Geometry 2.2

and $\wedge$ or $\vee$

Determine truth values of conjunctions, disjunctions, negations

T ∧ T T ∨ T F ∨ T T ∨ F

Represent conjunctions, disjunctions, negations using Venn diagrams

Determine counterexamples

statement
truth value
compound statement
conjunction
disjunction
truth table
Venn diagram
intersection

P: A triangle has 5 sides.

$\sim p$

Q: Tomorrow will be Friday.

$\sim q$

ConceptSummary Negation, Conjunction, Disconjunction

Statement	Words	Symbols
negation	a statement that has the opposite meaning and truth value of an original statement	$\sim p$, read not p
conjunction	a compound statement formed by joining two or more statements using the word *and*	$p \wedge q$, read p and q
disconjunction	a compound statement formed by joining two or more statements using the word *or*	$p \vee q$, read p or q

GuidedPractice

3. Construct a truth table for $\sim p \wedge \sim q$.

p	q	$\sim p$	$\sim q$	$\sim p \wedge \sim q$
T	T	F	F	F
T	F	F	T	F
F	T	T	F	F
F	F	T	T	T

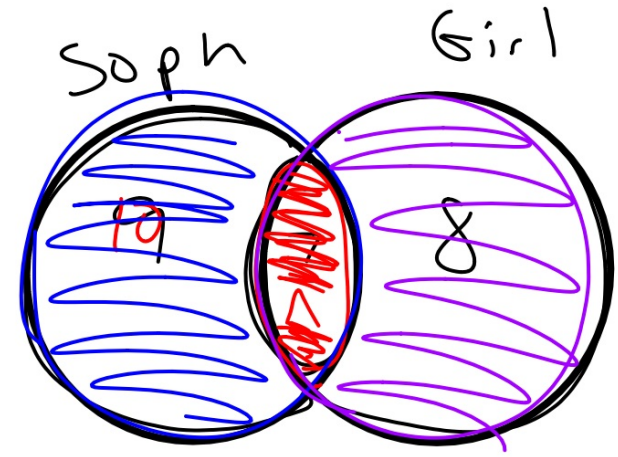
Construct a truth table for:

$-p \wedge (p \vee -q)$

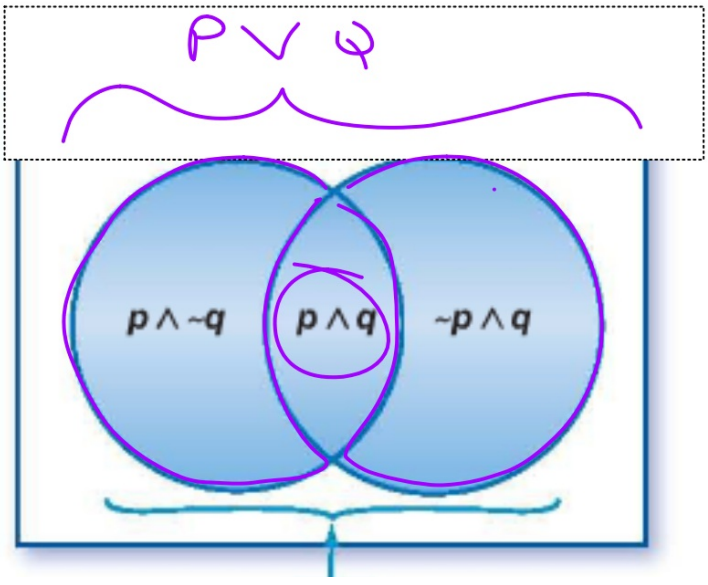
p	q	~p	~q	(p ∨ ~q)		~p ∧ ( )	
T	T	F	F	T ∨ F	T	F ∧ T	F
T	F	F	T	T ∨ T	T	F ∧ T	F
F	T	T	F	F ∨ F	F	T ∧ F	F
F	F	T	T	F ∨ T	T	T ∧ T	T

$(p \vee q) \wedge \sim r$

P	Q	r	~r	(P ∨ Q)		( ) ∧ ~r	
T	T	T	F	T ∨ T	T	T ∧ F	F
T	T	F	T	T ∨ T	T	T ∧ T	T
T	F	T	F	T ∨ F	T	T ∧ F	F
T	F	F	T	T ∨ F	T	T ∧ T	T
F	T	T	F	F ∨ T	T	T ∧ F	F
F	T	F	T	F ∨ T	T	T ∧ T	T
F	F	T	F	F ∨ F	F	F ∧ F	F
F	F	F	T	F ∨ F	F	F ∧ T	F



Sophomore ...Girl



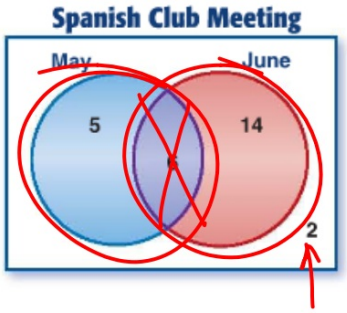
Real-World Example 4 Use Venn Diagrams

SCHEDULING The Venn diagram shows the number of people who can or cannot attend the May or the June Spanish Club meetings.

a. How many people can attend the May or the June meeting? $5+6+14=25$

b. How many people can attend both the May and the June meetings?

6



c. Describe the meetings that the 14 people located in the nonintersecting portion of the June region can attend.

Both 123

Students = 270

GuidedPractice

4. **PROM** The Venn diagram shows the number of graduates last year who did or did not attend their junior or senior prom.

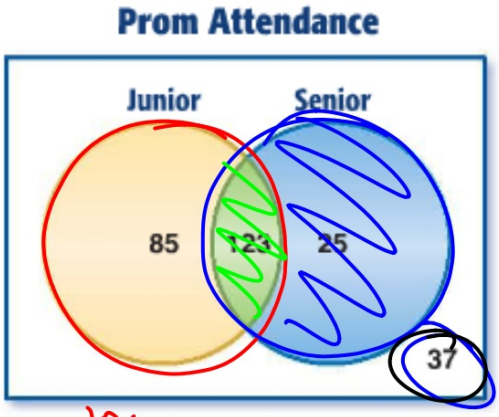
   A. How many graduates attended their senior but not their junior prom? 25

   B. How many graduates attended their junior and senior proms? 123

   C. How many graduates did not attend either of their proms? 37

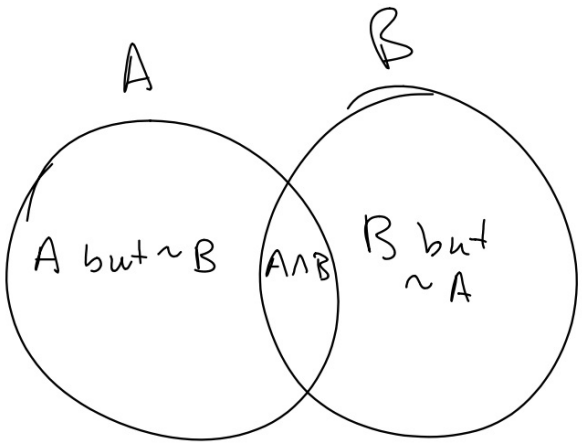
   D. How many students graduated last year? Explain your reasoning.

270



Jr: 208

Sr. 148



not A
not B

WB 2.2
prac.