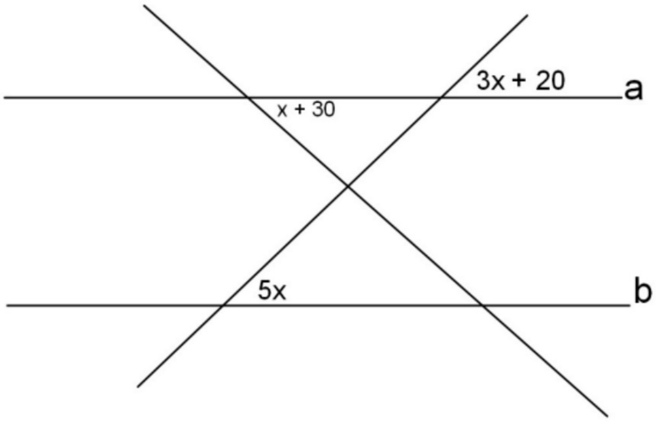
1. Find the value for x that makes a || b



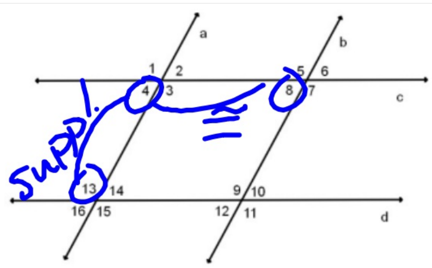
$3x + 20 = 5x$

$20 = 2x$

$x = 10$

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

Prove: ∠13 & ∠8 are supplementary



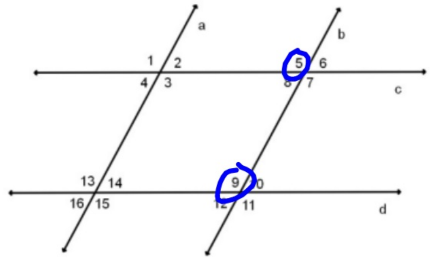
Start by planning it out

Statement	Reason
1. a || b and c || d	1. Given
2. ∠13 & ∠4 are suppl.	2. SS I <'s
3. ∠4 ≅ ∠8	3. Corresp <'s
4. ∠13 & ∠8 are suppl.	4. Subst.

3. Write a proof.

Given: $c \parallel d$ & $\angle 1 \cong \angle 9$

Prove: $a \parallel b$



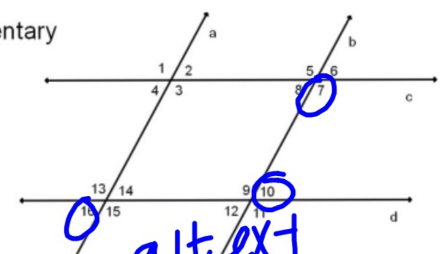
Start by planning it out.

Statement	Reason
1. $c \parallel d$ & $\angle 1 \cong \angle 9$	1. Given
2. $\angle 9$ & $\angle 5$ are cong.	2. Corresp
3. $\angle 1 \cong \angle 5$	3. Subst.
4. $a \parallel b$	4. Conv. Corresp. postulate

4. Given: $a \parallel b$ and $\angle 7$ & $\angle 16$ are supplementary

Prove: $c \parallel d$

Start by planning it out



alt. ext. ≅

Statement	Reason
1. $a \parallel b$ and $\angle 7$ & $\angle 16$ are supplementary	1. Given
2. $\angle 16 \cong \angle 10$	2. Alt ext.
3. $\angle 7$ & $\angle 10$ suppl	3. Subst.
4. $c \parallel d$	4. conv. SSI ∠'s thm.

Hwk #16 Answers –

1. a. $\angle 1 \cong \angle 2 \cong \angle 3$; Corresponding Angles Post. b. Yes, Slat D is perpendicular to slat A. Slats A, B, and C are parallel, so by Theorem 3-11, slat D is also perpendicular to B and C.

3.

$l \parallel k$ and $m \parallel k$	Given
$\angle 2 \simeq \angle 1$	Corresponding Angles Postualate
$\angle 1 \simeq \angle 3$	Corresponding Angles Postulate
$\angle 2 \simeq \angle 3$	Transitive Property of Congruence
$l \parallel m$	Converse of Corresponding Angles Theorem

6. The rungs are perpendicular to both sides. The rungs are perpendicular to one of the two parallel lines, so they are not perpendicular to both lines.

7. The rungs are parallel to each other because they are all perpendicular to one side. The sides are parallel because they are both perpendicular to one rung.

8. The sides are parallel because they are both perpendicular to one rung.

9. All of the rungs are parallel. All of the rungs are parallel to one rung, they are parallel to each other.

10. The rungs are parallel because they are perpendicular to one side.

14. First, $a \parallel c$. Conclusion, $a \parallel d$.

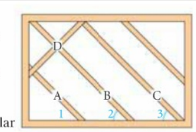
15. First, $a \parallel c$. Conclusion $a \perp d$.

16. First, $a \perp c$. Conclusion, $a \perp d$.

1. A carpenter is building a trellis for vines to grow on. The completed trellis will have two sets of overlapping diagonal slats of wood.

a. What must be true of $\angle 1$, $\angle 2$, and $\angle 3$ if slats A, B, and C must be parallel?

b. The carpenter attaches slat D so that it is perpendicular to slat *A*. Is slat D perpendicular to slats B and C? Justify your answer.



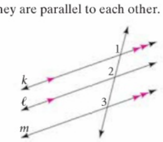
3. Developing Proof Copy and complete this paragraph proof of Theorem 3-9 for three coplanar lines.

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

Given: $\ell \parallel k$ and $m \parallel k$

Prove: $\ell \parallel m$

Proof: $\ell \parallel k$ means that $\angle 2 \cong \angle 1$ by the **a.** _?_ Postulate. $m \parallel k$ means that **b.** _?_ $\cong$ **c.** _?_ for the same reason. By the Transitive Property of Congruence, $\angle 2 \cong \angle 3$. By the **d.** _?_ Postulate, $\ell \parallel m$.



Each of the following statements describes a ladder. What can you conclude about the rungs, one side, or both sides of each ladder? Explain.

4. The rungs are each perpendicular to one side.

5. The rungs are parallel and the top rung is perpendicular to one side.

6. The sides are parallel. The rungs are perpendicular to one side.

7. The rungs are perpendicular to one side. The other side is perpendicular to the top rung.

8. Each side is perpendicular to the top rung.

9. Each rung is parallel to the top rung.

10. The rungs are perpendicular to one side. The sides are not parallel.

***a*, *b*, *c*, and *d* are distinct lines in the same plane. Exercises 14-21 show different combinations of relationships between *a* and *b*, *b* and *c*, and *c* and *d*. For each combination of the three relationships, how are *a* and *d* related?**

14. $a \parallel b, b \parallel c, c \parallel d$

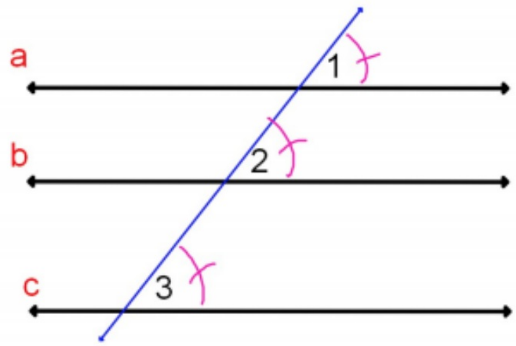
15. $a \parallel b, b \parallel c, c \perp d$

16. $a \parallel b, b \perp c, c \parallel d$

17. $a \perp b, b \parallel c, c \parallel d$

Section 3.3 Cont.

Given: a || b and a || c   What can you conclude?

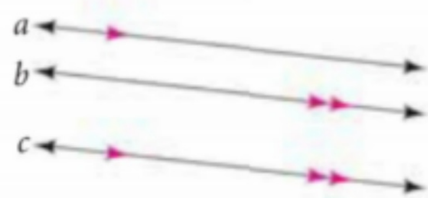


∴ b||c

Theorem 3-9

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

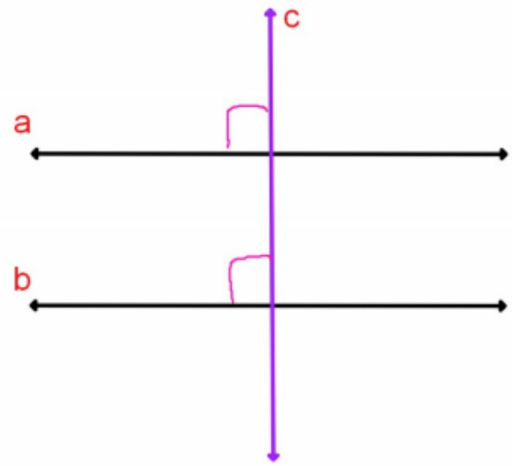
a || *b*



a || c and b || c

∴ a|| b

Given: $a \perp c$ and $b \perp c$ What can you conclude?

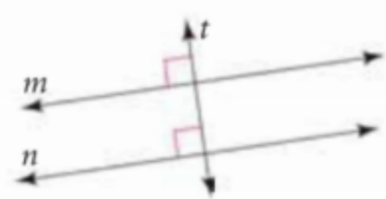


$\therefore$ $a \parallel b$

Theorem 3-10

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

$m \parallel n$

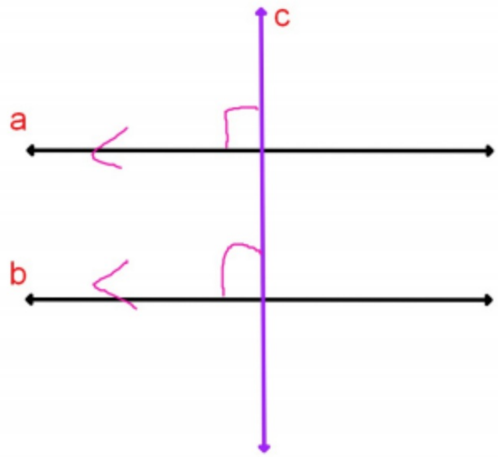


$m \perp t$ and $n \perp t$

$\therefore$ $m \parallel n$

Given: $a \parallel b$ and $c \perp a$

What can you conclude?



$\therefore b \perp c$

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.

$n \perp m$

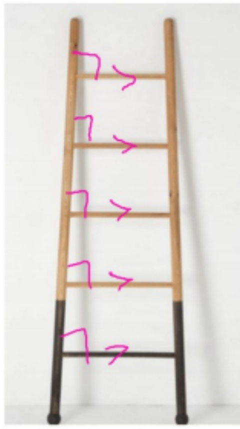
$n \perp \ell$ and $n \parallel m$

$\therefore m \perp \ell$

Each of the following statements describes a ladder. What can you conclude about the rungs, one side, or both sides of each ladder? Explain.

4. The rungs are each perpendicular to one side. Rungs are || to each other

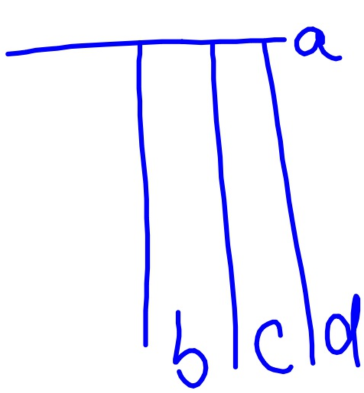
5. The rungs are parallel and the top rung is perpendicular to one side.



All the other rungs are perpendicular to that side too.

1. What is the relationship between lines a and d?

$a \perp b, \qquad b \parallel c, \qquad c \parallel d$

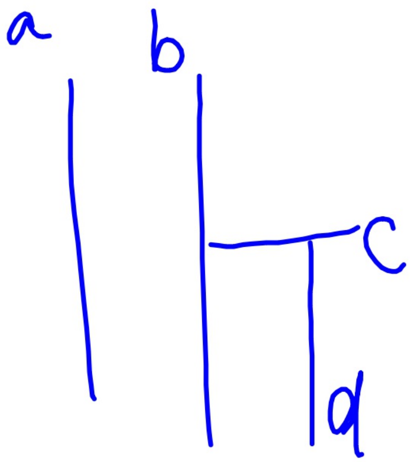


$a \perp d$

2. What is the relationship between lines a and d?

$a \parallel b, \qquad b \perp c, \qquad c \perp d$

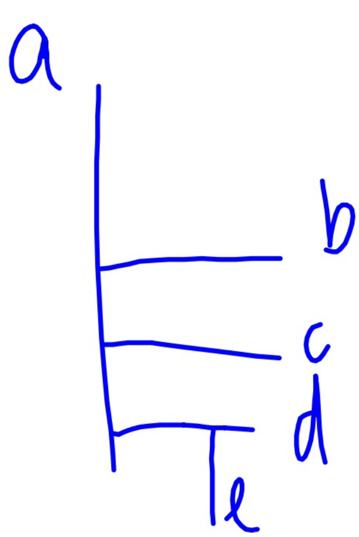
$a \parallel d$



3. What is the relationship between lines a and e?

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

$a \parallel e$



4. What is the relationship between lines a and e?

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

$a \perp e$