

TOPIC: 2.1 Using Inductive Reasoning

NAME:

Mrs. Hutschenreuter  
(KEY)

DATE:

ESSENTIAL QUESTION: How do you use inductive reasoning in mathematics?

QUESTIONS:

Define:

VOCABULARY:

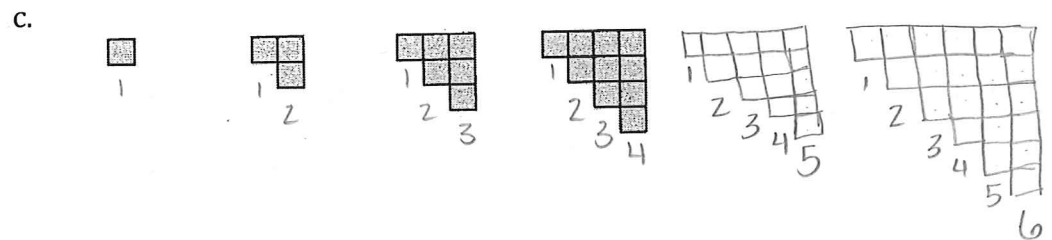
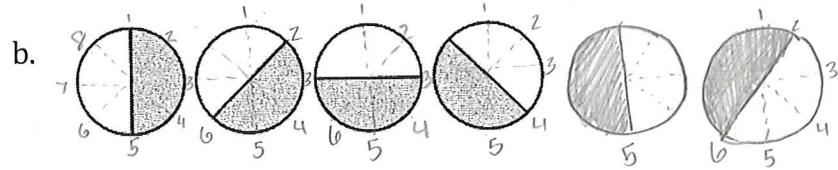
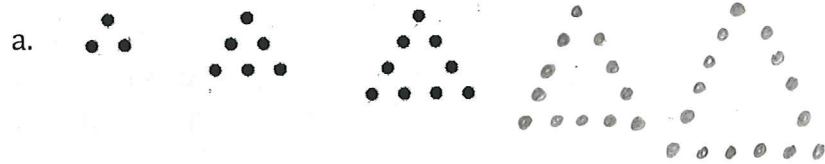
**conjecture** an unproven statement that is based on observations / a conclusion based on an observation

**inductive reasoning** A process that includes looking for patterns and making conjectures

**counterexample** A specific case that shows a conjecture is false

Complete the pattern

A1. Sketch the next two figures in sequence.



SUMMARY:

Use inductive reasoning to find a pattern or repetition to come to a conclusion, also known as a conjecture

QUESTIONS:

Complete the pattern and explain the pattern

A2. Use words to describe a pattern in the numbers. Write the next two numbers in the pattern.

- a. 32, 16, 8, 4, ... 2, 1 • Dividing by 2  
• cutting value in  $\frac{1}{2}$
- b. 5, 10, 15, 20, ... 25, 30 • Adding 5 to each value
- c. 7, 10, 8, 11, 9, 12, ... 10, 13 • Add 3, then minus 2  
 $+3$   $-2$   $+3$   $-2$   $+3$   $-2$   $+3$

Give a counterexample to the situation

A3. Show that the conjecture is false by finding a counterexample.

- a. Any four-sided polygon is a square.  
A rectangle has 4 sides but is not a square
- b. Every math teacher is uncool.  
Mrs. H is a math teacher and is cool!

Form a conjecture and counterexample

A4. Think of a situation you observed outside of school in which inductive reasoning was used incorrectly. Write a paragraph describing what happened and explaining why you think it was poor inductive reasoning.

I was in a public bathroom and saw 2 ladies walk out without washing their hands. I conjectured the ladies who use that particular restroom do not wash their hands.  
→ counterexample: I washed my hands

A5. On his way to a Gathering Convention, Caveperson Stony Grok picks up a rock, drops it into a lake, and watches it sink. He picks up a second rock, drops it into the lake, and it also sinks. He does this five more times, and each time the rock heads straight to the bottom of the lake. Stony conjectures: "Ura nok seblu," which translates to A rock in water sinks.

What counterexample would disprove Stony's conjecture?

A rock that does not sink  
For example: pumice

QUESTIONS:

Form a conjecture & counterexample

Yes, shoes don't determine where you sit

**A6.** Julianna, sitting in the last row of a school bus, notices that six students in a row get on the bus, all wearing high-top sneakers, and each student sits down on the left side of the bus. She conjectures that every student wearing high-top sneakers who gets on the bus will sit on the left side of the bus.

a. Is there anything wrong with her conjecture?

Yes, because not everyone owns high-tops and someone with high-tops can change sides

b. What counterexample will disprove it?

A student wearing high-tops sits on the right  
A student wearing sandals sits on the left

Complete the logic puzzle

**B7.** Six students attended a class party and ate a variety of foods. Something caused them to become ill. John ate pizza, hamburgers, and tacos, and became ill. Chee ate hamburgers and tacos but not pizza, and became ill. Tasha ate pizza only and felt fine. Ashley didn't eat anything, and also felt fine. Andre ate pizza and tacos only, and became ill. Joyce ate hamburgers and tacos but stayed away from pizza, and she also got sick. Make a table to organize the information and then determine the food that probably caused the illness.

	Pizza	Ham	Taco	Ill
John	x	x	x	✓
Chee		x	x	✓
Tasha	x			NO
Ashley				NO
Andre	x		x	✓
Joyce		x	x	✓

Everyone who ate tacos got sick

- Not the pizza  
- Andre ate pizza & tacos got sick

Complete the pattern

**B8. Determine the next two items in the patterns. Watch out!**

a. 18, 46, 94, <sup>63</sup>52, ...      52, 61  
 $7^2$   $8^2$   $7^2$   $6^2$        $5^2, 4^2$

b. O, T, T, F, F, S, S, E, N, ... **T, E**      one, two, three, ... nine, ten, eleven

c.  $1/2$ , 9,  $2/3$ , -10,  $3/4$ , 11, ...       $4/5, -12$   
 1, 2    2, 3    3, 4    4, 5  
 +9    -10    +11    -12