Geometry 2.1
Make conjectures based on inductive reasoning
Find counterexamples

inductive reasoning *look for pattern*
conjecture *what's going on...*
counterexample (exception)

1. Find the pattern (conjecture) "Here's what I think is going on..."
2. Extend the pattern to answer the question...

Example 1 Patterns and Conjecture

Write a conjecture that describes the pattern in each sequence. Then use your conjecture to find the next item in the sequence.

a. Movie show times: 8:30 A.M., 9:45 A.M., 11:00 A.M., 12:15 P.M., ...

Every 1:15 new Show

1:30 pm

b.

4   10   18   28   40   ...

Write a conjecture that describes the pattern in each sequence. Then use your conjecture to find the <u>next item</u> in the sequence.

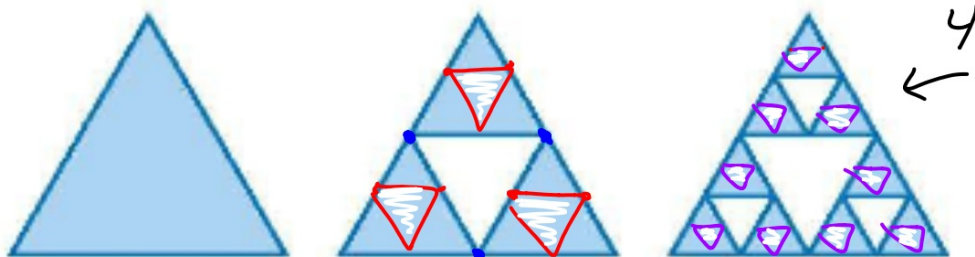*Visit every 5 months*

1A. Follow-up visits: Dec., May, Oct., Mar., . . .   *Aug.*

1B. 10, 4, −2, −8, . . .

Subtracting 6
−14

Find the pattern: conjecture
Extend the pattern: prediction

1C.

4

Connect mp 2
of each blue △.
Make center △ white

3

pattern

Example 2 Algebraic and Geometric Conjectures

Make a conjecture about each value or geometric relationship. List or draw some examples that support your conjecture.

a. the sum of two odd numbers

$$\left(\overset{n+1}{odd} \right) + \left(\overset{n+1}{odd} \right) = \overset{\text{even}}{}$$
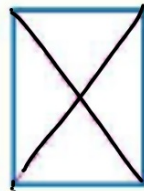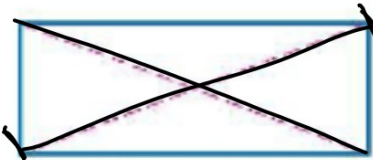
$$
\begin{bmatrix}
3 + 3 = 6 \\
1 + 1 = 2 \\
5 + 5 = 10
\end{bmatrix}
$$

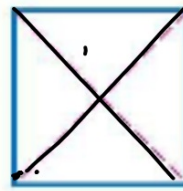Examples are not the same as proving it...but it's a start.

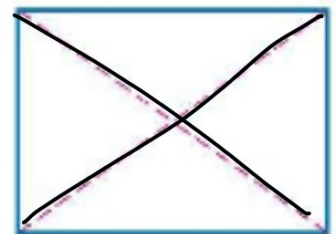**b.** segments joining opposite vertices of a rectangle   *diagonal*

Step 1

diagonals of rect $\cong$

ea 20cm   ea 24cm

$$\frac{\frac{n+1}{n+1}}{\frac{n+1}{n}}$$

Guided Practice

$n^2 \quad n$

$n^2 + 2n + 1$

1　　2　　3　　n　　n+1

2A. the sum of two even numbers

even + even = even

$10 + 6 = 16$

$4 + 4 = 8$

$6 = 6$

$6 + 2 = 8$

$= 6$

2B. the relationship between *AB* and *EF*, if $AB = CD$ and $CD = EF$

$AB = EF$　　$AB = 6 \quad CD = 6 \quad$ So $EF = 6$

41　　$8 \qquad 8 \qquad 4, 8$

2C. the sum of the squares of two consecutive natural numbers

$n = 4 \quad 16 + 25$

$16 + 16 + 8 + 1$

$n = 2 \quad (n)^2 + (n+1)^2 \qquad (= n + n^2 + 2n + 1)$

$2^2 + 3^2 \qquad\qquad 4 + 4 + 4 + 1$

$4 + 9 \qquad\qquad 13$

13

GuidedPractice

3. POSTAGE The table at the right shows the price of postage for the years 1982 through 2009.
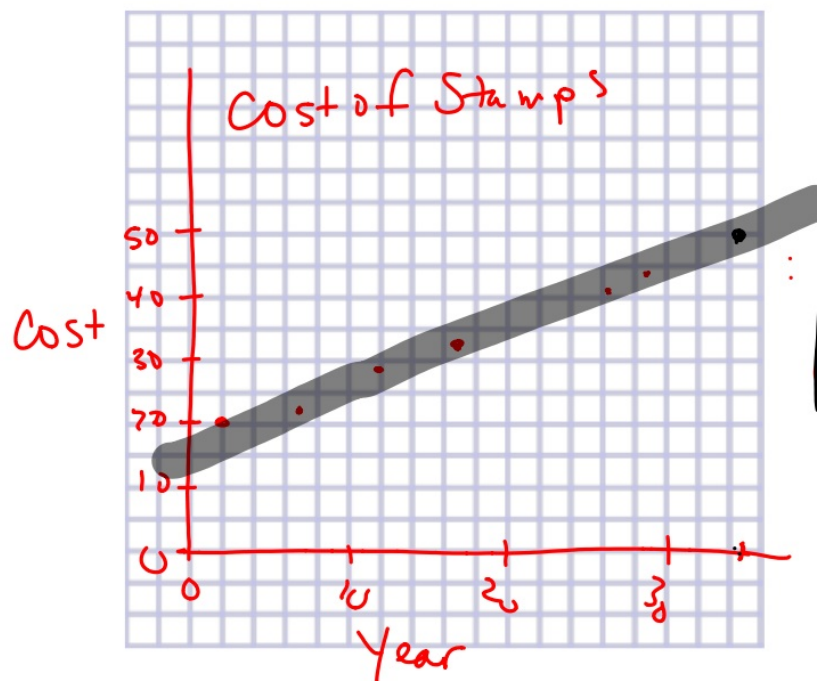
A. Make a statistical graph that best displays the data.

B. Predict the postage rate in ~~2015~~ based on the graph.

. So

C. Does it make sense that the pattern of the data will continue over time? If not, how will it change? Explain your reasoning.

x	Year	y Rate (cents)
2	1982	20
7	1987	22
12	1992	29
17	1997	32
22	2002	37
27	2007	41
29	2009	44

35

Cost of Stamps

Examples do not prove that something is always true. But a single counterexample (*an exception*) proves that something is not always true. All you need is one…

All dogs are brown.
Jaxon has a black.

Months have 31 days.
Sept. has 30

The sum of two numbers is even.
odd + even = odd

2 Find Counterexamples To show that a conjecture is true for all cases, you must prove it. It takes only one false example, however, to show that a conjecture is not true. This false example is called a **counterexample**, and it can be a number, a drawing, or a statement.

$$7 + 6 = 13$$

What if…?

$$\sqrt{-25} =$$

Example 4 Find Counterexamples

Find a counterexample to show that each conjecture is false.

a. If n is a real number, then $n^2 > n$.   0

T   F

$$n^2 > n$$
$$0^2 > 0$$

"If I square a number, it is always more than the original number."
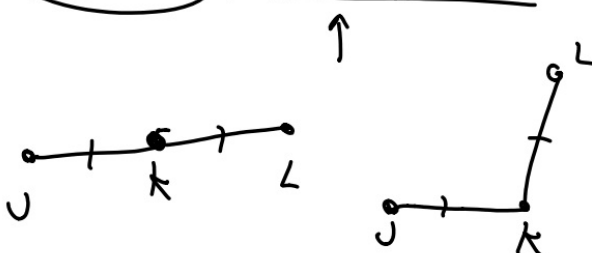Can you think of an exception (counterexample)?

$$\frac{1}{2} \cdot \frac{1}{2} > \frac{1}{2}$$

b. If $JK = KL$, then K is the midpoint of $\overline{JL}$.

"If two lengths are equal, then K is the midpoint.
Can you think of an exception? (counterexample)

Counterexample (exception)

GuidedPractice

4A. If n is a real number, then $-n$ is a negative number.

4B. If $\angle ABC \cong \angle DBE$, then $\angle ABC$ and $\angle DBE$ are vertical angles.