2-1 Inductive Reasoning and Conjecture

Conjecture: an educated guess based on known information

We use things that we know to find patterns and arrive at a conjecture. This process is called **inductive reasoning**.

Inductive reasoning is reasoning that is uses a number of specific examples to arrive at a **plausible** generalization or prediction.

Everyday conjectures

Sam wakes up to see 7 inches of snow on the ground outside his house. He remembers that last month when it snowed 6 inches, school was closed, and last week, when it snowed 8 inches, school was closed. What should Sam check on before he starts to get ready for school?

Angelina remembered to study for the first test of the year. She earned an A on the test.

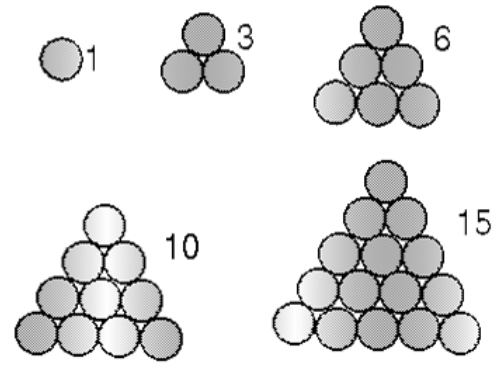
She decided not to study for the second test, because she had a party to attend the night before. Her grade was a C+.

On the third test of the year, Angelina was not allowed out, and she had to study. She scored an A-.

What do you anticipate will happen if Angelina commits to studying for the fourth test?

Extend Page

Example: there is a special pattern of numbers called "triangular numbers." The first 5 triangular numbers are shown below. Make a conjecture about the next 2 triangular numbers.



The First 5 Triangular Numbers

Try it:

Make a conjecture about the next term in the sequence

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

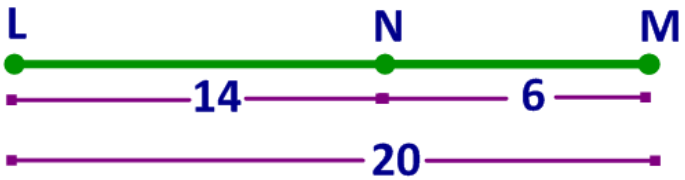
Next Step

Skills Practice Worksheet
p. 8 (Section 2-1) - - - #1-4

Conjectures about Geometry

Example: For points L, M and N, LM = 20, MN = 6, and LN = 14. Make a conjecture and draw a figure to illustrate your conjecture.

Since LM is the longest segment, and MN + LN = LM, I try to draw a segment so that L, M and N are collinear.



It works, visually, so I know I can make the conjecture: L, M and N are collinear.

Practicing Together:

Worksheet 2-1 (p. 8) # 5- 8

5) Points *A*, *B* and *C* are collinear, and *D* is between *B* and *C*.

6) Point *P* is the midpoint of $\overline{NQ}$.

7) $\angle 1$, $\angle 2$, $\angle 3$, and $\angle 4$ form four linear pairs.

8) $\angle 3 \cong \angle 4$

Essential Concept: a conjecture is true ONLY if it is true in ALL cases!!!!

If I can find ONE example that is NOT TRUE, I have found a COUNTEREXAMPLE, which shows that the conjecture is not true.

It only takes one counterexample to disprove a conjecture.

Counterexample: a false example; it disproves a conjecture

Try it:

(be very specific in your counterexample)

1) Disprove my conjecture: Sophomore boys are taller than sophomore girls.

2) Disprove my conjecture: If there is snow on the ground, we will not have to come to school.

3) Disprove my conjecture: If two angles are supplementary, they have to be drawn as a linear pair.

Extend Page

Determining the truth of a conjecture and finding counterexamples for conjectures in Geometry

Determine whether each conjecture is true or false. Give a counterexample for any false conjecture.

1) *Given*: ∠ABC and ∠DBE are vertical angles.

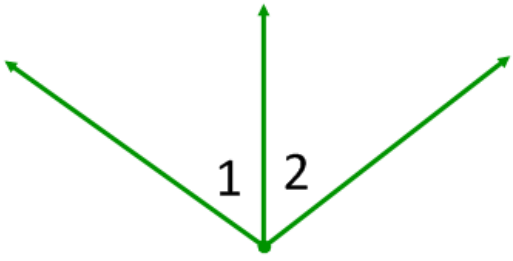
Conjecture: ∠ABC and ∠DBE are congruent.

Answer: I know that ALL vertical angles are congruent, so I know that if "∠ABC and ∠DBE are vertical angles" then ∠ABC and ∠DBE MUST be congruent. **The conjecture is true.**

2) *Given*: ∠1 and ∠2 are adjacent angles.

Conjecture: ∠1 and ∠2 form a linear pair.

Answer: I can draw a figure that shows ∠1 and ∠2 that are adjacent, but not a linear pair. So, **the conjecture is false** and my counterexample is the picture, with an explanation of: "∠1 and ∠2 that are adjacent, but their sum could be 85°, for example."



Try it:

Determine whether each conjecture is true or false.

Give a counterexample for any false conjecture.

(Draw a picture, too!)

1) *Given*: ∠ABC is a right angle.

Conjecture: m∠ABC is 90.

2) *Given*: Point L is between points Q and R on segment QR.

Conjecture: *QL = LR.*