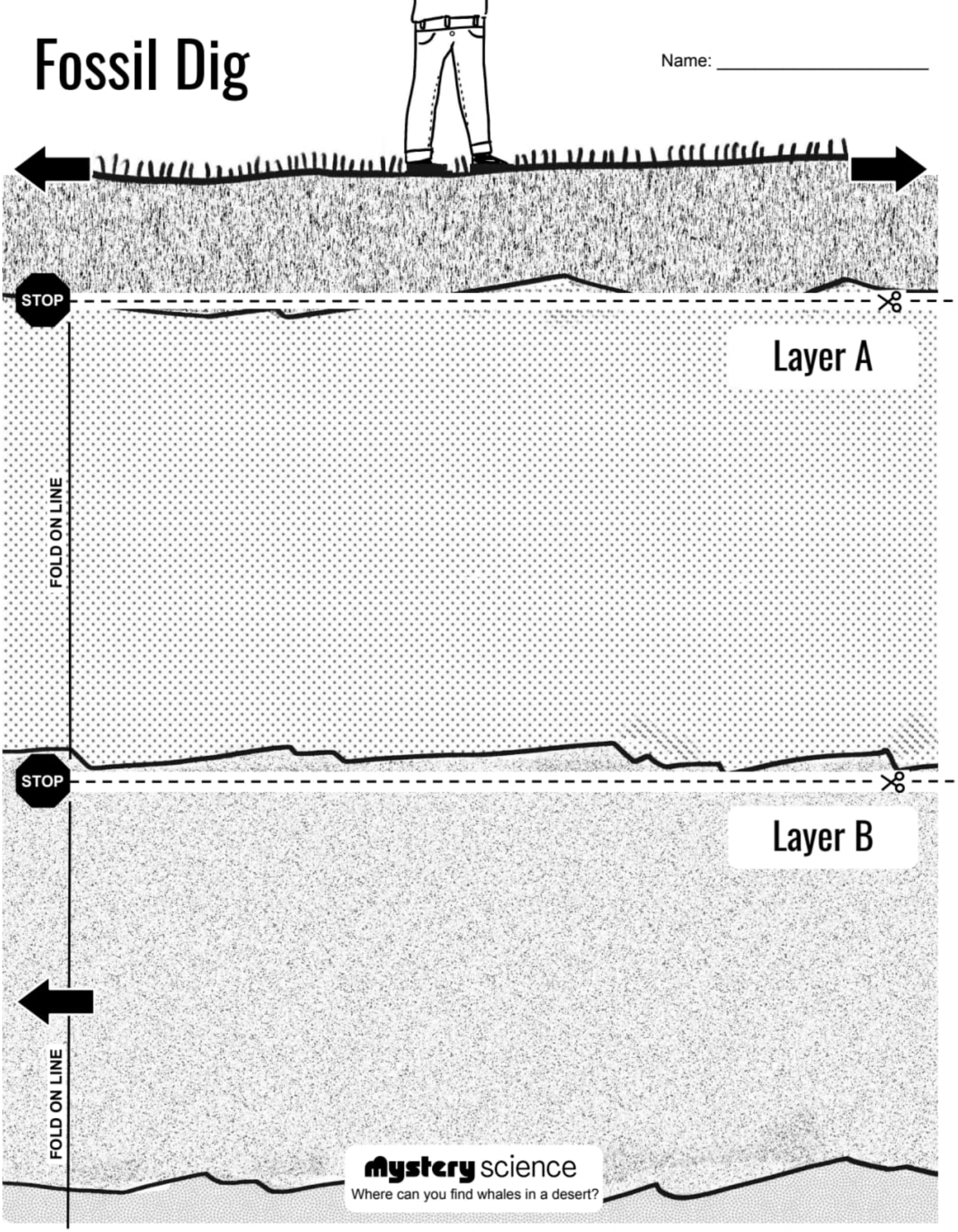
Where can you find whales in a desert?

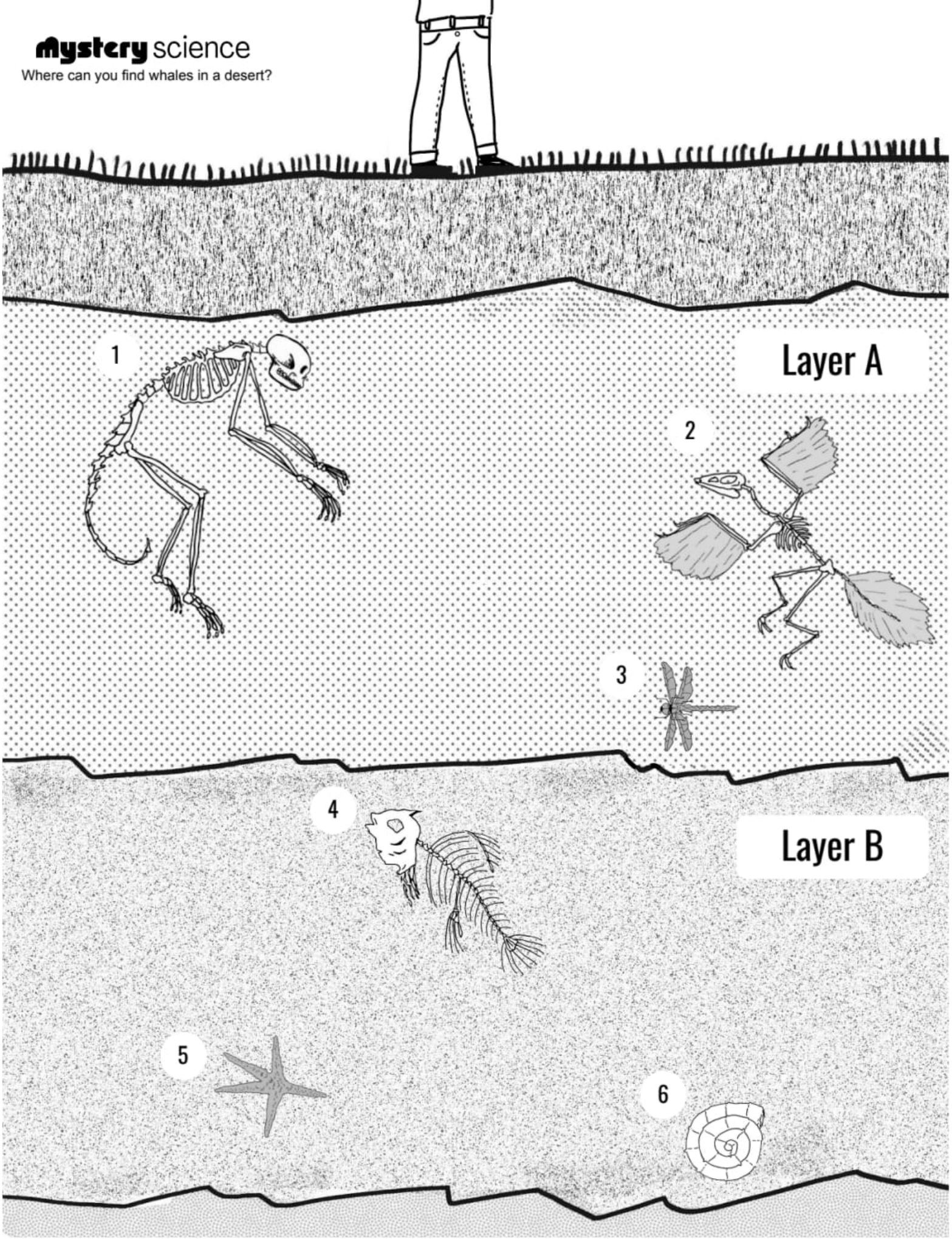
Fossil Dig

Name: _____

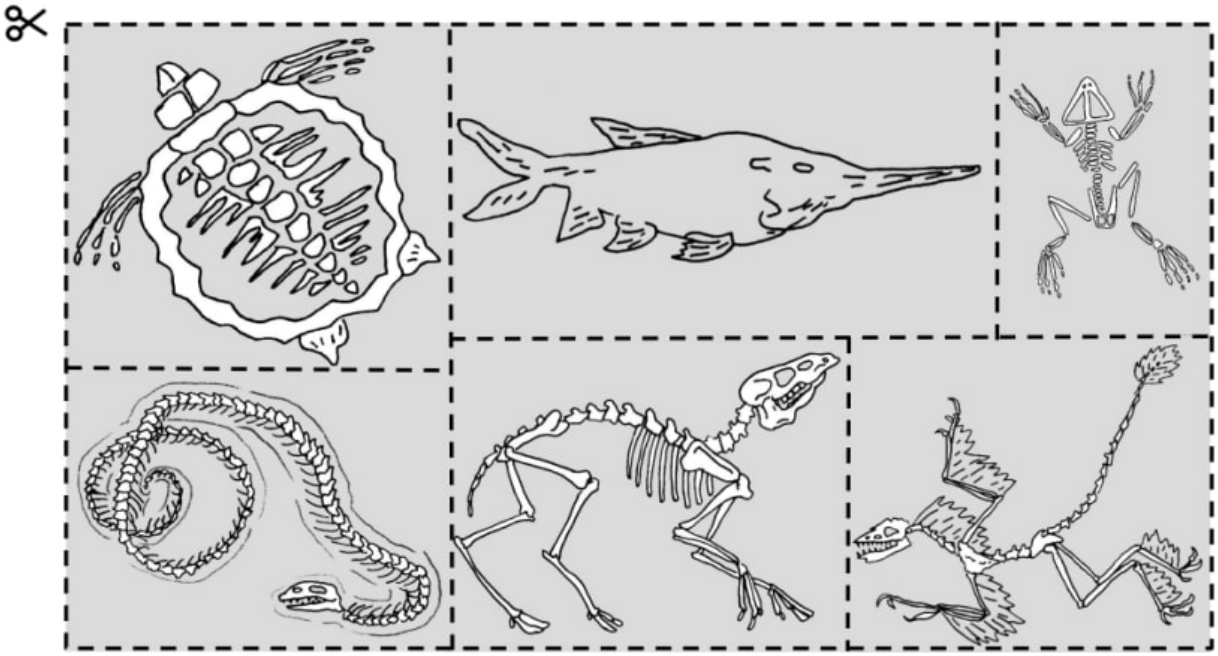


Mystery science

Where can you find whales in a desert?



Mystery Fossils



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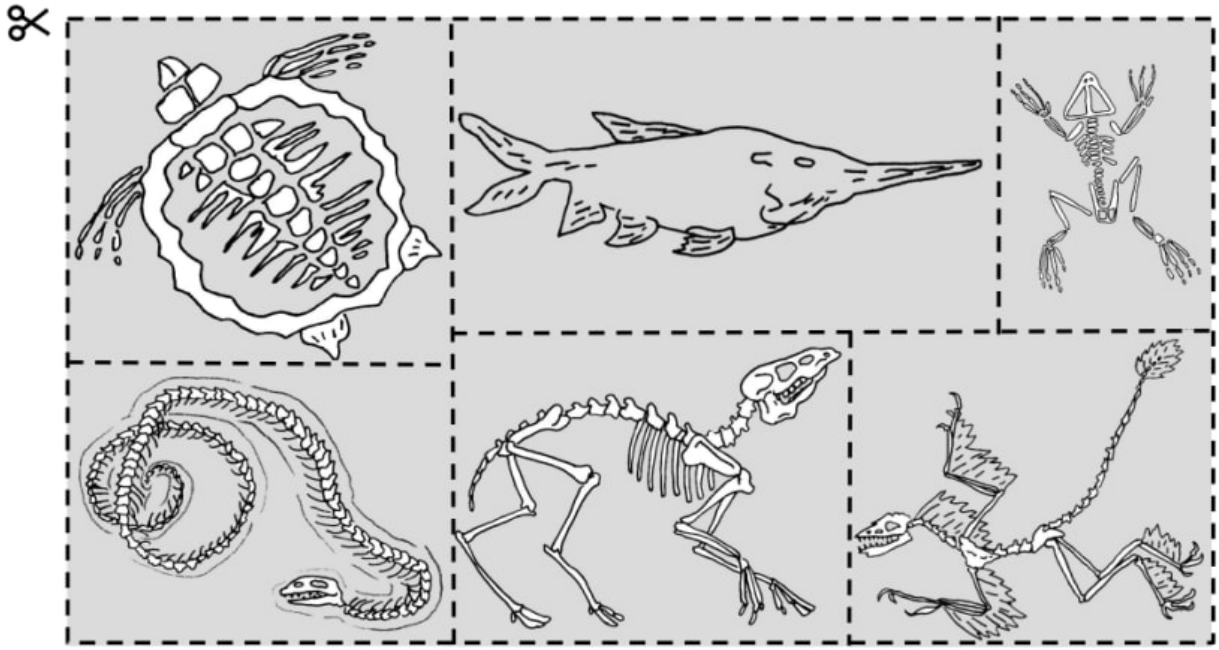
Where can you find whales in a desert?

Mystery Fossils



mystery science

Where can you find whales in a desert?

Name: _____

Date: _____

Lesson Assessment

1. You take a trip to the local quarry. You walk all the way to the very bottom. At the bottom of the quarry you find the fossils shown in the image above. What kind of habitat do you think was in this location when these animals were alive?
   a. Grassland
   b. River
   c. Ocean
   d. Desert

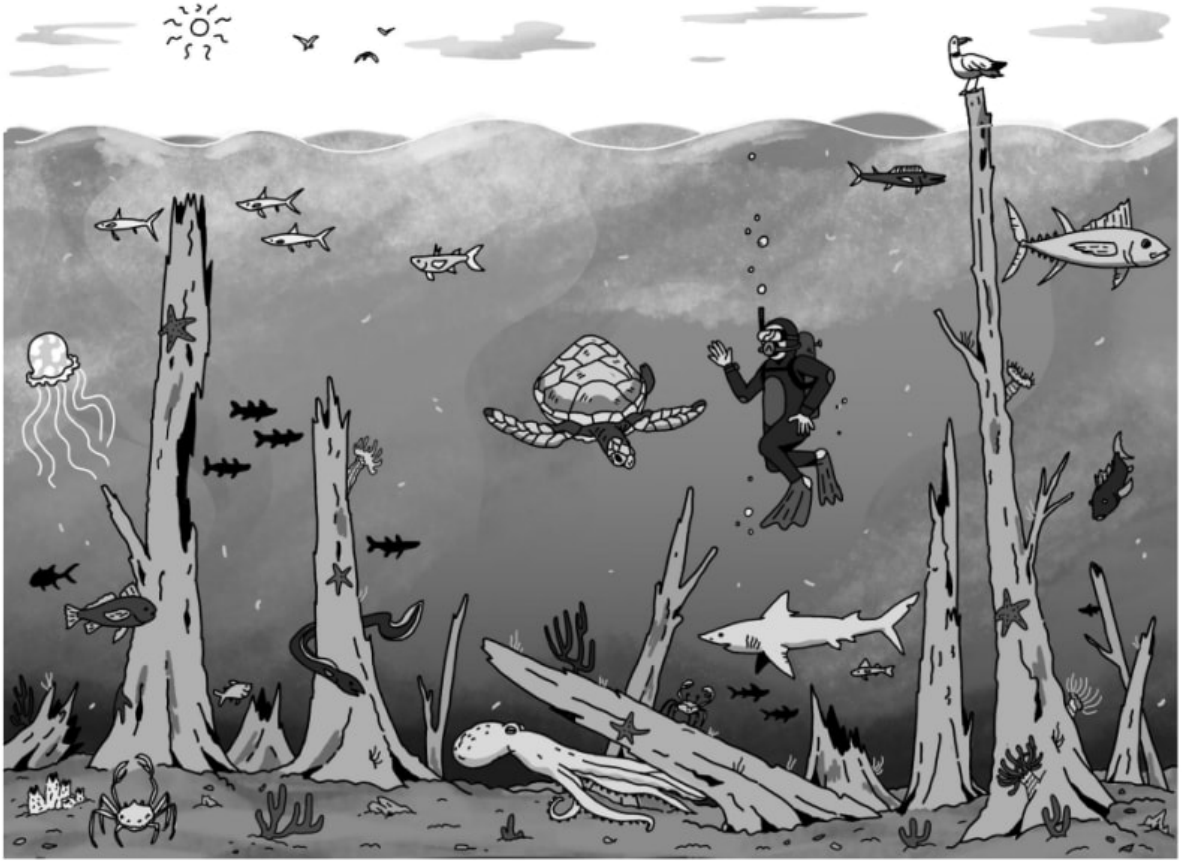
2. Why did you choose this answer? What evidence do the fossils give you to support your claim?

_____

_____

_____

_____



3. Kayla went swimming so she could see sharks and sea turtles. When she started swimming, she saw many tree trunks on the ocean floor. What kind of habitat do you think was in this location a long time ago?

a. Forest
b. Grassland
c. Ocean
d. Desert

4. The tree trunks are evidence that the habitat in this location has changed. What other evidence could you look for to support this claim?

_____

_____

_____

_____

5. Your friend Martha just found a crab shell on the ground. She's really excited because she thinks it might be a fossil. She thinks this is evidence that your town used to be an ocean a very long time ago. The picture above shows you the location where she found the crab shell. Do you think your friend Martha found a fossil? Why or why not?

_____

_____

_____

_____

6. You tell Martha that one crab shell is not enough evidence. If this habitat did use to be an ocean, what are examples of evidence that would support Martha's claim?

_____

_____

_____

_____

_____

_____

7

8

9

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How do we know what dinosaurs look like?

7

8

9

mystery scienc

How do we know what dinosaurs look like?

A

mystery science

How do we know what dinosaurs looked like?

1

A

2

A

3

A

4

B

Front

Back

1

B

Front

Back

2

B

Front

Back

3

B

Front

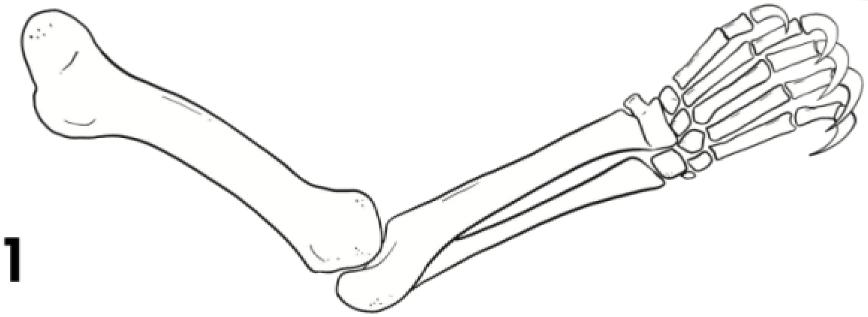
Back

4

mystery science

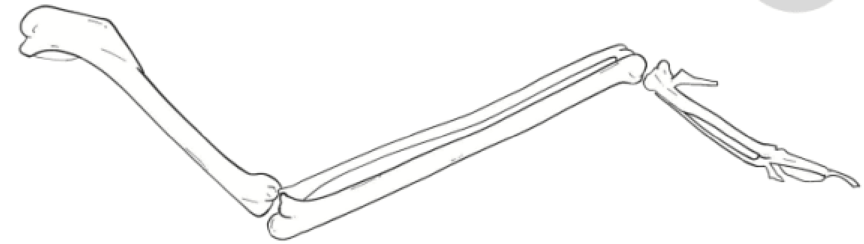
How do we know what dinosaurs looked like?

C



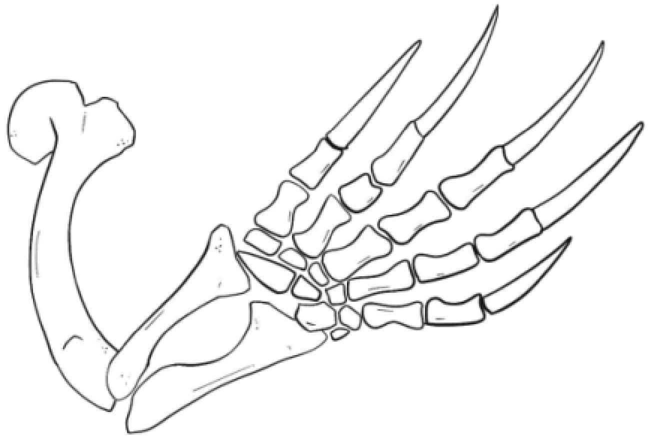
1

C



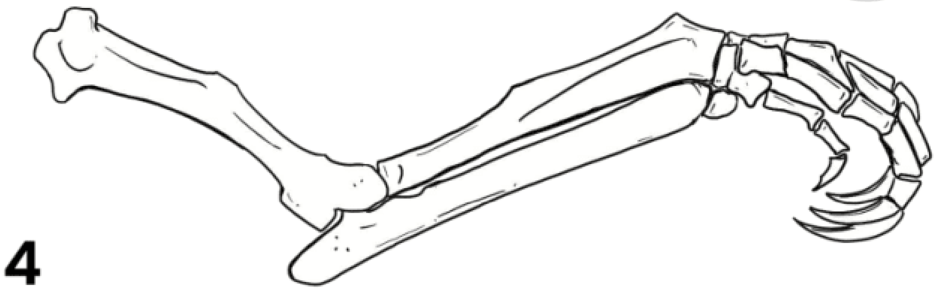
2

C



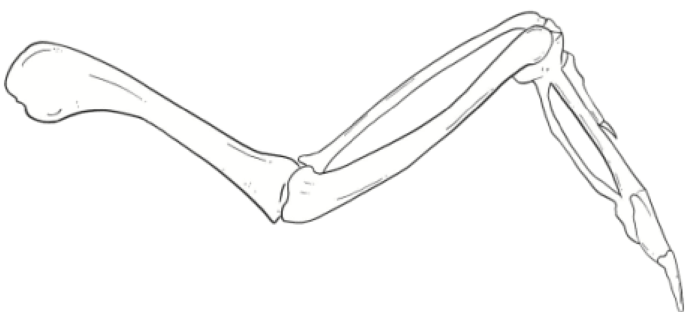
3

C



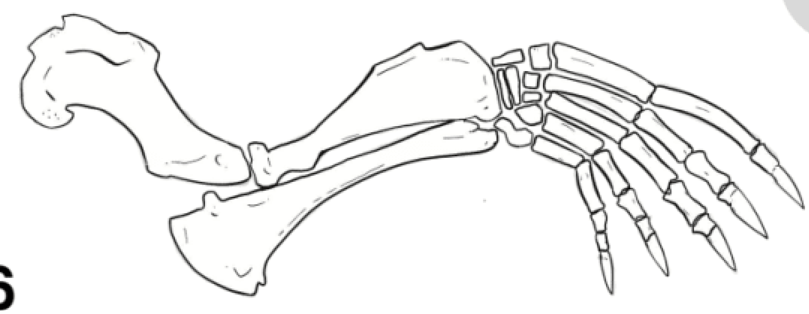
4

C



5

C



6

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How do we know what
dinosaurs looked like?

Dinosaur Decisions

Name: _____

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How do we know what dinosaurs looked like?

A What did it eat?

1. What evidence did you use to sort the modern animal bones the way you did?

_____

_____

_____

2. I think this dinosaur ate **meat** / **plants** *(circle 1)*.

3. What evidence did you use from the fossil to make this decision?

_____

_____

_____

B How did it walk?

4. What evidence did you use to sort the modern animal bones the way you did?

_____

_____

_____

5. I think this dinosaur walked on **its back two limbs** / **all four limbs** *(circle 1)*.

6. What evidence did you use from the fossil to make this decision?

_____

_____

_____

C What did its front limbs look like?

7. What evidence did you use to sort the modern animal bones the way you did?

_____

_____

_____

8. I think this dinosaur's front limbs were **wings** / **flippers** / **claws** *(circle 1)*.

9. What evidence did you use from the fossil to make this decision?

_____

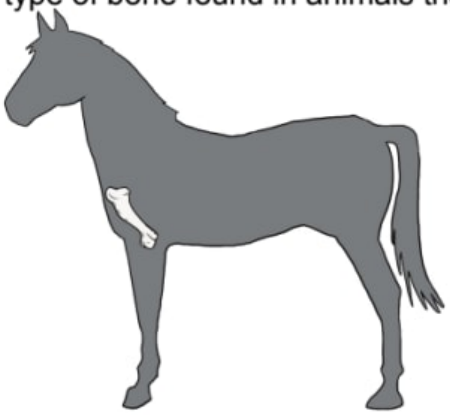
_____

Name: _____
Date: _____

Lesson Assessment

Alice is a paleontologist who has discovered a new fossil! She has figured out that the fossil is a bone from the front limb of a dinosaur. Alice wants to figure out how big this dinosaur was when it was alive. So she studies the front limb bones of several animals that are alive today: horses, wolves, and chickens. Look closely at the fossil and compare it to the same type of bone found in animals that are alive today.

Dinosaur Fossil Bone



Horse

Wolf

Chicken

1. The table below organizes information about the type of animal, the bone size, and the overall body size of the animals shown in the images above. Use information from the images above to correctly fill in the three blank spaces in the table.

Type of Animal	Dinosaur	Horse		Chicken
Bone Size	Extra Large	Large	Medium	
Size of Animal	Unknown		Medium	Small

2. Which of the following claims has the STRONGEST evidence from the table above to support it?

a. The dinosaur was probably smaller than a chicken.
b. The dinosaur was probably about the same size as a wolf.
c. The dinosaur was probably smaller than a wolf.
d. The dinosaur was probably about the same size as a horse.
e. The dinosaur was probably larger than a horse.
f. The fossil bone does not give any evidence about the size the dinosaur.

Dinosaur Fossil Teeth

Horse Skull

Wolf Skull

Chicken Skull

3. Alice finds fossil teeth of the dinosaur. Alice is curious if the dinosaur ate meat (carnivore) or ate plants (herbivore). She compares the fossil teeth to the teeth of animals that are alive today – horses, wolves, and chickens. The table below lists information about the types of food that horses, wolves, and chickens eat and their teeth characteristics. Use information from the images above to correctly fill in the three blank spaces in the table.

Type of Animal	Dinosaur		Wolf	Chicken
What the Animal Eats	not known	hay, grain	deer, elk, moose	grain
Meat or Plants	not known	eats plants	eats meat	
Teeth Characteristics		flat teeth	sharp teeth	no teeth

4. Which of the following claims has the STRONGEST evidence to support it?

a. The dinosaur probably ate plants (herbivore) because it had flat teeth.
b. The dinosaur probably ate plants (herbivore) because it had sharp teeth.
c. The dinosaur probably ate meat (carnivore) because it had flat teeth.
d. The dinosaur probably ate meat (carnivore) because it had sharp teeth.
e. There is no evidence about what the dinosaur ate.

5. Alice only has three fossil teeth. You only have evidence that the horse has flat teeth and eats plants. You only have evidence that the wolf has sharp teeth and eats meat. This is not much evidence. What would be more evidence to support the claim in question 4?

Run for your life!

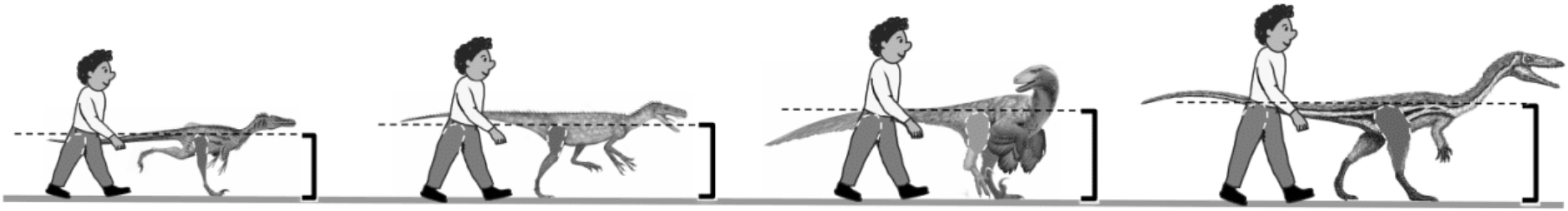
mystery science
Can you outrun a dinosaur?

Name: _____

Find out which dinosaur you'll race:

1. Calculate your leg length: (_____ x 12 inches) + _____ inches = _____ inches
   number of whole ruler lengths

2. Circle the dinosaur that's your leg length or **less**:



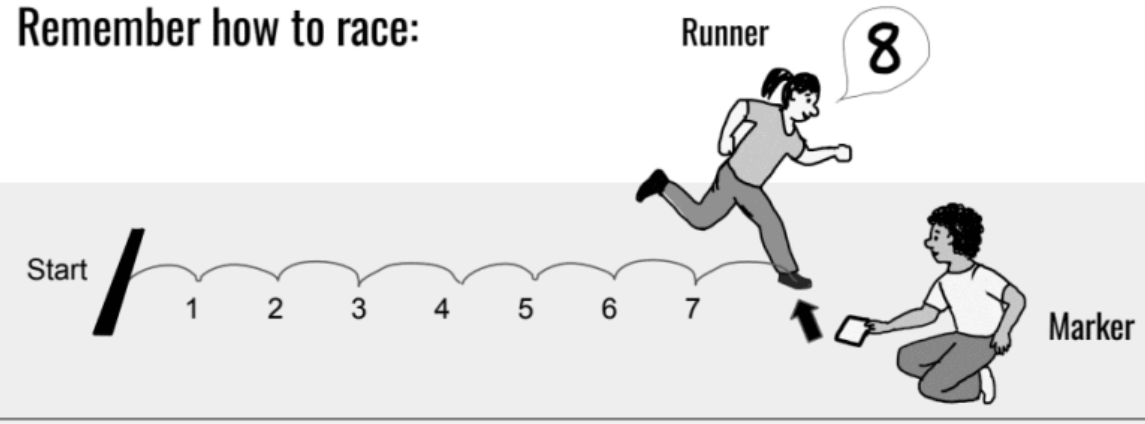
VeeLo
(Velociraptor)
Leg length: about **20** inches

SanJuan
(*Sanjuansaurus*)
Leg length: about **25** inches

DeeNo
(Deinonychus)
Leg length: about **30** inches

CeeLo
(*Coelophysis*)
Leg length: about **35** inches

Remember how to race:



PARTNER'S NAME
on sticky note

mystery science

Name: _____
Date: _____

Can you outrun a dinosaur?

Lesson Assessment

1. How do scientists know that the footprints they found came from dinosaurs?

2. How can you tell if someone was walking or running just by looking at their footprints?

3. What can you do to figure out if you can run faster than CeeLo?

Name: _____

My Watery Cave Story

Use this page to plan an amazing story about the watery cave!

Setting: It is over 8,000 years ago. You are in a forest near a cave in Mexico. The cave is not full of water—yet!

Characters: Choose which of these characters you want to be. Check the box next to the character you choose.

- ☐ One of the small animals that left footprints in the cave
- ☐ One of the people that burned wood in the cave
- ☐ The bear that ends up leaving its bones in the cave

1. What were you doing when you found the cave?_____

_____

2. Why did you enter the cave? _____

_____

3. What happened in the cave? Did you have a problem or make a discovery? What did you think and feel?

_____

_____

4. What is something realistic that your character might leave behind? Your character will leave either footprints, burned wood, or bone; now, come up with something extra. How would someone in the future know you had been in the cave?

_____

5. Conclude your story. Did you escape the cave, or get trapped inside? How did it happen?_____

_____

Name: _____

What do you think?

People and other animals have visited the cave for thousands of years. Today, people just like you love to visit the cave. Some dive and explore. Others play at the surface.

Most people take care of the cave, but some don't. Ancient things in the caves have been damaged. Some people have left trash behind.

Imagine you were in charge of the cave. Would you let people visit? If you kept people out, you could keep the cave safe and clean. But that means that nobody would be able to discover new things or play in the water.

What do you think? Should people be allowed to visit the cave?

I think _____

★ Use at least one of these words/phrases in each reason: **because, since, therefore, for example**.

Reason #1*:* _____

_____

Reason #2*:* _____

_____

Reason #3*:* _____

_____

Concluding statement: *I think this is important because* _____

_____

Name: _____

Watery Cave Tours

Imagine you are a tour guide in the watery cave. You get to take people on dives in the cave and teach them about what's inside!

The discoveries in the cave show us that the cave has changed over time. **Your main goal is to help people understand *why* the discoveries show us that the cave has changed!** Use these sheets to plan what you will say on your tours.

1. Come up with a name for your tour company. _____

2. Write an introduction for visitors before you take them into the cave. Tell them where they are going and what they are going to learn about, but don't go into details yet.

_____

_____

_____

3. **The first tour stop:**

- What are these? *These are* _____
- What would the ground need to be like for such good footprints to form? *Good footprints like this form when the ground is* _____
- Why do these footprints show that the cave has changed over time? *These footprints show that the cave changed over time because* _____

_____

Watery Cave Tours

Name: _____

4. **The second tour stop:**

- What is this? *This is* _____
- How do we know this wood burned here in the cave? *We know this wood burned here because* _____
- Why does this burned wood show that the cave has changed over time? *The burned wood shows that the cave changed over time because* _____

5. **The final tour stop:**

- What type of animal was this? *This was a* _____
- How do we know what this animal ate? *We know what this animal ate because* _____
- Why do these bones show that the cave has changed over time? *These bones show that the cave changed over time because* _____

6. What would you say at the end of your tour to help people remember what they learned? _____

mystery science

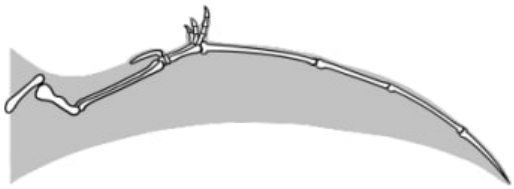
Fossils & Changing Environments

Name: _____

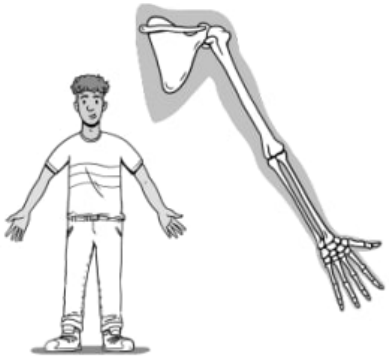
Date: _____

Unit Assessment

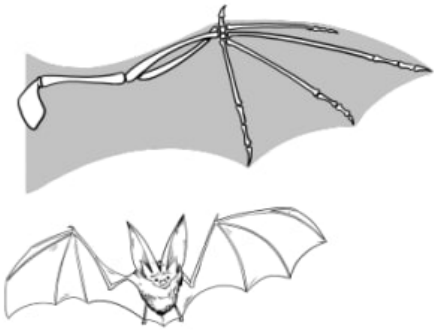
Vivian, a paleontologist, just discovered a new fossil! Vivian wants to figure out what the ancient animal was like when it was alive. She decides to compare the arm bones of the mystery fossil with the arm bones of some modern animals. Compare the bones below with the mystery fossil bones.



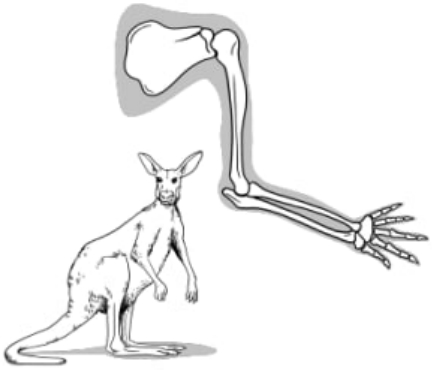
Mystery Fossil Arm Bones



Human Arm Bones



Bat Arm Bones



Kangaroo Arm Bones

1. Which of the following claims has the STRONGEST evidence to support it?

a. The mystery animal walked on two legs.
b. The mystery animal walked on four legs.
c. The mystery animal lived in the water.
d. The mystery animal flew or glided through the air.
e. The mystery animal was a carnivore.

2. Explain the reason for your answer to question 1. Support your answer with evidence.

_____

_____

_____

_____

3. Marcus is a paleontologist who is studying the fossils found at three different fossil dig locations. Marcus has discovered 2 clam fossils in a forest habitat. Marcus has found 3 shark tooth fossils, 2 clam fossils, and 1 fish fossil in a grassland habitat. Marcus hasn't found any fossils in a desert habitat.

Draw the type and number of each fossil that Marcus has discovered in each habitat. [Don't worry about the details of your drawing – a simple outline of the shape is just fine!]

Fossils Found in Each Habitat

Forest	Grassland	Desert

4. Modern sharks, clams, and fish that are alive today usually live in ocean habitats. Marcus thinks that some of the habitats where he is currently finding fossils have changed over time. Which of the following claims has the STRONGEST evidence to support it?

a. The desert habitat used to be an ocean.
b. The grassland habitat used to be an ocean.
c. The forest habitat used to be an ocean.
d. Sharks used to walk on land.

5. Explain the reason for your answer to question 4. Support your answer with evidence.

_____

_____

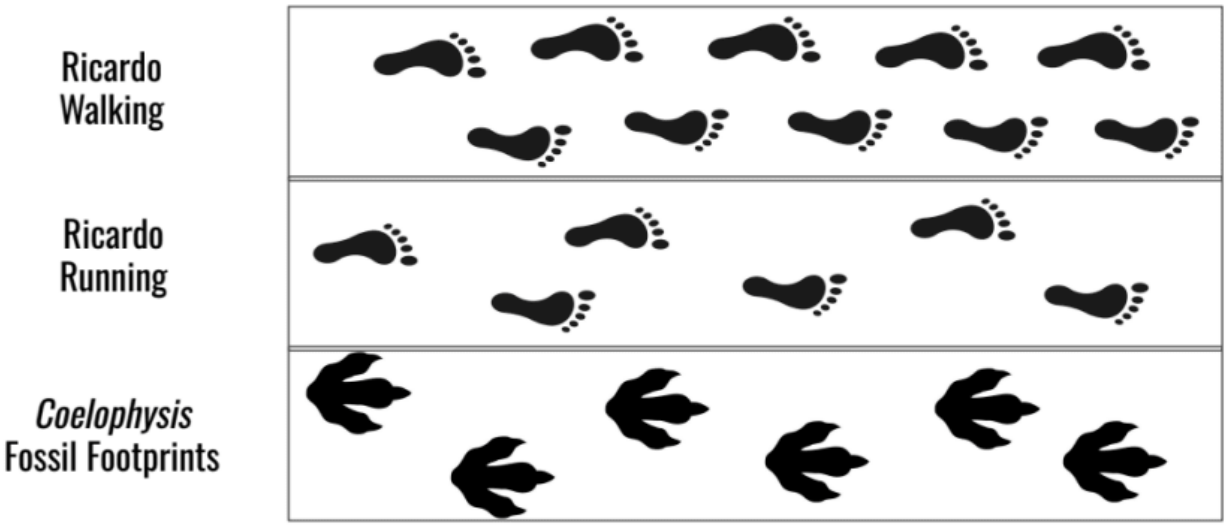
_____

_____

_____

Ricardo was researching an extinct dinosaur called *Coelophysis* and noticed his own legs are the same exact height as this dinosaur's legs.

Scientists have discovered trace fossils of *Coelophysis* footprints and Ricardo wants to compare his footprints to these fossils. Ricardo walked on the beach and took a photo of his footprints. He also ran on the beach and took a photo of his footprints. Compare the fossil footprints with Ricardo's footprints.



6. Which of the following claims has the STRONGEST evidence to support it?

a. The dinosaur *Coelophysis* never ran when it was alive.
b. The dinosaur *Coelophysis* was always running when it was alive.
c. The dinosaur *Coelophysis* was probably walking when it stepped in the mud that made the trace fossils.
d. The dinosaur *Coelophysis* was probably running when it stepped in the mud that made the trace fossils.
e. Humans and dinosaurs lived at the same time.

7. Explain the reason for your answer to question 6. Support your answer with evidence.

_____

_____

_____

_____

_____

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Life Cycles

3rd Grade • NGSS • Unit Worksheets

Lesson 1

How is your life like an alligator's life?

Lesson 2

What's the best way to get rid of mosquitoes?

Lesson 3

Why do plants grow flowers?

Lesson 4

Why do plants give us fruit?

Lesson 5

Why are there so many different kinds of flowers?

I am also curious about...

See-Think-Wonder Chart

Name: _____

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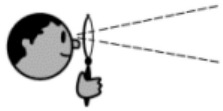
See	Think	Wonder
What did you observe? 	How can you explain what is happening? 	What questions do you have? 

Spotting Cycles

mystery science
Life Cycles | Anchor Phenomenon

Name: _____

Directions: Describe any cycles that involve the bats and the saguaros. You can use words, drawings, or both. If you need more space, you can use the back of this page.

Bat Cycles

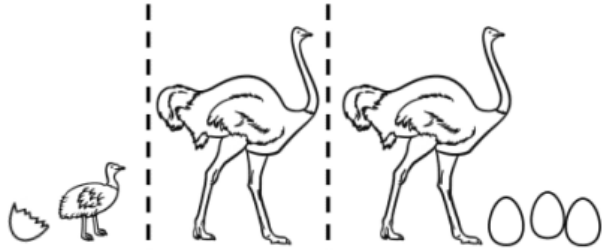
Saguaro Cycles

Birthday Buddies Animal Cards

mystery science
How is your life like an alligator's life?

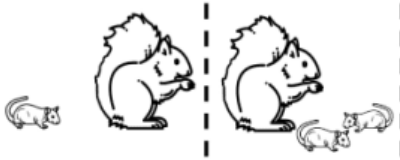
Ostrich (bird)

- **0** — Chick hatches
- **2** — Grows to adult size
- **4** — Adult ostrich lays eggs
- Lives up to **70** years



Gray Squirrel (mammal)

- **0** — Baby squirrel is born
- **Half a year** — Grows to adult size
- **1** — Adult squirrel has babies
- **10** — Lives up to 10 years



Bullfrog (amphibian)

- **0** — Tadpole hatches
- **2** — Tadpole turns into frog
- **3** — Grows to adult size
- **4** — Adult frog lays eggs
- **8** — Lives up to 8 years

Hercules Beetle (insect)

- **0** — Beetle larva hatches
- **1** — Beetle larva grows
- **2** — Larva turns into adult beetle and lays eggs
- **3** — Lives up to 3 years

Birthday Buddies Timeline

Name: _____

Mystery science

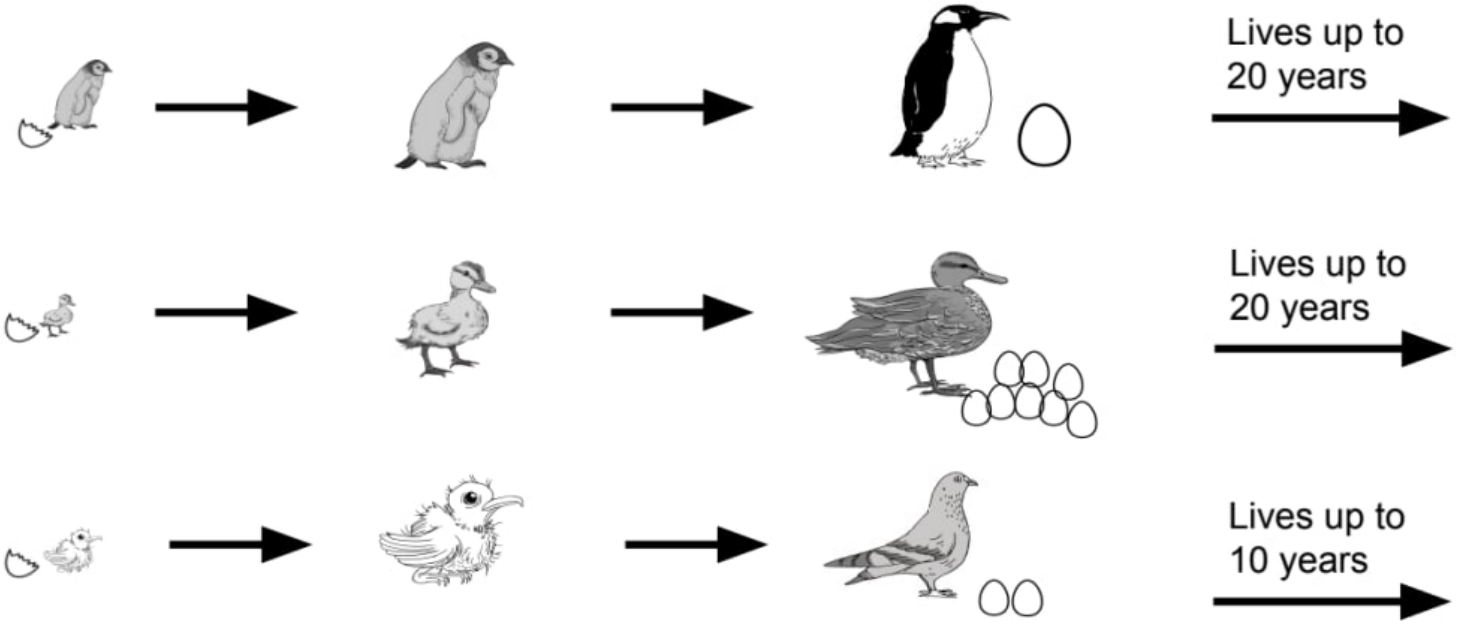
How is your life like an alligator's life?

Birthday Buddy #1

Birthday Buddy #2

Name: _____
Date: _____

Lesson Assessment



1. The images above show the major events in the lives of three different kinds of birds–penguins, ducks, and pigeons. Look carefully for patterns of what is the same and what is different about these three life cycles.
Using information from above, circle **True** or **False** for each sentence.

True False All baby birds hatch from an egg.

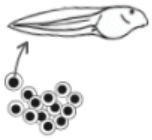
True False Birds all live for the same amount of time.

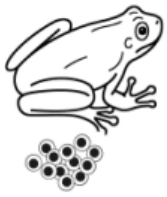
True False All birds grow during their life cycle.

True False All birds lay the same number of eggs during their life cycle.

2. The images above are a model for the life cycles of these three types of birds. What do the arrows represent in this model?

a. The arrows represent a major event in the life cycle of each bird.
b. The arrows represent a certain amount of time passing.
c. The arrows don't represent anything in the model.





3. The images above show a frog at different points in its life cycle. Draw arrows to show the correct order of events in the life of a frog.

4. Animals have life cycles. This means that life continues, even though death is a part of the cycle. Look closely at your model of the frog life cycle. Add **a dashed line** to this model to show how the frog life cycle will continue, even though death is part of the life cycle.

5. Add to your model of the frog's life cycle above by adding one of the four descriptions to each of the images.

Birth (Hatch from an Egg) **Growth** **Have Babies** **Death**

6. Imagine that there is something in the pond water where these frogs live that prevents the eggs from hatching into tadpoles. Use your model of the frog's life cycle to explain what would happen to the frogs over time.

_____

_____

_____

_____

_____

_____

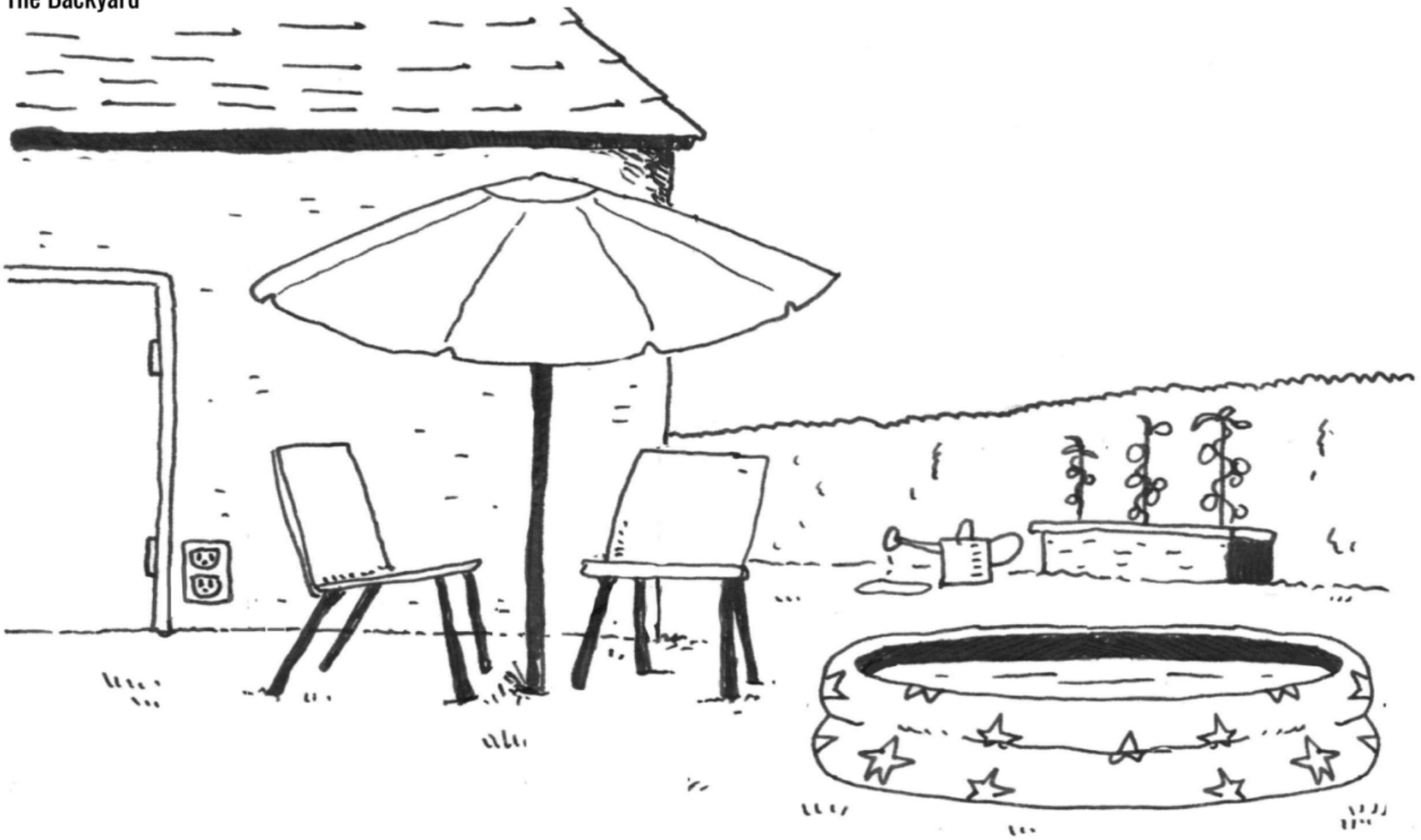
Bug Off Worksheet #3

Name:_____

mystery science

What's the best way to get rid of mosquitoes?

The Backyard



This is how I will solve the mosquito problem in this backyard: _____

_____

_____

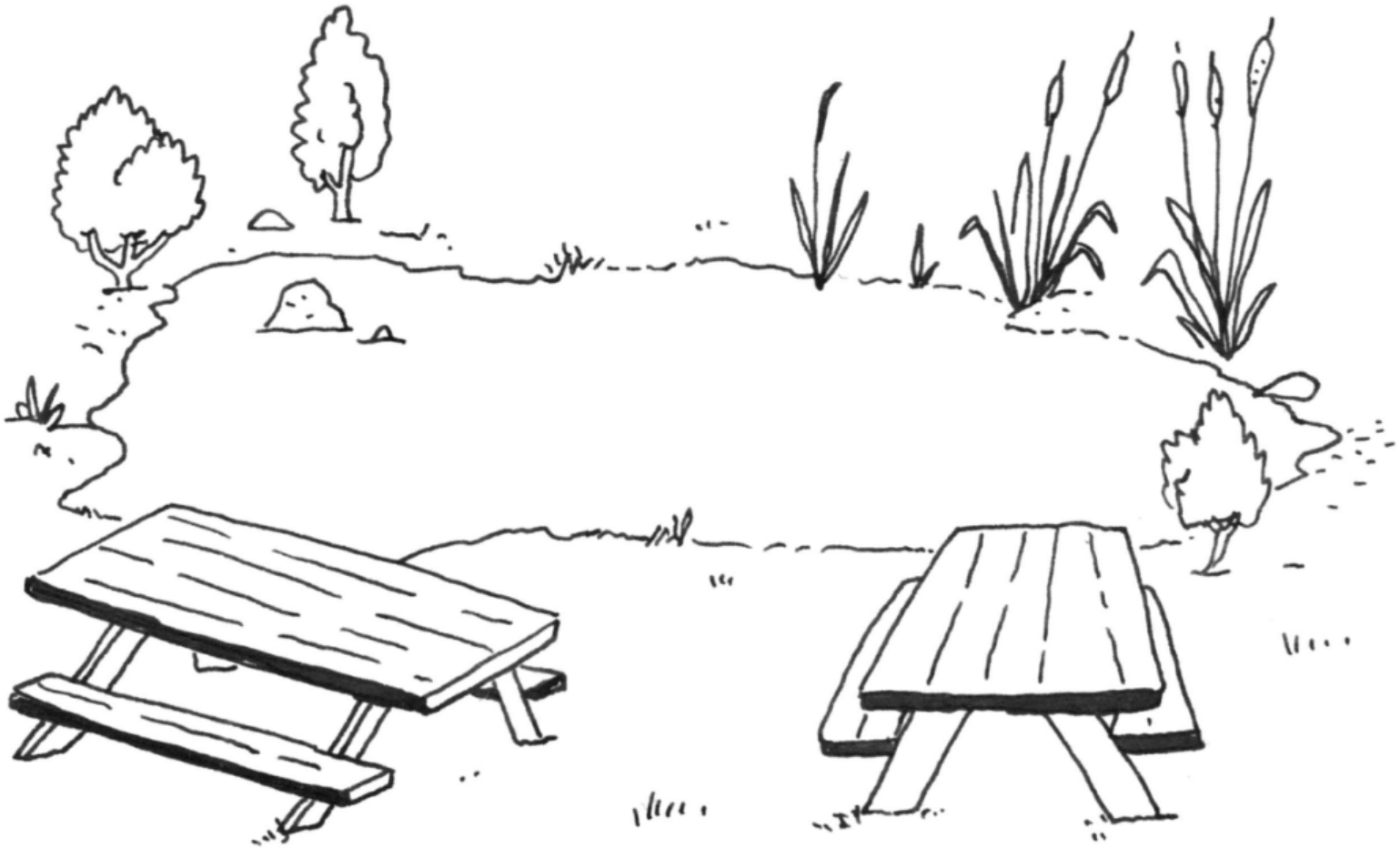
Bug Off Worksheet #2

The Picnic Area

Name:_____

mystery science

What's the best way to get rid of mosquitoes?



This is how I will solve the mosquito problem at the picnic area: _____

_____

_____

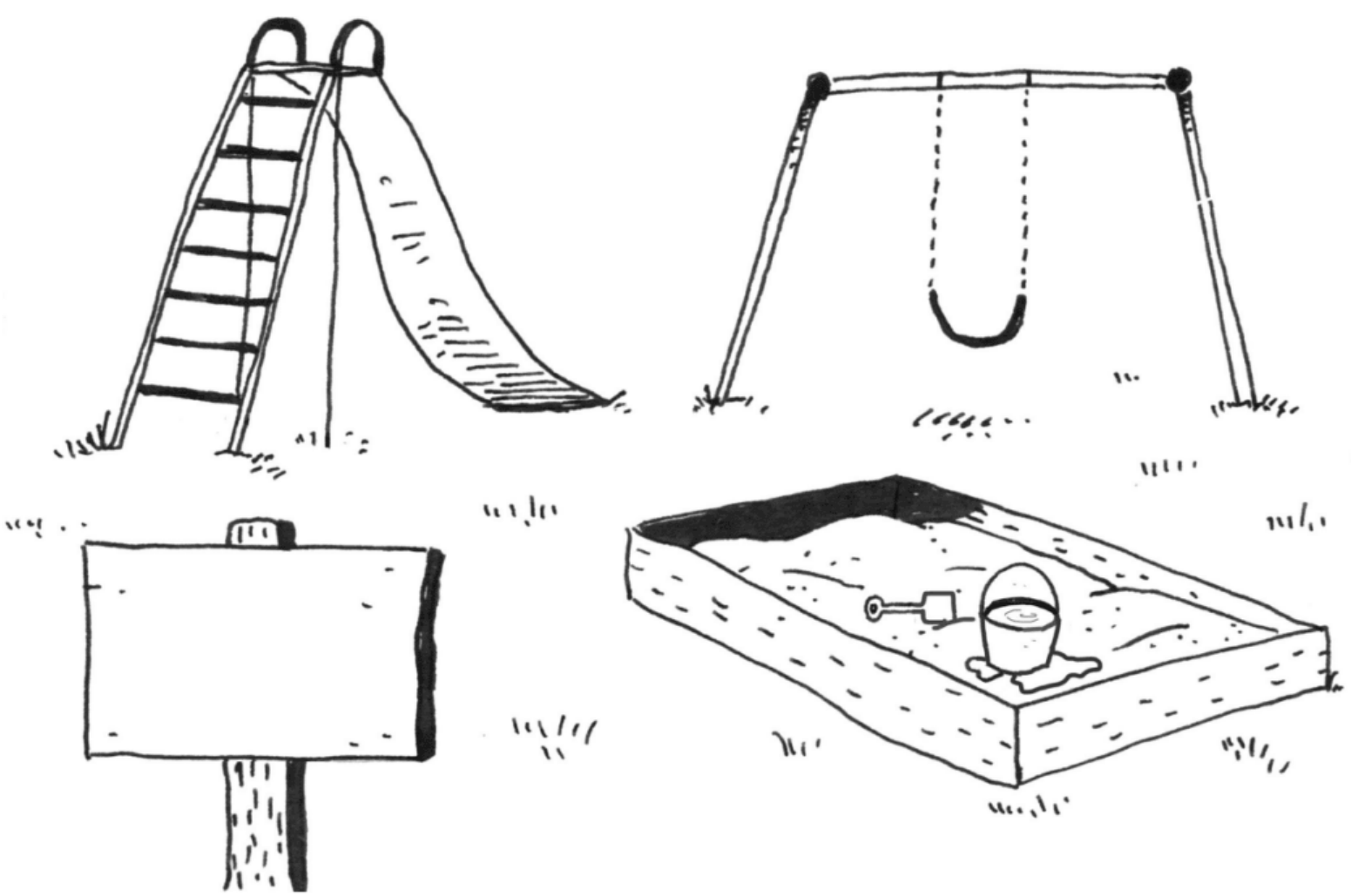
Bug Off Worksheet #1

The Playground

Name:_____

mystery science

What's the best way to get rid of mosquitoes?



This is how I will solve the mosquito problem at the playground: _____

_____

_____

Name: _____

Problem Solver's Sheet

PROBLEM

1) What's the problem you need to solve? Problem: _____

_____

SOLUTIONS

2) After listening to each expert, write down any ideas you have about how to solve the mosquito problem. The more ideas, the better!

PARK RANGER:

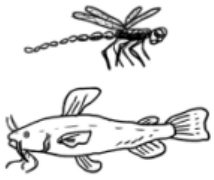
"Mosquitoes need water for their eggs and larvae."

Ideas: _____

_____

_____

_____



FISHERMAN:

"Fish eat mosquito eggs and larvae. Dragonflies eat mosquitoes."

Ideas: _____

_____

_____

_____

WEATHER REPORTER:

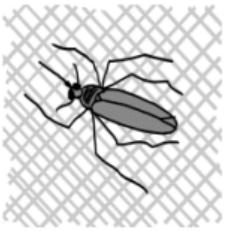
"Mosquitoes can't fly in wind over 10 miles per hour." (16 km/h)

Ideas: _____

_____

_____

_____



HOME REPAIR EXPERT:

"Mosquitoes can't get through screens or netting."

Ideas: _____

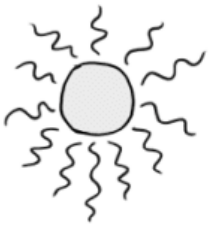
_____

_____

_____

mystery science

What's the best way to get rid of mosquitoes?



HIKER:
"Mosquitoes bite most at sunrise and sunset."

Ideas: _____

BIRD WATCHER:
"Birds and bats eat lots of mosquitoes."

Ideas: _____

DAD & KID:
"Insect repellent keeps them away, but it's icky."

Ideas: _____

3) Look at your "Bug Off" sheet. Are there any solutions that will NOT work here? Why won't they work?

_____

_____

_____

_____

4) How will you figure out how well your solution worked? For example, is there some way you could compare what it was like in the town before and after your solution?

_____

_____

_____

mystery science

Name: _____
Date: _____

What's the best way to get rid of mosquitoes?

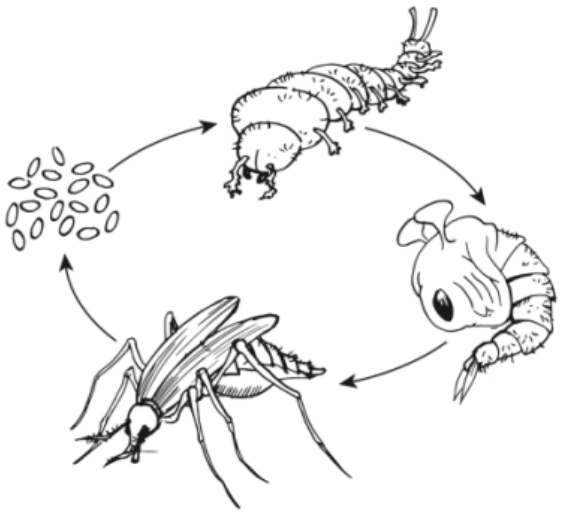
Lesson Assessment

1. Which is a disease carried by mosquitoes?
   a. Asthma
   b. Flu
   c. Chicken pox
   d. Malaria

2. Which of the following would NOT protect people from getting diseases carried by mosquitoes?
   a. Leaving buckets outside to catch rainwater
   b. Covering porches and beds with mosquito nets
   c. Using powerful fans in doorways where insects might get in
   d. Spraying uncovered skin with mosquito repellant

3. You are most likely to find mosquitoes in a habitat that is...
   a. dry and hot
   b. cold and wet
   c. warm and wet
   d. cold and dry

4. Label the stages of the mosquito life cycle using words from the word bank.



Word Bank:
Pupa
Eggs
Adult
Larva

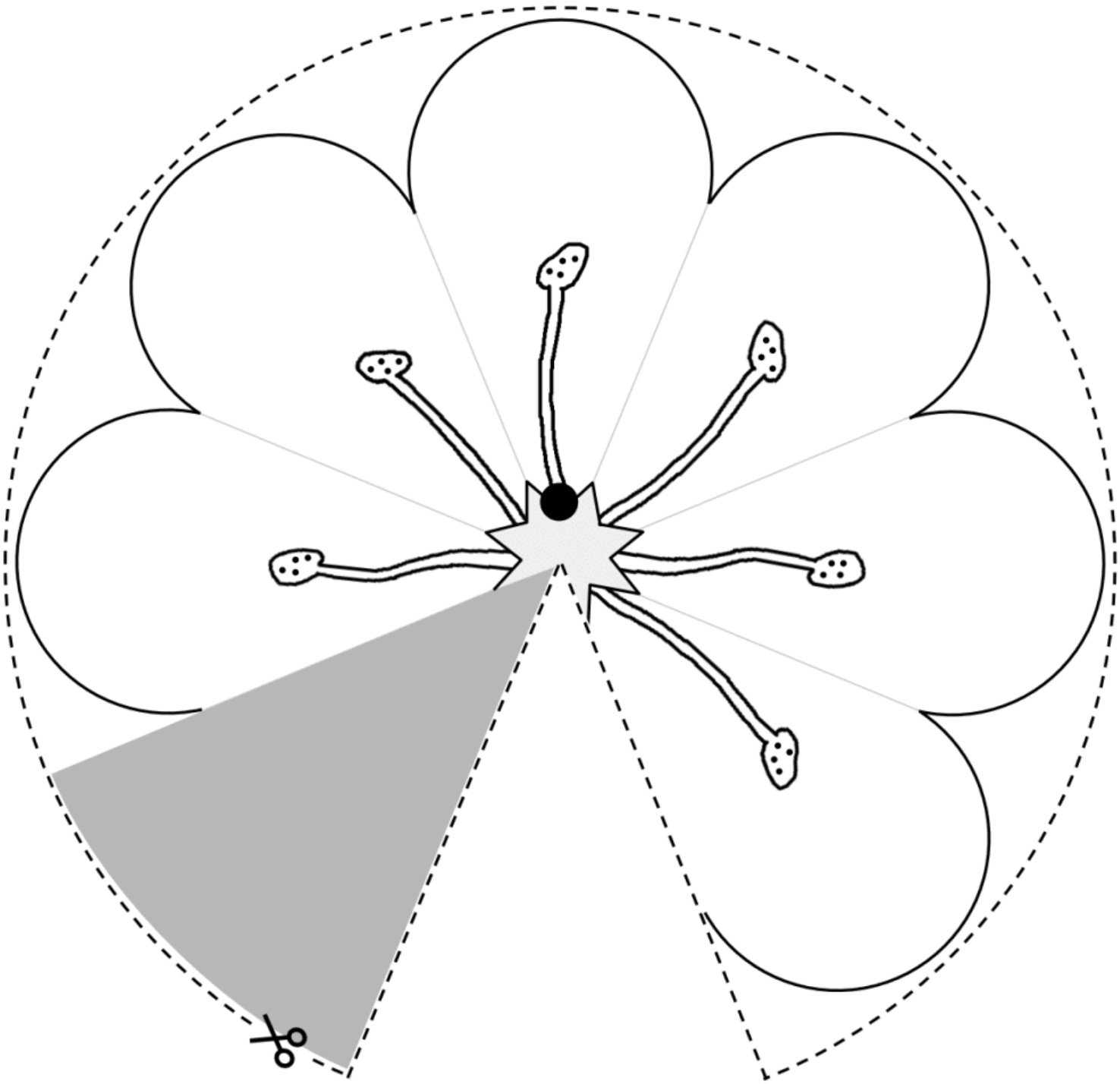
5. If Pondville has a drought next year, will mosquitoes become more or less common? Support your answer with reasoning.

6. A friend tells you, “Mosquitoes are just annoying, they’re not dangerous.” Do you agree? Why or why not?

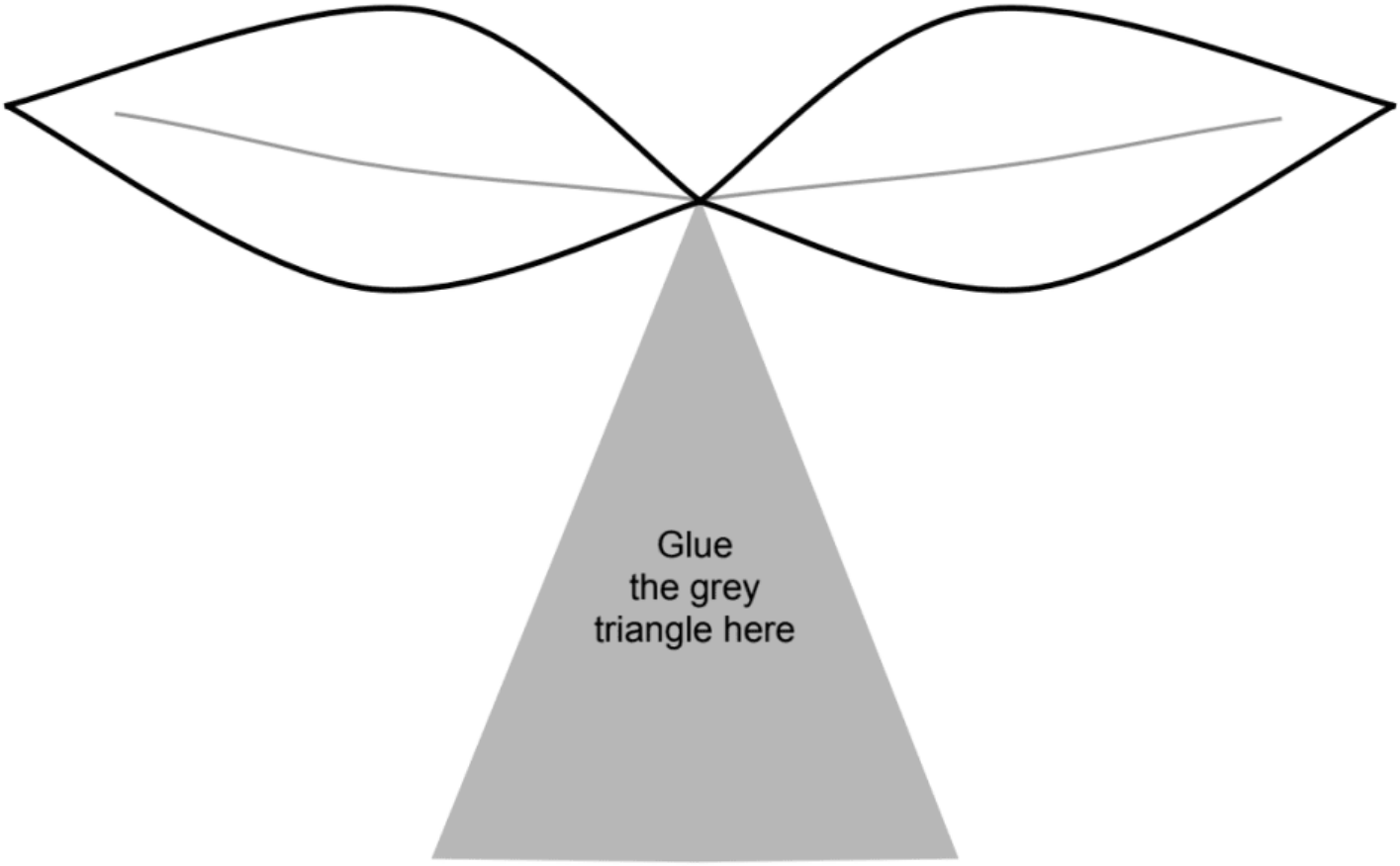
mystery science

Why do plants grow flowers?

Make a Flower



Flower Base



Name: _____

1. Circle what pollen you see on the sticky stigma:

   Pollen from my flower | Pollen from my partner's flower | Pollen from both flowers

2. Do you think your flower will make seeds?

   Yes | No

KEY

pollen duster

sweet nectar

mystery science

Name: _____
Date: _____

Why do plants grow flowers?

Lesson Assessment

1. How do bees help flowers make seeds?

2. If you take a flower's pollen and then put it on that same flower's stigma, will that make a seed pod grow? Why or why not?

3. Why do bees like crawling into flowers?

mystery science

Why do plants give us fruit?

Name: _____

Date: _____

Science Fruit or Science Vegetable?

Circle your answers for each food.

Radish:

What do you think it is?	science fruit	science vegetable
Did you find seeds?	Yes, I found seeds!	No seeds here.
What did the class decide?	science fruit!	science vegetable!

Tomato:

What do you think it is?	science fruit	science vegetable
Did you find seeds?	Yes, I found seeds!	No seeds here.
What did the class decide?	science fruit!	science vegetable!

Cucumber:

What do you think it is?	science fruit	science vegetable
Did you find seeds?	Yes, I found seeds!	No seeds here.
What did the class decide?	science fruit!	science vegetable!

Potato:

What do you think it is?	science fruit	science vegetable
Did you find seeds?	Yes, I found seeds!	No seeds here.
What did the class decide?	science fruit!	science vegetable!

Celery:

What do you think it is?	science fruit	science vegetable
Did you find seeds?	Yes, I found seeds!	No seeds here.
What did the class decide?	science fruit!	science vegetable!

mystery science

Name: _____
Date: _____

Why do plants give us fruit?

Lesson Assessment

1. Why do flowers grow fruit?

2. What part of an apple reminds you that it was once a flower?

3. How could you tell if something is a “science fruit?”

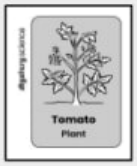
4. What is an example of a “science fruit” that is normally called a vegetable in the grocery store? Why do you think it’s called a vegetable in the grocery store?

Rules

GOAL OF THE GAME:
Have the most Plant Cards in your Fruit & Seed Basket at the end of the game.

What to do on your turn:

FIRST, DRAW A CARD



Draw 1 Plant Card.

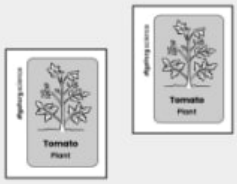
or

Draw 1 Bee Card (only if you have plants in your garden.)

THEN, PLANT & POLLINATE (if you can!) (as much as you can!)

1 ADD PLANTS TO YOUR GARDEN

If 2 Plant Cards match, add them to your garden.

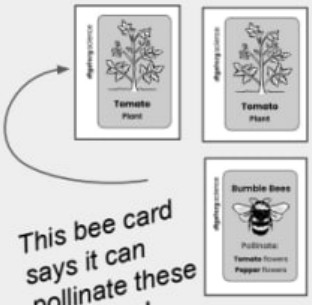


If you don't have any plant cards that match, keep them in the Plant Zone.

2 CHECK YOUR BEE CARDS

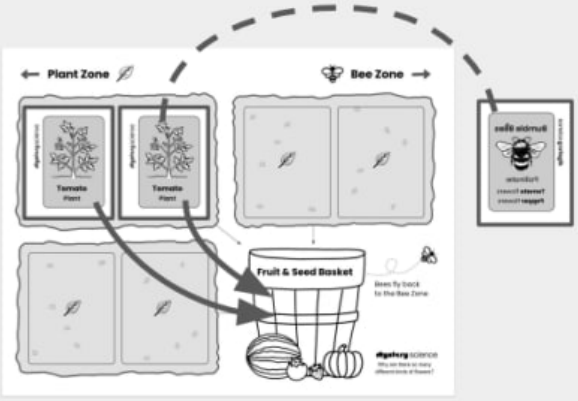
Read your Bee Cards to see if they can pollinate any plants in your garden.

IF they can, then **Pollinate** your plants



3 POLLINATE PLANTS & MOVE THEM TO THE BASKET

- Pretend your bee pollinates the flowers of your plants.Those flowers now turn into fruits! Move both Plant Cards to your Fruit & Seed Basket. (You just scored two points!)
- Keep the Bee Card in the Bee Zone. You can use that bee again.



GAME ENDS:

The game ends when there are no more cards to draw.(You probably didn't get to pollinate all your plants and that's okay!)

mystery science
Why are there so many different kinds of flowers?

Mystery science

Strawberry
Plant

Mystery science

Strawberry
Plant

Mystery science

Strawberry
Plant

Mystery science

Strawberry
Plant

Mystery science

Strawberry
Plant

Mystery science

Strawberry
Plant

Mystery science

Tomato
Plant

Mystery science

Tomato
Plant

Mystery science

Tomato
Plant

Mystery science

Tomato
Plant

Mystery science

Tomato
Plant

Mystery science

Tomato
Plant

Mystery science

Why are there so many different kinds of flowers?

Watermelon
Plant

Mystery science

Watermelon
Plant

Mystery science

Watermelon
Plant

Mystery science

Watermelon
Plant

Mystery science

Watermelon
Plant

Mystery science

Watermelon
Plant

Mystery science

Pumpkin
Plant

Mystery science

Pumpkin
Plant

Mystery science

Pumpkin
Plant

Mystery science

Pumpkin
Plant

Mystery science

Pumpkin
Plant

Mystery science

Pumpkin
Plant

Mystery science
Why are there so many different kinds of flowers?

Card Station

Plant Cards

Plant Cards

Bee Cards

Bee Cards

Name: _____

Scorecard

How Many Plants Were Pollinated?

YEAR 1:		YEAR 2:	
Strawberry:	_____	Strawberry:	_____
Tomato:	_____	Tomato:	_____
Watermelon:	_____	Watermelon:	_____
Pumpkin:	_____	Pumpkin:	_____
Total:	_____	**Total:**	_____

1. If you removed all the bees from the garden, what would happen? Why?

_____

_____

_____

Name: _____

Scorecard

How Many Plants Were Pollinated?

YEAR 1:

Strawberry: _____
Tomato: _____
Watermelon: _____
Pumpkin: _____
Total: _____

YEAR 2:

Strawberry: _____
Tomato: _____
Watermelon: _____
Pumpkin: _____
Total: _____

1. If you removed all the bees from the garden, what would happen? Why?

_____

_____

_____

Mystery science

Squash Bees

Pollinate:
Pumpkin flowers
Zucchini flowers

Mystery science

Bumble Bees

Pollinate:
Tomato flowers
Pepper flowers

Mystery science

Long-horned Bees

Pollinate:
Watermelon flowers
Cantaloupe flowers

Mystery science

Andrena Bees

Pollinate:
Strawberry flowers
Cucumber flowers

Mystery science

Squash Bees

Pollinate:
Pumpkin flowers
Zucchini flowers

Mystery science

Bumble Bees

Pollinate:
Tomato flowers
Pepper flowers

Mystery science

Long-horned Bees

Pollinate:
Watermelon flowers
Cantaloupe flowers

Mystery science

Why are there so many different kinds of flowers?

Plant Zone

Bee Zone

Fruit & Seed Basket

Bees fly back to the Bee Zone

mystery science

Why are there so many different kinds of flowers?

Plant Zone

Bee Zone

Fruit & Seed Basket

Bees fly back to the Bee Zone

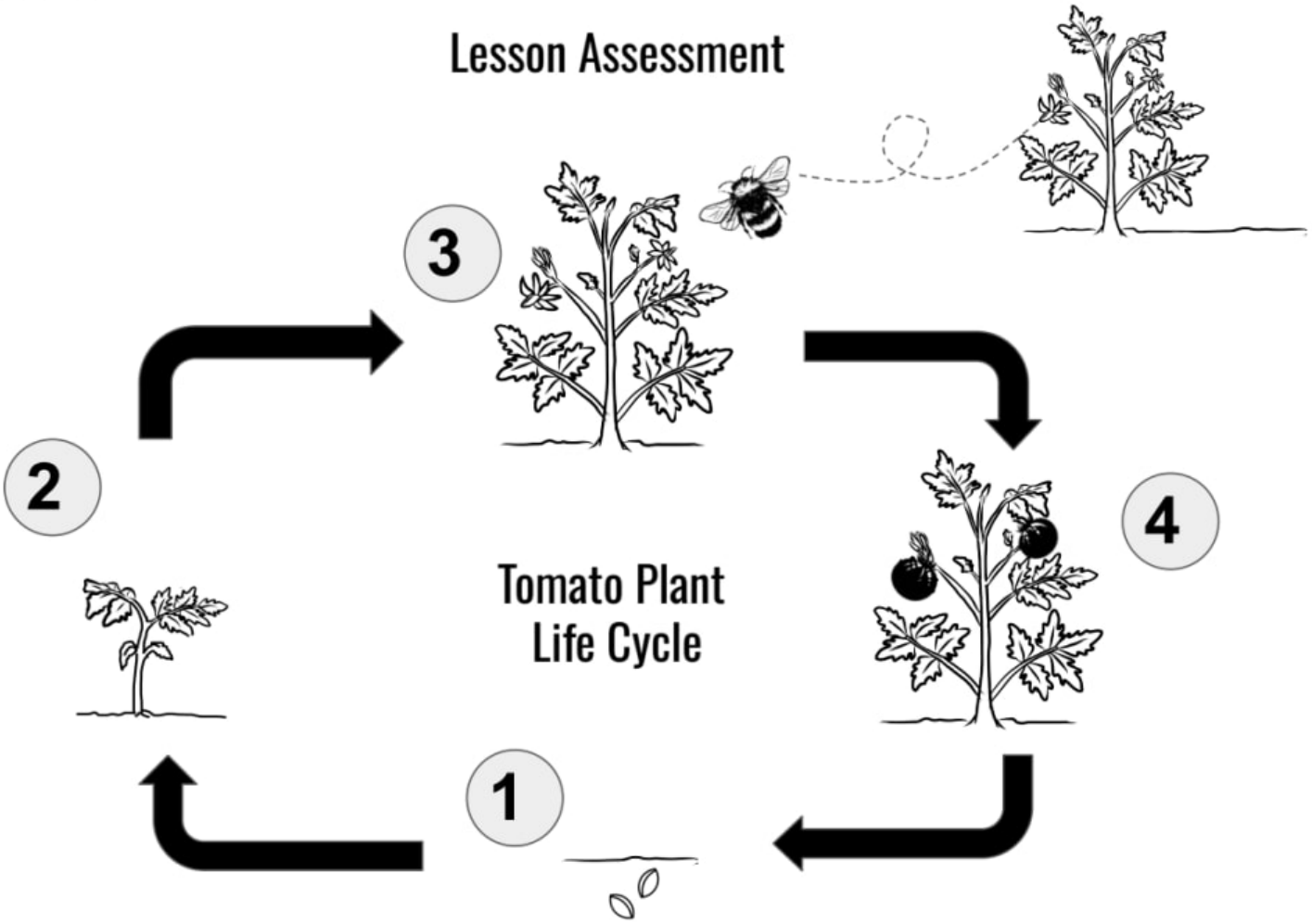
mystery science

Why are there so many different kinds of flowers?

Name: _____

Date: _____

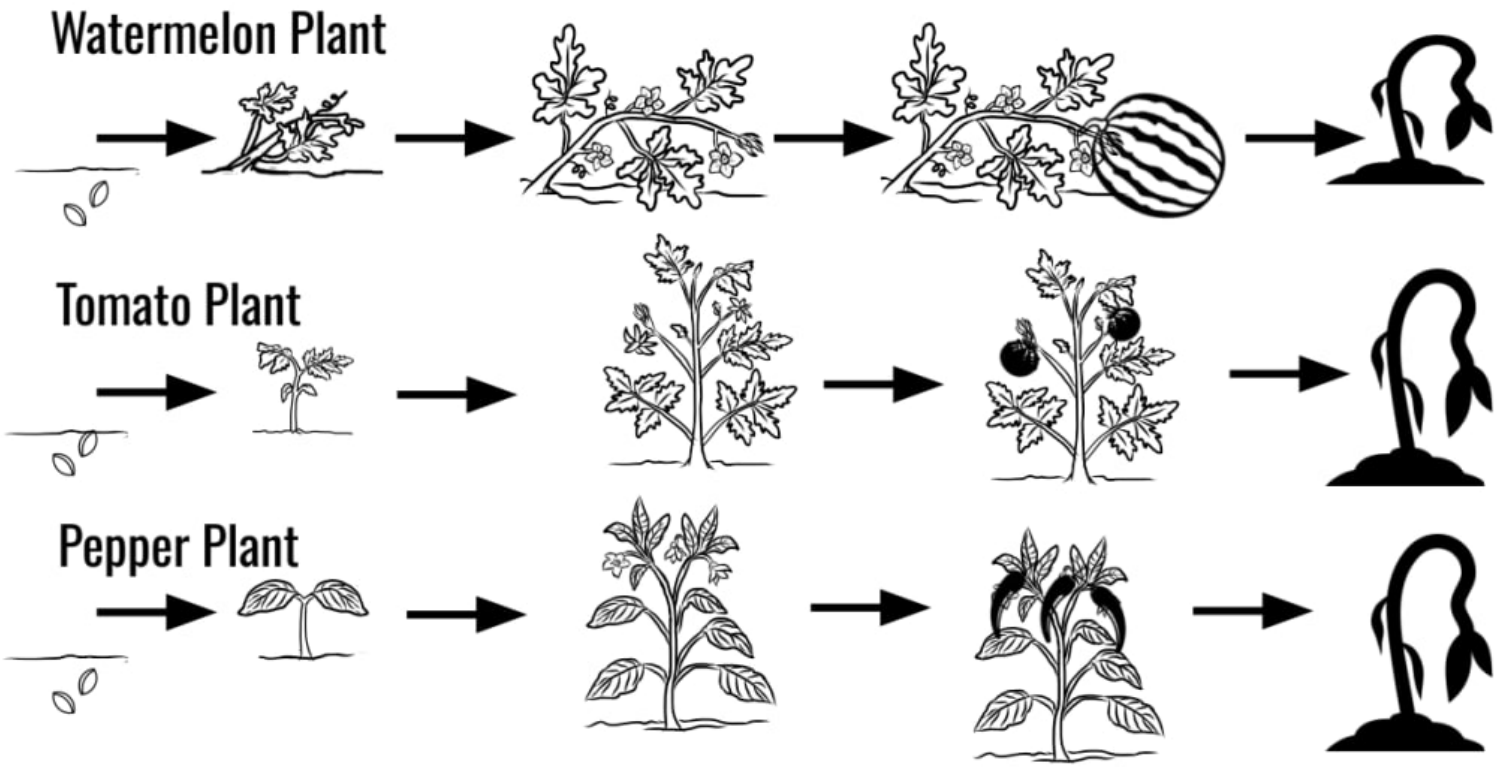
Lesson Assessment



Use the model of the tomato plant life cycle shown above to help you answer the questions.

1. Where did the seeds shown in part 1 of the model come from?
   a. Seeds come from the roots of the adult plant.
   b. Seeds are always present under the ground.
   c. Seeds come from the fruit of the adult plant.
   d. Seeds come from the leaves of the adult plant.

2. What would happen if you removed the bumblebee from part 3 of the model?
There may be more than one correct answer. Circle all correct answers.
   a. The plant will produce less fruit (tomatoes) because the bumblebee helps pollinate the flowers.
   b. The plant will produce fewer seeds because there will be less fruit. With fewer seeds there will be fewer tomato plants in the future.
   c. The current adult tomato plant will die because it needs the bumblebee to survive.
   d. The current plant will not produce flowers because the plant needs the bumblebee to grow flowers.



3. The images above are models that show different stages of the life cycle for three different kinds of plants: watermelon, tomato, and pepper. Use these models to find patterns of what is the same and different for these plants. Circle **True** or **False** for each sentence.

True False All plants start small and grow into larger plants.

True False All plants eventually die.

True False All plants produce the same number of fruits.

4. A plant life cycle should continue in a loop (or circle). Add one arrow to each life cycle to show how the life cycle will continue, even though death is a part of the life cycle.

5. Imagine that you have a garden with watermelon plants, tomato plants, and pepper plants. This garden gets plenty of water and sunshine. But you only have bees in your garden that pollinate watermelon flowers. Describe what will happen to your garden in the next few years if everything stays the same.

Saguaro Life Cycle

mystery science
Life Cycles | Anchor Phenomenon

Name: _____

Directions: The list of words below is out of order. Use that list of words to title each box in the correct order that a saguaro grows. The word "germinating" is done for you. Then, draw what the saguaros look like at each step.

- **Flowering**: when a plant grows flowers
- **Growing**: when a plant gets bigger and bigger
- **Fruiting**: when flowers on a plant turn into fruits with seeds
- **Germinating:** when a baby plant begins to grow from a seed
- **Dying**: saguaros can live for over 100 years, but not forever!

1. Germinating

2. _____

3. _____

4. _____

5. _____

Saguaro Life Cycle

mystery science
Life Cycles | Performance Task

Name: _____

Directions: Answer the following questions.

1. Bats are important to the saguaro life cycle because bats are pollinators. During which stage of the saguaro life cycle does pollination take place? Circle your answer from the words below:

   Germinating **Growing** **Flowering** **Fruiting** **Dying**

2. Bats go through life cycles, too. Bats are born, they grow, they have babies, and they eventually die. Each of those stages is similar to a stage in the saguaro life cycle. Complete the following sentence:

   *When bats are **born**, it is similar to when saguaros are _____ in their life cycle.*

3. Saguaros need pollinators, but imagine if there were no pollinators. How would the saguaro life cycle change if there were no pollinators, such as the bats? Why?

   If there were no pollinators, these stages would change: _____

   because _____

   _____

4. If there were no pollinators, what would happen to the number of saguaros over time? Why?

   If there were no pollinators, the number of saguaros would _____,

   *because*_____

   _____

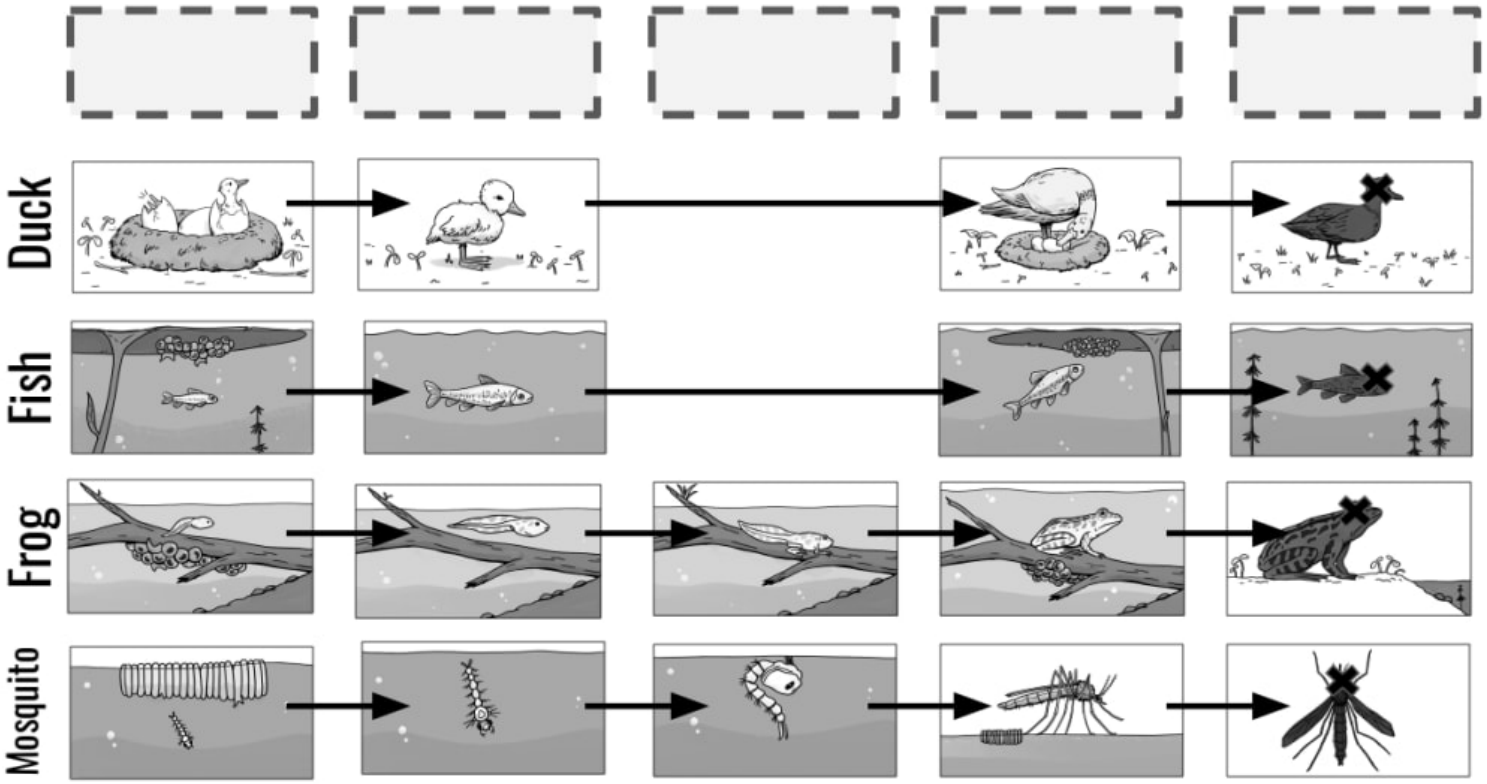
Name: _____

Date: _____

Unit Assessment

1. Sheena makes a visit to her local pond. She sees ducks, frogs, and fish living there. She also gets bitten by a few mosquitoes. Sheena wants to learn more about the life cycles of the animals living in this habitat. To help her understand similarities and differences, Sheena makes some life cycle models. Use the terms in the word bank to label each life stage shown in the models. Write the correct term for each stage in the empty boxes below.

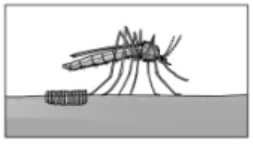
Growth	Birth (Hatching)	Have Babies (Reproduction)	Death	Metamorphosis



2. Sheena notices a pattern in the life cycles of frogs and mosquitoes. Use evidence from the life cycle models. Circle all the correct answers. There may be more than one correct answer.

a. Frogs and mosquitoes never die.
b. Frogs and mosquitoes go through a major change in their bodies called metamorphosis.
c. Frogs and mosquitoes have the same number of life stages as ducks and fish.
d. Frogs and mosquitoes go through a growth stage after they hatch from eggs.

3. Sheena notices another pattern. The adult ducks, fish, frogs, and mosquitoes can have babies (reproduce). When the animals lay eggs, babies can then hatch from those eggs and grow into adults. But every year there are about the same number of animals at the pond. If animals are having lots of babies every year, why isn't the pond overflowing with too many animals? Look back at Sheena's life cycle models on Page 1 to help you answer.



_____

_____

_____

_____

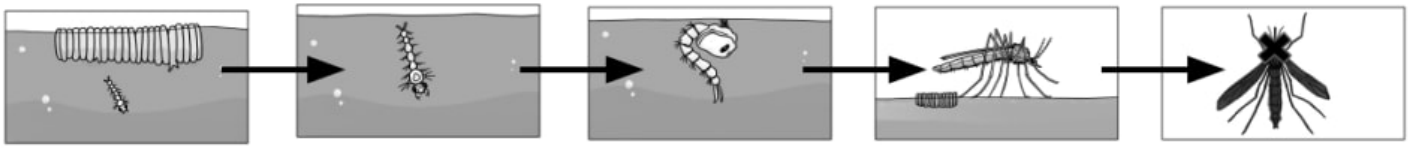
_____

_____

There is a mosquito problem near the pond that Sheena visits. Mosquitoes do well in warm weather, so when the temperature gets warmer in the summer, there are more and more adult mosquitoes. The adult mosquitoes fly around and bite people.

Omar knows about a chemical that will kill mosquito eggs. He thinks we should spray the chemical into the pond water.

Mosquito



4. Do you think Omar's solution will solve the problem? Look at the mosquito life cycle model again to help you choose the best answer.

a. No, Omar's solution will not work because the mosquito eggs are not biting people.
b. No, Omar's solution will not work because the chemical does not kill the adult mosquitoes that are biting people.
c. Yes, Omar's solution will work because it will kill the adult mosquitoes that are biting people.
d. Yes, Omar's solution will work because if it kills the eggs, then they won't hatch and grow into adult mosquitoes that will bite people.

5. The chemical that Omar wants to spray into the pond water not only kills mosquito eggs. It will kill the eggs of other animals in the water.

Look back at Sheena's life cycle models on Page 1. Use evidence from those life cycle models to describe why Omar's idea may not be a good solution to solve the mosquito problem.

_____

_____

_____

_____

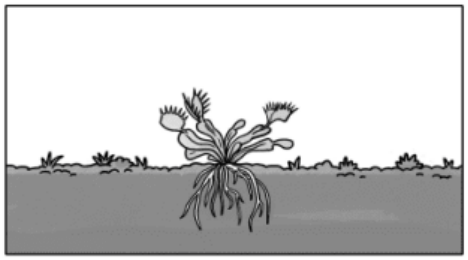
_____

_____

6. Zara has a different solution to solve the mosquito problem at the pond. An interesting plant grows around the pond called a Venus Flytrap.

The plant has little traps. When a bug lands in the trap, the trap slams shut, and kills the bug.

Zara notices that adult mosquitoes get caught in the traps and die. Zara thinks the town should gather a bunch of Venus Flytrap seeds and plant them around the pond.



Venus Flytrap

Do you think Zara's idea will solve the problem this year? Why or why not?

_____

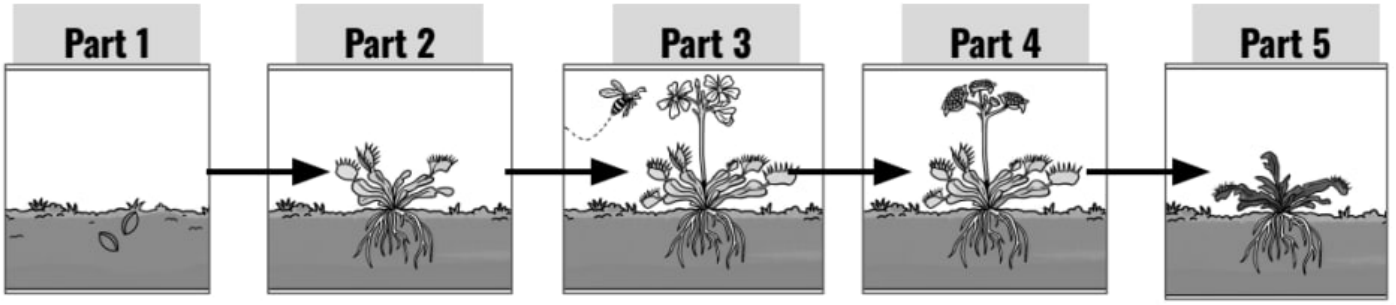
_____

_____

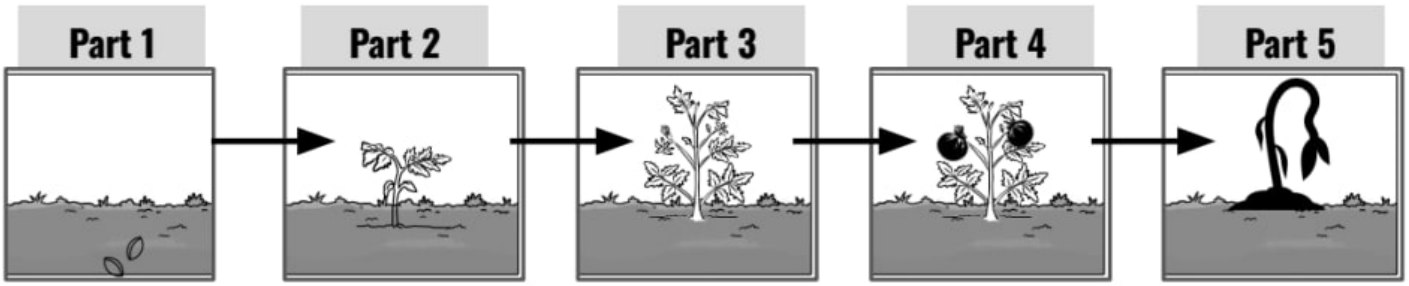
_____

_____

Venus Flytrap Plant



Tomato Plant



7. Sheena wants to know more about the Venus Flytrap plant. She wants to know if the Venus Flytrap has anything in common with a tomato plant. So she makes a life cycle model of a Venus Flytrap and a life cycle model of a tomato plant, which are shown above. Using information from above, circle **True** or **False** for each sentence.

True False Both plants begin their life as a seed and then grow into bigger plants.

True False The tomato plant has flowers in Part 3, but the Venus Flytrap does not.

True False Both plants will eventually die as shown in Part 5 of both models.

8. Sheena is amazed to see that a Venus Flytrap actually has several things in common with other plants. So she wonders if something as different as a frog and a tomato have anything in common too!

Frog

Compare the frog life cycle model to the tomato plant life cycle model. Even though they are SO different, write down everything their life cycles have in common!

mystery science

Heredity, Survival, & Selection

3rd Grade • NGSS • Unit Worksheets

Lesson 1

How do you identify a mysterious fruit?

Lesson 2

What do dogs and pigeons have in common?

Lesson 3

How could a lizard's toes help it survive?

Lesson 4

Why do dogs wag their tails?

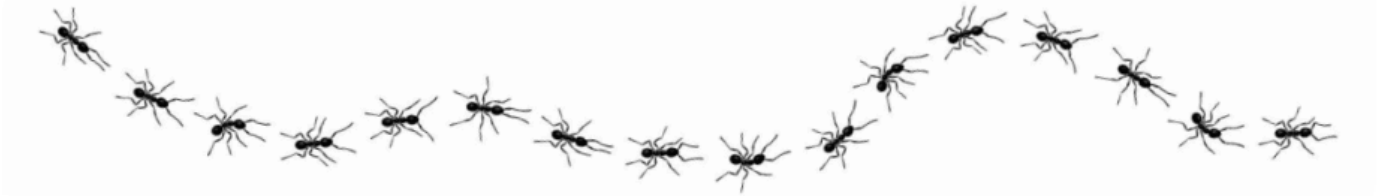
Lesson 5

How long can people (and animals) survive in outer space?

I am also curious about...

Amazing Ants

Name: _____



Use this space to **write** what you think ants do that helps them be successful.

_____

_____

_____

_____

_____

_____

_____

_____

_____

Use this space to **draw** what you think ants do that helps them be successful.

Use this space to write things you learn or questions you have about ants.

_____

_____

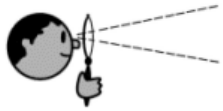
_____

_____

See-Think-Wonder Chart

Name: _____

mystery science

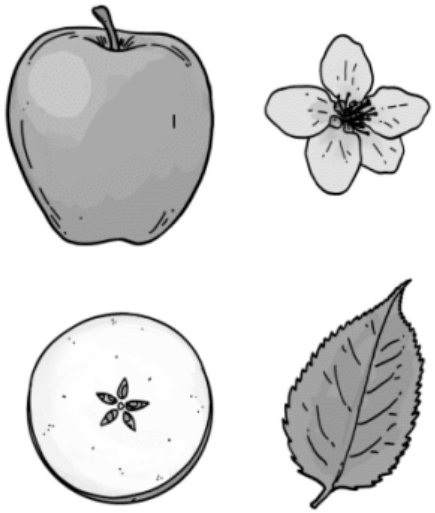
See	Think	Wonder
What did you observe? 	How can you explain what is happening? 	What questions do you have? 

Fruit Cards

Mystery science

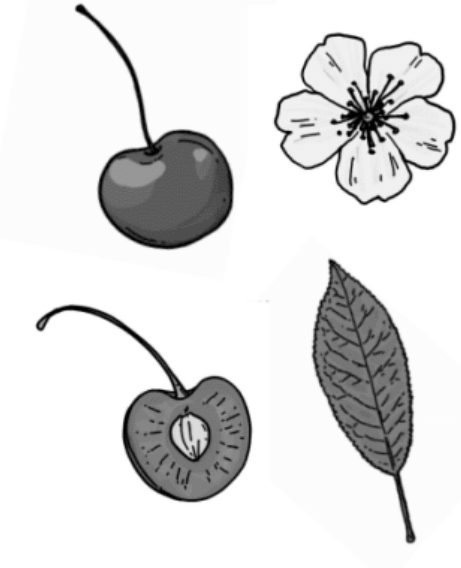
How do you identify a mysterious fruit?

apple



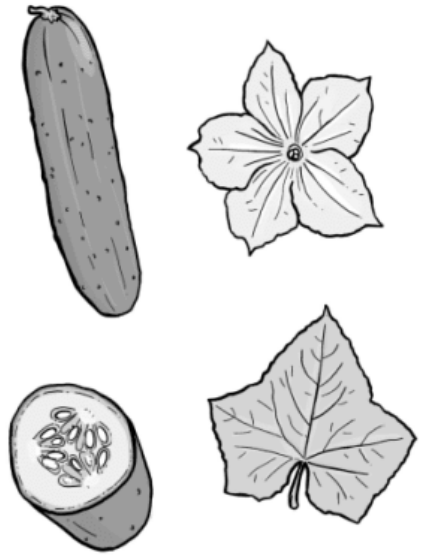
Mystery science

cherry



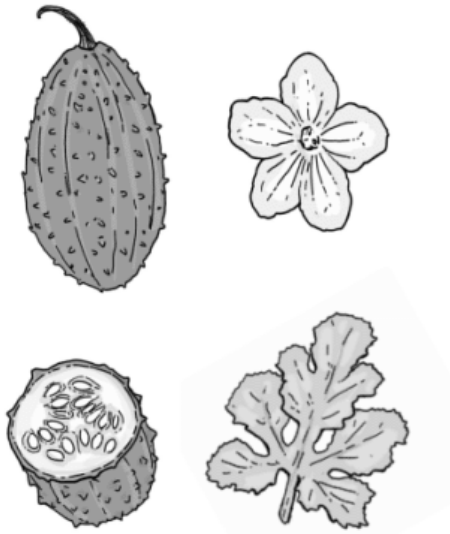
Mystery science

cucumber



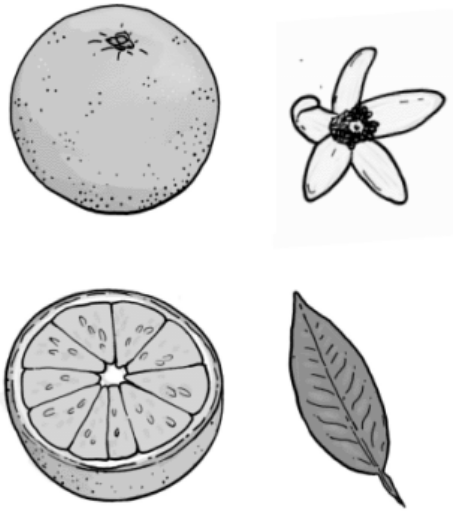
Mystery science

burr gherkin



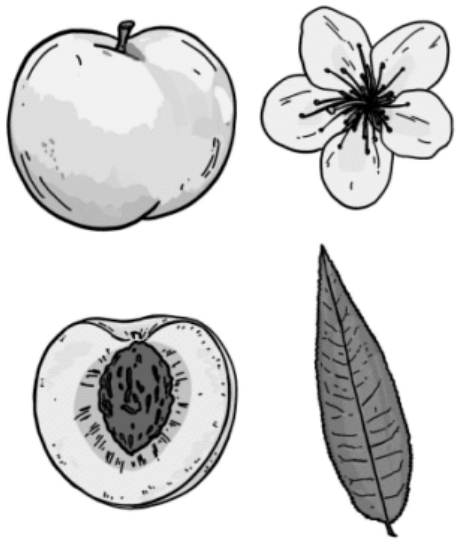
Mystery science

orange



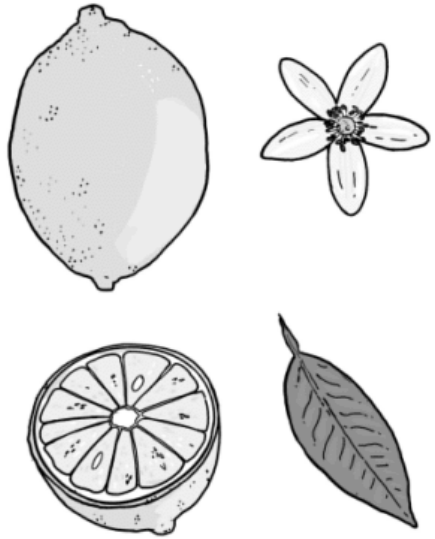
Mystery science

peach



Mystery science

lemon



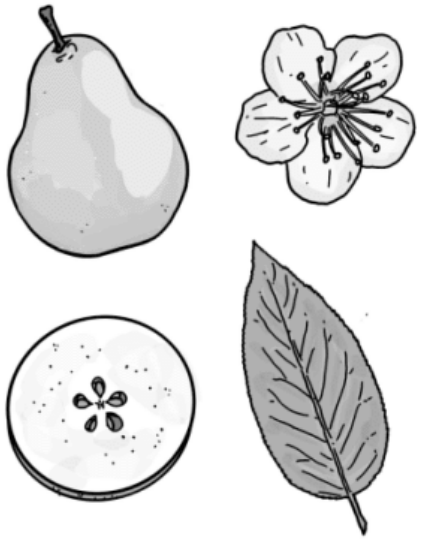
Mystery science

cranberry

Mystery science

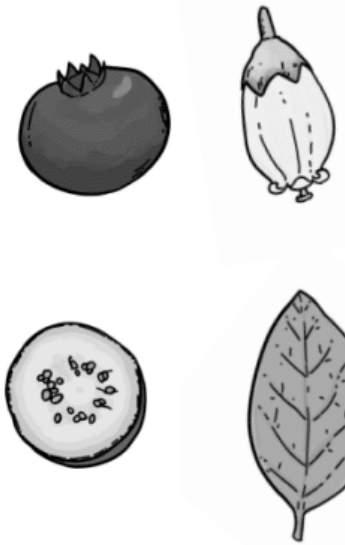
How do you identify a mysterious fruit?

pear



Mystery science

blueberry



Mystery science

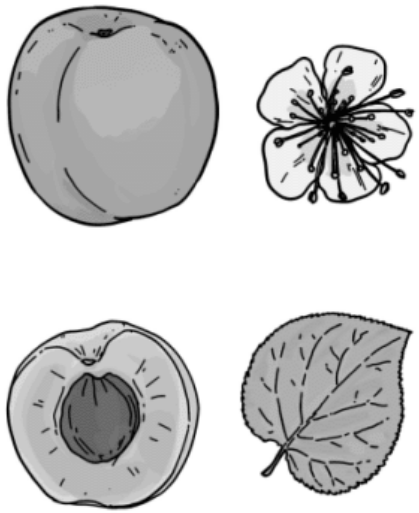
plum

Mystery science

horned melon

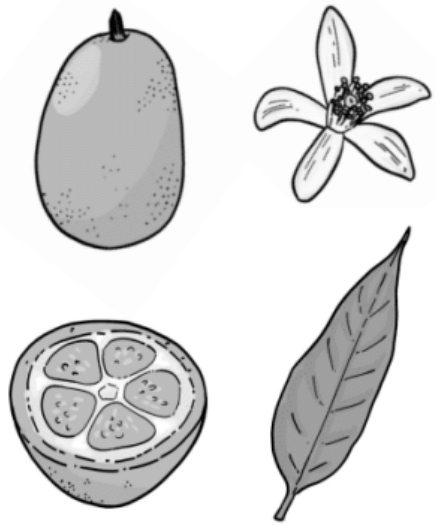
Mystery science

apricot



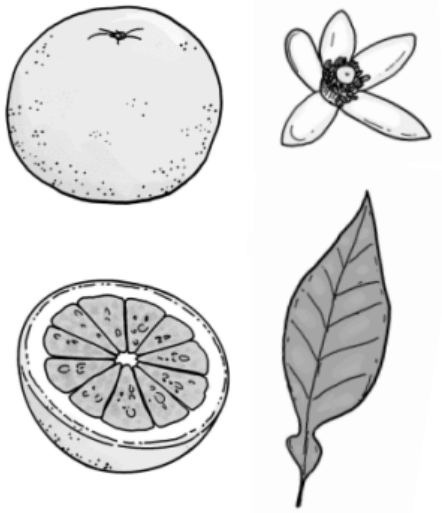
Mystery science

kumquat



Mystery science

grapefruit



Mystery science

Fruit Market Mysteries

Name: _____

mystery science

How do you identify a mysterious fruit?

Round 1

1. Circle the 2 fruits you would group together by looking at the outside:

cherry plum grape

2. Circle the 2 fruits you would group together by looking at their insides, flowers, & leaves:

cherry plum grape

What is your **evidence** for grouping these fruits together? List three traits they share:

- _____
- _____
- _____

Round 2

3. Circle the 2 fruits you would group together by looking at the outside:

cucumber lemon dosakai

4. Circle the 2 fruits you would group together by looking at their insides, flowers, & leaves:

cucumber lemon dosakai

What is your **evidence** for grouping these fruits together? List three traits they share:

- _____
- _____
- _____

Round 3

5. Circle the 2 fruits you would group together by looking at the outside:

tomato watermelon zebra fruit

6. Circle the 2 fruits you would group together by looking at their insides, flowers, & leaves:

tomato watermelon zebra fruit

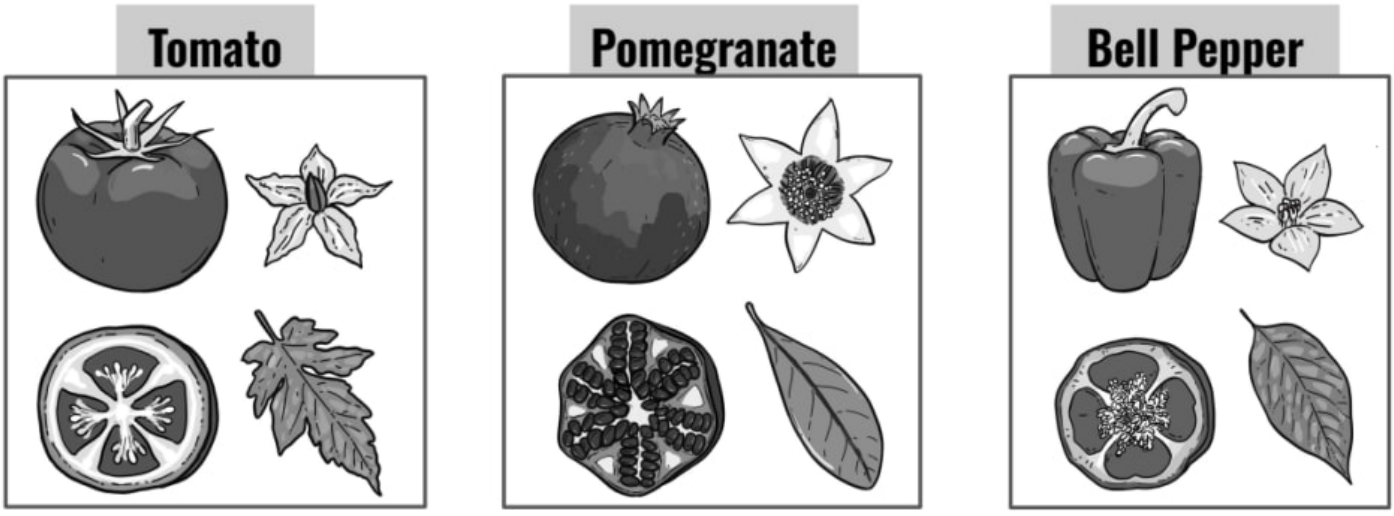
What is your **evidence** for grouping these fruits together? List three traits they share:

- _____
- _____
- _____

Name: _____

Date: _____

Lesson Assessment



1. Jamie visits the grocery store and finds three different fruits: a tomato, a pomegranate, and a bell pepper. Above are images of the outside of each fruit, the inside of each fruit, their leaves, and their flowers. Look carefully at their traits and complete the table below.

	Tomato	Pomegranate	Bell Pepper
Leaf Tip Shape	Pointed	Rounded	
Number of Fruit Sections		6	4
Number of Flower Petals			5

2. Which two fruits would you place in a group together based on the traits they have in common? Circle your answer.

Tomato & Pomegranate **Tomato & Bell Pepper** **Pomegranate & Bell Pepper**

3. If you plant a tomato seed in the ground, the seed will sprout and eventually grow into a plant with flowers and fruits. The fruits of that adult plant most likely look like this:

Why is that? Circle the correct answer.

a. Fruits always look the exact same way.
b. Plants inherit traits from the parent plants.
c. Parent plants inherit traits from their babies.

mystery science
What do dogs and pigeons have in common?

Pigeon Cards

Parents:

Offspring:

Name: _____

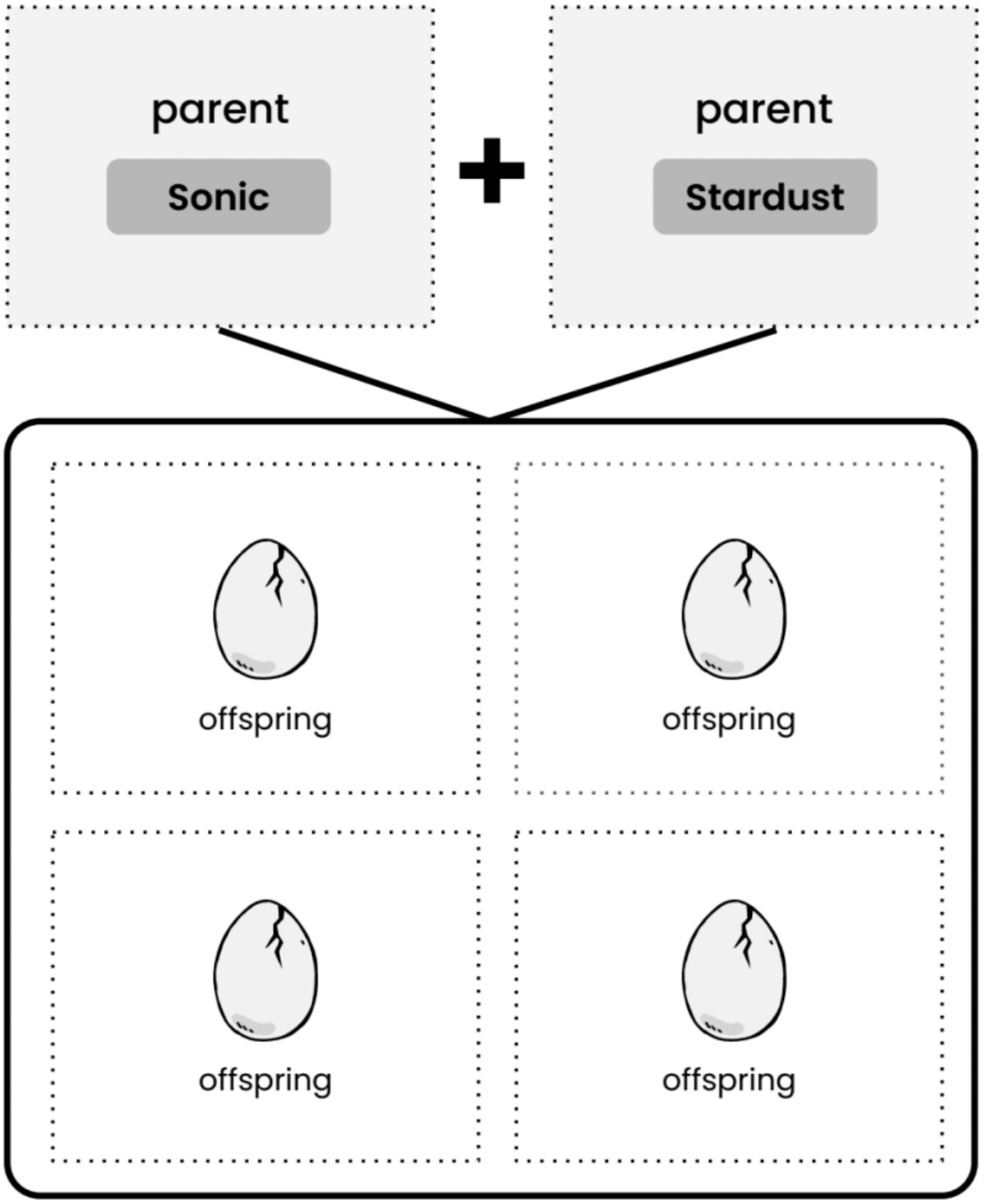
Pigeon Pairings

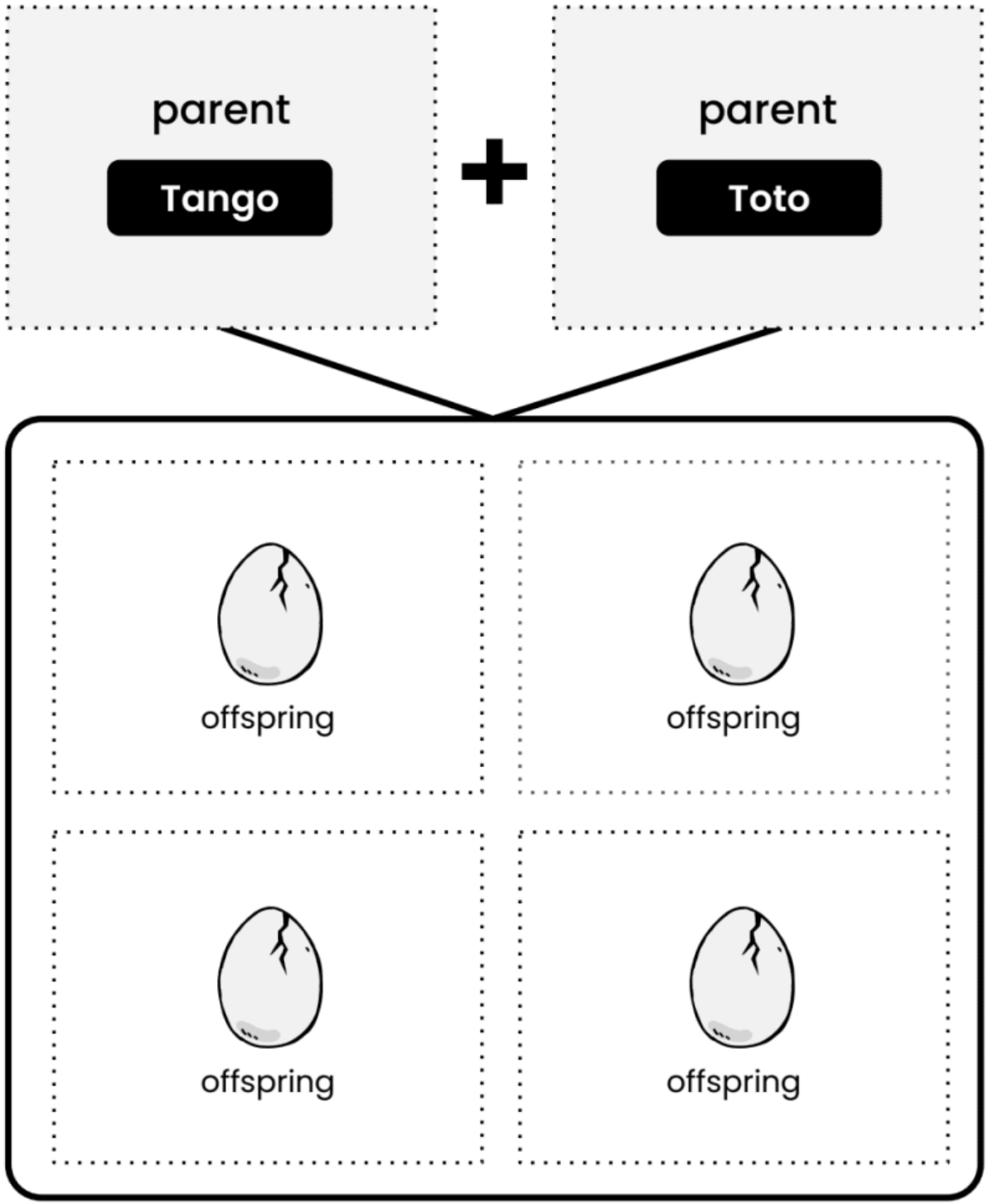
Sonic & Stardust

1. What traits helped you match the offspring to these parents?

2. What differences do you notice among the traits of these siblings?

3. Look at the two pigeon families side by side. How are the traits in the Sonic & Stardust family *different* from the traits in the Tango & Toto family?





Name: _____

Pigeon Pairings

Tango & Toto

1. What traits helped you match the offspring to these parents?

2. What differences do you notice among the traits of these siblings?

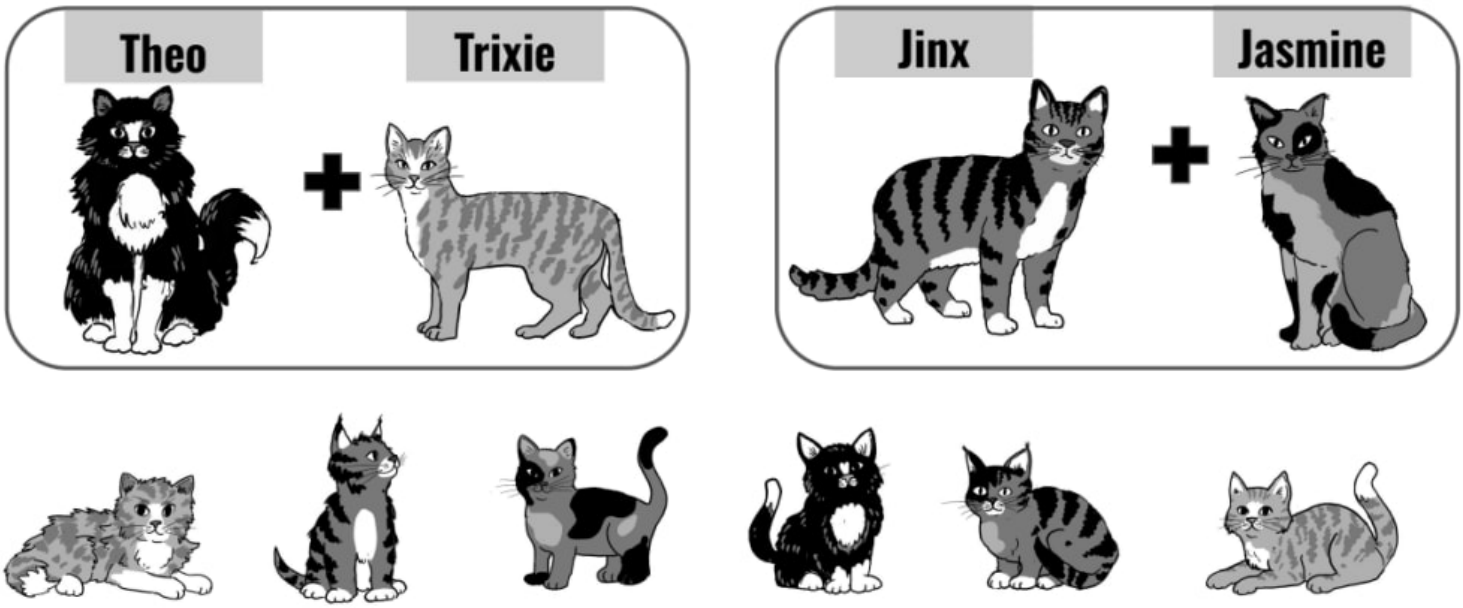
3. Look at the two pigeon families side by side. How are the traits in the Sonic & Stardust family *different* from the traits in the Tango & Toto family?

Name: _____

Date: _____

Lesson Assessment

Theo and Trixie are adult cats that had three kittens. Jinx and Jasmine are adult cats that also had three kittens. All six kittens are shown below. Which ones are Theo and Trixie's kittens and which ones are Jinx and Jasmine's kittens?



1. Look closely at the traits of the parents and the traits of all the kittens. Write a "T" above each of Theo and Trixie's kittens. Write a "J" above each of Jinx and Jasmine's kittens.

2. Which traits helped you match Theo and Trixie with their kittens? Circle all correct answers. **Hint:** These are traits that the kittens of Theo and Trixie have in common with at least one of their parents.

a. Black stripes
b. Black on the tip of their tails
c. Light gray stripes
d. White on the tip of their tails

3. The kittens of Jinx and Jasmine are all siblings, but they don't all look exactly the same. Which traits do at least two of the Jinx and Jasmine siblings have in common? Circle all correct answers.

a. Black stripes.
b. Black on the tip of their tails.
c. Light gray stripes.
d. White on the tip of their tails.

4. Take a closer look at the trait of white paws.
Circle **True** or **False** for each statement.

True False Some kittens inherited the trait of white paws from one of their parents.

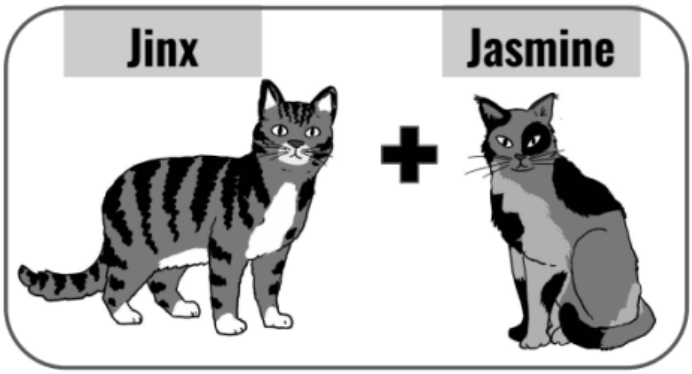
True False The trait of white paws in all the kittens looks exactly the same.

True False The trait of white paws in the kittens looks slightly different.

5. Even though Theo and Trixie's kittens have different traits, it was still possible to identify their 3 kittens because the kittens inherited their traits from their parents. Why DON'T Theo and Trixie's kittens look EXACTLY like them? Circle all correct answers.

a. Each trait can be inherited from either parent.
b. There is variation in the traits.
c. The parents wanted their offspring to look different.

6. If Jinx and Jasmine have another 3 kittens together, do you think these kittens will look EXACTLY the same as the other 3 kittens that Jinx and Jasmine had? Why or why not? Explain in terms of inherited traits.



mystery science
How could a lizard's toes help it survive?

HOW MANY LIZARDS?

Name: _____

ORIGINAL LIZARDS (GENERATION 1)

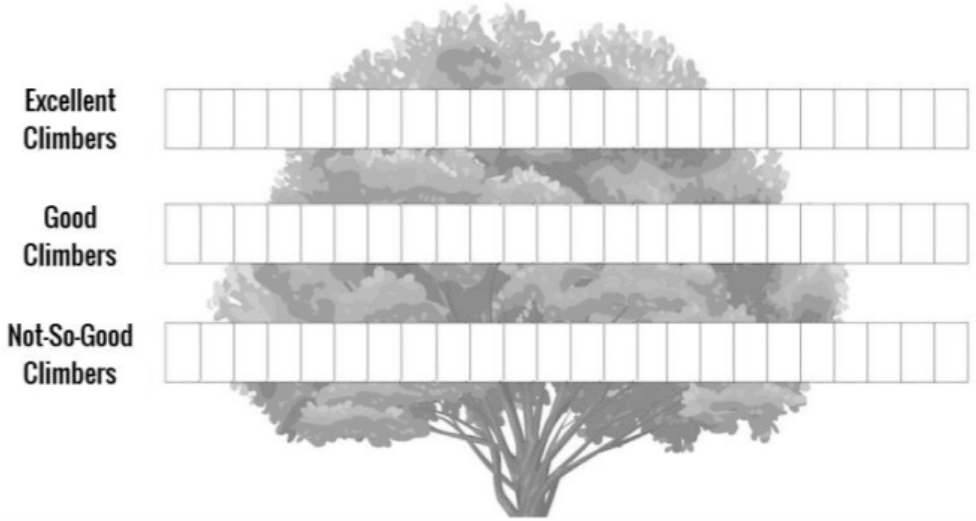
When brown lizards came to the island, the green lizards could climb trees. But some green lizards were better climbers than others.

There are _____ Excellent Climbers

There are _____ Good Climbers

There are _____ Not-So-Good Climbers

To make a bar graph, color in a box for each lizard.



BABY LIZARDS (GENERATION 2)

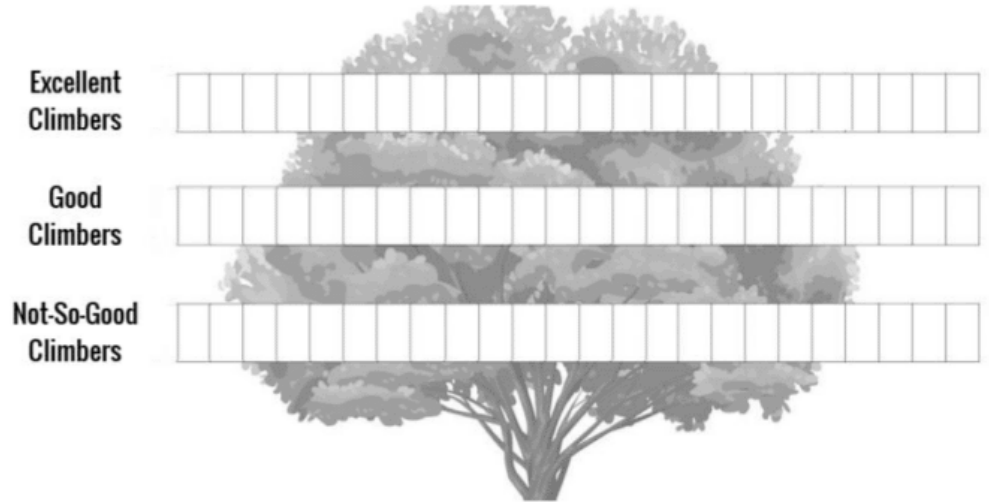
This is what the green lizard babies were like after the brown lizards arrived.

There are _____ Excellent Climbers

There are _____ Good Climbers

There are _____ Not-So-Good Climbers

To make a bar graph, color in a box for each lizard.



Name: _____

mystery science

How could a lizard's toes help it survive?

Baby Lizard

How many toe scales does your baby lizard have?

Step 1: Write down how many toe scales each parent has.

Toe scales on parent #1: _____

Toe scales on parent #2: _____

Step 2: Add those numbers together.

The sum of the parents' toe scales equals _____

Step 3: Divide the sum by 2.

The sum divided by 2 equals _____

This is how many toe scales the baby has.

Circle the kind of climber this lizard is.

23 or more scales = **Excellent Climber**

19 to 22 scales = **Good Climber**

18 or fewer scales = **Not-So-Good Climber**

Name: _____

mystery science

How could a lizard's toes help it survive?

Baby Lizard

How many toe scales does your baby lizard have?

Step 1: Write down how many toe scales each parent has.

Toe scales on parent #1: _____

Toe scales on parent #2: _____

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23 or more scales = **Excellent Climber**

19 to 22 scales = **Good Climber**

18 or fewer scales = **Not-So-Good Climber**

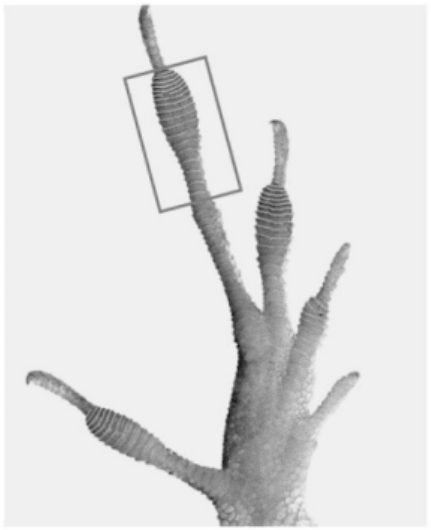
Mystery science

How could a lizard's toes help it survive?

Name: _____

ADOPT A LIZARD

Count the scales on the big toe.



My lizard's toe has _____ scales.

Circle the kind of climber this lizard is:

23 or more scales = **Excellent Climber**

19 to 22 scales = **Good Climber**

18 or fewer scales = **Not-So-Good Climber**

A

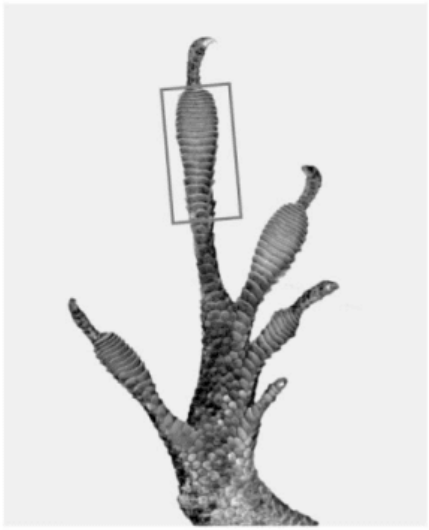
mystery science

How could a lizard's toes help it survive?

Name: _____

ADOPT A LIZARD

Count the scales on the big toe.



My lizard's toe has _____ scales.

Circle the kind of climber this lizard is:

23 or more scales = **Excellent Climber**

19 to 22 scales = **Good Climber**

18 or fewer scales = **Not-So-Good Climber**

B

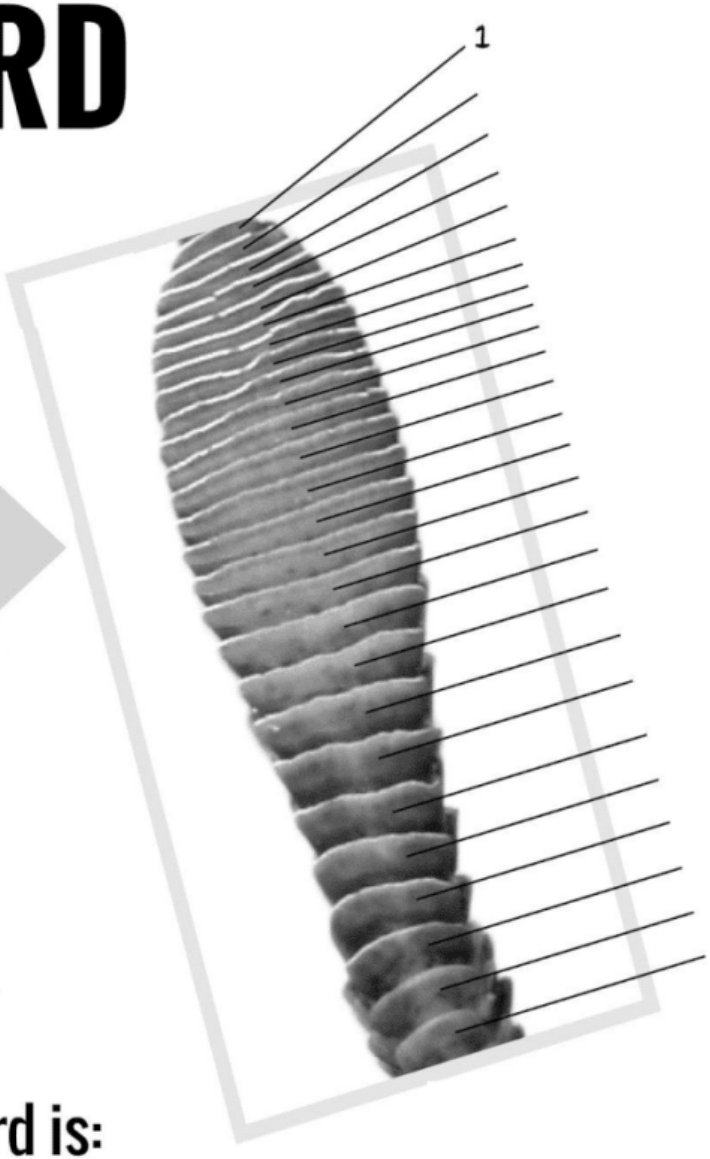
Mystery science

How could a lizard's toes help it survive?

Name: _____

ADOPT A LIZARD

Count the scales on the big toe.



My lizard's toe has _____ scales.

Circle the kind of climber this lizard is:

23 or more scales = **Excellent Climber**

19 to 22 scales = **Good Climber**

18 or fewer scales = **Not-So-Good Climber**

C

Name: _____

Date: _____

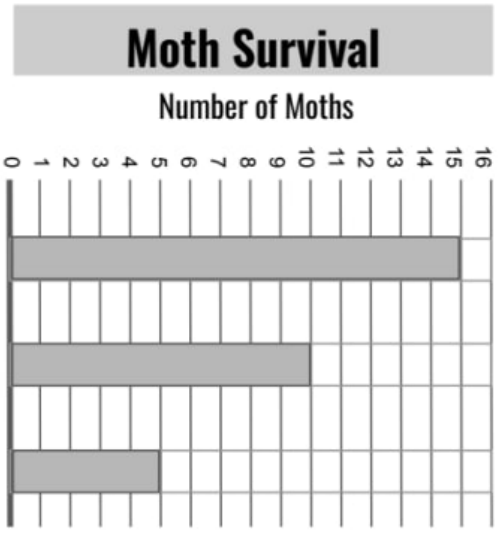
Lesson Assessment

There is a species of moth that varies in the color of its wings. Some moths have black wings, some have gray wings, and some have white wings.



These moths live in a habitat where the trees have very dark-colored bark. During the day, the moths rest on the trunks of these trees. Birds hunt for these moths and eat the ones they find on the tree trunks.

At the start of summer, there were 60 moths living in the forest: 20 moths had black wings, 20 moths had gray wings, and 20 moths had white wings. The graph shows the number of moths that did NOT get eaten by birds.



1. Which is correct? Circle the correct answer.
   a. More moths with black wings survived.
   b. More moths with gray wings survived.
   c. More moths with white wings survived.



2. What does the graph provide evidence for? Circle all correct answers.
   a. Birds prefer eating moths with black wings.
   b. Birds are able to find moths with white wings easier than moths with black wings.
   c. There were more moths with black wings at the start of the summer.
   d. Moths with black wings are better camouflaged on trees with dark bark.

3. Think about what would happen if there was suddenly no variation in the color of the moths' wings. If suddenly all the moths had ONLY white wings, would that affect their survival? Why or why not? Use information from the graph to support your answer.

_____

_____

_____

_____

Snow Monkeys

These monkeys live in northern Japan, where it snows in the winter. No other monkey lives in such a cold place!

Snow Monkey Field Notes:

A

Describe what the snow monkeys do.

Do you think the snow monkeys help each other? Explain.

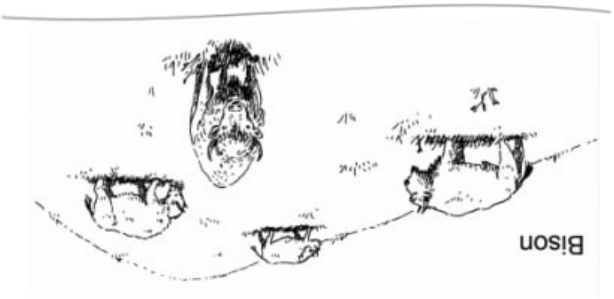
Raven Field Notes:

List at least two things the ravens did. (You can write more if you noticed more.)

Do you think the ravens help each other? Explain.

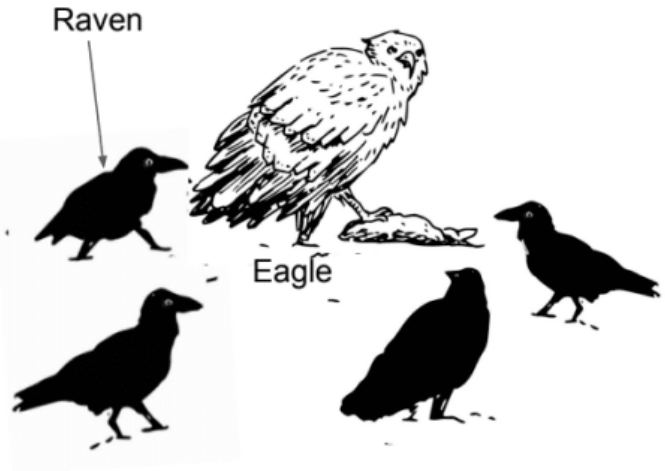
Bison

Bison eat grass, leaves, and twigs. Some people call these animals buffalo. One bison can weigh more than 5 football players.



Ravens

Ravens live in flocks of many birds. Ravens will eat almost anything they can find—or steal!



Bison Field Notes:

List at least two things the bison did. (You can write more if you noticed more.)

Do you think bison help each other? Explain.

Meerkat Field Notes:

List at least two things the meerkats did. (You can write more if you noticed more.)

Do you think the meerkats help each other? Explain.

Here's what I noticed:

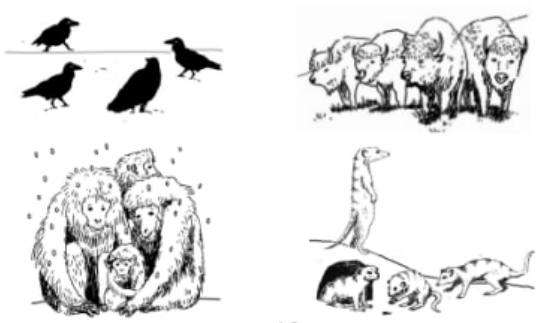
Here are ways that I saw animals that live in groups help each other:

Meerkats

Families of meerkats live together in underground burrows. They come out to search for insects and small lizards to eat.

C

Suppose your friend told you, "Animals live in groups just to be with their friends. It's not like they do it to stay alive." Do you agree or disagree? Explain.



staple

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Field Journal

My Name: _____

Date: _____

mystery science

Why do dogs wag their tails?

mystery science

Name: _____
Date: _____

Why do dogs wag their tails?

Lesson Assessment

1. Animals that live in groups are **less** likely to...
   a. share their food
   b. feel lonely
   c. get eaten by predators
   d. survive when their environment changes, like when it floods

2. Which is an example of how **living in a group** can help animals **get food**?
   a. Penguins huddle together to stay warm in winter.
   b. Seagulls scavenge for food in city trash cans.
   c. Adult dolphins swim in a group around their calves.
   d. Bees in a hive make honey for their larvae to eat.

3. Which is an example of how **living in a group** can **provide protection**?
   a. One meerkat keeps lookout while the rest of the group collects food.
   b. Monkeys shout an alarm call if they see a leopard, and all other monkeys in the group run into the trees.
   c. Elephants form a circle around their calves to protect them from lions.
   d. All of the above

4. TRUE or FALSE? (circle one) All animals would be better off living in groups.

5. TRUE or FALSE? (circle one) Animals that live in groups, like dogs, need ways to communicate with one another.

6. Choose one of the following examples of an animal that lives in a group:

Meerkats Ravens Snow Monkeys Bison

Explain in two to three full sentences how living in a group helps that animal survive.

_____

_____

_____

_____

_____

_____

_____

7. BONUS: Match the animal with the name of its group. You don't need to use all the answer choices.

___ Ants
___ Wolves
___ Bison
___ Lions
___ Birds

A. Flock
B. Herd
C. Colony
D. Pride
E. Pack
F. Troop

Traits in Space

Name: _____

Astronaut ____ (A or B)

Traits	BEFORE MY YEAR IN SPACE	AFTER MY YEAR IN SPACE
ARM STRENGTH	Before my year in space, I can do _____ push-ups.	After my year in space, I predict my arms would be **stronger / weaker / the same strength**. Being in space **would / would not** change this trait because… _____ _____ _____
BALANCE	Before my year in space, I can take _____ steps (out of 10) before losing my balance.	After a year in space, I predict that my balance would be **better / worse / the same**. Being in space **would / would not** change this trait because… _____ _____ _____
HEIGHT	Before my year in space, I am this tall: _____	If I stayed on Earth, I might grow one inch (2.5 cm) per year. But if I spent a year in space, I think I would **grow even taller / grow the same amount / get shorter.** I think being in space **would / would not** change this trait because… _____ _____

mystery science

Name: _____
Date: _____

How long can people (and animals) survive in outer space?

Lesson Assessment

1. How is the environment different for people living in space?
   a. The force of gravity is not as strong
   b. There is nothing to eat
   c. There is no way to exercise
   d. They can't communicate

2. Which of these are **traits** of living things?
   a. Dimples on people's faces
   b. The shape of plants' leaves
   c. The color of birds' wings
   d. All of the above

3. Which traits changed for astronauts living in space?
   a. Height and hearing
   b. Freckles and hair color
   c. Balance and muscle strength
   d. Weight and skin color

4. Which is NOT an example of cause and effect?
   a. When people exercise, their muscles get stronger.
   b. When people live in space, they get shorter.
   c. When dogs are overfed, they gain weight.
   d. When plants aren't watered enough, they wilt.

5. TRUE or FALSE? (circle one) Scientists are still studying the effects of space travel on living things.

6. Identify three traits of the Snow Leopard below. Draw an arrow to each trait and label the trait.

7. A friend tells you, “I think your traits can change in space, but if you stay on earth, the traits you were born with will never change.” Do you agree or disagree? Provide evidence to support your answer.

Mystery science
Heredity, Survival, & Selection | Performance Task

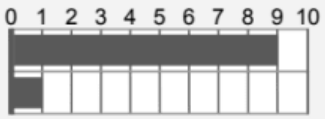
Name: _____

Who Won the Food?

Ant colonies are groups of ants that live and work together. Scientists were curious about what happens when colonies of Argentine ants and tufted tyrant ants compete for the same food. Which kind of ant would win? The ants that win and get the food are more likely to survive.

Scientists observed colonies of specific sizes that were competing for the same food. They observed each of those sizes of colonies ten different times. Read about what the scientists observed in each box below, and study the graphs. Then answer the questions.

Observation Set 1: Colonies of 500 tufted tyrant ants vs. 500 Argentine ants.

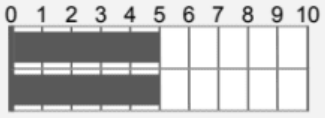


1. How many ants were in each colony? _____ *Tufted Tyrant Ants* _____ *Argentine Ants*

2. How many times did each colony win the food?

Tufted Tyrant Ants won _____ time(s). *Argentine Ants won _____ time(s).*

Observation Set 2: Colonies of 500 tufted tyrant ants vs. 1,500 Argentine ants.

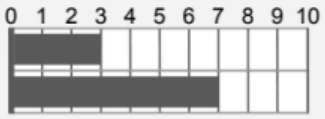


3. How many ants were in each colony? _____ *Tufted Tyrant Ants* _____ *Argentine Ants*

4. How many times did each colony win the food?

Tufted Tyrant Ants won _____ time(s). *Argentine Ants won _____ time(s).*

Observation Set 3: Colonies of 500 tufted tyrant ants vs. 2,500 Argentine ants.



5. How many ants were in each colony? _____ *Tufted Tyrant Ants* _____ *Argentine Ants*

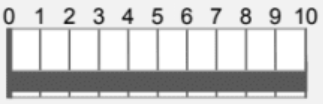
6. How many times did each colony win the food?

Tufted Tyrant Ants won _____ time(s). *Argentine Ants won _____ time(s).*

Name: _____

Observation Set 4: Colonies of 500 tufted tyrant ants vs. 5,000 Argentine ants.

Tufted Tyrant Ants Won
Argentine Ants Won



7. How many ants were in each colony? _____ *Tufted Tyrant Ants* _____ *Argentine Ants*

8. How many times did each colony win the food?

Tufted Tyrant Ants won _____ time(s). *Argentine Ants won _____ time(s).*

9. Daniel is a student learning about ants. He thinks that Argentine ants live in so many places because they *always* beat other kinds of ants when they compete for food. Do you agree or disagree? Do Argentine ants *always* win when they compete for food? Circle one:

Agree **Disagree**

10. What **evidence** from the observations makes you agree or disagree with Daniel? Look back across the observations of ant colonies to get specific numbers to put in your answer.

_____

_____

_____

11. Look back across all four sets of observations. Describe the situations when Argentine ants are more likely to win, and when they are less likely to win.

Argentine ants are more likely to win when _____

_____

Argentine ants are less likely to win when _____

_____

12. Which ant do you think would win if **one** Argentine ant competed with **one** tufted tyrant ant for food? Be sure to mention which observation set helps you figure out an answer.

I think the _____ ***ant would win because*** _____

_____

_____

_____

mystery science

Heredity, Survival, & Selection

Name: _____

Date: _____

Unit Assessment

1. There are so many different varieties of dogs because…
    a. people chose to breed dogs with traits they wanted.
    b. dogs wanted to be different from each other.
    c. dog babies (puppies) were different from their parents.
    d. dogs have a lot of puppies.

2. The green anoles are such good climbers because…
    a. they like climbing trees.
    b. they need to be able to climb to get food that is high up in the trees.
    c. they need to be able to get away from brown anoles on the ground.
    d. the green anoles that were poor climbers were more likely to get eaten by brown anoles, so they had fewer babies.

3. Becky has light-colored skin. During the summer, sometimes her skin turns red if she stays in the sun too long. Which of these are true?
    a. Becky's skin color is a trait she got from her parents.
    b. Becky's skin color changed because of her experience in the summer.
    c. Both a and b.

4. Chickens living today have bigger eggs than chickens that lived a long time ago. How do you think that happened?

_____

_____

_____

_____

_____

Vervet Monkeys

Vervet monkeys live in woodlands and forests on the eastern coast of Africa. They eat fruit, leaves, seeds, and some small animals. They have four common predators: eagles, snakes, leopards, and baboons. Scientists have discovered that vervet monkeys use different alarm calls for each predator. For example, when they hear a "snake" alarm call, they stand up on their back legs and look around on the ground. But when they hear the alarm call for "leopard," they climb to the very tops of the trees.

Use the passage above to answer question 5 and question 6.

5. How does living in a group help vervet monkeys survive? Choose the best answer.

a. They show each other where to find food.
b. The communicate in their own language
c. They warn each other of danger.
d. They groom each other's fur.

6. If dry weather kills many of the plants in the vervet monkeys' habitat, how would that affect the vervet monkeys?

a. They would be more likely to survive.
b. They would be less likely to survive.
c. There would be no change.

7. How does living in a group help some animals survive? Give at least two animal examples other than vervet monkeys to support your answer.

Imagine you are a cat breeder who wants kittens. Choose two cats to be parents. Circle the two that you choose. Then answer the questions below.

8. Describe the traits their kittens might have. What will the tail and body look like? What will the face and ears look like?

_____

_____

_____

_____

_____

9. Why did you choose your answers to question 8? Explain your reasoning.

_____

_____

_____

_____

_____

10. Would all the kittens from those two cats look the same? YES NO
(circle one)

mystery science

Weather & Climate

3rd Grade • NGSS • Unit Worksheets

Lesson 1

Where do clouds come from?

Lesson 2

How can we predict when it's going to storm?

Lesson 3

Where's the best place to build a snow fort?

Lesson 4

Why are some places always hot?

Lesson 5

How can you keep a house from blowing away in a windstorm?

I am also curious about...

Summer Ice Storm - Hail Protection

Name: _____

Can you design a device that will save cars and trucks from hail damage?

It must do three things:

- Protect cars or trucks in a hailstorm.
- Fold up so it can fit inside a car or truck.
- Be lightweight so people can easily set it up.

Draw Your Device:

Describe your device and explain how it works: _____

_____

_____

_____

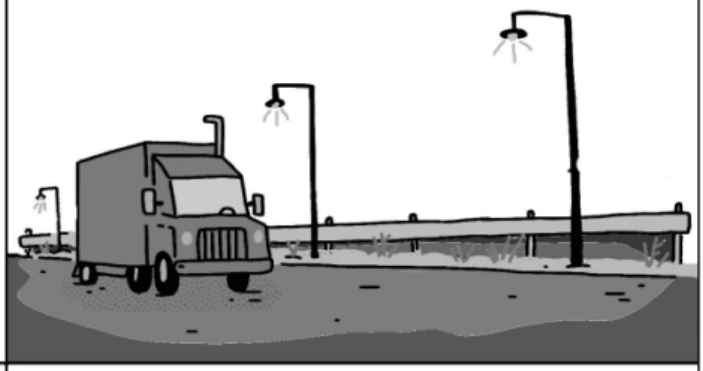
Name your device:_____

Summer Ice Storm

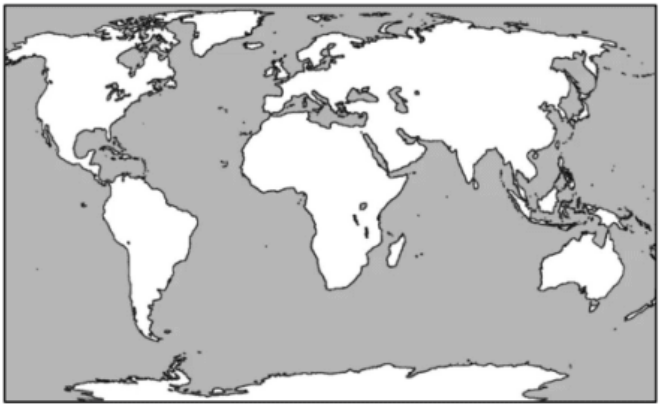
Name: _____

Use this space to **write** what you think might have caused the summer ice storm and any other important things you learn.

Use this space to **draw** what you think might have caused the summer ice storm and any other important things you learn. Label your drawing with words if it is helpful.



World Map

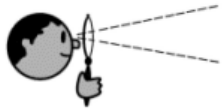


Regional Map

See-Think-Wonder Chart

Name: _____

mystery science

See	Think	Wonder
What did you observe? 	How can you explain what is happening? 	What questions do you have? 

GAS TRAP

Name: _____

mystery science

Where do clouds come from?

Gas Trap Tester

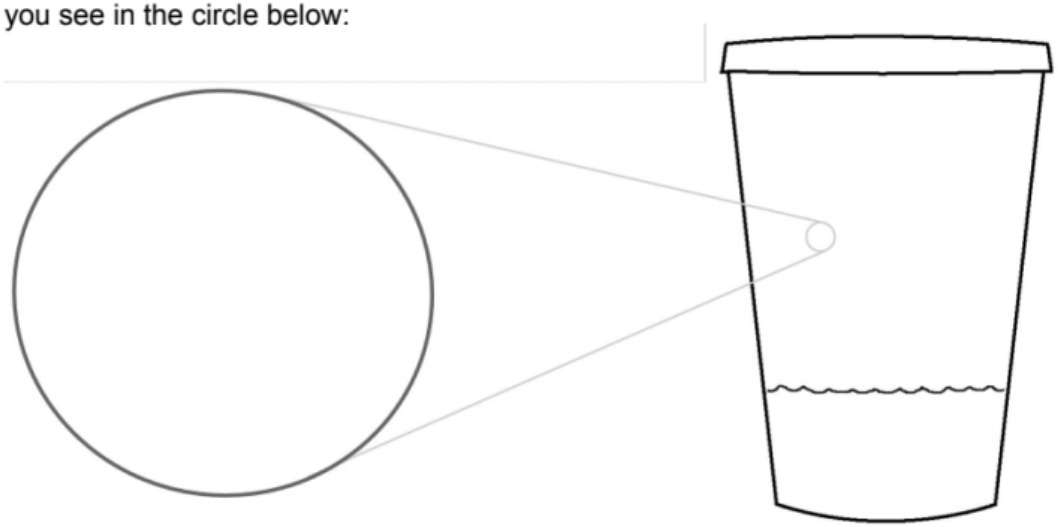
1. Before you begin the experiment, try reading your GAS TRAP TESTER through your cup. What's the last line you can read? Write it here:

   _____

2. Now that you have the warm water, try reading the GAS TRAP TESTER through your cup again. What's the last line you can read now? Write it here:

   _____

3. Look at the sides of your cup up close (as close as you can). Draw what you see in the circle below:



Can you read all these words through your cup?

Maybe you can, maybe not.
To find out—try it and see!

WAIT TO DO QUESTION #4 UNTIL AFTER YOUR CLASS DISCUSSION

4. Open the lid and feel the inside of the cup. How does it feel? _____
   Feel the bottom of the lid. How does that feel? _____

mystery science

Name: _____
Date: _____

Where do clouds come from?

Lesson Assessment

1. **Draw** a picture that shows how clouds form in the sky. **Label** the steps in your picture.

2. Explain your drawing above. Where is the water before it forms a cloud? What forms does the water take as it becomes a cloud?

_____

_____

_____

3. After a couple days, puddles on the sidewalk shrink and disappear. What happens to the water?

The liquid water _____

_____

4. Roberto thinks that clouds can't be made out of water because clouds are white and water is clear. What do you think? Explain to Roberto why clouds look white. Use examples to convince him!

Clouds look white because _____

_____

_____

mystery science

How can we predict when it's going to storm?

Name: _____

WILL IT STORM?

Look at the screen to see the pictures in color.

Photo #1: Rowboat

What clouds are in the sky?

cumulus cumulonimbus stratus stratonimbus

Are those stormclouds? Yes No

If they are, how long will the storm last?

less than an hour hours and hours no storm

Are the clouds coming your way? Yes No

Would you row across the lake? Why or why not?

_____

_____

Photo #2: Picnic

What clouds are in the sky?

cumulus cumulonimbus stratus stratonimbus

Are those stormclouds? Yes No

If they are, how long will the storm last?

less than an hour hours and hours no storm

Are the clouds coming your way? Yes No

Would you have a picnic here? Why or why not?

_____

_____

Name: _____

WILL IT STORM?

Photo #3: Beach

What clouds are in the sky?

cumulus cumulonimbus stratus stratonimbus

Are those stormclouds? Yes No

If they are, how long will the storm last?

less than an hour hours and hours no storm

Are the clouds coming your way? Yes No

So would you go for a swim? Why or why not?

_____

_____

Photo #4: Same beach, later that day

What clouds are in the sky now?

cumulus cumulonimbus stratus stratonimbus

Are those stormclouds? Yes No

If they are, how long will the storm last?

less than an hour hours and hours no storm

Are the clouds coming your way? Yes No

Would you go for a swim now? Why or why not?

_____

_____

Name: _____

WILL IT STORM?

Photo #5: Baseball game

What clouds are overhead?

cumulus cumulonimbus stratus stratonimbus

What clouds are in the distance?

cumulus cumulonimbus stratus stratonimbus

What kind of clouds are coming your way?

cumulus cumulonimbus stratus stratonimbus

Are the clouds that are coming your way stormclouds? Yes No

If they are, how long will the storm last?

less than an hour hours and hours no storm

So would you play ball? Why or why not?

_____

_____

_____ cloud

- Nice weather—no storm

But this cloud can change!
(See next page)

1

_____ nimbus cloud

- Brings rain and lightning
- Storm lasts under an hour

Is it coming your way?
(See pages 5-6)

2

_____ cloud

- Gloomy skies—but no storm

But this cloud can change!
(See next page)

3

_____ nimbus cloud

- Brings rain
- Storm can last all day

Is it coming your way?
(See pages 5-6)

4

Is that storm cloud heading your way?

Check the wind to find out!

5

Collect them all!

Watch the sky and make a note if you see these clouds.
Can you spot them all?

Cloud Type	Date I saw it
☐ Cumulus	
☐ Cumulonimbus	
☐ Stratus	
☐ Stratonimbus	

mystery science

How can we predict when it's going to storm?

6

- Write down the city you live in:

_____

- From what direction does the wind *usually* blow there?

_____

- So, to see the weather coming my way, I can look toward:

_____

The STORM Spotter's Guide

Name: _____

Date: _____

mystery science

Name: _____
Date: _____

How can we predict when it's going to storm?

Lesson Assessment

1. How would you spot each of these clouds? Describe what you would look for.

cumulus	
cumulonimbus	
stratus	
stratonimbus	

2. Denai says that clouds covering the whole sky means it's going to rain. What do you think?

_____

_____

_____

3. Why do stratonimbus storms usually last all day long, but cumulonimbus storms only last for a short time?

_____

_____

_____

_____

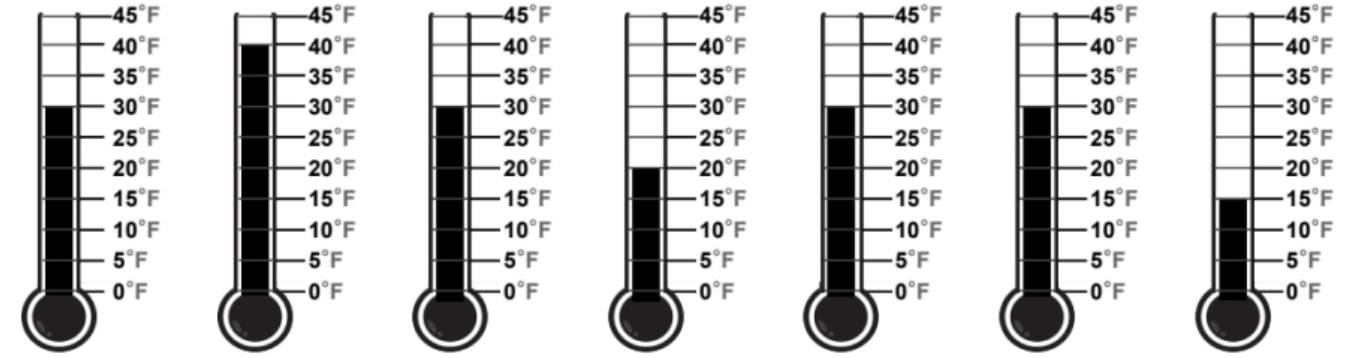
Thermometers

Names: _____ _____

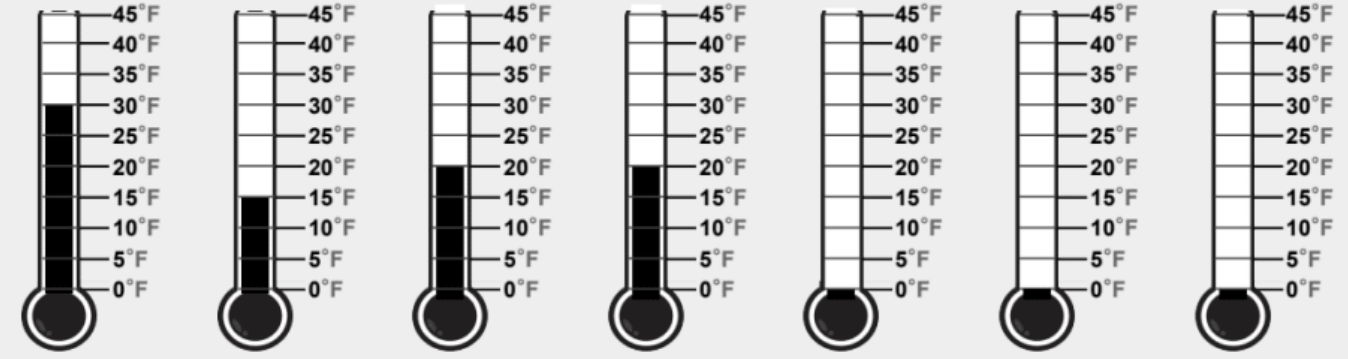
KEY

- **Too Hot =** Red X (above 32°F)
- **Too Cold =** Blue X (below 25°F)
- **Just Right =** O

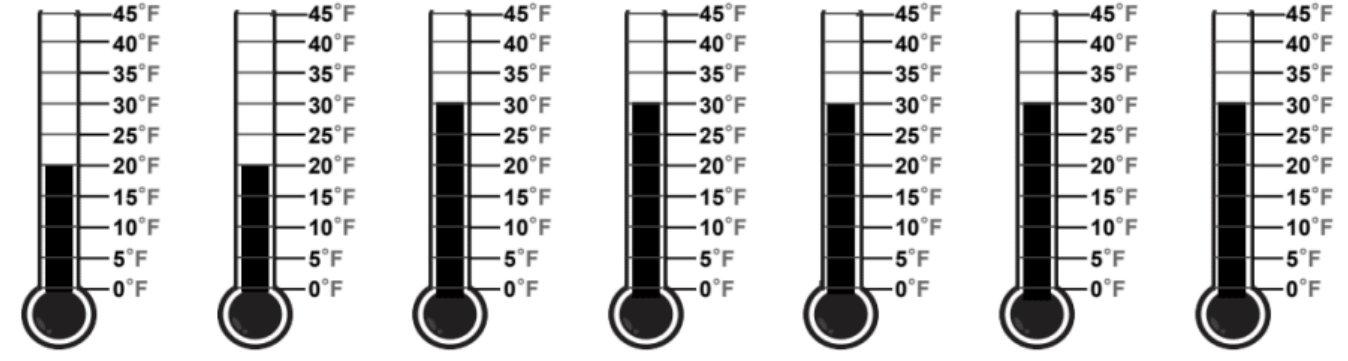
Madison, Wisconsin



Fairbanks, Alaska



Truckee, California



Mystery science
Where's the best place to build a snow fort?

What's the Weather?

Names: _____ _____

Towns	Number of days that are **Too Hot** ✕ (red)	Number of days that are **Too Cold** ✕ (blue)	Number of days that are **Just Right** ○	**More data:** _____
1 _____ _____				
2 _____ _____				
3 _____ _____				

Name: _____

Date: _____

Lesson Assessment

Months with Snow Last Year

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
City A	❄		❄								❄	❄
City B	❄											❄
City C	❄	❄	❄	❄					❄	❄	❄	❄

1. Jeremiah is planning a winter vacation. He is deciding between three cities. He wants to visit a place where there is the best chance for him to see snow while he's there. To help plan the trip, Jeremiah decides to look up weather information from last year. Each snowflake represents a month when it snowed last year. Fill in the table on the right.

	Number of Months with Snow Last Year
City A	
City B	
City C	

2. Use the information from Question 1 to predict which location—A, B, or C—will most likely have snow when Jeremiah visits this year. Which is the best location for Jeremiah's visit? Which location is the worst option? Provide evidence using the information in the table.

_____

_____

_____

_____

	Location A	Location B	Location C
July (Summer)			
December (Winter)			

KEY  = No Rain  = Rainy Day

3. Mei is planning a vacation. She is deciding between three locations (A, B, or C). She is also deciding between two seasons (summer or winter). Mei likes to spend time outside, so she **doesn't** want to visit when there's a chance of rain. To help plan the trip, Mei finds out how many days it rained in each location during 1 month in each season last year. Use this information and fill in the table on the right.

Number of Rainy Days

	Location A	Location B	Location C
July (Summer)			
December (Winter)			

4. Which location should Mei visit? During which season (winter or summer) should she visit? Provide evidence from the table.

_____

_____

_____

_____

_____

_____

mystery science
Why are some places always hot?

Climates in Europe & Africa

Name: _____

CLIMATE KEY

- ◯ This climate is cold all year long.
- ◯ This climate has cold winters and hot summers.
- ◯ This climate has warm winters and hot summers.
- ◯ This climate is hot all year long.

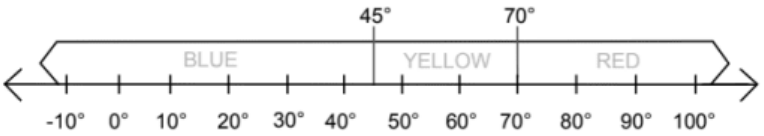
mystery science

Why are some places always hot?

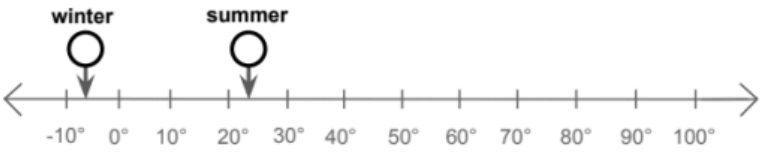
Climates in Europe & Africa (Fahrenheit)

Name: _____

Climate Decoder

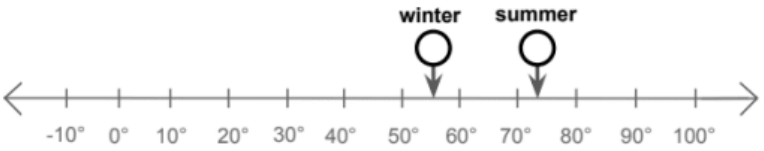


Antarctica Research Station



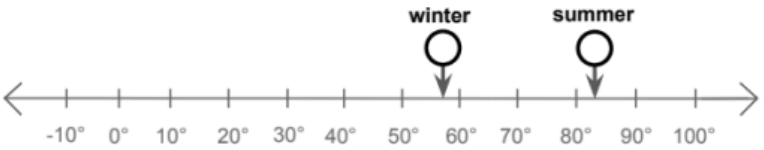
climate color

Casablanca, Morocco



climate color

Cairo, Egypt



climate color

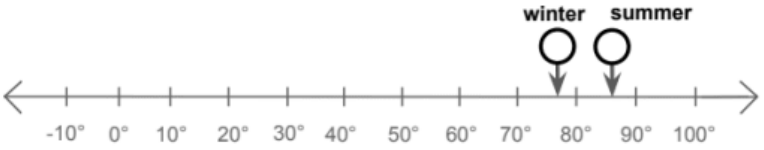
Cape Town, South Africa

climate color

Daneborg, Greenland

climate color

Juba, South Sudan

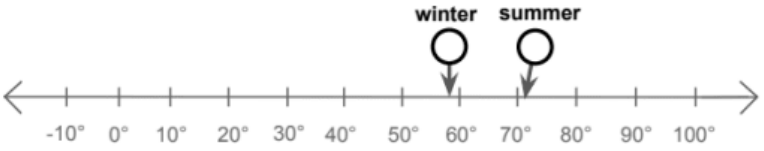


climate color

Rome, Italy

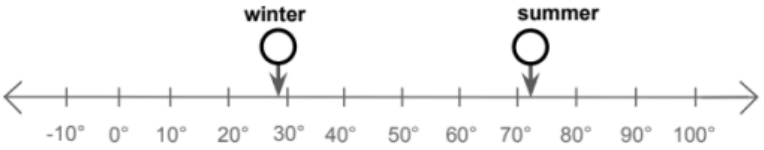
climate color

The island of Madagascar



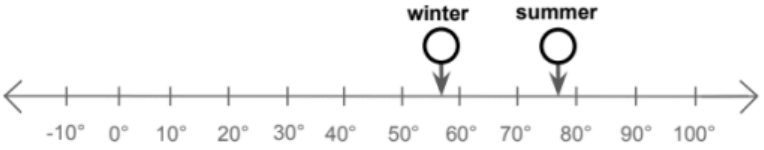
climate color

Warsaw, Poland



climate color

Windhoek, Namibia



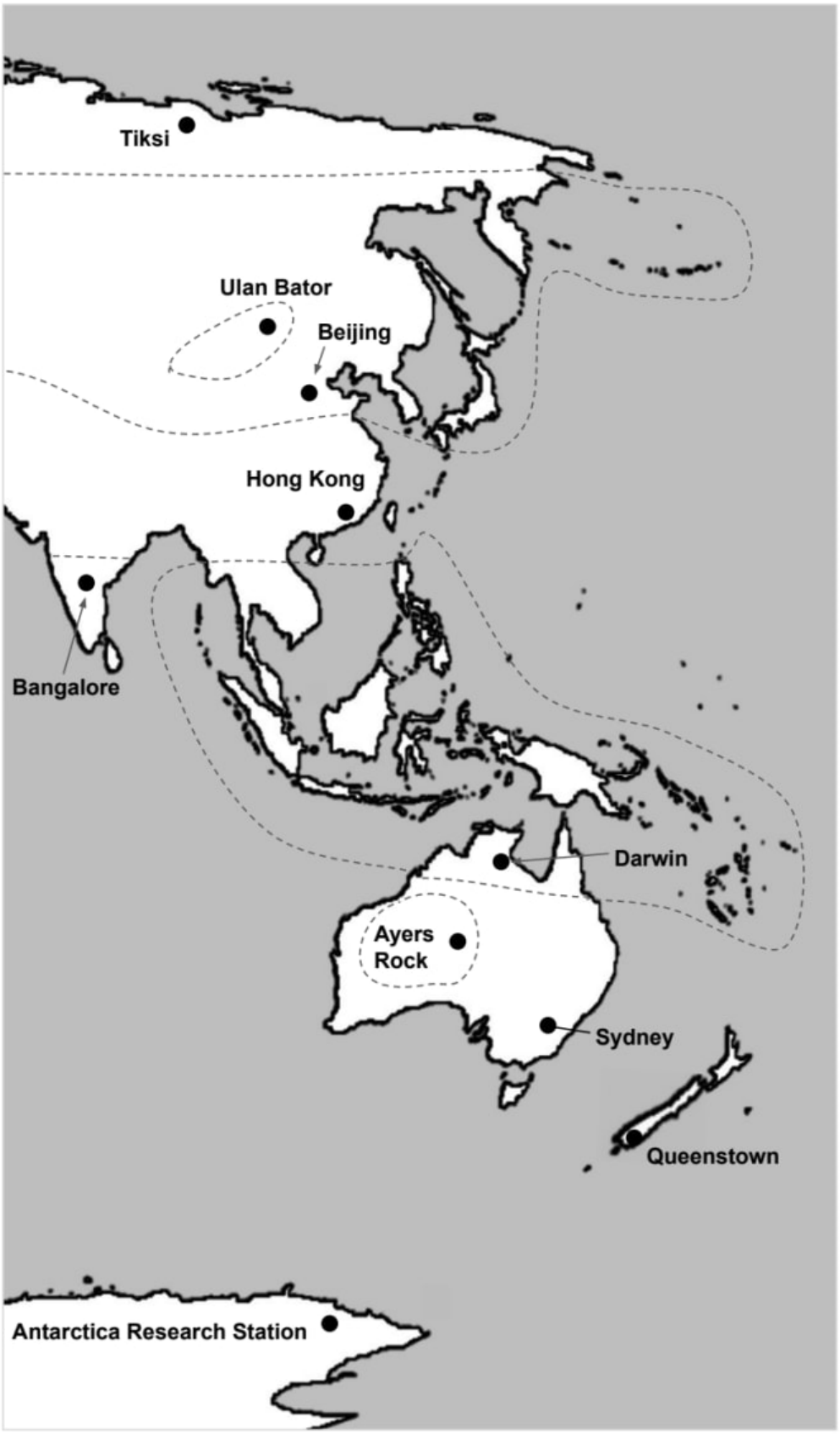
climate color

Note: All temperatures are in Fahrenheit

mystery science
Why are some places always hot?

Climates in Asia & Australia

Name: _____



CLIMATE KEY

- ◯ This climate is cold all year long.
- ◯ This climate has cold winters and hot summers.
- ◯ This climate has warm winters and hot summers.
- ◯ This climate is hot all year long.

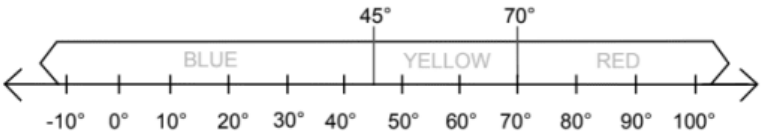
mystery science

Why are some places always hot?

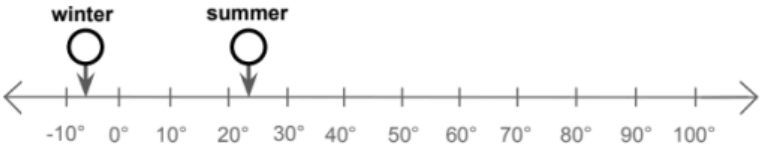
Climates in Asia & Australia (Fahrenheit)

Name: _____

Climate Decoder



Antarctica Research Station

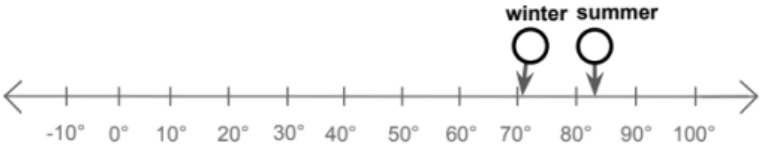


climate color

Ayers Rock (Uluru), Australia

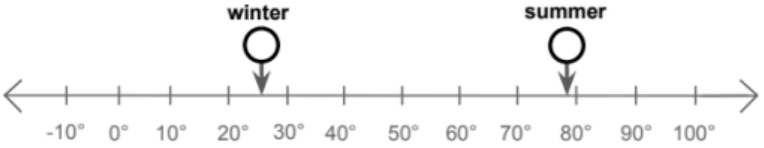
climate color

Bangalore, India



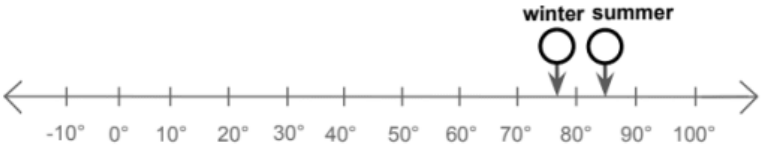
climate color

Beijing, China



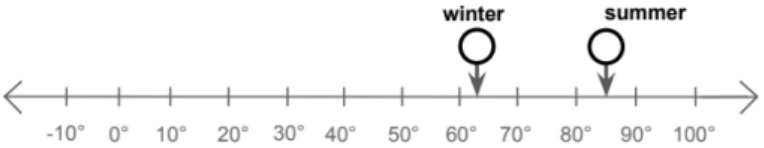
climate color

Darwin, Australia



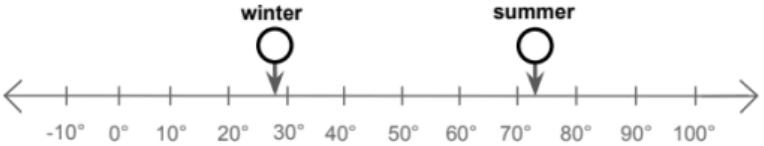
climate color

Hong Kong



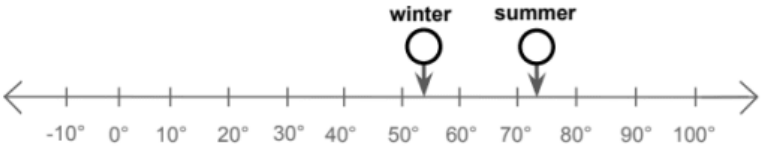
climate color

Queenstown, New Zealand



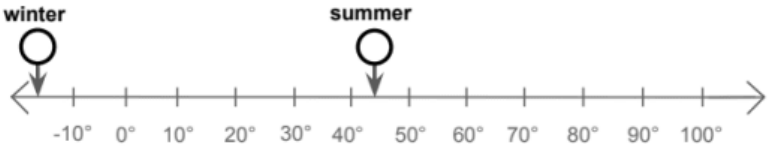
climate color

Sydney, Australia



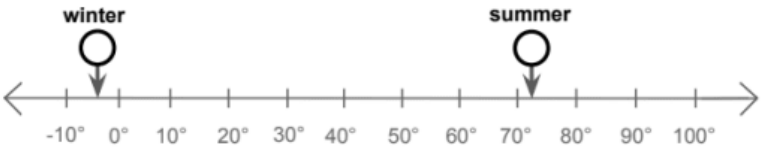
climate color

Tiksi, Russia



climate color

Ulan Bator, Mongolia



climate color

Note: All temperatures are in Fahrenheit

mystery science

Why are some places always hot?

Climates in the Americas

Name: _____

CLIMATE KEY

- ◯ This climate is cold all year long.
- ◯ This climate has cold winters and hot summers.
- ◯ This climate has warm winters and hot summers.
- ◯ This climate is hot all year long.

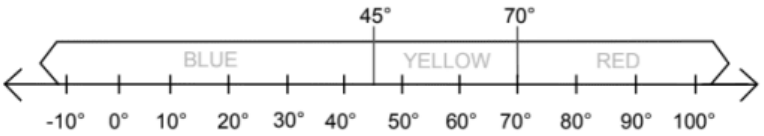
mystery science

Why are some places always hot?

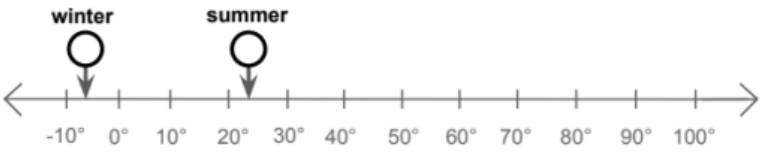
Climates in the Americas (Fahrenheit)

Name: _____

Climate Decoder



Antarctica Research Station

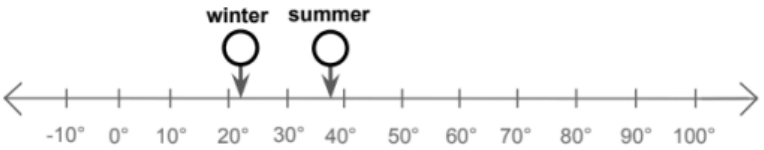


climate color

Atlanta, Georgia, USA

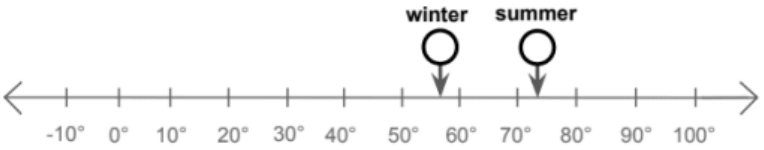
climate color

Utqiaġvik, Alaska, USA



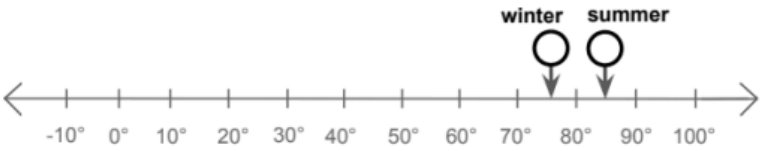
climate color

Buenos Aires, Argentina



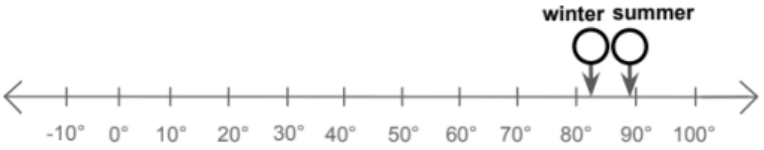
climate color

Cancun, Mexico:



climate color

Georgetown, Guyana

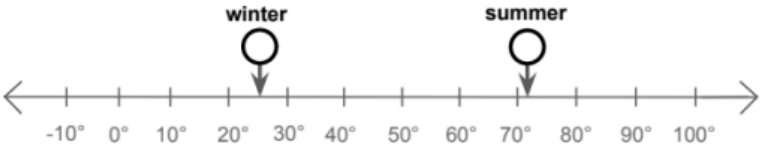


climate color

Las Vegas, Nevada, USA

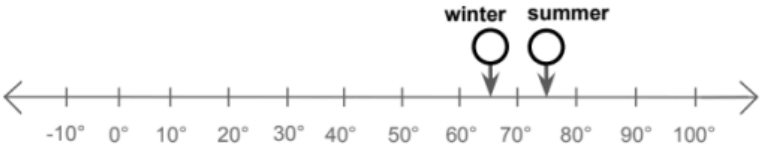
climate color

Perito Moreno, Argentina



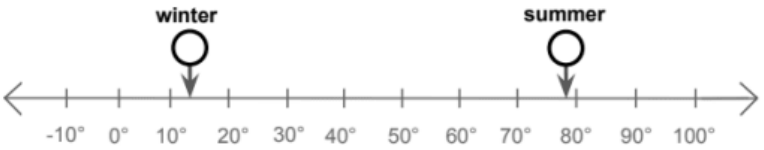
climate color

Tacna, Peru



climate color

Winnipeg, Canada



climate color

Note: All temperatures are in Fahrenheit

mystery science

Name: _____
Date: _____

Why are some places always hot?

Lesson Assessment

1. If you met someone from another country, what questions would you ask to figure out what climate he or she is from?

_____

_____

_____

_____

_____

2. Chantal loves warm weather and enjoys hiking in lush, green forests. What climate or climates would you suggest she visit for her vacation? Why?

_____

_____

_____

_____

_____

3. Why is it so much hotter near the equator than at the poles?

_____

_____

_____

_____

_____

8

8

6

6

4

4

2

2

mystery science

How can you keep a house from blowing away in a windstorm?

Wind Maker

paperclip

7

7

5

5

3

3

1

1

mystery science

How can you keep a house from blowing away in a windstorm?

Paper House Model

A

A

(don't cut)

(don't cut)

B

B

(don't cut)

(don't cut)

C

mystery science

C

B

B

(don't cut)

(don't cut)

Your name: _____ Partner's name: _____

Design a Windproof House

1. WHAT'S THE PROBLEM?

The problem with our house is _____

_____

(describe what you noticed when testing your house)

Why does it matter? Why is it important to fix it? _____

_____

2. CREATE AND TEST YOUR FIRST DESIGN.

Design #1: Draw your design.

What happened when you tested Design #1? _____

_____

_____

_____

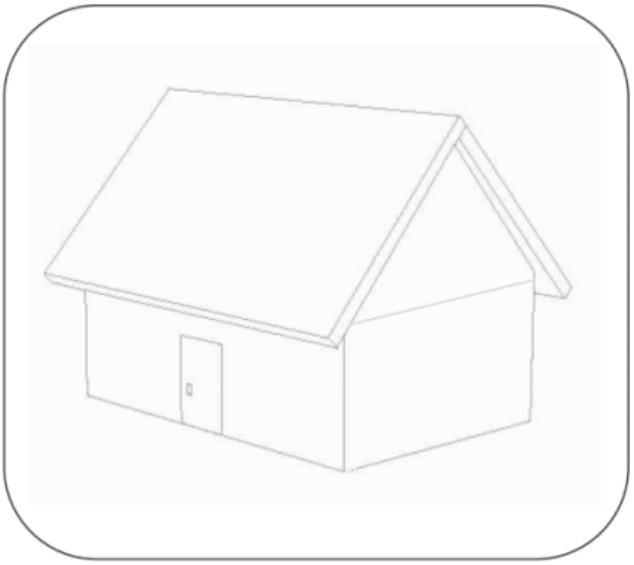
_____

_____

Your name: _____ Partner's name: _____

3. CREATE AND TEST YOUR SECOND DESIGN.

Design #2: Draw your design.



What happened when you tested Design #2? _____

_____

_____

_____

_____

_____

4. WHICH DESIGN WORKED BETTER AND WHY?

Which one was easiest to build? Which one used the fewest materials? Which one do you think would last the longest?

Design #1 / Design #2 (choose one) worked best because _____

_____

_____

_____

_____

Name: _____

Date: _____

Lesson Assessment

1. a) What do hurricanes, tornadoes, and dust storms have **in common**?

_____

_____

_____

b) How are hurricanes, tornadoes, and dust storms **different**?

_____

_____

_____

_____

_____

2. Reflect on your Wind-Proof House:

A. What problem were you trying to solve?

_____

_____

_____

_____

_____

B. How did you test your designs to see whether they worked or not?

C. Engineers are always working to improve their designs. How could you improve your best design? What else would you try?

D. Engineers often work together in teams to share ideas. Did you and your partner both get to share ideas? How did you work as a team?

Stormy Skies
Performance Task

Name: _____

Future Hailstorm Prediction

Directions: Use the hailstorm data from last year to make predictions for next year.

1. Use the hailstorm data you studied to make a prediction for next year. In which two seasons and in which zone do you think your design will be needed the most?

   Next year, I think my design will be needed the most during the seasons

   of _____ and _____, and in zone ____.

2. Why do you think your design will be needed most in that zone during those seasons? Be sure to use data in your answer!

   I think this because last year, _____

   _____

   _____.

3. In which season and in which zone do you think your design will be needed the **least**? Why?

   I think my design will be needed the least in the season of _____

   and zone ____ because _____

   _____

   _____.

Stormy Skies
Performance Task

Name: _____

Past Hailstorm Patterns

Directions: Study your graphs to become an expert on one season. Then, answer these questions.

1. Which season is your data from? _____

2. Complete this table for your season.

	Zone A	Zone B	Zone C	Zone D
Number of Hailstorms				

3. Zone with the most hailstorms: ____ Zone with the fewest hailstorms: ____

4. How many more hailstorms fell in zone C than in zone A? _____

Now, talk with the people that studied the **other** seasons.

5. Look at all of the data from every season. Where and when are the **fewest hailstorms?** *Zones* _____ *in the season of* _____

6. Complete this table for each season in **zone C.**

	Spring	Summer	Fall	Winter
Number of Hailstorms in Zone C				

7. In zone C, how many **more** hailstorms happened in spring and summer combined than in fall and winter combined? _____

Stormy Skies
Performance Task

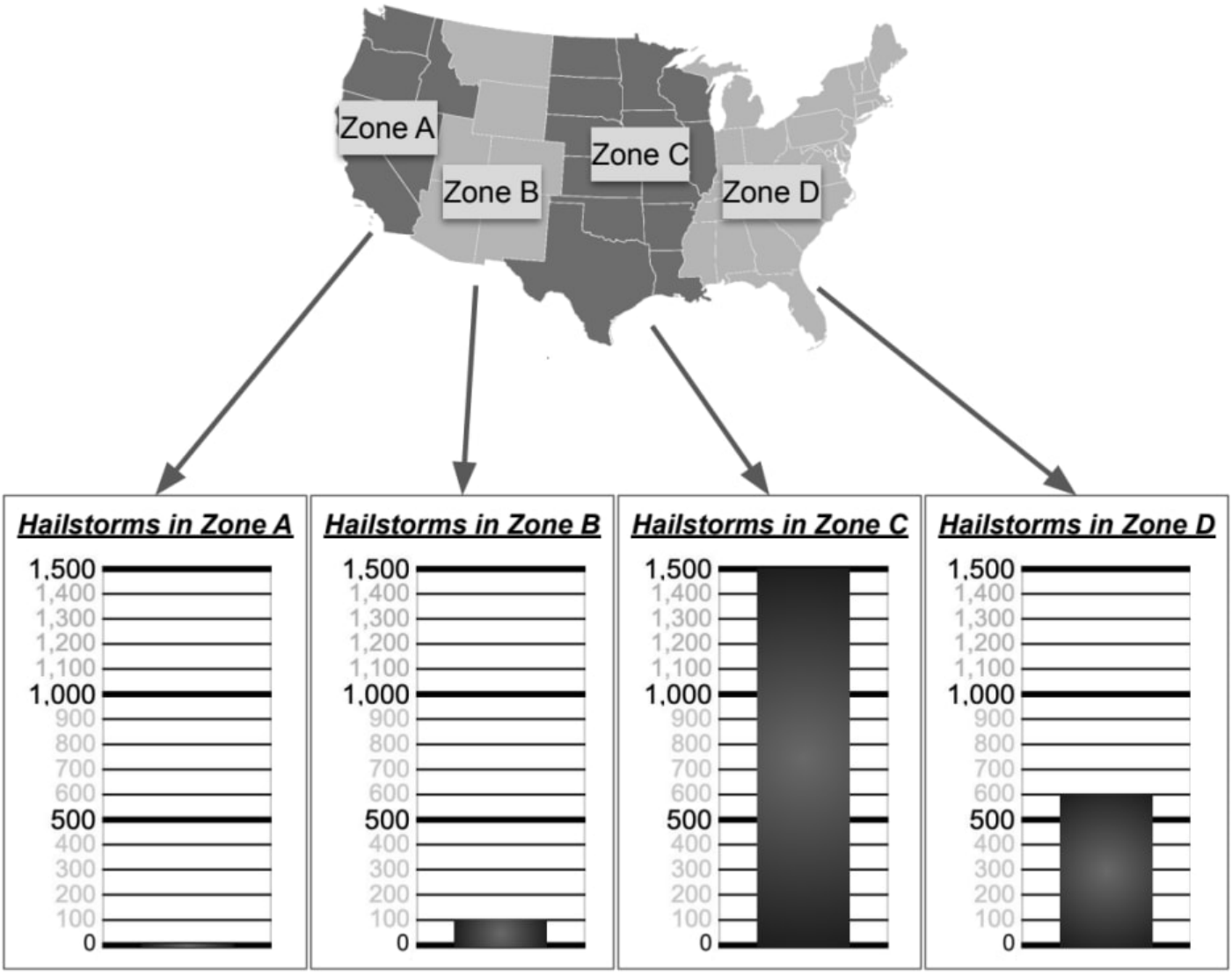
Name: _____

Spring Hailstorm Data

Introduction: We split the country up into four zones. Look at the map below to see how we did it.

The bar graphs show how many major hailstorms happened in each zone.

This is only data from **March, April, and May**. These are the months of **spring**. You're going to be the expert on hailstorms in the spring!



Stormy Skies
Performance Task

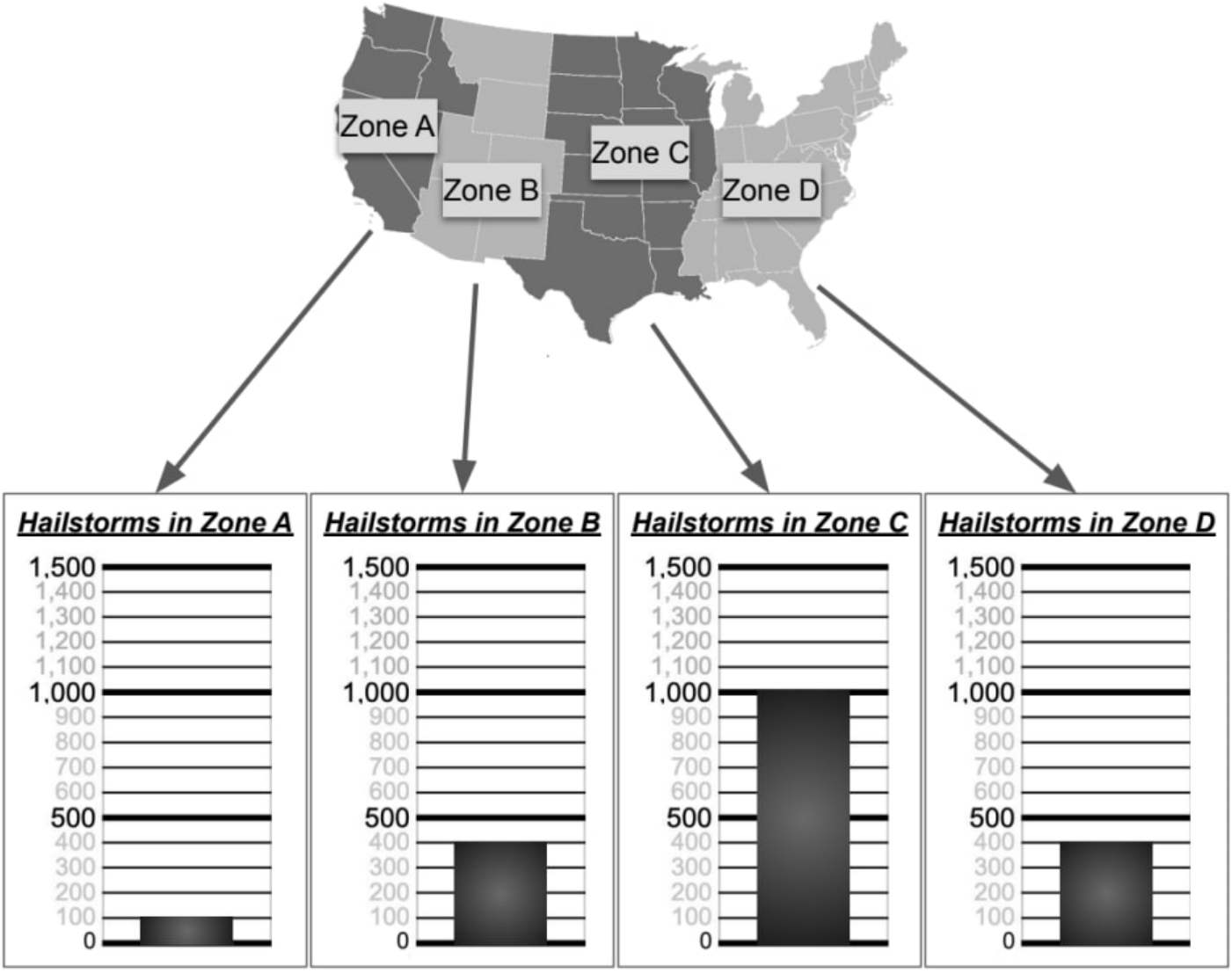
Name: _____

Summer Hailstorm Data

Introduction: We split the country up into four zones. Look at the map below to see how we did it.

The bar graphs show how many major hailstorms happened in each zone.

This is only data from **June, July, and August**. These are the months of **summer**. You're going to be the expert on hailstorms in the summer!



Stormy Skies
Performance Task

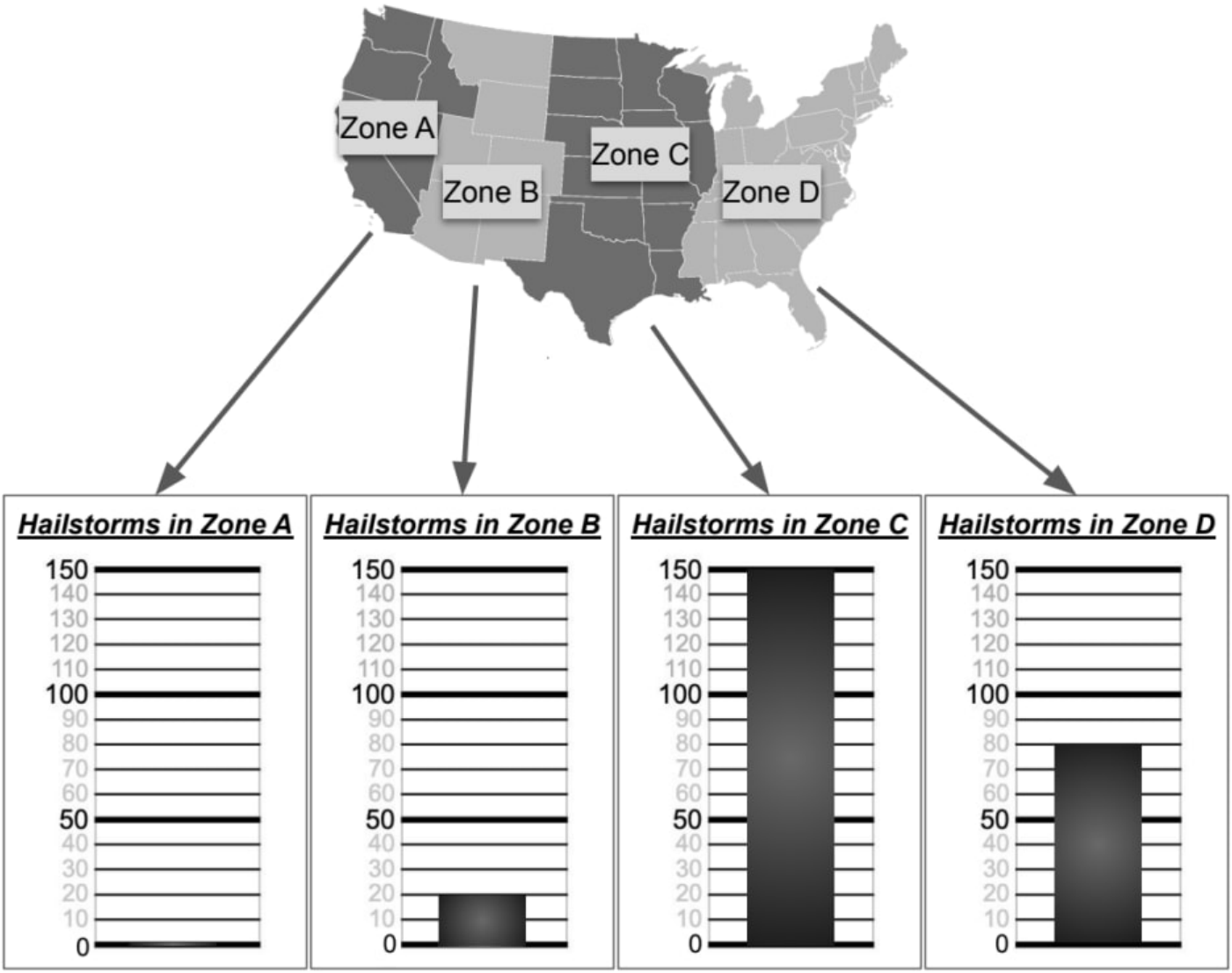
Name: _____

Fall Hailstorm Data

Introduction: We split the country up into four zones. Look at the map below to see how we did it.

The bar graphs show how many major hailstorms happened in each zone.

This is only data from **September, October, and November**. These are the months of **fall**. You're going to be the expert on hailstorms in the fall!



Stormy Skies
Performance Task

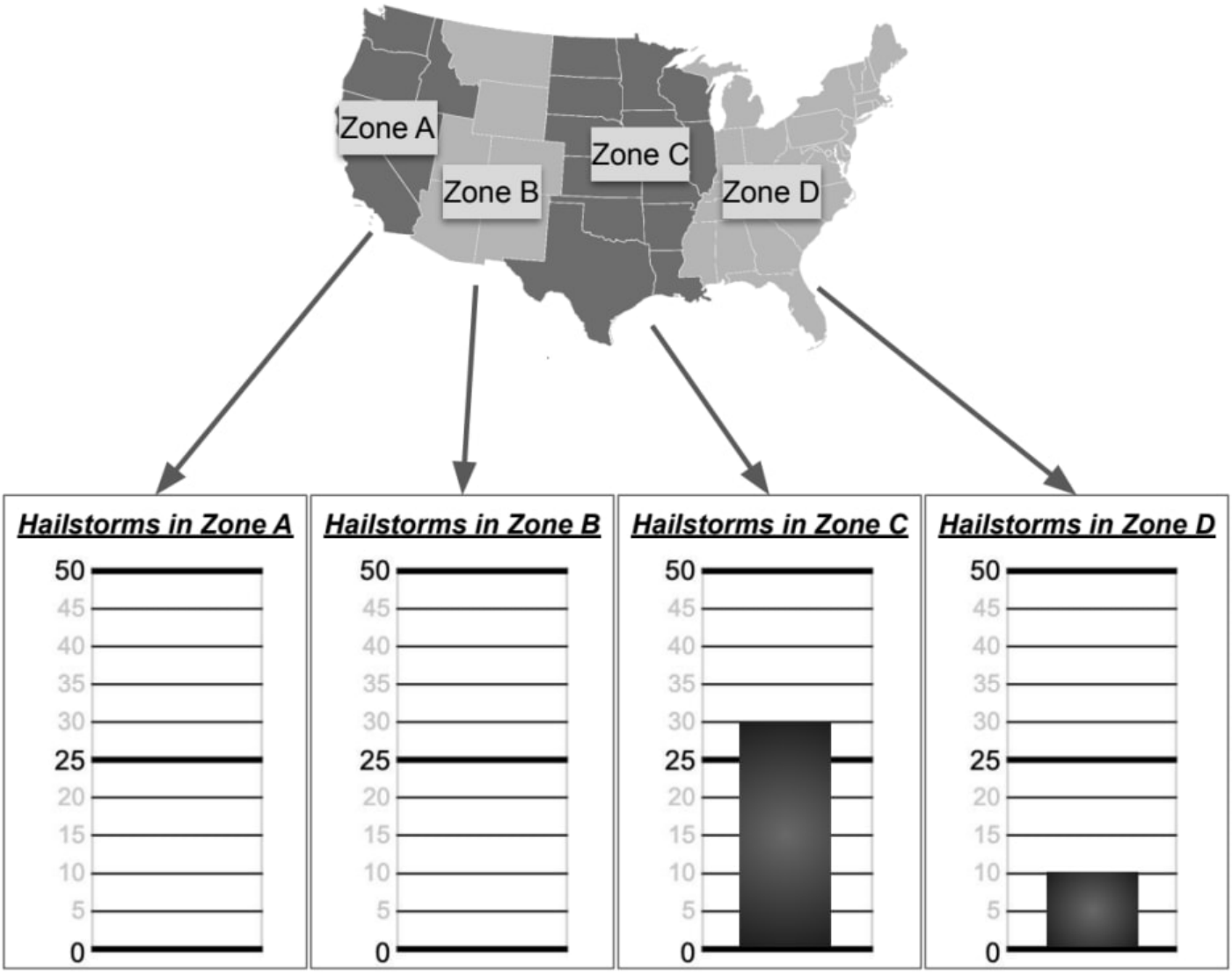
Name: _____

Winter Hailstorm Data

Introduction: We split the country up into four zones. Look at the map below to see how we did it.

The bar graphs show how many major hailstorms happened in each zone.

This is only data from **January, February, and December**. These are the months of **winter**. You're going to be the expert on hailstorms in the winter!



Name: _____
Date: _____

Unit Assessment

Multiple Choice

1. How can you tell the difference between a stratus and a stratonimbus cloud?
   a. A stratus cloud is small and a stratonimbus cloud is very tall.
   b. A stratonimbus cloud has a lighter color.
   c. A stratonimbus cloud is darker than a stratus cloud, and causes rain.
   d. A stratus cloud only covers part of the sky, and a stratonimbus cloud covers the whole sky.

2. Stratonimbus storms usually cause rain all day long because _____.
   a. the clouds are very wide so they spend a long time over one area.
   b. there is no hail in stratonimbus storms.
   c. they turn into cumulus clouds.
   d. they turn into stratus clouds.

3. Tropical climate zones are very wet and humid because _____.
   a. the temperature is cold.
   b. they have many types of plants.
   c. the Earth travels in a circle around the sun.
   d. sunbeams shine directly on them, causing more water evaporation and rainfall.

Short Answer

1. Where do clouds come from?

_____

_____

_____

2. Imagine a rain cloud is coming towards you. Choose which kind of rain cloud it's going to be! **Draw** a picture of what you see, then describe your cloud below.

Type of rain cloud: _____

How long will this storm last? _____

3. Which climate is being described below? (temperate, polar, tropical, mild or desert) Write the answer in the blank.

a) Animals that live here have blubber or thick fur: _____
b) Trees lose their leaves in the autumn: _____
c) Many animals hibernate in winter, come back out in springtime: _____
d) It's hot in December and in June: _____
e) Animals that live here don't pant to cool off, otherwise they would lose water: _____
f) It's cold in December and in June: _____
g) It doesn't rain here very much, ever: _____
h) Winters here are nice and warm, but not hot: _____

4. Scientists have discovered a new species of dog. It has very large ears and a small mouth, and it doesn't pant with its mouth open like other dogs. What climate do you think this dog could be from? Explain.

_____

_____

_____

mystery science

Forces, Motion, & Magnets

3rd Grade • NGSS • Unit Worksheets

Lesson 1

How could you win a tug-of-war against a bunch of adults?

Lesson 2

What makes bridges so strong?

Lesson 3

How high can you swing on a flying trapeze?

Lesson 4

What can magnets do?

Lesson 5

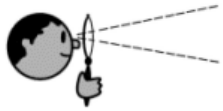
How can you unlock a door using a magnet?

I am also curious about...

See-Think-Wonder Chart

Name: _____

mystery science

See	Think	Wonder
What did you observe? 	How can you explain what is happening? 	What questions do you have? 

Name _____

The Biggest Magnet in the World

Suppose you are lost in a snowstorm. You have a map. It shows where you are. It also shows a ranger station that's not far away.

The ranger station is north of you. If you walk north, you will get to safety. That should be easy enough. But there's a problem. You don't know which way is north. All you can see is falling snow. There's nothing to tell you which way to go.

Luckily, you have a compass in your pocket. A compass has a magnetic needle that always points north. The compass needle points the way to the ranger station.

When the compass was invented, no one knew why it worked. For hundreds of years, people tried to figure it out. They played with magnets. They knew that magnets did strange things. Two magnets could pull on each other, even when they weren't touching.

People also made some discoveries about the Earth. They found out that the Earth isn't flat like a dinner plate. The Earth is round, like a rubber ball.

Then they discovered something really strange. They discovered that the compass needle points north because the biggest magnet in the world is always pulling on it.

Do you know what the biggest magnet in the world is?

The biggest magnet in the world is the world. The planet Earth is a magnet. The giant magnetic Earth pulls on the tiny magnetic compass needle. That makes the needle point north and shows you the way to go.

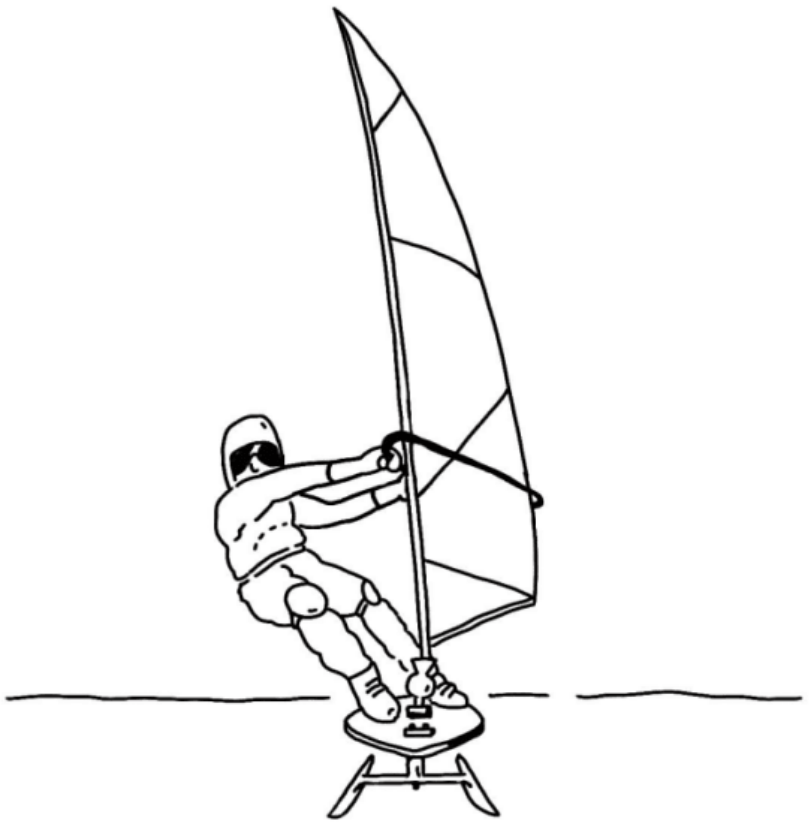
Ice Board

Name: _____

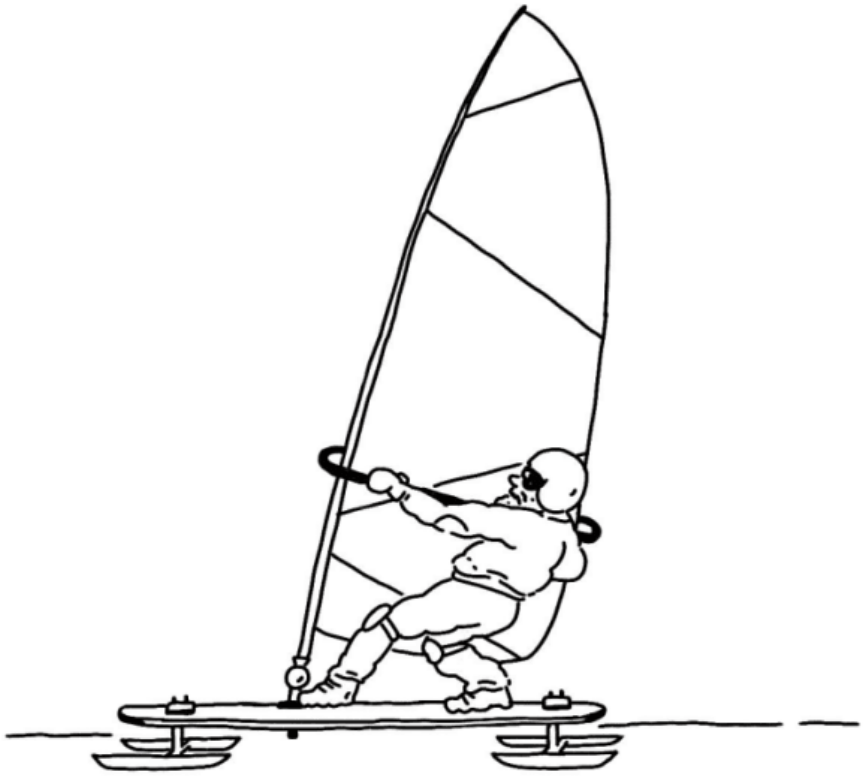
Directions:

Add labels to these drawings to explain how the ice board works.

Front View



Side View

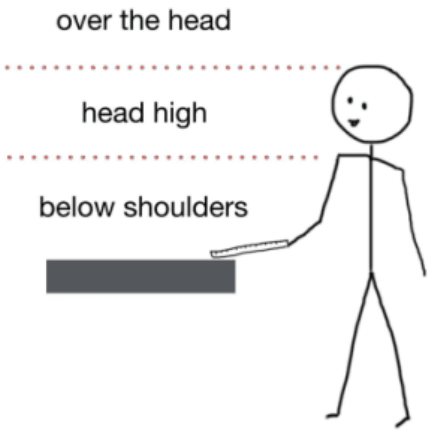


High Hop Scorecard

Name: _____

1. Work with your partner to *estimate* how high your hopper hops (that means you'll make a very good guess). While the LAUNCHER makes their hopper jump, MISSION CONTROL will carefully watch how high it goes--over the launcher's head, about head high, or below the launcher's shoulders.

   Launch 4 times and write your results on the chart below. Then switch jobs.



	Below shoulders	Head high	Over the head
Launch 1			
Launch 2			
Launch 3			
Launch 4			
Total number			

2. How do you think you could change the hopper to make it go higher?

   _____

   _____

3. Try your idea. What happened?

   _____

   _____

4. Based on what you observed, how else would you like to change/improve your hopper?

   _____

   _____

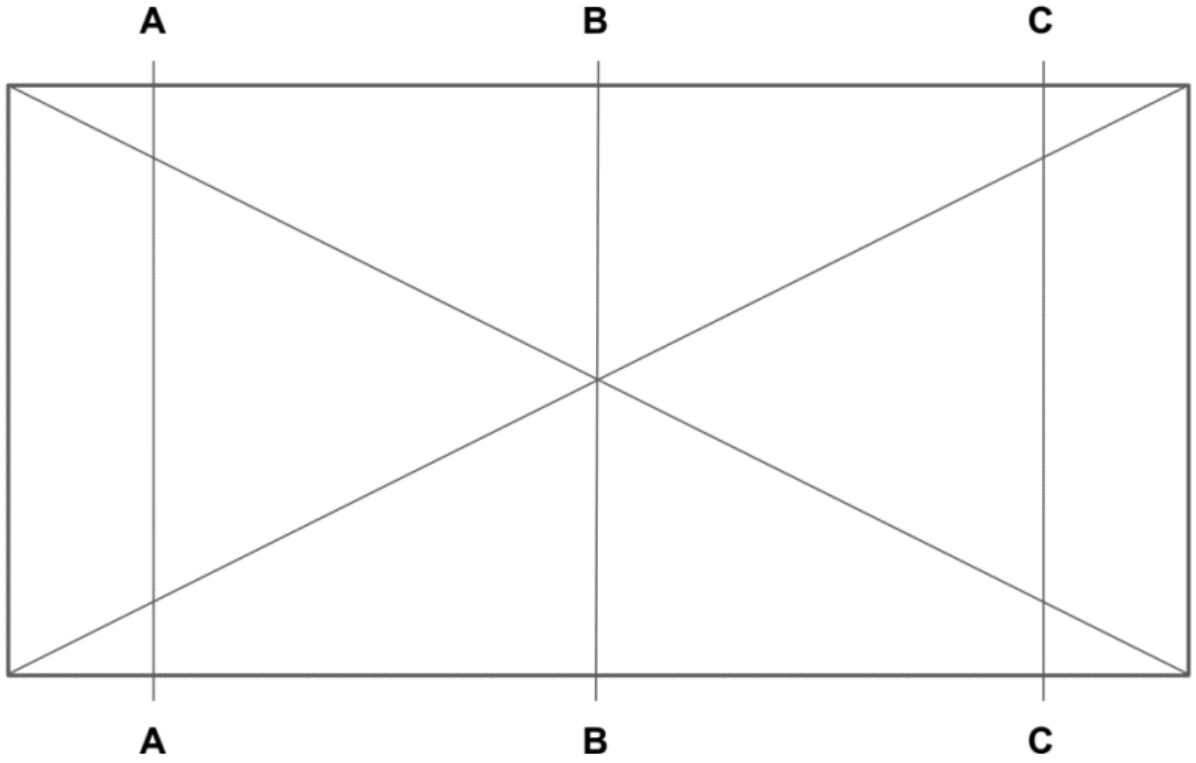
mystery science

How could you win a tug-of-war against a bunch of adults?

1 MAKE IT

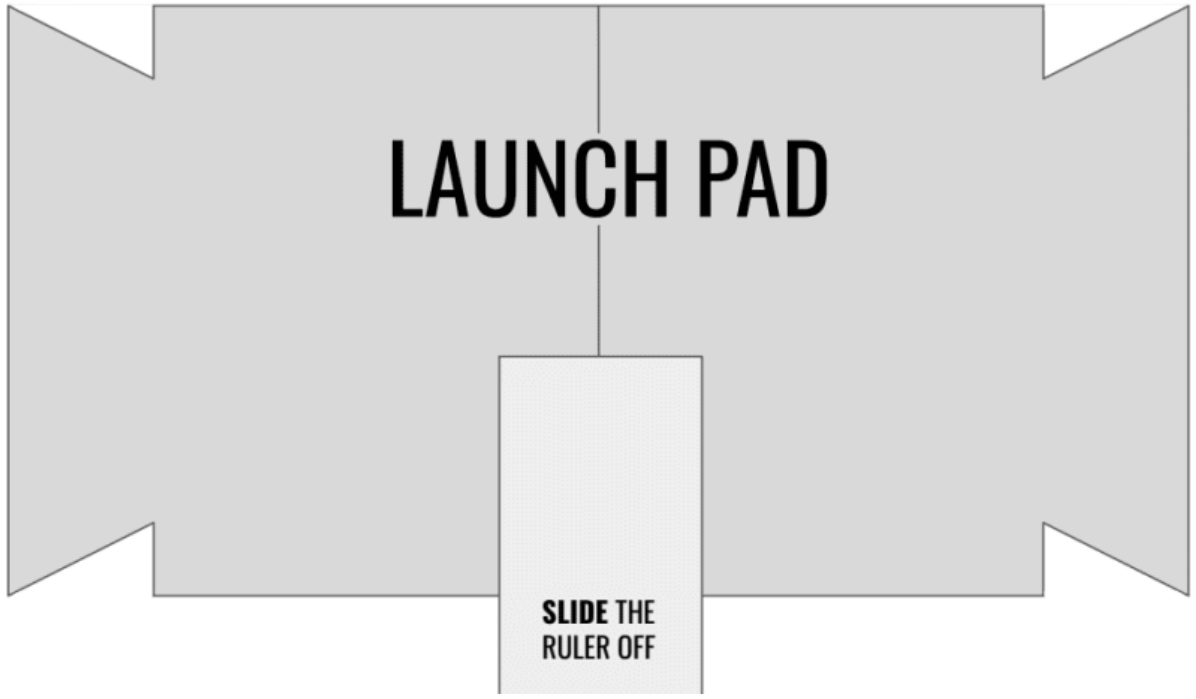
Follow the steps in the video.

mystery science



2 LAUNCH IT

Mission Control: Unfold the hopper until it's flat.
Launcher: Lay the ruler down on top. When it's launch time, SLIDE it off!



mystery science

Name: _____
Date: _____

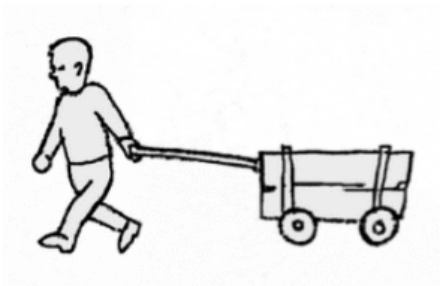
How could you win a tug-of-war against a bunch of adults?

Lesson Assessment

1. Put an "X" to show whether each of these actions is a pull or a push:

Action	Pull	Push
press		
throw		
tow		
stomp		
yank		

2. Draw arrows to show wherever there are forces (pushes or pulls):



The hand is about to hit the tip of the spoon. That's broccoli sitting on the other end of the spoon.

3. Why does a water balloon pop when you step on it but a watermelon doesn't pop when you step on it? Draw the force arrows on the pictures below:

(Assume this is the moment right before it bursts)

4. What was special about the one final rubber band that caused the watermelon to burst?

Bridge Designer's Notebook

Name:_____

My Bridge Design Build a bridge, then draw it here.	Changes Write down what you want to try next.
Bridge #1 How many pennies did this bridge hold? _____	To make a stronger bridge, I will _____ _____ _____ _____ _____ _____
Bridge #2 How many pennies did this bridge hold? _____	To make a stronger bridge, I will _____ _____ _____ _____ _____ _____
Bridge #3 How many pennies did this bridge hold? _____	To make a stronger bridge, I will _____ _____ _____ _____ _____ _____

You can use lots of paper when you are experimenting -- as long as your final bridge has only two pieces of paper.

Bridge Challenge

The problem:
Using only two sheets of paper, build a strong bridge that will reach across a 6-inch gap. The bridge must be at least 3 inches wide.

The test:
How many pennies will your bridge hold before it collapses?

You need:

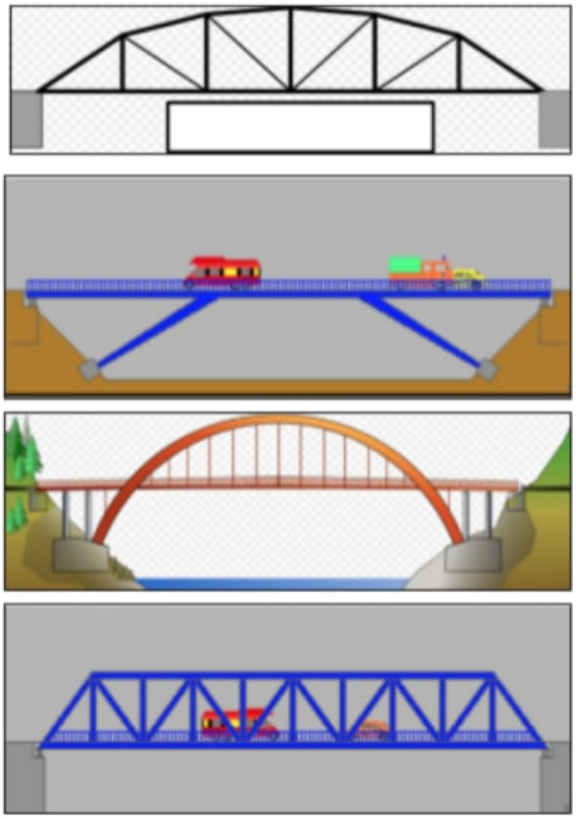
- paper
- scissors
- pennies
- a pencil
- two stacks of books of about the same height
- a ruler
- a Bridge Designer's Notebook sheet

Here's what you do:

1 Place the stacks of books 6 inches apart, using your ruler to measure the gap.

2 Think about bridges that you have seen.

Can you make something that has the same shape out of paper?



3 Experiment!

- Make a paper bridge across the gap between the books.
- Put pennies on your bridge, one by one. Watch what happens when pennies push downward.
- Keep adding pennies until the bridge collapses.
- Think about how you could change your bridge so it's better at fighting the downward push.
- Change your bridge and try again. Build at least three different designs.

4 Keep track of your experiments on your Bridge Designer's Notebook.

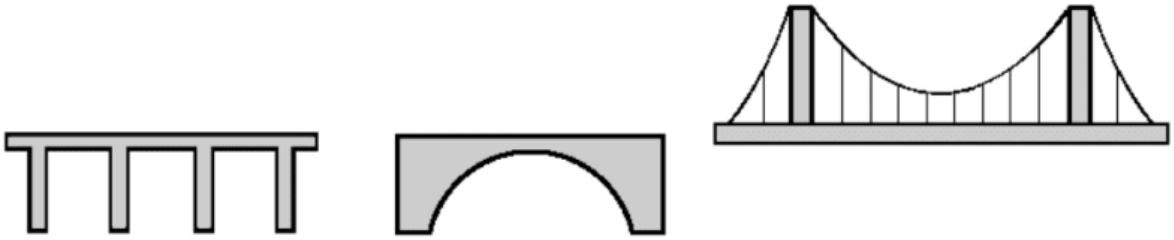
mystery science

Name: _____
Date: _____

What makes bridges so strong?

Lesson Assessment

1. Here are pictures of different bridge designs. Draw arrows to show where the bridge is being supported:



2. Why are pillar and arch bridges stronger than a simple board bridge?

_____

_____

_____

_____

_____

3. Why was the suspension bridge a good design for connecting San Francisco and Sausalito?

_____

_____

_____

_____

_____

4. When your paper bridge failed, what did you learn? What did you do differently the next time to make your bridge stronger?

_____

_____

_____

_____

Trapeze Training

Name: _____

Different lengths of string

Long

1. The long string swung _____ times in 10 seconds.

Short

2. The short string swung _____ times in 10 seconds.

3. I predict that a real trapeze with long ropes will _____

_____.

I think this because _____

_____.

Different number of pennies

____ pennies

4. This one swung _____ times in 10 seconds.

____ pennies

5. This one swung _____ times in 10 seconds.

6. I predict that a real swing with more people on it will _____

_____.

I think this because _____

_____.

Name: _____

Date: _____

Lesson Assessment

A wrecking ball is a heavy steel ball used for tearing down large buildings. The wrecking ball is raised to a certain height and then released. The ball will swing forward and crash into the building at a certain height.

Wendy operates a wrecking ball and has collected information about how high she raises the wrecking ball and the maximum height of the building it hits. This information is shown in the table to the right.

Height of release	Maximum height of building reached
5 meters	4 meters
10 meters	9 meters
15 meters	14 meters
20 meters	19 meters
25 meters	24 meters

1. What height should Wendy raise the wrecking ball to if she wants to hit the top of a building that is 19 meters tall?

a. 10 meters
b. 15 meters
c. 19 meters
d. 20 meters

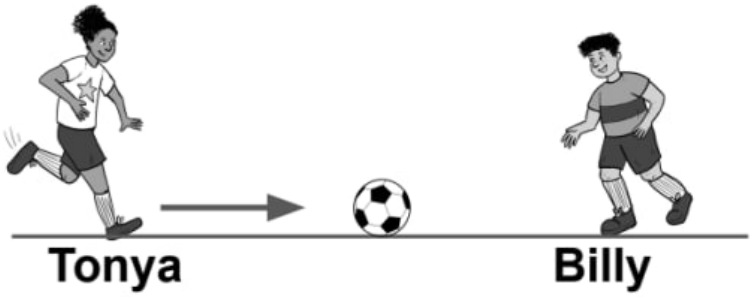
2. What **pattern** do you notice about the wrecking ball's motion?
Circle all correct answers.

a. The higher the height of release, the higher the wrecking ball can go.
b. The higher the height of release, the lower the wrecking ball can go.
c. The height of release is equal to the maximum height the wrecking ball can reach on the other side.
d. The height of release is more than the maximum height the wrecking ball can reach.

3. **Predict** the height Wendy will raise the wrecking ball to if she needs to demolish the top of a building that is 29 meters tall.

a. 15 meters
b. 20 meters
c. 25 meters
d. 30 meters

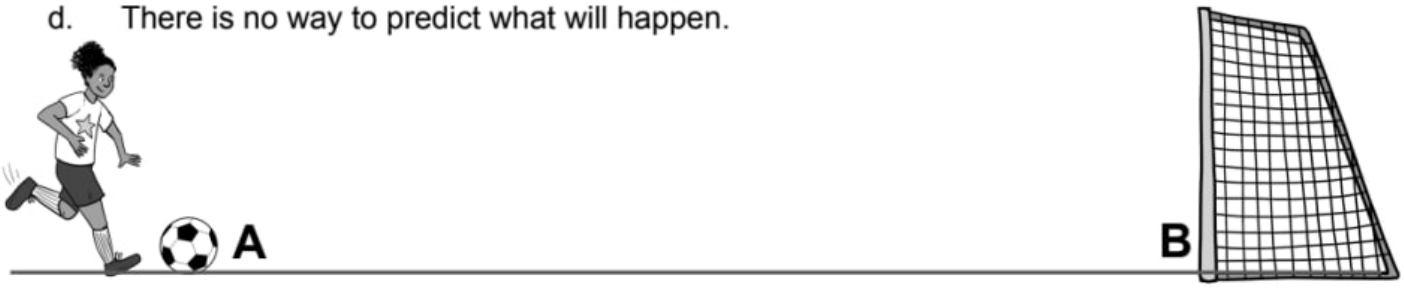
Tonya and Billy are on a soccer team. During practice, they stand in the same spot and pass the ball back and forth to one another. Tonya kicked the ball, but it stopped between them before it reached Billy.



The ball is moved so that it is now in front of Billy. Billy kicks the soccer ball with the EXACT SAME amount of force that Tonya used to kick the ball earlier.

4. Based on this information, what do you **predict** the soccer ball will do?

a. It will travel toward Tonya and stop right next to her.
b. It will travel toward Tonya and stop before it reaches her.
c. It will travel toward Tonya and keep going past her.
d. There is no way to predict what will happen.



5. Tonya needs to score a goal. She needs to know how much force she should use to get the soccer ball from Point A to Point B. What kinds of information could she collect to help her answer this question? Circle all correct answers.

a. Observe how far the ball travels after kicking it with different amounts of force.
b. Observe how quickly the goalie stops the ball.
c. Measure the distance the soccer ball travels each time it's kicked.
d. Measure the size of the soccer ball.

Force of Kick	Distance Ball Moves
Small	4 yards
Small	5 yards
Large	9 yards
Large	10 yards

6. If Tonya kicks the soccer ball with a medium amount of force, how far do you think it will travel? Why do you think this? Explain your answer using evidence from the table on the right.

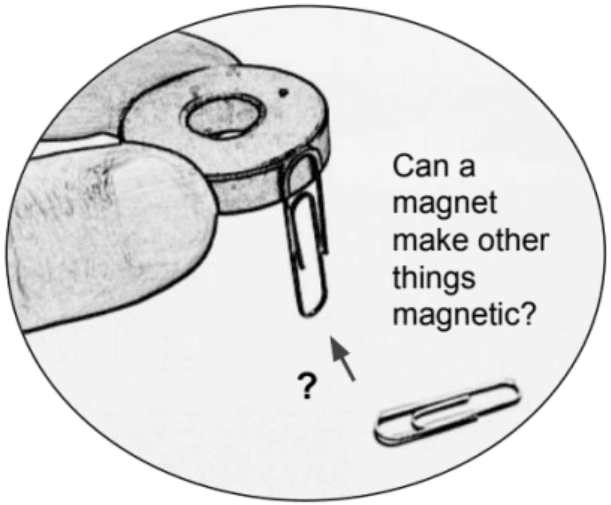
I think the soccer ball will travel _____ yards.

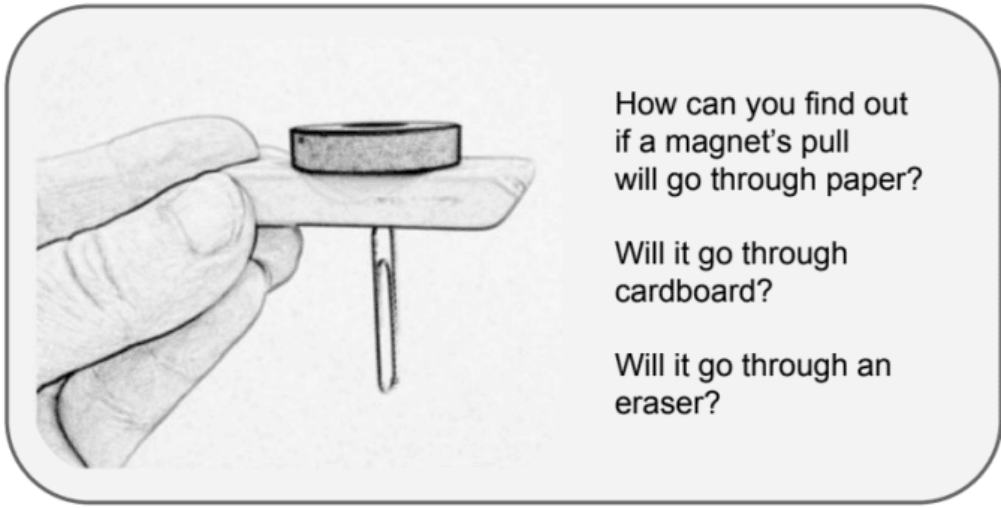
I think this because _____

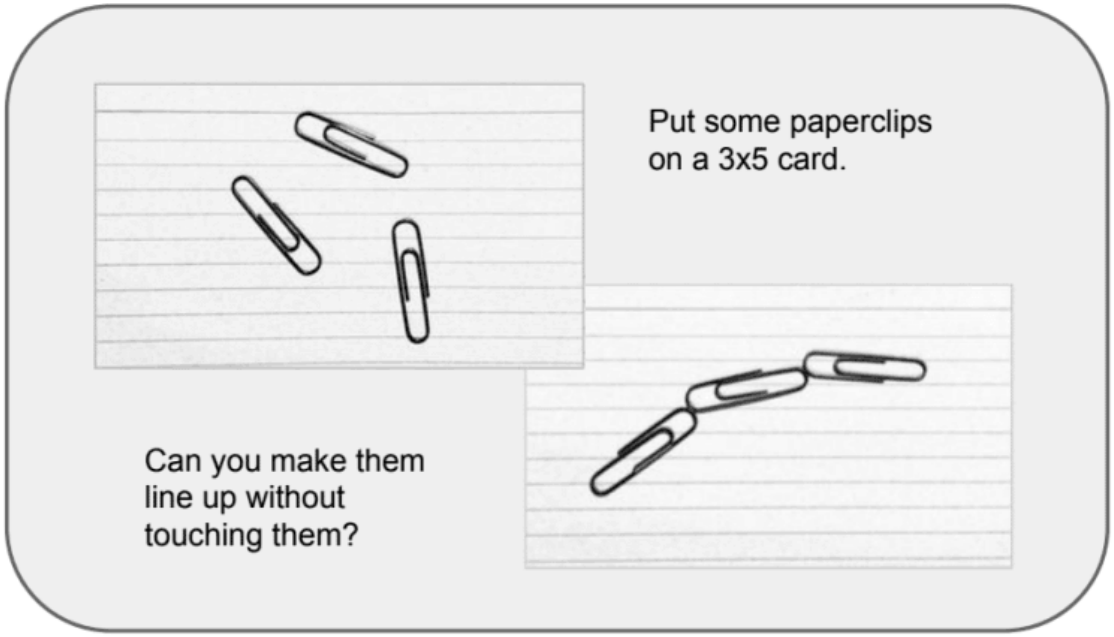
_____

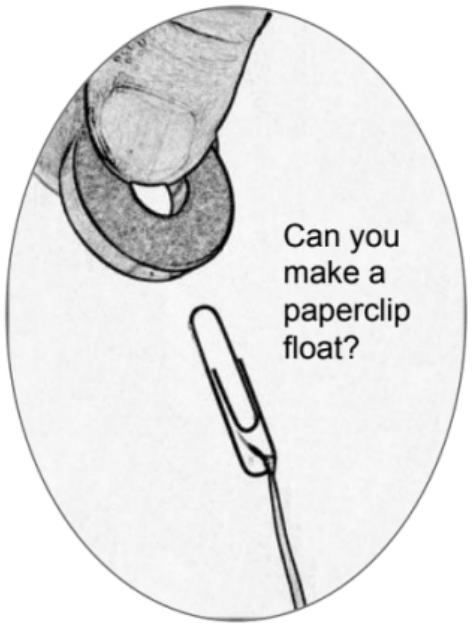
_____

Ideas for Experimenters





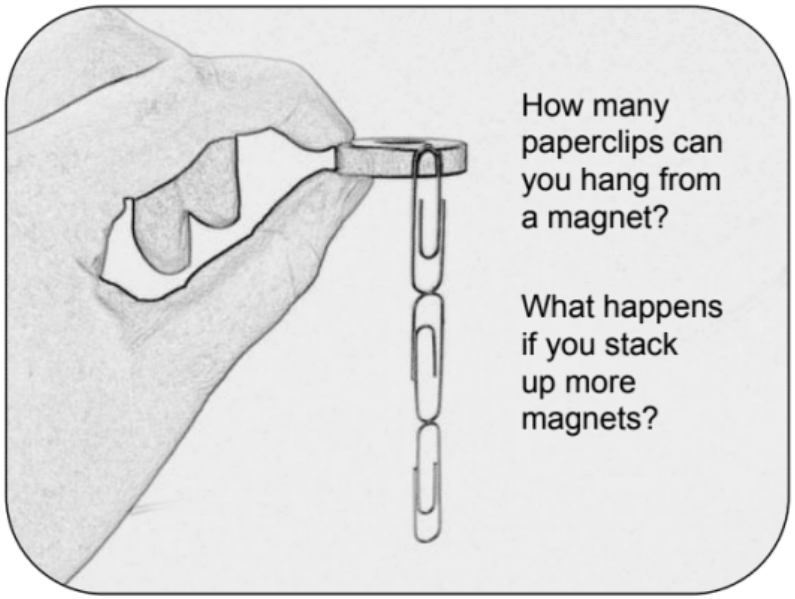




mystery science

What can magnets do?

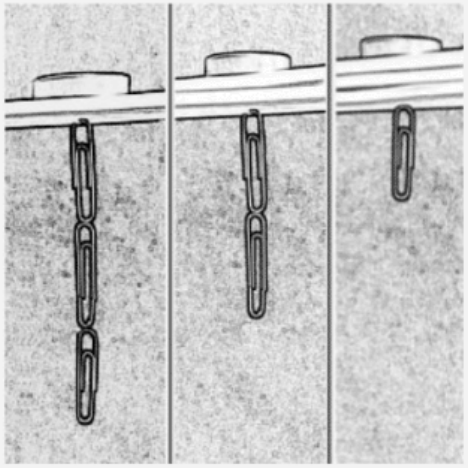
More ideas

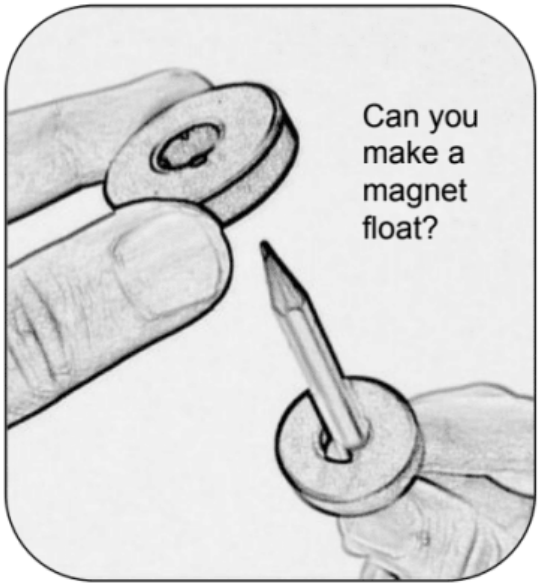


How many paperclips can you hang from a magnet?

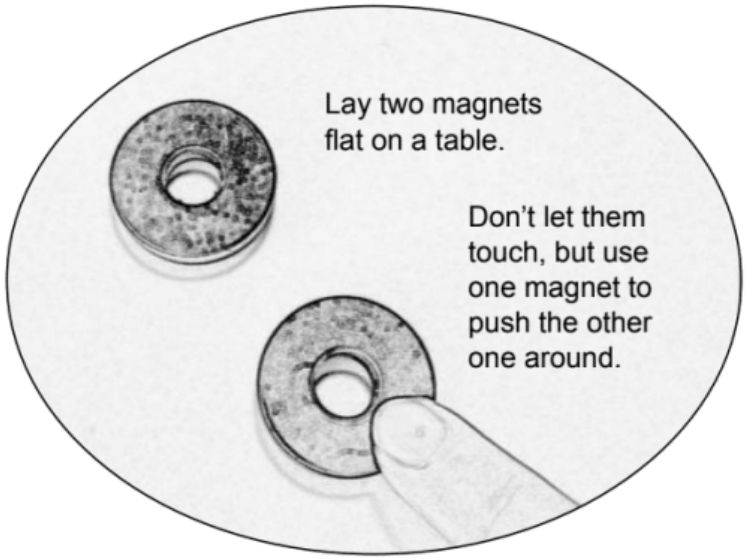
What happens if you stack up more magnets?

How can you make a magnet's pull weaker?





Can you make a magnet float?



Lay two magnets flat on a table.

Don't let them touch, but use one magnet to push the other one around.

Magnets Are Weird

Name: _____

Questions:	My drawing of what I tried:	What happened:
1. Will a magnet's pull go through paper? Will it go through cardboard? Other materials?		
2. Can you make a paperclip float? Can you make a magnet float?		
3. Write your own question:		

mystery science

Name: _____
Date: _____

What can magnets do?

Lesson Assessment

1. Do you think magnets are weird? Why or why not?

_____

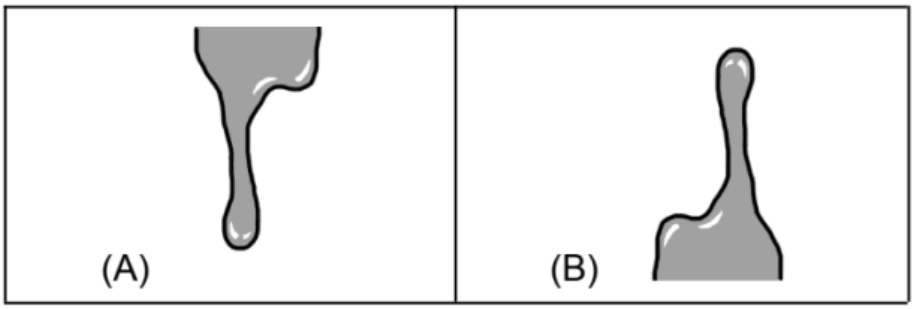
_____

_____

_____

_____

2. When you pour chocolate syrup, it falls down (like in picture A). How could you get the chocolate syrup to pour upwards (like in picture B)? Explain why you think your plan would work.



_____

_____

_____

_____

3. What invention would you make if you had a lot of magnets? Explain why you think that invention would be a good idea.

_____

_____

_____

_____

_____

mystery science

Name: _____
Date: _____

How can you unlock a door using a magnet?

Lesson Assessment

1. For each example, circle the property or properties of magnets being used. (There may be examples where more than one property is being used.)

Attracting: Magnets attract other magnets and some metals.
Repelling: Magnets repel other magnets.
Working at a distance: Magnets don't have to be touching to push and pull each other.

Example	Which property(ies) of magnets is being used?		
a. Holding things on the refrigerator with magnets	Attracting	Repelling	Working at a distance
b. Cow magnets picking up metal in a cow's stomach	Attracting	Repelling	Working at a distance
c. Magnetic train ("MagLev" train) using magnets instead of wheels	Attracting	Repelling	Working at a distance
d . Magnetic clasp on a purse or bag	Attracting	Repelling	Working at a distance
e. "Magic" trick: moving a magnet with a magnet under the table	Attracting	Repelling	Working at a distance
f. Picking up cars & other metal pieces at the junkyard	Attracting	Repelling	Working at a distance

Bonus: In the space below, come up with your own example. Give the property of magnets it uses.

2. Reflect on your magnetic lock design:

A. What problem were you trying to solve?

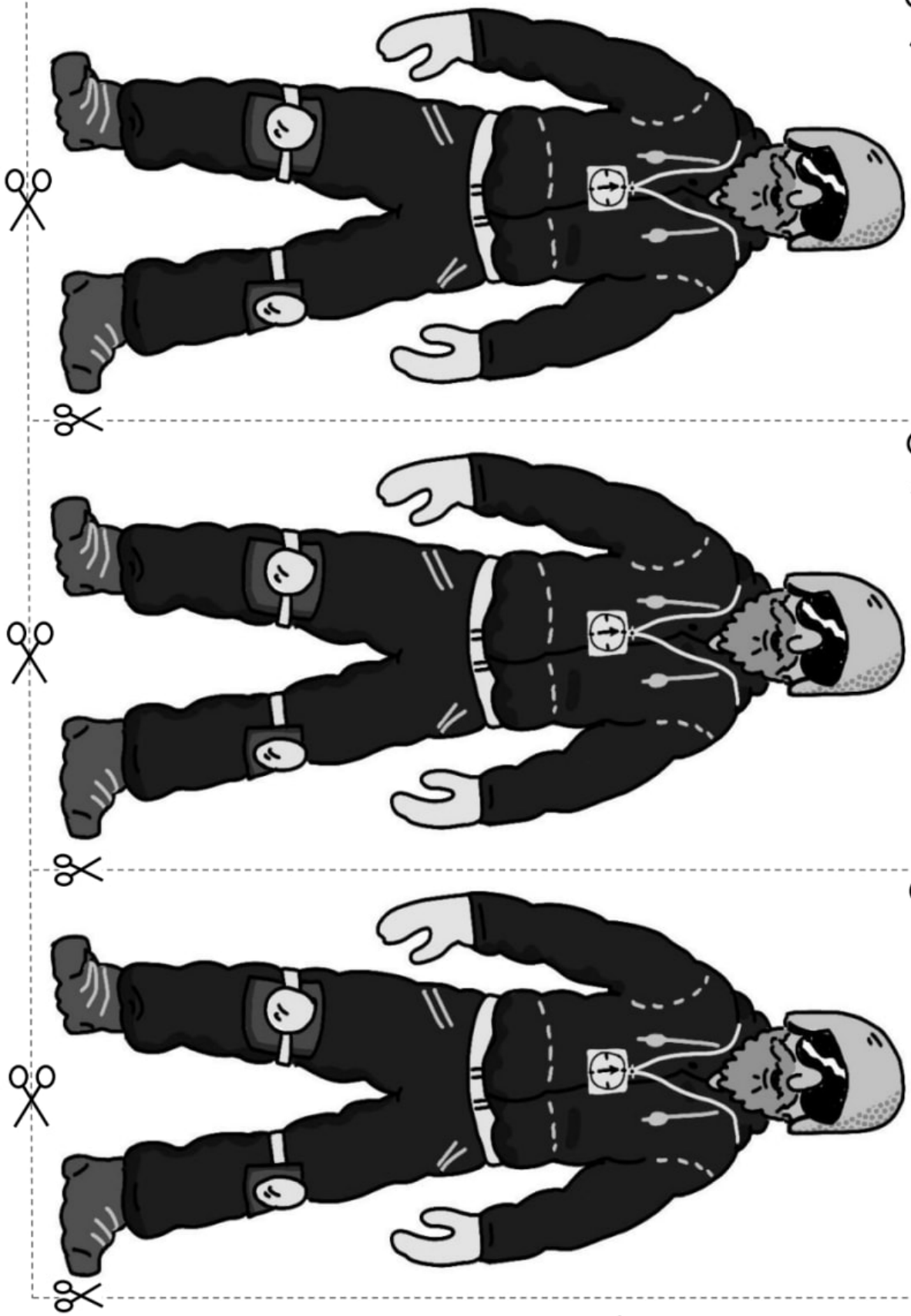
B. Draw and label your lock design.

C. Choose one property of magnets:

attracting repelling working at a distance

How was this property of magnets useful in your design?

Ice Board Rider — 1 Rider/Group



Ice Board Designer

Name: _____

The ice board rider is going to take a trip to Lake Baikal! This lake is huge. He needs a new ice board design to get ready for such a big lake. Can you design a new ice board and build a model of it?

1. Read the design goals. Your design must:

- include a seat so the ice board rider is comfortable, sitting up, and facing forward
- include a sail that won't fall over when you blow on it (you might have to build something to hold the sail up, too)
- fit the cutout of the ice board rider— not too big, and not too small
- cost as little as possible

2. Come up with a plan for your model.

Explain your plan on the lines below. Draw your plan in the box to the right.

_____

_____

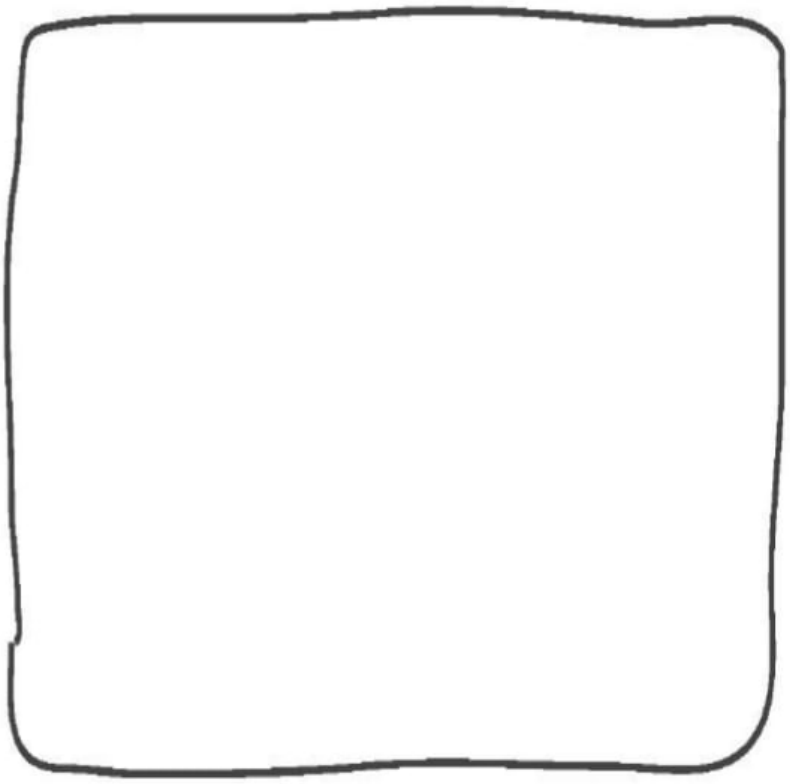
_____

_____

_____

_____

_____



Ice Board Designer

Name: _____

3. Build a model of your new ice board.

As you build, you may find that you have to change your plan. That's okay! Be sure to test it to make sure it won't fall over if you blow on it. If it does fall over, keep improving your design so that it doesn't. When you are finished go back and make sure you have met all of the design goals!

4. Check your work.

When you are done, look back at step 1. Make sure your design meets all of the design goals.

5. Calculate the total cost of your design.

Use this table to help you figure out the cost.

Material	How many does your design use?	Multiply to calculate the cost of each type of material
Note card		_____ x $5 each = _____
Paper clip		_____ x $5 each = _____
Tape strip		_____ x $10 each = _____

Total cost of all items (add them up): $

6. Improve your design.

Think of something creative you can add to your design that will make it even better for the ice board rider. You might add something to make it more comfortable, faster, easier to use, or something else. You might remove certain parts to reduce the cost. Describe what you came up with in the space below. If you have time, you can build it on your actual model.

On my design, I added _____

_____

_____

Name: _____
Date: _____

Unit Assessment

Multiple Choice

1. Why is it hard to win a tug-of-war against a group of teachers?
   a. Teachers try really hard.
   b. Teachers have more legs than students.
   c. Teachers have a lot of friction.
   d. Teachers can push really hard.

2. The last rubber band caused the watermelon to burst because _____.
   a. it was stronger than the other rubber bands.
   b. it was thicker than the other rubber bands.
   c. it was the last rubber band in the bag.
   d. it created a force that was greater than the force of the watermelon rind.

3. Why was a suspension bridge a good design for the Golden Gate Bridge in San Francisco?
   a. Ships had to pass underneath the bridge.
   b. It has a lot of pillars underneath to support it.
   c. The distance the bridge had to cross wasn't very long.
   d. The water under the bridge was very shallow.

4. A trapeze won't swing forever because _____.
   a. a trapeze is too heavy to keep swinging.
   b. friction and air resistance slow the trapeze down.
   c. a trapeze isn't heavy enough to keep swinging.
   d. the ropes of the trapeze aren't long enough.

5. Magnets attract _____.
   a. objects that contain iron.
   b. only other magnets.
   c. anything made of metal.
   d. things that are not too heavy.

Short Response

1. Why do hoppers hop off the table?

_____

_____

_____

_____

2. Why are pillar bridges and arch bridges stronger than board bridges?

pillar bridge arch bridge board bridge

_____

_____

_____

_____

3. Imagine a trapeze artist wants to make their trapeze swing more slowly. How should they do this? Should they have a second trapeze artist join them, so that there is more weight? Or should they make the ropes shorter or longer? On the lines below, explain how you know which change to make.

I think they should _____.

I think this because _____

_____

_____

4. Are paper clips magnets? Explain.

_____

_____

_____

_____