Types of Proofs
Logical order
Formal Two Column
Paragraph
Informal Flow

Coordinate Proof
formal

Indirect Proof
(Not direct)

If P then Q

Law of detachment
If P then Q is true
and P is true
then Q is true

A triangle has at most
1 obtuse angle

what we know
$\angle A + \angle B + \angle C = 180 \rightarrow \angle A + \angle B = 180 - \angle C$

Make an assumption that is the
opposite of the conclusion

$\angle A > 90^\circ \quad \angle B > 90^\circ$

$\angle A + \angle B > 90 + 90$

$\angle A + \angle B > 180^\circ$

$180 - \angle C > 180$
$-180 \qquad -180$

$-\angle C > 0$

$\underline{\angle C < 0}$

$\angle C < 0$ is a contradiction
If our opposite statement
gets us an answer that is
known to be false
then the original is true

1. Use Hypothesis as
given and assume it is true
2. make assumption that is
opposite of the conclusion
3. Carry out steps in logical order
until you reach a contradiction
4. The contradiction proves your assumption
is false, thereby showing original
statement is true

If $A+B > 100$ then $A > 50$ or $B > 50$

1) Both > 50
Not helpful

$a > 50 \quad b > 50$

$a + b > 50 + 50$

$a + b > 100$

2) Both < 50

$A + B > 100$

$A < 50, \; B < 50$

$A + B < 50 + 50$

$A + B < 100$
contradiction

So Either $A > 50$ or $B > 50$

If $a+b$ is odd then a or b is odd

1) both odd 2) both even

k	0	1	2	3	4	5	6	7	....
$2k$	0	2	4	6	8	10	12	14	....
→ $2k+1$	1	3	5	7	9	11	13	15	...

$(2k+1)+(2m+1)$

$2k+2m+2$

$2(k+m+1)$

even

$2k+2m$

$2(k+m)$

even

Therefore a is odd or b is odd

If n^2 is divisible by 3 then n is divisible by 3

What we knew

3 is a factor of n^2

Assumption 3 is not a factor of n

$3\left(\frac{n^2}{3} = k\right)$

$n^2 = 3k$

$n^2 \to 3,\ k$

$n \cdot n = 3k$

$n = \frac{3k}{n}$

$n = 3\left(\frac{k}{n}\right)$

contradiction

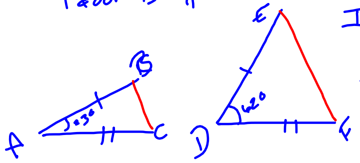
therefore n is divisible by 3

Hinge Theorem

2 32in doors

1 door is open at a 23° angle

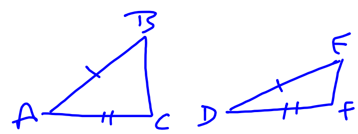
1 door is open at a 62° angle



If $\overline{AB} \cong \overline{DE}$, $\overline{AC} \cong \overline{DF}$

$\angle D > \angle A$

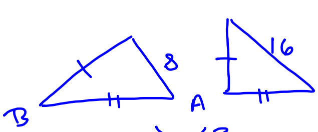
$\overline{EF} > \overline{BC}$



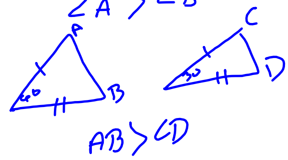
If $\overline{AB} \cong \overline{DE}$, $\overline{AC} \cong \overline{DF}$

and $BC > EF$

Then $\angle A > \angle D$



$\angle A > \angle B$



$AB > CD$

P 305 – 307

2 – 28 even

26 is an indirect proof