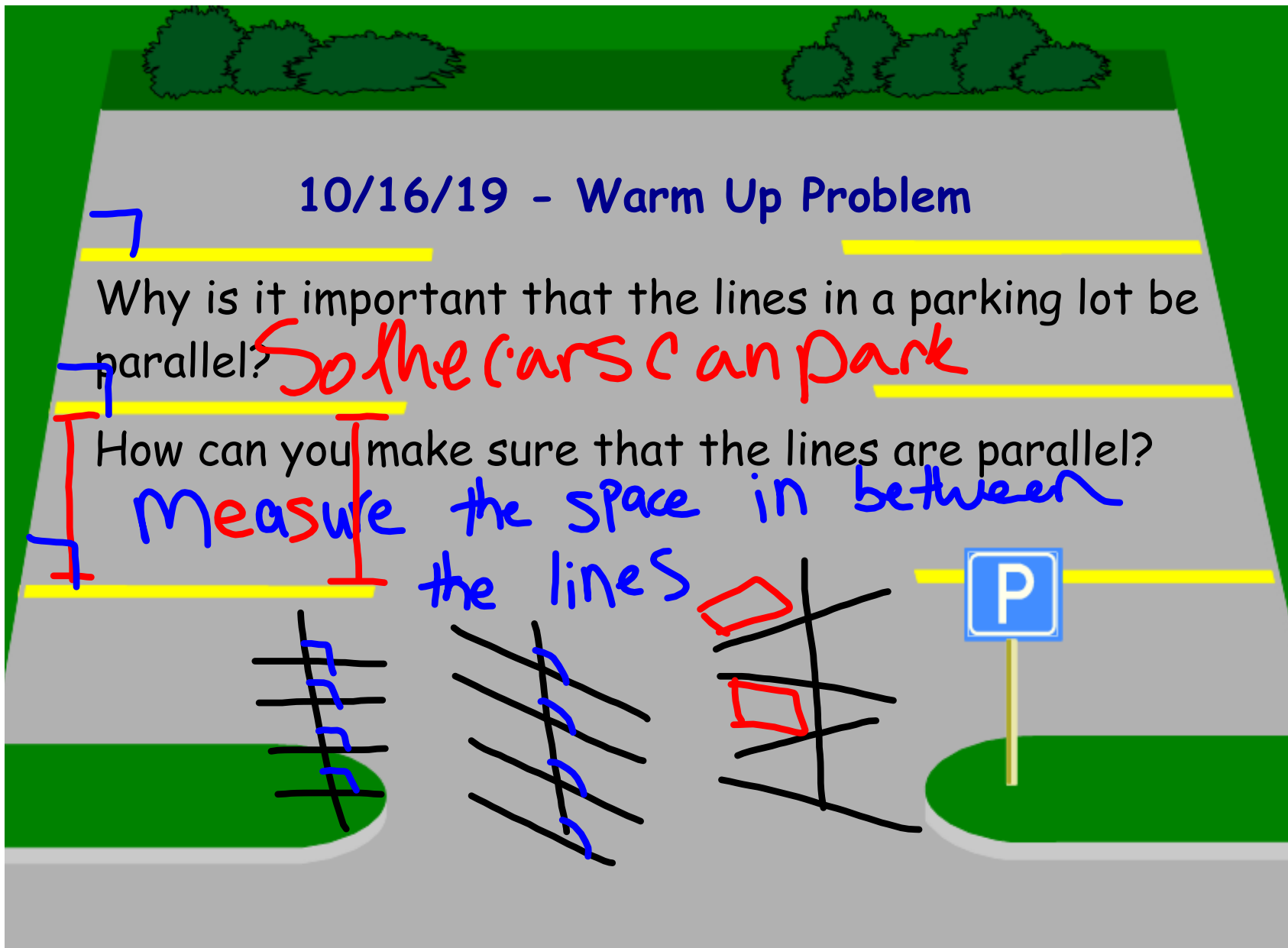


10/16/19 - Warm Up Problem

Why is it important that the lines in a parking lot be parallel? *So the cars can park*

How can you make sure that the lines are parallel? *Measure the space in between the lines*



Section 3.3 - Proving Lines are Parallel

Goal: Prove lines are parallel using converses

Parallel Lines and Angle Pairs

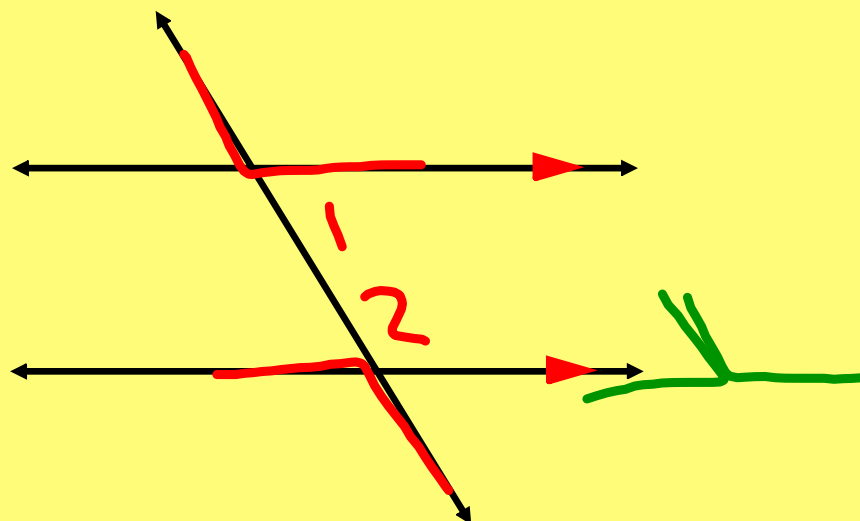
If two **parallel** lines are cut by a transversal, then

Corresponding Angles are Congruent

Alternate Interior Angles are Congruent.

Alternate Exterior Angles are Congruent.

Same-Side Interior Angles are Supplementary



Corresponding Angles Theorem

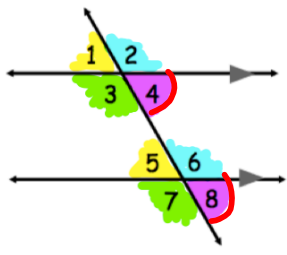
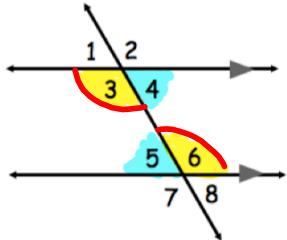
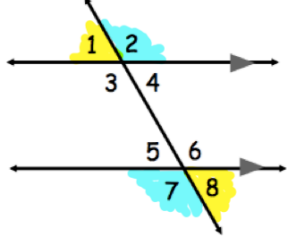
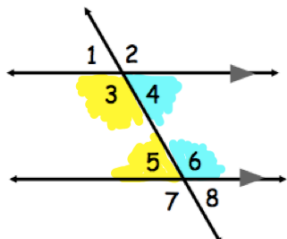
If two parallel lines are cut by a transversal, then corresponding angles are congruent

What is the converse of this theorem?

If corr. \angle s are \cong , then
2 parallel lines are cut by a
transversal.

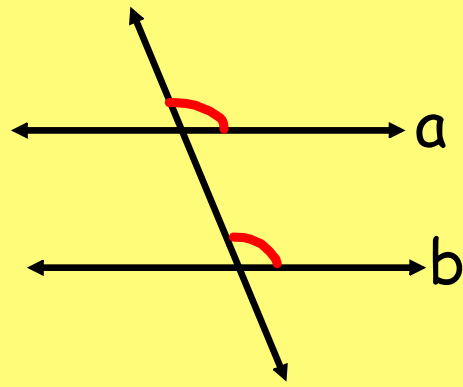
Use these to justify why two angles are congruent or supplementary.

Use these to justify why two lines are parallel.

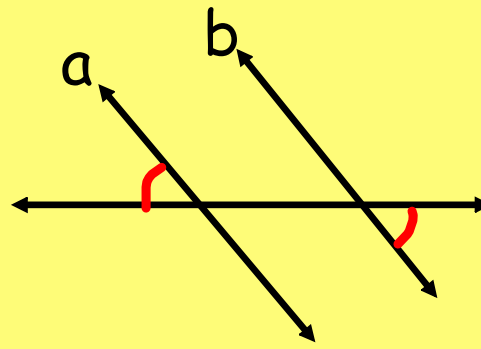
| | | |
|--|--|---|
| <p>Corresponding Angles Theorem</p> <p>If a transversal intersects two parallel lines, then corresponding angles are...</p> <p>Congruent</p> |  | <p>Corresponding Angles Converse</p> <p>If two lines and a transversal form corresponding angles that are congruent, then...</p> <p><i>the lines are parallel</i></p> |
| <p>Alternate Interior Angles Theorem</p> <p>If a transversal intersects two parallel lines, then alternate interior angles are...</p> <p>Congruent</p> |  | <p>Alternate Interior Angles Converse</p> <p>If two lines and a transversal form alternate interior angles that are congruent, then...</p> <p><i>the lines are parallel.</i></p> |
| <p>Alternate Exterior Angles Theorem</p> <p>If a transversal intersects two parallel lines, then alternate exterior angles are...</p> <p>Congruent</p> |  | <p>Alternate Exterior Angles Converse</p> <p>If two lines and a transversal form alternate exterior angles that are congruent, then...</p> <p><i>the lines are parallel.</i></p> |
| <p>Same-Side Interior Angles Postulate</p> <p>If a transversal intersects two parallel lines, then same-side interior angles are...</p> <p>Supplementary</p> |  | <p>Same-Side Interior Angles Converse</p> <p>If two lines and a transversal form same-side interior angles that are supplementary, then...</p> <p><i>the lines are parallel.</i></p> |

Using the Converses

Can you prove that lines a and b are parallel?
Explain why or why not.

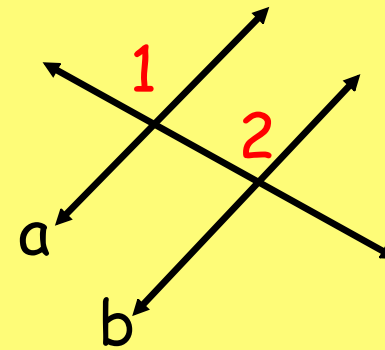


$a \parallel b$
corr. \angle s are \cong



$a \parallel b$
Alt. Ext. \angle s are \cong

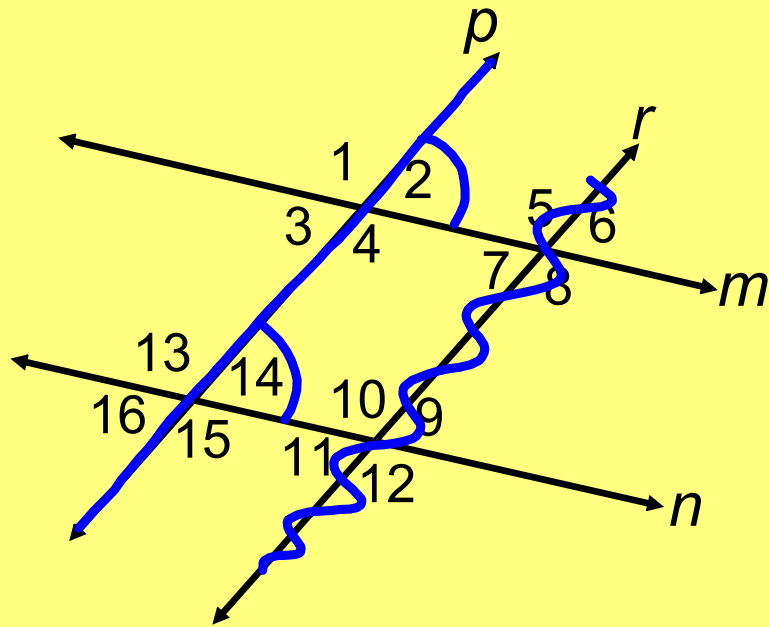
$$m\angle 1 + m\angle 2 = 180$$



not
enough
info

Proving Lines are Parallel

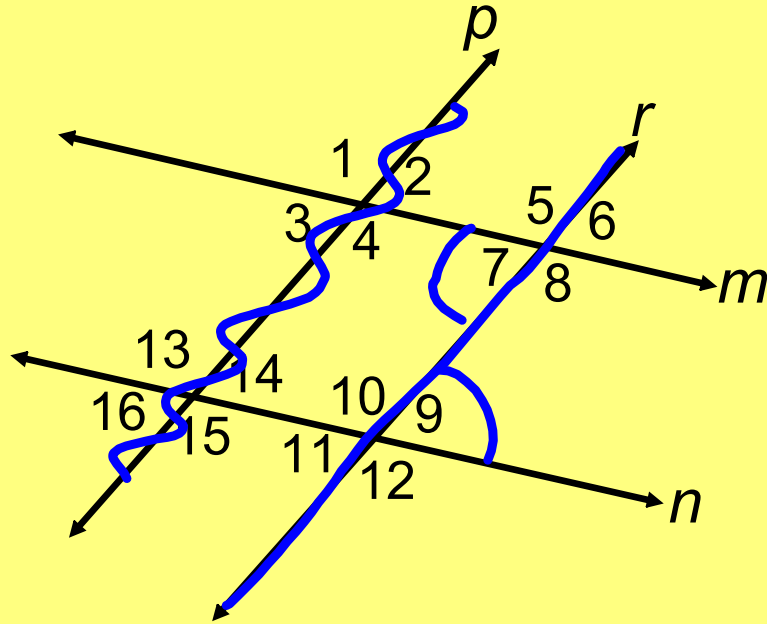
Determine which lines, if any, are parallel. State the postulate or theorem that justifies your answer.



$$\underline{\underline{\angle 2 \cong \angle 14}}$$

$m \parallel n$
 corr. \angle s
 are \cong

Determine which lines, if any, are parallel. State the postulate or theorem that justifies your answer.

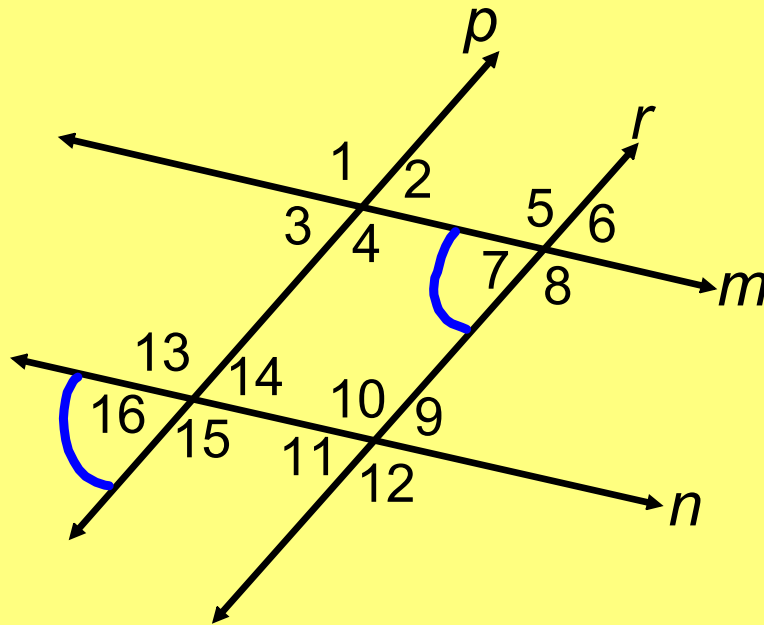


$$\angle 7 \cong \angle 9$$

$$m \parallel n$$

Alt. Int. \angle s
are \parallel

Determine which lines, if any, are parallel. State the postulate or theorem that justifies your answer.



$$\angle 7 \cong \angle 16$$

not possible

Assignment:
 Concept 7 Worksheet
 (back)

Developing Proof Use the given information to determine which lines, if any, are parallel. Use the converses from your notes to justify your answers.

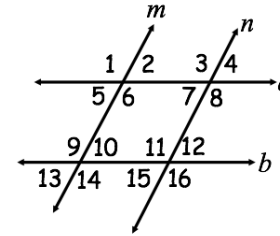
10. $\angle 11$ is supplementary to $\angle 10$. 11. $\angle 6 \cong \angle 9$

m || n
Same Side Int. Converse

12. $\angle 13$ is supplementary to $\angle 14$. 13. $\angle 13 \cong \angle 15$

not possible

14. $\angle 12$ is supplementary to $\angle 8$. 15. $\angle 2 \cong \angle 7$

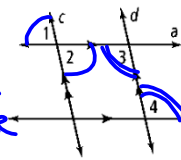


16. $\angle 1$ is supplementary to $\angle 12$ 17. $\angle 7 \cong \angle 4$

18. **Given:** $a \parallel b, c \parallel d$

Prove: $\angle 1$ and $\angle 4$ are supplementary

| Statements | Justifications |
|--|--------------------------|
| 1. $a \parallel b, c \parallel d$ | Given |
| 2. $m\angle 1 = m\angle 2$ | Vertical Angles Thm |
| 3. $m\angle 3 = m\angle 4$ | Alt. Int. Angles Thm |
| 4. $m\angle 2 + m\angle 3 = 180$ | Same Side Int. Postulate |
| 5. $m\angle 1 + m\angle 3 = 180$ | Substitution |
| 6. $m\angle 1 + m\angle 4 = 180$ | Substitution |
| 7. $\angle 1$ and $\angle 4$ are supplementary | Def of Supplementary |



19. **Given:** $g \parallel h$ and $i \parallel j$

Prove: $\angle 1 \cong \angle 15$

| Statements | Justifications |
|--|----------------|
| 1. $g \parallel h$ and $i \parallel j$ | |
| 2. $\angle 1 \cong \angle 11$ | |
| 3. $\angle 11 \cong \angle 15$ | |
| 4. $\angle 1 \cong \angle 15$ | |

