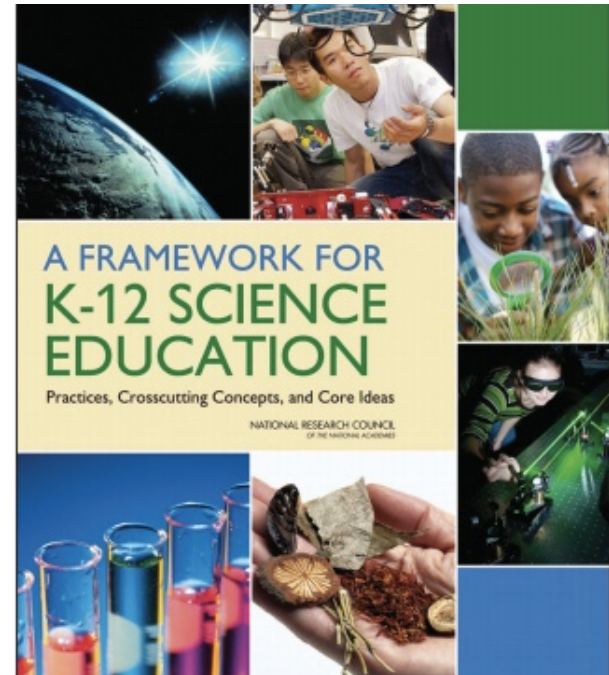


# Constructing CI-Ev-R Explanations in Science

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# Scientific Explanations

## Scientific Practice #6: Constructing Explanations



# **Explanations- 3 Parts**

**Claim**

**Evidence**

**Reasoning**

# Claim

Statement that answers the probe

Complete

Relevant

Stands alone

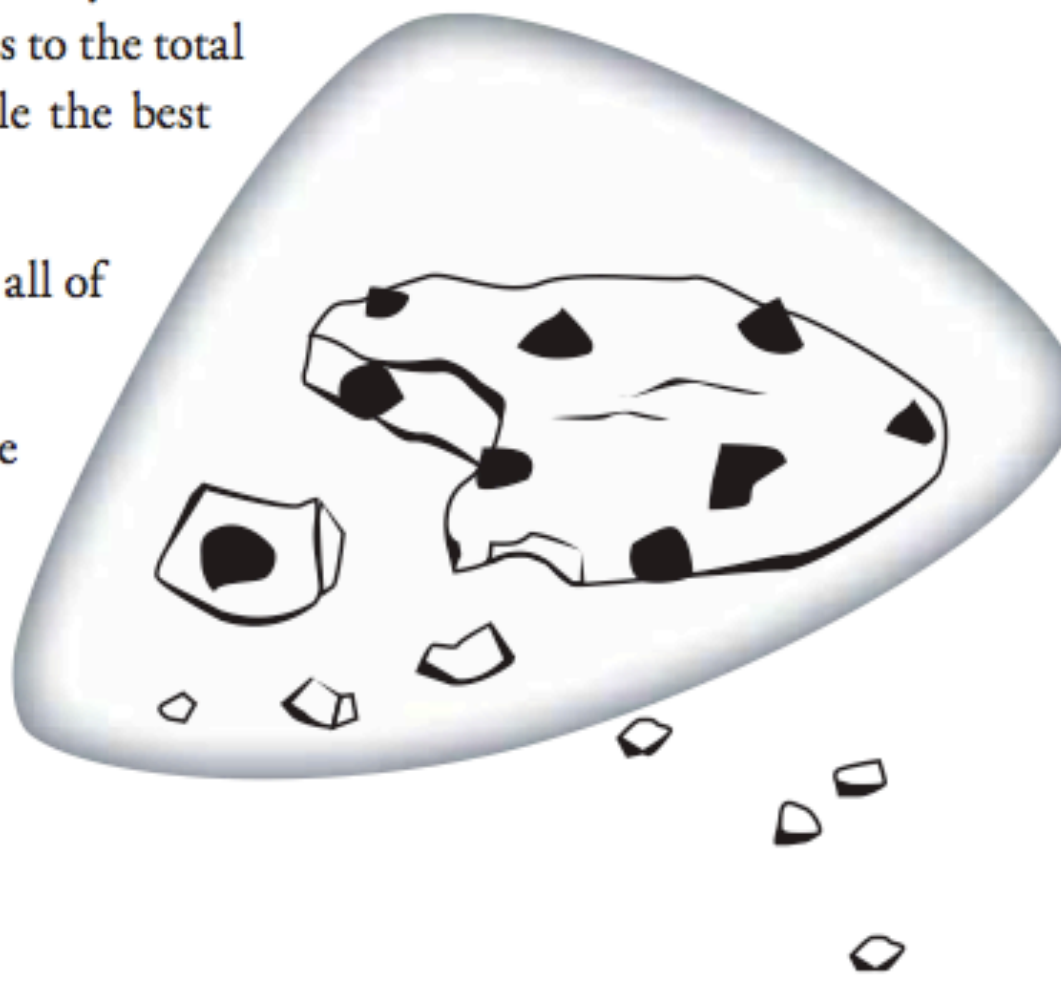
Complete sentence

# Cookie Crumbles

Imagine you have a whole cookie. You break the cookie into tiny pieces and crumbs. You weigh all of the pieces and crumbs. How do you think the weight of the whole cookie compares to the total weight of all the cookie crumbs? Circle the best answer.

- A** The whole cookie weighs more than all of the cookie crumbs.
- B** All of the cookie crumbs weigh more than the whole cookie.
- C** The whole cookie and all of the cookie crumbs weigh the same.

Describe your thinking. Provide an explanation for your answer.



# Talking About Gravity

Two friends were talking about gravity.

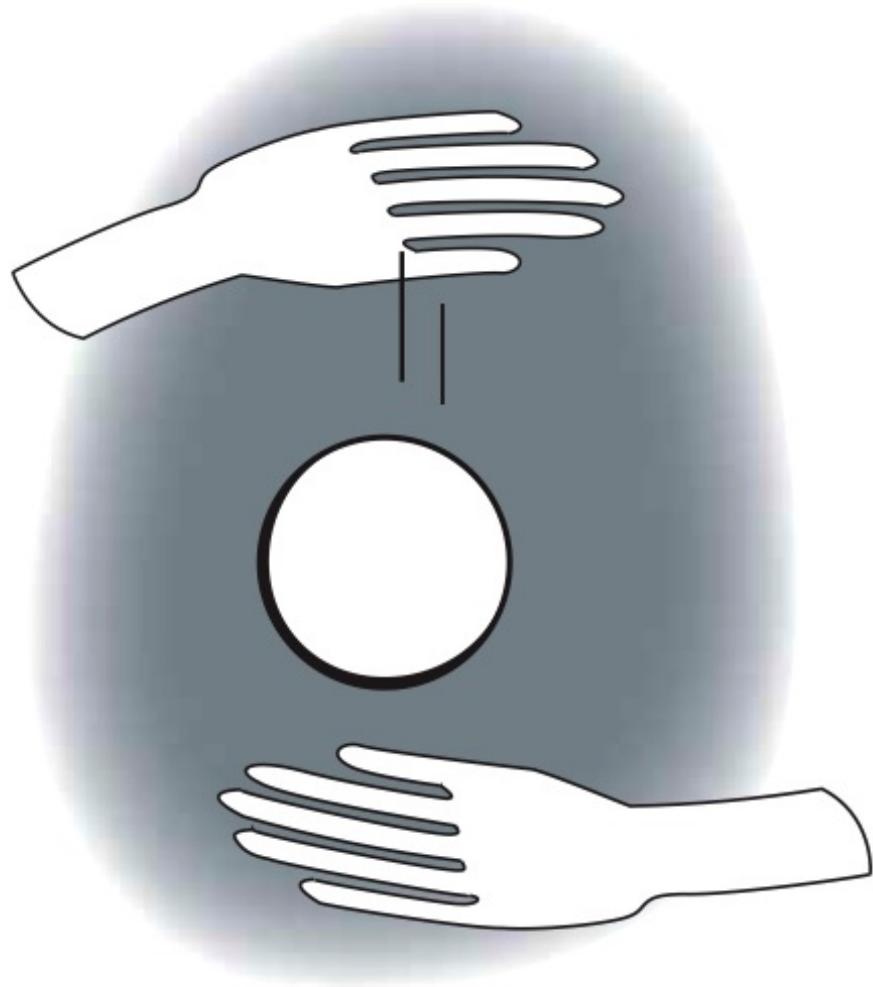
Ben said, "Gravity needs an atmosphere or air. If there is no air or atmosphere, there will be no gravity."

Kelly said, "Gravity doesn't need an atmosphere or air. If there is no air or atmosphere, there will still be gravity."

Which friend do you agree with? \_\_\_\_\_

Describe your thinking. Explain why you agree with one friend and disagree with the other.

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# Evidence

## **Pre-Instruction:**

Information from prior knowledge or experience that supports the claim

**Appropriate**

**Sufficient**

**Complete sentence**

## **Post-Instruction:**

Scientific data or information that supports the claim

**Appropriate (scientific)**

**Sufficient**

**Complete sentence**

# **Practicing Identifying Appropriate & Sufficient Evidence**

Does the evidence support the claim- yes, no, partially

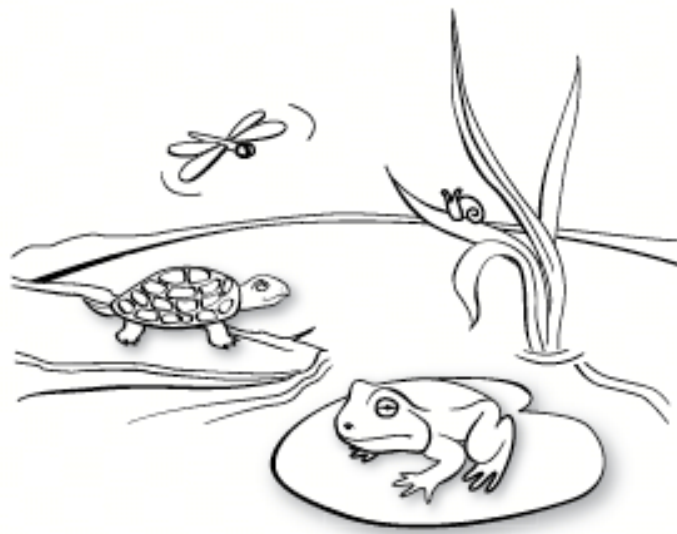
Why the evidence supports, partially supports, or does not support the claim



# Is It an Amphibian?

Belinda's sister came home excited about her science class. They were studying amphibians. Her sister asked Belinda to help her make a list of amphibians.

Put an X next to the animals they should put on their list.



\_\_\_\_\_ tree frog

\_\_\_\_\_ dragonfly

\_\_\_\_\_ pond turtle

\_\_\_\_\_ water snake

\_\_\_\_\_ penguin

\_\_\_\_\_ beaver

\_\_\_\_\_ shark

\_\_\_\_\_ alligator

\_\_\_\_\_ bullfrog

\_\_\_\_\_ duck

\_\_\_\_\_ salamander

\_\_\_\_\_ whale

\_\_\_\_\_ catfish

\_\_\_\_\_ toad

\_\_\_\_\_ sea turtle

\_\_\_\_\_ mosquito

\_\_\_\_\_ crab

\_\_\_\_\_ seal

\_\_\_\_\_ snail

\_\_\_\_\_ rattlesnake

\_\_\_\_\_ eel

Explain your thinking. What rule or reasoning did you use to decide if something is an amphibian?

# Reasoning

A justification that connects the evidence to the claim.

Clear

Sufficient

Appropriate scientific principle used

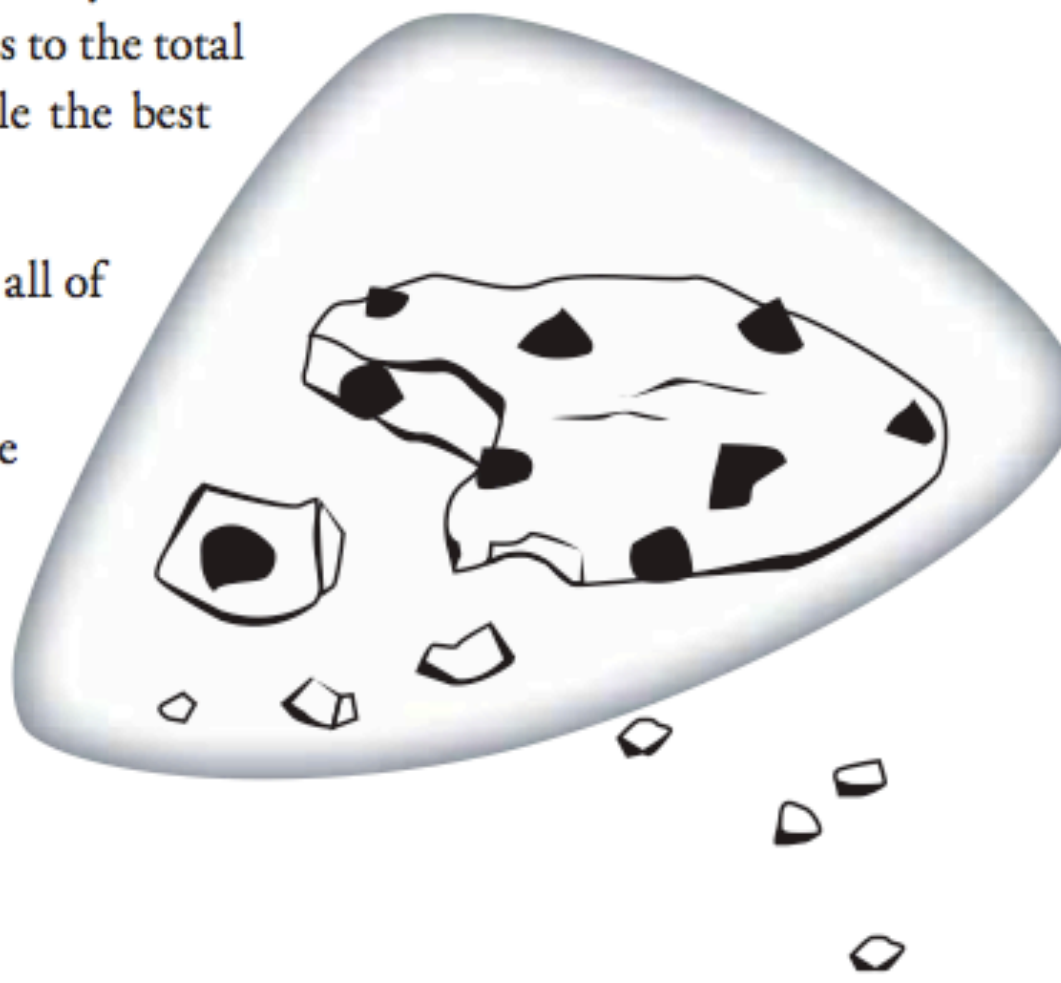
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# Cookie Crumbles

Imagine you have a whole cookie. You break the cookie into tiny pieces and crumbs. You weigh all of the pieces and crumbs. How do you think the weight of the whole cookie compares to the total weight of all the cookie crumbs? Circle the best answer.

- A** The whole cookie weighs more than all of the cookie crumbs.
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- C** The whole cookie and all of the cookie crumbs weigh the same.

Describe your thinking. Provide an explanation for your answer.



# Explanation (pre-instruction)

**Claim:** The whole cookie weighs more than all the cookie crumbs.

**Evidence:** Cookie crumbs are smaller than a whole cookie. Cookies lose weight when they are broken up.

**Reasoning:** Because the cookie has smaller pieces and isn't a whole cookie, some of the cookie gets lost when it is in crumbs which makes it weigh less.

# Explanation (post-instruction)

**Claim:** The whole cookie weighs the same as all the cookie crumbs.

**Evidence:** The same amount of cookie is there.

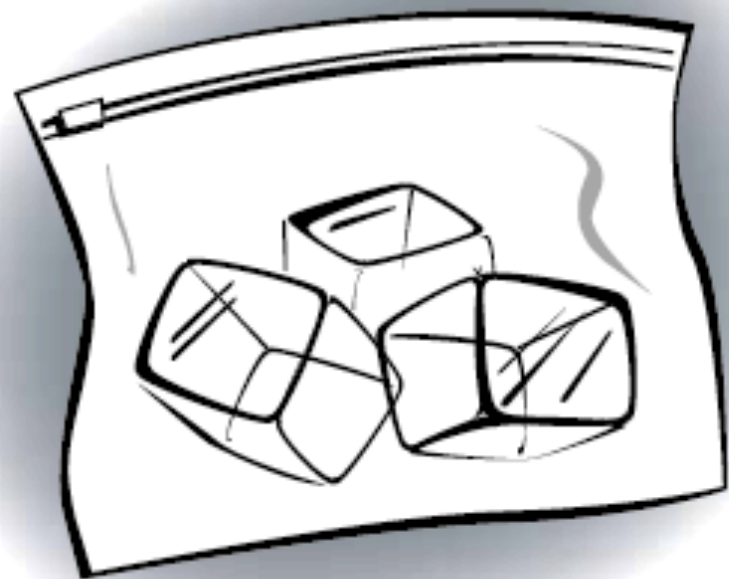
The whole cookie weighed 182 grams. All the crumbs weighed 182 grams.

**Reasoning:** Because the weight of the whole cookie is the same as the weight of the cookie crumbs, the weight stays the same when a cookie is broken into pieces. All that changes is its shape.

# Ice Cubes in a Bag

You are having an argument with your friend about what happens to the mass when matter changes from one form to another. To prove your idea, you put three ice cubes in a sealed bag and record the mass of the ice in the bag. You let the ice cubes melt completely. Ten minutes later you record the mass of the water in the bag. Which of the following best describes the result? Circle your prediction.

- A** The mass of the water in the bag will be less than the mass of the ice in the bag.
- B** The mass of the water in the bag will be more than the mass of the ice in the bag.
- C** The mass of the water in the bag will be the same as the mass of the ice cubes in the bag.



Describe your thinking. Provide an explanation for your answer.

# Pre-Instruction

Claim: The weight is more.

# Pre-Instruction

**Evidence: Ice cubes float in water. There is less ice than water.**



# Pre-Instruction

**Reasoning: It's less because of density.**

## Post-Instruction

The mass of water in the bag is the same as the mass of the ice. We found both masses were the same. The mass of water in the bag is the same because both masses were the same.

# Post-Instruction

C. The mass of ice in the bag was 86 grams. After it melted it was 86 grams. Also, the bag is sealed so nothing gets in or out of the bag. Therefore because we measured and found the mass stayed the same before and after melting, and the bag is a closed system, the law of the conservation of mass supports my claim.

# Post Instruction

The mass will be the same. The bag was sealed so nothing was added or taken away. This is an example of the conservation of matter. Ice melting is an example of a change in state of the matter. No new matter is added or taken away during a change in state which is why it stays the same.

# Rolling Marbles

Five friends built a marble tower. The marble tower had a curved track. The track was designed so that the marbles would move down the track in a circular path. The track ended on the floor. Each friend predicted how he or she thought the marble would move when it rolled off the end of the track onto the floor. This is what they said:

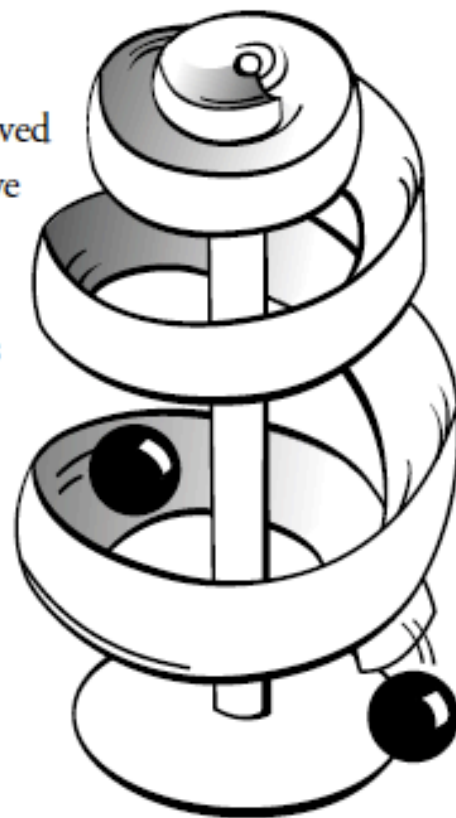
Magda: "I think it will roll in circles."

Soledad: "I think it will curve for a bit and then straighten out."

Allen: "I think it will roll in one big curve."

Keira: "I think it will roll in a straight line."

Rafael: "I think it will zigzag for a little while."



Which friend do you most agree with? \_\_\_\_\_

Use the picture above to draw the path you think the marble will take when it gets to the end of the track.

Explain your thinking. Why do you think the marble will move that way?