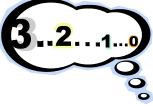**Key**

USING INDUCTING REASONING TO MAKE CONJECTURES

2.1.a: Identify patterns and make conjectures (inductive reasoning)

2.1.b: Use a counterexample to show a conjecture is false

3..2…1…0

INDUCTIVE REASONING: 2.1.a

Inductive reasoning is the process of looking for __patterns__ and making __conjectures__

Find the next 2 #'s in each sequence

Ex: $0, 1, 1, 2, 3, 5, \ldots$

8 and 13

Fibonacci's Sequence!

Ex. $2, -3, 3, -4, 4, \ldots$

$-5 \quad +6 \quad -7 \quad +8 \quad -9 \quad +10$

−5 and 5

CONJECTURES: 2.1.a

A conjecture is an unproven statement that is based on __Observations__

Ex: The sun is going to come up tomorrow morning.

Ex. The sum of two negative #'s is __negative__

Think and Discuss: What are some other conjectures you make?

THREE STAGES OF INDUCTIVE REASONING: 2.1.a

1st Look for a pattern

2nd Make a conjecture

3rd Prove TRUE or find a counter-example

PROVING A CONJECTURE IS TRUE OR FALSE: 2.1.b

To prove a conjecture is true... you must prove it true for all cases

To prove a conjecture is false... you only need to find one example that shows it is false

Ex: The diff of 2 pos. #'s is pos.

$5 - 7 = -2$

False

Ex: Goldbach's Conjecture: Every even number greater than 2 can be written as the sum of 2 prime #'s.
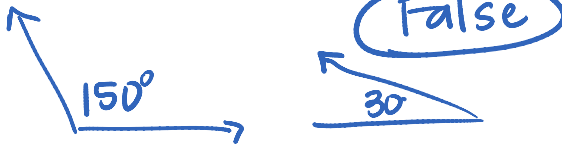
$4 = 2 + 2, \ 6 = 3 + 3, \ 8 = 3 + 5$

Have we proven this true?

With a Partner

Think and Discuss: Do you think it is easier to prove a conjecture is true or false?

FIND A COUNTEREXAMPLE: 2.1.b. Write or draw a counterexample to show each statement is false.

1. Supplementary angles are adjacent. *False*

$150°$ 30

2. Each pair of supplementary angles includes one obtuse angle. *False*

$90°$ $90°$

3. For all positive numbers n, $\frac{1}{n} \le n$.

$n = \frac{1}{2}$ $\frac{1}{\frac{1}{2}} \le \frac{1}{2}$ *False*
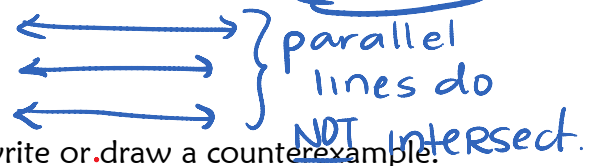
$2 \le \frac{1}{2}$

4. If $1 - y > 0$, then $0 < y < 1$. *False*

$y = -1$ $1 + (+1) > 0$

$2 > 0$ ✓
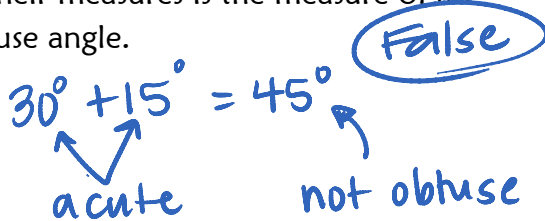
but $y = -1$ is not btwn 0 and 1

5. For any integer n, $n^3 > 0$.

$n = -2$ $(-2) > 0$ *False*

$-8 \not> 0$

6. If three lines lie in the same plane, then they interest in at least one point. *False*

parallel lines do NOT intersect.

TRUE OR FALSE?? 2.1.a and 2.1.b. If true, write true. If false, write or draw a counterexample.

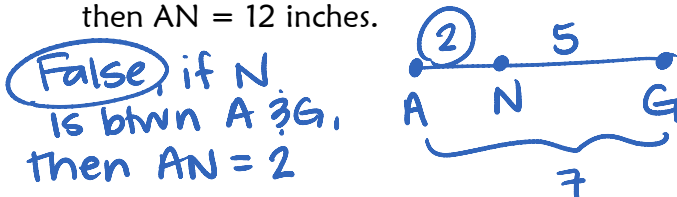1. If two angles are acute, then the sum of their measures is the measure of an obtuse angle. *False*

$30° + 15° = 45°$

acute   not obtuse

2. The square of any negative number is positive.

$(-2)^2 = 4$

$(-3)^2 = 9$ *TRUE*

$(-\frac{1}{2})^2 = \frac{1}{4}$

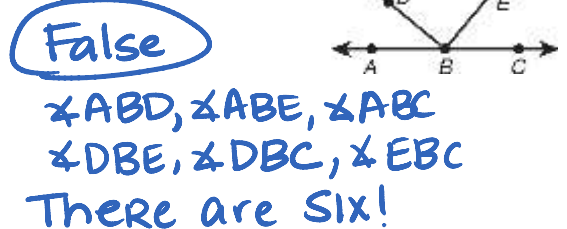3. Points A, G, and N are collinear. If AG = 7 inches and GN = 5 inches, then AN = 12 inches.

False, if N is btwn A & G, then AN = 2

2 5

A N G

7

4. The total number of angles in the figure is 3. *False*

∢ABD, ∢ABE, ∢ABC
∢DBE, ∢DBC, ∢EBC
There are SIX!

5. If J is between H and K, then HJ = KJ.

2 5 *False*

H J K

6. The product of an even number and an odd number is even.

$4(3) = 12$ *TRUE*

$6(5) = 30$

$8(11) = 88$

CHALLENGE: Please create your own false conjecture about numbers. Then provide the counterexample to prove it false.