Math 2201 **Date:_____**

1.1 Making Conjectures

Inductive reasoning is a form of reasoning in which a conclusion is reached based on a pattern present in numerous observations. The premises makes the conclusion likely, but does not guarantee it to be true.

Deductive reasoning is the process of coming up with a conclusion based on facts that have already been shown to be true. The facts that can be used to prove your conclusion deductively may come from accepted definitions, properties, laws or rules. The truth of the premises guarantees the truth of the conclusion.

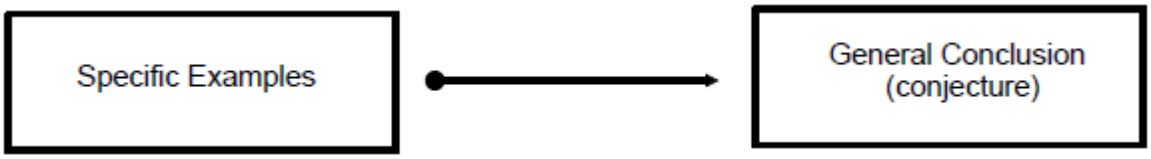
In this unit, we will examine situations, information and problems to develop your reasoning skills. You will form conjectures through the use of inductive reasoning and prove their conjectures through the use of deductive reasoning.

A conjecture is a testable expression that is based on available evidence but is not yet proven. Given the visual below, analyze the picture and develop an explanation for the possible events that have occurred. As students explore this example, you might realize you already have had some experience making conjectures. People often draw conclusions by observing patterns and identifying properties in specific examples.

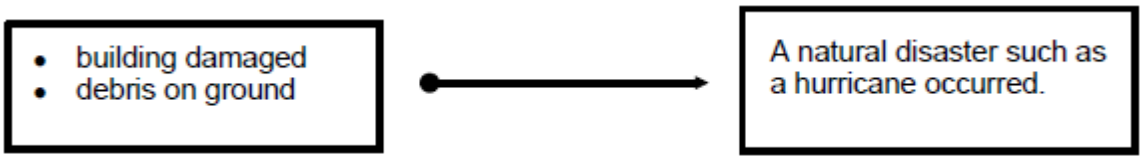
Example 1:
What has happened in the following situation? What evidence supports your conjecture?

Conjecture: Natural disaster: hurricane or tornado or earthquake or flood

Evidence: debris
destroyed building
no leaves on trees

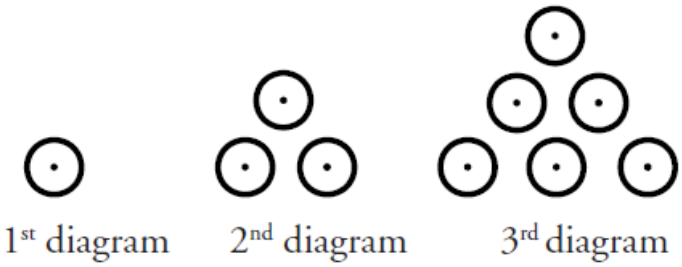


Applying this to the picture in Example 1:

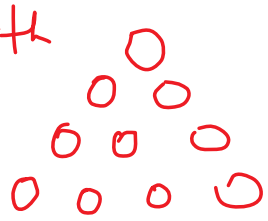


Extending Patterns Using Inductive Reasoning
We can examine several elements or examples in a set, look for a pattern, and come up with missing elements in the set.

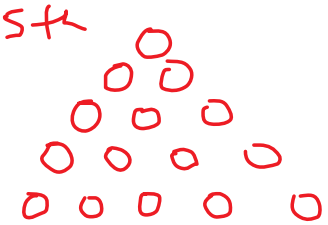
Example 2:
What would be the 6th diagram in the following sequence of diagrams?



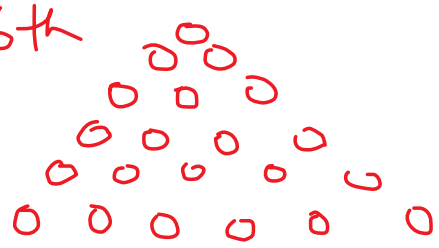
4th



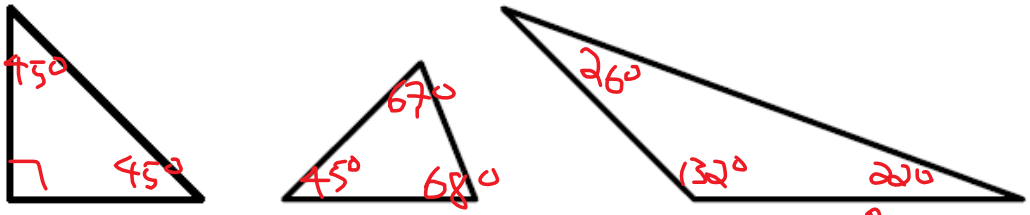
5th



6th



Example 3:
Make a conjecture about the sum of the angles in a triangle.



$45° + 90° + 45° = 180°$

$45° + 67° + 68° = 180°$

$26° + 132° + 22° = 180°$

Conjecture: the sum of the angles of any triangle are 180°.

Example 3:
Make a conjecture about the product of two consecutive integers.
(one after the other)

$2 \times 3 = 6$
$4 \times 5 = 20$
$10 \times 11 = 110$
$1 \times 2 = 2$
$3 \times 4 = 12$

Conjecture: the product of two consecutive numbers is always even.

Example 4:
Using the data shown below, decide on the best time to go mussel picking on Saturday.

La Scie (Station #1105)
7 days Tidal Prediction
Reference : Chart Datum

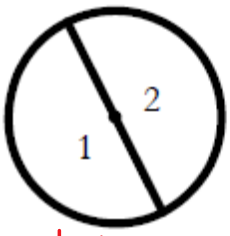
Times and Heights for High and Low Tides

(Wednesday)			(Thursday)			(Friday)		
Time	Height		Time	Height		Time	Height	
NDT	(m)	(ft)	NDT	(m)	(ft)	NDT	(m)	(ft)
00:59	**0.1**	0.3	01:36	**0.0**	0.0	02:16	**0.0**	0.0
07:24	**1.3**	4.3	08:05	**1.4**	4.6	08:47	**1.4**	4.6
13:39	**0.0**	0.0	14:21	**-0.0**	0.0	15:02	**0.0**	0.0
19:47	**1.2**	3.9	20:32	**1.2**	3.9	21:21	**1.1**	3.6

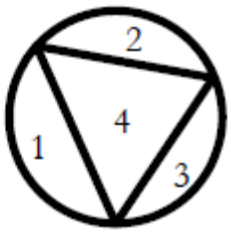
Conjecture: low tide moves ahead around 40 minutes every day.

Begin mussel picking around 3:40 on Saturday.

Example 5:
Points are placed on the circumference of a circle and joined. Make a prediction about the number of regions formed when 6 points are used.

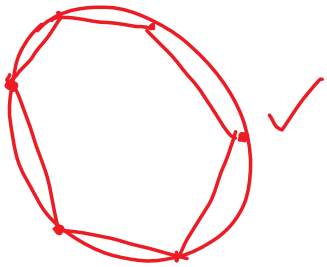


1 line
= 2 regions



3 lines
= 4 regions

Conjecture: 6 lines = 7 regions



Example 6:
Complete the conjecture started below that holds for all the equations.

3 + 7 = 10
11 + 5 = 14
9 + 13 = 22
7 + 11 = 18

Conjecture: The sum of two odd numbers is always an... even number

Textbook Questions: page 12 - 14 #1, 2, 3, 5, 8a, 9, 12, 16