What is the relationship between lines a and c?

$a \perp b$ $b \parallel c$ $a \perp c$

What is the relationship between lines a and e?

$a \perp b$ $b \perp c$ $c \parallel d$ $d \perp e$

$a \perp e$

What is the relationship between lines a and h?

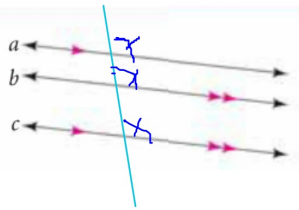
$a \parallel b,\ b \parallel c,\ c \perp d,\ d \perp e,\ e \parallel f,\ f \perp g,\ g \parallel h$

$a \perp h$

Theorem 3-9

If two lines are parallel to the same line, then they are parallel to each other.

$a \parallel b$



a || c and b || c

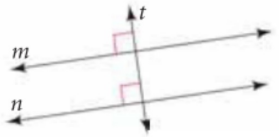
$\therefore a \parallel b$

Because all correponding angles will be equal, so the lines are parallel.

Theorem 3-10

In a plane, if two lines are perpendicular to the same line, then they are parallel to each other.

$m \parallel n$

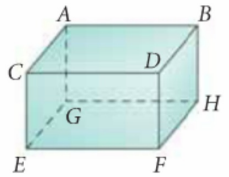


m ⊥ t and n ⊥ t

$\therefore m \parallel n$

Because corresponding angles are congruent.

Writing Theorem 3-10: In a plane, two lines perpendicular to the same line are parallel. Use the rectangular solid at the right to explain why the words *in a plane* are needed.

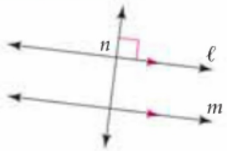


GH is perpendicular to AG at the same time EG is perpendicular to AG but GH and EG aren't parallel to each other.

Theorem 3-11

In a plane, if a line is perpendicular to one of two parallel lines, then it is also perpendicular to the other.

$n \perp m$



$n \perp \ell$ and $\ell \parallel m$

$\therefore n \perp m$

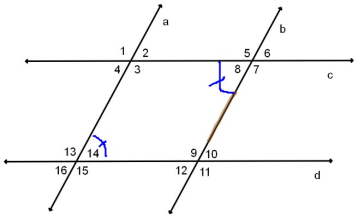
Example

Write a proof.

Given: c || d & $\angle 8 \cong \angle 14$

Prove: a || b

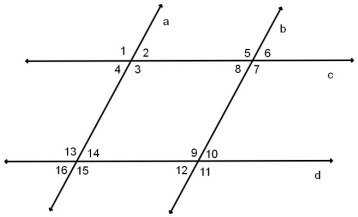
Start by planning it out.



Statement	Reason
1. c || d & $\angle 8 \cong \angle 14$	1. Given
2. $\angle 2 \cong \angle 14$	2. Corr $\angle$s $\cong$
3. $\angle 2 \cong \angle 8$	3. Transitive
4. a || b	4. b/c alt int $\angle$s $\cong$

1. Given: a || b and c || d

Prove: $\angle 7$ & $\angle 16$ are supplementary



Start by planning it out

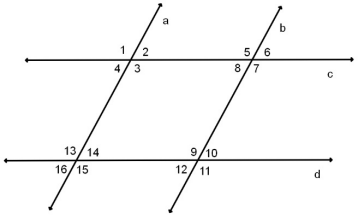
Statement	Reason
1. a || b and c || d	1. Given

2. Write a proof.

Given: c || d & $\angle 7 \cong \angle 13$

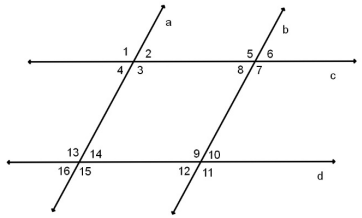
Prove: a || b

Start by planning it out.



Statement	Reason
1. c || d & $\angle 7 \cong \angle 13$	1. Given

3. Write a proof.



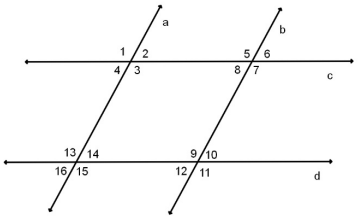
Given: a || b and c || d

Prove: ∠4 ≅ ∠10

Start by planning it out.

Statement	Reason
1. a || b and c || d	1. Given

4. Write a proof.



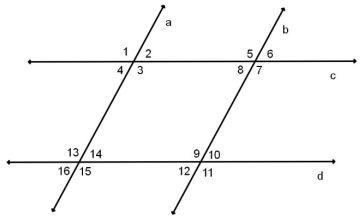
Given: a || b and c || d

Prove: ∠3 ≅ ∠9

Start by planning it out.

Statement	Reason
1. a || b and c || d	1. Given

5. Write a proof.



Given: a || b and ∠2 ≅ ∠12

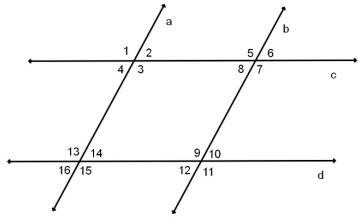
Prove: c || d

Start by planning it out.

Statement	Reason
1. a || b and ∠2 ≅ ∠12	1. Given

6. Given: a || b and c || d

Prove: ∠8 & ∠15 are supplementary



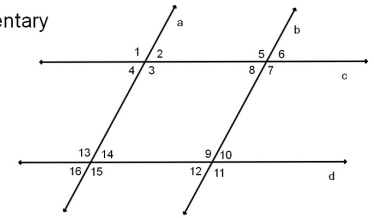
Start by planning it out

1. Statement	Reason
1. a || b and c || d	1. Given

7. Given: c || d and ∠1 & ∠12 are supplementary

Prove: a || b

Start by planning it out



Statement	Reason
1. c || d and ∠1 & ∠12 are suppl	1. Given