Inductive Reasoning classwork

During our study of geometry, we will be using a *system of logic* to prove various mathematical concepts.

Conjecture and Inductive Reasoning

- **What is a conjecture in your own words?**_____

  _____.

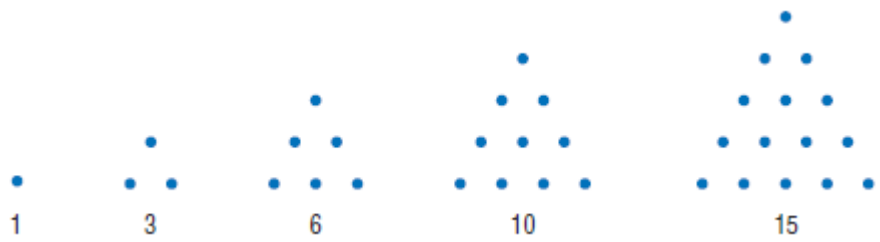
- **Which statement applies to inductive reasoning?** Circle one:

  using many examples to draw a general conclusion

  beginning with a general conclusion and making specific statements using it

Ex #1: Eric was driving his friends to school when his car suddenly stopped two blocks away from school. Make a list of conjectures that Eric can make as to why his car stopped.

Ex #2: The numbers represented below are called *triangular numbers*. Make a conjecture about the next triangular number.



Ex #3: Make a conjecture about the next item in the sequence.

a) 20, 16, 11, 5, -2, -10

b) 2, 4, 12, 48, 240, 1440

Ex #4: Given that points *P*, *Q*, *R* are collinear. Joel made a conjecture that *Q* is between *P* and *R*. Determine if the conjecture is true or false. If false, please explain why in simple terms.

Counterexample

In the previous example, you may have used a counterexample to make your case. What is a counterexample?

_____

_____

How many counterexamples do I need to establish, in order to prove a conjecture FALSE? ___

Ex #5: Determine whether each conjecture is true or false. Give a counterexample for any false conjecture.

a) Given: $\angle 1$ and $\angle 2$ are supplementary angles.
Conjecture: $\angle 1$ and $\angle 2$ are both right angles.

b) Given: Points *A*, *B*, and *C* are collinear.
Conjecture: *B* is between *A* and *C*.

c) Given: *n* is negative number
Conjecture: n^2 is a nonnegative number

Now let's review the concept of creating "if-then" statements. The fancy term for an "if-then" statement is called a *conditional statement*.

Conditional statement: any statement that can be written ___-_____ form.

Example: "Buying this car gets you $1500 cash back!"

Example: ***If*** you buy this car, ***then*** you get $1500 cash back.

Symbols: $p \rightarrow q$

Read: If *p*, then *q*. OR *p* implies *q*.

What does "*p*" stand for here? What does "*q*" stand for here?

Statement	If-Then Form
The sum of two odd numbers is even.	
Two angles that have the same measure are congruent.	
I carry an umbrella on rainy days.	

If-Then Statements are called *conditional statements* or *"conditionals."*

- **Hypothesis** – the portion of the statement following the word: _____
- **Conclusion** – the portion of the statement following the word: _____

Ex #6: Identify the hypothesis and conclusion of each statement.

a) If points *A*, *B*, and *C* lie on line *m*, then they are collinear.

Hypothesis: _____

Conclusion: _____

b) The Tigers will play in the tournament if they win their next game.

Hypothesis: _____

Conclusion: _____

c) If $x - 3 = 7$, then $x = 10$.

Hypothesis: _____

Conclusion: _____

Ex #7: Write each statement in if-then form.

a) A five-sided polygon is a pentagon.

b) Math teachers love to solve problems.

Ex #8: **Take the statement: "People who live in Florida live in the U.S."**

a) Write the statement in if-then form. Identify "*p*" and "*q*" and write as a conditional statement, with the fancy → symbol.

b) What is the *inverse* of this statement, in words, and in symbols? True or False?

c) What is the *converse* of this statement, in words, and in symbols? True or False?

d) What is the *contrapositive* of this statement, in words, and in symbols? True or False?

Ex #9:

a) Come up with any statement of your choosing, that is already *true*. Feel free to be creative, personal, funny, anything!

b) Write the statement in if-then form. Identify “p” and “q” and write as a conditional statement, with the fancy → symbol.

c) What is the *inverse* of this statement, in words, and in symbols? True or False?

d) What is the *converse* of this statement, in words, and in symbols? True or False?

e) What is the *contrapositive* of this statement, in words, and in symbols? True or False?