

Essential Question: How can inductive reasoning be used to prove things true?

## **3.1 INDUCTIVE REASONING & PATTERNS**

# WARMUP #1

1. Describe the pattern in the following number sequence. Then determine the next three numbers in the sequence.

1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ...

2. Use your chrome book to complete the research necessary to answer the following questions regarding the above sequence.

A. Identify the name of the sequence: \_\_\_\_\_

B. State one (1) historical fact that you find interesting about the mathematician the sequence is named after. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

C. State two (2) real-world examples in which this sequence is used.

1) \_\_\_\_\_

2) \_\_\_\_\_

# INDUCTIVE REASONING

## Problem #1

When you fold a piece of paper in half "hamburger style" and then unfold it, the paper is divided into two rectangles. Refold the paper, and then fold it in half again. This time when you unfold it, there are four rectangles. How many would you get if you folded a piece of paper in half eight times? Explain both your answer and the strategy you used.



# VOCABULARY

Inductive Reasoning:

A form of **reasoning** in which a conclusion is reached based on a pattern present in numerous observations

Conjecture:

A statement that is believed to be true but not yet proved.

# INDUCTIVE REASONING

## Problem #2

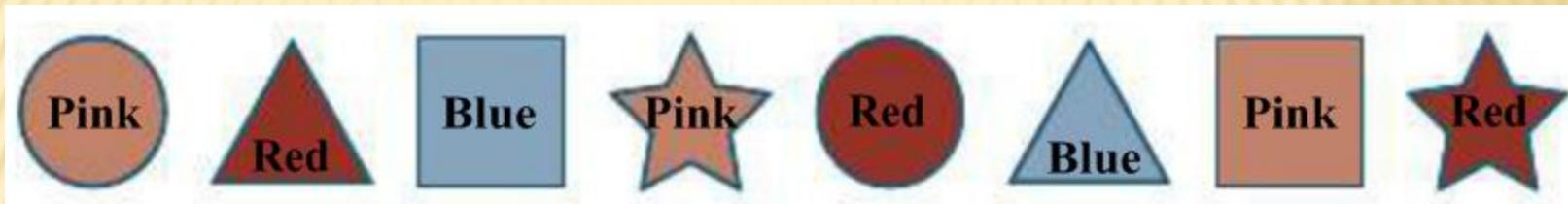
What conjecture can you make about the sum of the first 30 even numbers?  
Show your work to justify.

What conjecture can you make about the product of two odd numbers?  
Show your work to justify.

# EXIT SLIP #1

Answer the following questions.

1. Use the sequence and inductive reasoning to make a conjecture.



The next shape will a blue circle .

2. What are the next two terms in the sequence? What is the pattern you used to determine this?

$$1, 3, 7, 13, 21, \dots$$

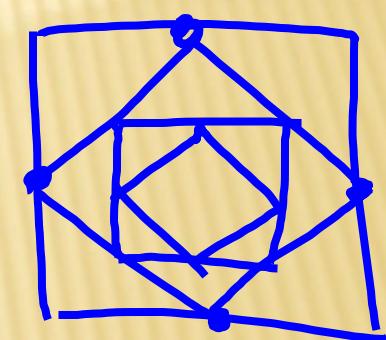
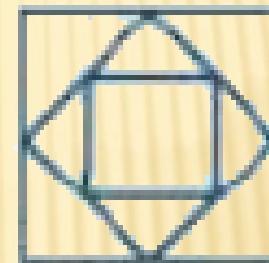
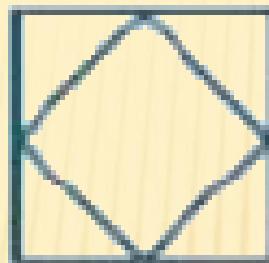
$\begin{matrix} +2 \\ +4 \\ +6 \\ +8 \\ +10 \\ +12 \end{matrix}$

$31, 43$

Add next  
even number

# WARMUP #2

1. Describe how to sketch the fourth figure in the pattern. Then sketch the fourth figure.



2. Describe the pattern in the following number sequence. Then determine the next three numbers in the sequence.

Divide by -2

1000, -500, 250, -125...  $62.5, -31.25, 15.625$

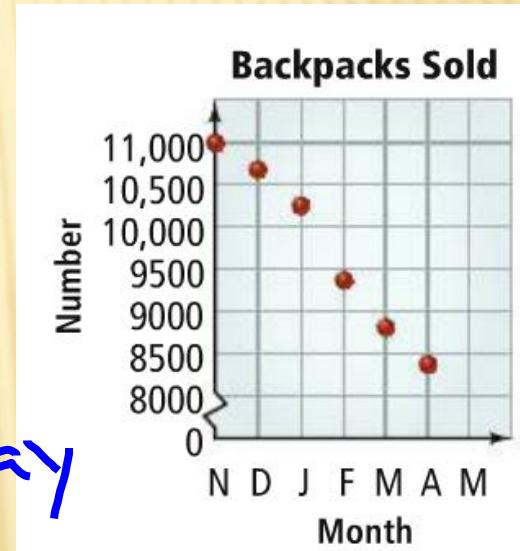
# INDUCTIVE REASONING

## Problem #3

Sales of backpacks at a nationwide company decreased over a period of six consecutive months.

What conjecture can you make about the number of backpacks the company will sell in May?

*Backpack sales will be down in May*



What conjecture can you make about the backpack sales in June?

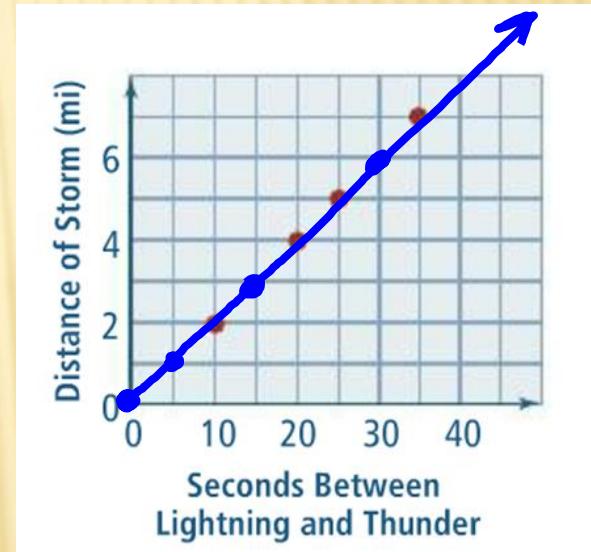
Is it reasonable to use this graph to make a conjecture about sales in August? Explain.

# INDUCTIVE REASONING

## More Problem #3

Lightning travels much faster than thunder, so you see lightning before you hear thunder. If you count 5 seconds between the lightning and the thunder, how far away is the storm?

1 mile



Is it possible to write a function to represent the distance of the storm in relation to the seconds between lightning and thunder?

$$y = mx + b$$

$$y = \frac{1}{5}x$$

# INDUCTIVE REASONING

Problem #4

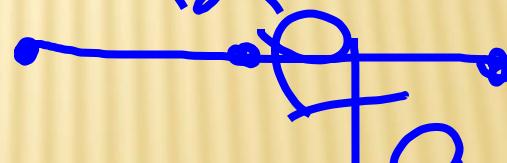
Are the following conjectures true or false? Justify your answer.

- A. If the name of a month starts with the letter J, it is a summer month.

False: January      ~~July~~

- B. You can connect any three points to form a triangle.

False: Straight Line



- C. When you multiply a number by 3, the product is divisible by 6.

False:  $1 \cdot 3 = 3$

~~9 example~~

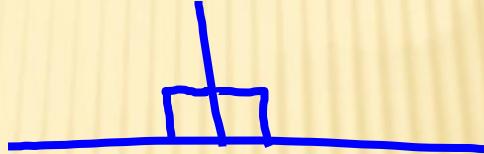
# INDUCTIVE REASONING

multiple examples  
I count examples

Are the following conjectures true or false? Justify your answer.

- D. Angle 1 and Angle 2 are supplementary, so one of the angles is acute.

False:  $90^\circ + 90^\circ$



- E. The sum of two numbers is greater than either number.

False:  $-1 + 1 = 0$

Explain the process you used to disprove the above conjectures. How does this differ from the process you use to prove conjectures true?

# EXIT #2 - SUMMARY

