Reasoning and Proof – Inductive Reasoning

Notes Section 2.1 Name________________

Inductive Reasoning: looking at several specific situations to arrive at a conjecture.

Conjecture: an educated guess.

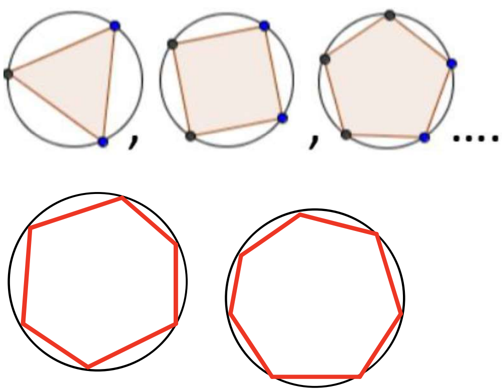
Counterexample: a false example; an example that proves a conjecture false.

Use inductive reasoning to conjecture about the next 2 numbers in the pattern.

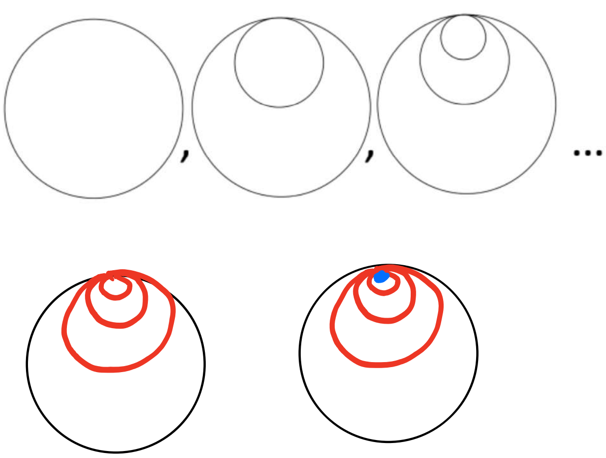
1. 1, 4, 16, 64 … 256, 1024

·4 ·4 ·4

2.



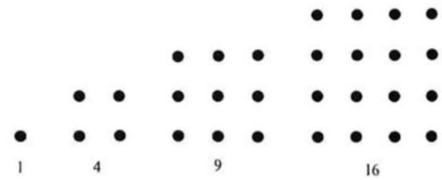
3.



4. 16, 8, 4, 2, 1 … $\frac{1}{2}$, $\frac{1}{4}$

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

5. How many dots in the 20[th] figure.



1^2 2^2 3^2 4^2 5^2 6^2

6.

Try and figure out the 43[rd] term of the following sequence:

R1 R2 R3 R4 R0

A, E, I, O, U, A, E, …

8 R3
5)43
40
3

5)1 0 R1   5)2 0 R2   5)3 0 R3   5)4 0 R4   5)5 1 R0

I

Give a counterexample for each of the false conjectures given.

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

False   True

Counterexample: January

2. Multiplying a number by -2 makes the product negative.

True   False

Counterexample: $-2(-5)=10$

3. If you teach Geometry, you are bald.

True   False

Counterexample: Mrs. Allensworth

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Notes Section 2.1

Name________________

p → q

Conditional Statement = A statement that can be written in "if-then" form.

1. Write a conditional statements.

   If you are in this class, (p)
   then you are in Geometry. (q)

Hypothesis = the portion of a if-then statement that immediately follows "if."

2. Identify the hypothesis from 1.

   you are in this class,

Conclusion = the portion of a if-then statement that immediately follows "then."

3. Identify the conclusion from 1.

   you are in Geometry.

Write the following conditionals in "if-then" form.

4. "Adjacent angles have a common vertex."

   If two angles are adjacent, (hypothesis)
   then they have a common vertex. (conclusion)

5. "Vertical angles are congruent."

   If two angles are vertical, (hypothesis)
   then they are congruent (conclusion)

Converse = a statement made by interchanging the hypothesis and conclusion.

q → p

6. Write the converse of the conditionals you made from 5.

   If two angles are congruent,
   then they are vertical

Inverse = a statement made by negating both the hypothesis and conclusion of the conditional.

~p → ~q

7. Write the inverse of the conditionals you made from 5.

   If two angles are Not vertical,
   then they are Not congruent

Contrapositive = a statement made by negating both the hypothesis and conclusion of the converse statement

~q → ~p

8. Write the contrapositive of the conditionals you made from 5.

   If two angles are Not congruent,
   then they are Not vertical

The contrapositive will **ALWAYS have the same truth-value** as the original conditional! The converse and inverse MIGHT have the same truth-value, but it also MIGHT NOT have the same truth-value.

Summary of Related Conditional Statements		
Conditional Statement	p → q	If p, then q.
Converse	q → p	If q, then p.
Inverse	~p → ~q	If not p, then not q.
Contrapositive*	~q → ~p	If not q, then not p.

* Same truth value as the conditional

If you notice, the inverse is the contrapositive of the converse. Therefore, the inverse and the converse will always have the same truth-value.