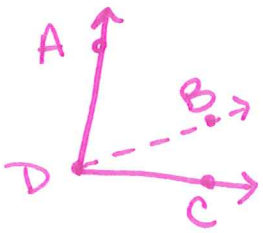
**Name:** _____ **Hour:** _____

## Proof and Logic Unit Review

*Determine whether the conjecture is* true *or* false. *Give a counterexample for any false conjecture.*

1. **Given:** Point $B$ is in the interior of $\angle ADC$.
   **Conjecture:** $\angle ADB \cong \angle BDC$




False

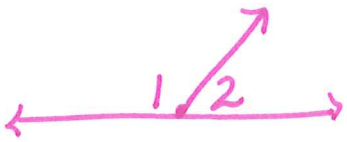
We do not know if $\overrightarrow{DB}$ is an angle bisector.

2. **Given:** $m^2 + 6 = 10$
   **Conjecture:** $m = 2$

$2^2 + 6 = 10$
$4 + 6 = 10$
$10 = 10$

True

3. **Given:** Two angles are supplementary.
   **Conjecture:** They are both acute angles.




False

one angle must be obtuse or both be 90°

4. Make a conjecture given that *P is the midpoint of AB.*

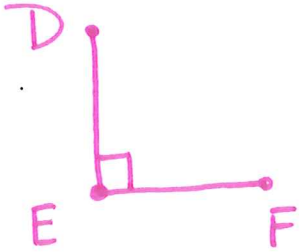
Many options!


$AP \cong PB$

A, P, B are collinear

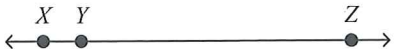
$AP + PB = AB$

5. Make a conjecture given that $DE \perp EF$



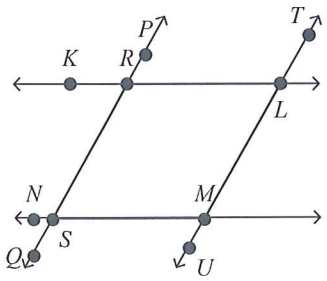

$\angle DEF = 90°$

6. If $ZY = 7XY$, then $ZX = 8XY$.




1. ZY = 7XY — 1. given
2. ZX = XY + YZ — 2. segment addition
3. ZX = XY + 7XY — 3. Substitution
4. ZX = 8XY — 4. CLT

7. Line $KL$ is parallel to line $NM$. Line $PQ$ is parallel to line $TU$. If $\angle KRS \cong \angle SMU$, then $\angle PRK \cong \angle LMS$.

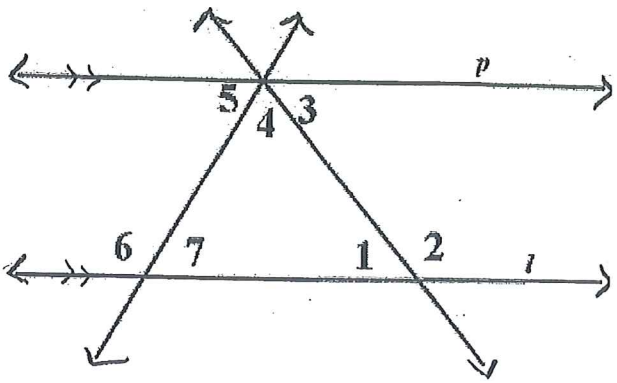



1. $\angle KRS \cong \angle SMU$ — 1. given
2. $\angle KRS + \angle PRK = 180$, $\angle SMU + \angle LMS = 180$ — 2. Linear Pairs are suppl.
3. $\angle KRS + \angle PRK = \angle SMU + \angle LMS$ — 3. substitution
4. $\angle KRS + \angle PRK = \angle KRS + \angle LMS$ — 4. substitution
5. $\angle PRK = \angle LMS$ — 5. subtraction

Name: _____ Date: _____ Hr: _____

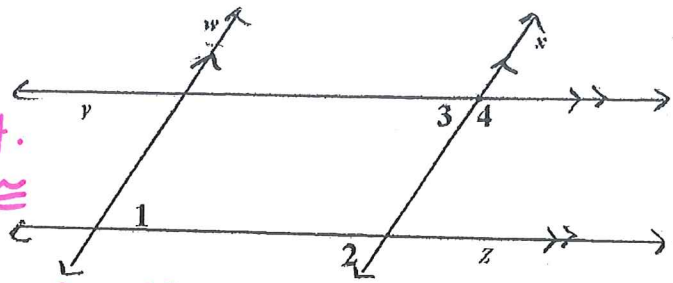
# Parallels Cut by Transversals Proofs

1. Given: $\angle 7 \cong \angle 1$ and $l \parallel p$
Prove: $\angle 5 \cong \angle 3$




| | |
|---|---|
| 1. $\angle 7 \cong \angle 1$, $\ell \parallel p$ | 1. given |
| 2. $\angle 7 \cong \angle 5$, $\angle 1 \cong \angle 3$ | 2. alt. int. $\angle$s are $\cong$ |
| 3. $\angle 7 \cong \angle 3$ | 3. substitution |
| 4. $\angle 5 \cong \angle 3$ | 4. substitution |

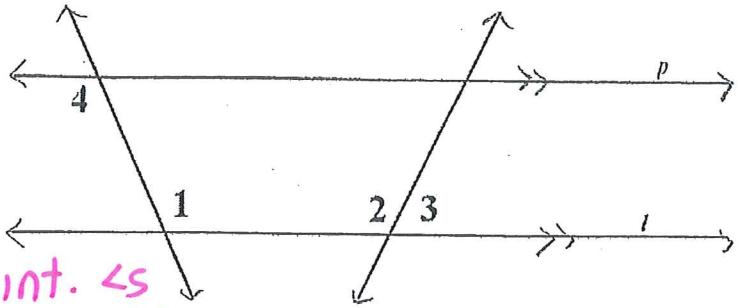
2. Given: $w \parallel x$ and $y \parallel z$
Prove: $\angle 1$ and $\angle 4$ are supplementary




| | |
|---|---|
| 1. $w \parallel x$, $y \parallel z$ | 1. given |
| 2. $\angle 1 \cong \angle 2$ | 2. alt. int. $\angle$s are $\cong$ |
| 3. $\angle 2 \cong \angle 3$ | 3. corr. $\angle$s are $\cong$ |
| 4. $\angle 3 + \angle 4 = 180$ | 4. Linear Pairs are suppl. |
| 5. $\angle 2 + \angle 4 = 180$ | 5. substitution |
| 6. $\angle 1 + \angle 4 = 180$ | 6. substitution |
| 7. $\angle 1$ and $\angle 4$ are supplementary | 7. def of supplementary |

3. Given: $\angle 1 \cong \angle 2$ and $l \parallel p$

Prove: $\angle 3 + \angle 4 = 180°$




| | |
|---|---|
| 1. $\angle 1 \cong \angle 2$, $l \parallel p$ | 1. given |
| 2. $\angle 4 \cong \angle 1$ | 2. alt. int. $\angle$s are $\cong$ |
| 3. $\angle 2 + \angle 3 = 180$ | 3. Linear Pairs are suppl. |
| 4. $\angle 1 + \angle 3 = 180$ | 4. substitution |
| 5. $\angle 4 + \angle 3 = 180$ | 5. substitution |

**Determine whether the following statements are *always*, *sometimes*, or *never* true.**

**4.** Two angles that are supplementary are complementary.

Never True

**5.** Complementary angles are congruent.

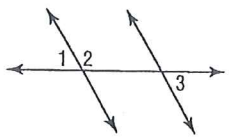
Sometimes True (if we have 45° angles)

**6.** Write a two-column proof.

**Given:** $\angle 1$ and $\angle 2$ form a linear pair.
$\angle 2$ and $\angle 3$ are supplementary.

**Prove:** $\angle 1 \cong \angle 3$

You don't know they are $\parallel$ so you may NOT use Alt ext $\angle$s $\cong$




| | |
|---|---|
| 1. $\angle 1$ and $\angle 2$ form a linear pair, $\angle 2$ and $\angle 3$ are suppl. | 1. given |
| 2. $\angle 1 + \angle 2 = 180$ | 2. Linear pairs are suppl. |
| 3. $\angle 2 + \angle 3 = 180$ | 3. def. of suppl. |
| 4. $\angle 1 + \angle 2 = \angle 2 + \angle 3$ | 4. substitution |
| 5. $\angle 1 \cong \angle 3$ | 5. subtraction |

NAME Proof and Logic Review Part 1 DATE _____ PERIOD ____

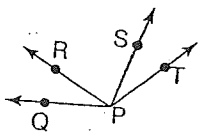
## 2-8 Study Guide and Intervention *(continued)*

**9.** Copy and complete the following proof.

**Given:** $\angle QPS \cong \angle TPR$

**Prove:** $\angle QPR \cong \angle TPS$

**Proof:**

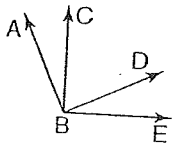



| Statements | Reasons |
|---|---|
| 1. $\angle QPS \cong \angle TPR$ | 1. given |
| 2. $\angle QPS = \angle QPR + \angle RPS$<br>$\angle TPR = \angle TPS + \angle RPS$ | 2. angle addition |
| 3. $\angle QPR + \angle RPS = \angle TPS + \angle RPS$ | 3. substitution |
| 4. $\angle QPR = \angle TPS$ | 4. subtraction |

**Write a two-column proof.**

**Given:** $\angle ABC$ and $\angle CBD$ are complementary.
$\angle DBE$ and $\angle CBD$ form a right angle.

**Prove:** $\angle ABC \cong \angle DBE$

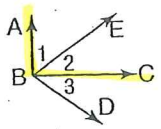



| Statements | Reasons |
|---|---|
| 1. $\angle ABC$ & $\angle CBD$ are compl.<br>$\angle DBE$ & $\angle CBD$ form a right angle | 1. given |
| 2. $\angle ABC + \angle CBD = 90$ | 2. def of compl. |
| 3. $\angle DBE + \angle CBD = 90$ | 3. def of right angle |
| 4. $\angle ABC + \angle CBD = \angle DBE + \angle CBD$ | 4. substitution |
| 5. $\angle ABC = \angle DBE$ | 5. subtraction |

**Exercises** **Complete each proof.**

**1. Given:** $\overline{AB} \perp \overline{BC}$; $\angle 1$ and $\angle 3$ are complementary.

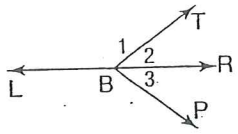
**Prove:** $\angle 2 \cong \angle 3$




| Statements | Reasons |
|---|---|
| 1. $AB \perp BC$, $\angle 1$ & $\angle 3$ are compl. | 1. given |
| 2. $\angle ABC = 90$ | 2. def of $\perp$ |
| 3. $\angle 1 + \angle 3 = 90$ | 3. def of compl. |
| 4. $\angle 1 + \angle 2 = \angle ABC$ | 4. angle addition |
| 5. $\angle 1 + \angle 2 = 90$ | 5. substitution |
| 6. $\angle 1 + \angle 2 = \angle 1 + \angle 3$ | 6. substitution |
| 7. $\angle 2 = \angle 3$ | 7. subtraction |

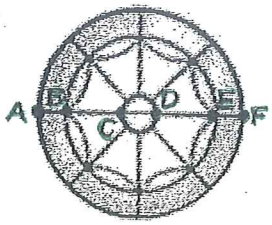
**2. Given:** $\angle 1$ and $\angle 2$ form a linear pair. $m\angle 1 + m\angle 3 = 180$

**Prove:** $\angle 2 \cong \angle 3$




| Statements | Reasons |
|---|---|
| 1. $\angle 1$ & $\angle 2$ form a linear pair | 1. given |
| $\angle 1 + \angle 3 = 180$ | |
| 2. $\angle 1 + \angle 2 = 180$ | 2. linear pairs are suppl. |
| 3. $\angle 1 + \angle 3 = \angle 1 + \angle 2$ | 3. substitution |
| 4. $\angle 3 = \angle 2$ | 4. subtraction |

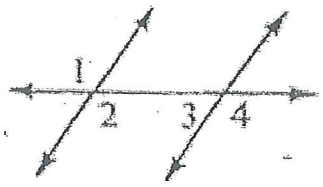
**4. LIGHTING** In the light fixture, $\overline{AB} \cong \overline{EF}$ and $\overline{BC} \cong \overline{DE}$. Prove that $\overline{AC} \cong \overline{DF}$.




1. $AB = EF$, $BC = DE$ — 1. given
2. $AB + BC = AC$, $DE + EF = DF$ — 2. segment addition
3. $BC + AB = DF$ (same as $AB + BC$) — 3. substitution
4. $AC \cong DF$ — 4. substitution

2. *Given:* $\angle 1 = \angle 4$

*Prove:* $\angle 3$ and $\angle 1$ are supplements.

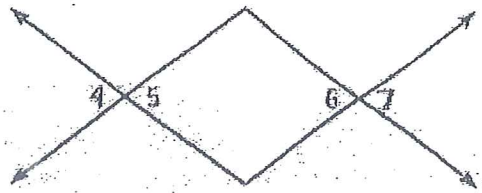



NOT // lines!!

| | |
|---|---|
| 1. $\angle 1 = \angle 4$ | 1. given |
| 2. $\angle 3 + \angle 4 = 180$ | 2. linear pairs are suppl. |
| 3. $\angle 1 = \angle 2$ | 3. vertical $\angle$'s are $\cong$ ← extra information we do not need it |
| 4. $\angle 3 + \angle 1 = 180$ | 4. substitution |
| 5. $\angle 3$ + $\angle 1$ are supplements | 5. def of suppl. |

3. Given: $\angle 5 \cong \angle 6$

Prove: $\angle 4 \cong \angle 7$




| | |
|---|---|
| 1. $\angle 5 \cong \angle 6$ | 1. given |
| 2. $\angle 4 \cong \angle 5$<br>$\angle 6 \cong \angle 7$ | 2. vertical $\angle$'s are $\cong$ |
| 3. $\angle 4 \cong \angle 6$ | 3. substitution |
| 4. $\angle 4 \cong \angle 7$ | 4. substitution |

# 2.7 Practice

**Name the definition, property, postulate or theorem illustrated.**

1. $QA = QA$ Reflexive Property

2. If $AB \cong BC$ and $BC \cong CE$, then $AB \cong CE$.

Transitive Prop.

3. If $Q$ is between $P$ and $R$, then $PR = PQ + QR$.


Segment Addition Postulate

4. If $AB + BC = EF + FG$ and $AB + BC = AC$, then $EF + FG = AC$.

Substitution

5. If $\overline{DE} \cong \overline{GH}$, then $\overline{GH} \cong \overline{DE}$.

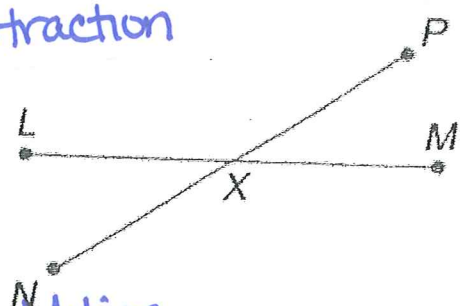
Symmetric Prop.

**Write a 2 column proof for each of the following.**

6. **Given:** $C$ is the midpoint of $\overline{BD}$ and $\overline{AE}$.
**Prove:** $AB = DE$


| | |
|---|---|
| 1. C is the mdpt of BD & AE | 1. given |
| 2. BC = CD<br>AC = CE | 2. def of midpoint |
| 3. AB + BC = AC<br>CD + DE = CE | 3. segment addition |
| 4. AB + BC = CD + DE | 4. substitution |
| 5. AB + BC = BC + DE | 5. substitution |
| 6. AB = DE | 6. subtraction |

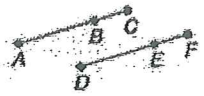
1. If $\overline{LM} \cong \overline{PN}$ and $\overline{XM} \cong \overline{XN}$, then $\overline{LX} \cong \overline{PX}$.




| | |
|---|---|
| 1. LM = PN, XM = XN | 1. given |
| 2. LM = LX + XM<br>NP = PX + XN | 2. segment addition |
| 3. LX + XM = PX + XN | 3. substitution |
| 4. LX + XM = PX + XM | 4. substitution |
| 5. LX = PX | 5. subtraction |

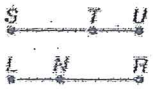
Write a proof.

8. Given: $\overline{AB} \cong \overline{DE}$; $\overline{BC} \cong \overline{EF}$
Prove: $\overline{AC} \cong \overline{DF}$




1. $AB = DE$, $BC = EF$ — 1. given
2. $AC = AB + BC$, $DF = DE + EF$ — 2. segment addition
3. $DF = AB + BC$ — 3. substitution
4. $DF = AC$ — 4. substitution

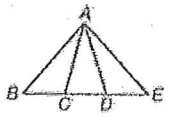
9. Given: $\overline{SU} \cong \overline{LR}$, $\overline{TU} \cong \overline{LN}$
Prove: $\overline{ST} \cong \overline{NR}$




1. $SU = LR$, $TU = LN$ — 1. given
2. $SU = ST + TU$, $LR = LN + NR$ — 2. segment addition
3. $ST + TU = LN + NR$ — 3. substitution
4. $ST + TU = TU + NR$ — 4. substitution
5. $ST = NR$ — 5. subtraction

Write a proof.

10. Given: $C$ is the midpoint of $\overline{BD}$.
$D$ is the midpoint of $\overline{CE}$.
Prove: $\overline{BD} \cong \overline{CE}$




1. C is the midpoint of BD, D is the midpoint of CE — 1. given
2. $BC = CD$, $CD = DE$ — 2. def of midpoint
3. $BD = CB + CD$, $CE = CD + DE$ — 3. segment addition
4. $CE = BC + CD$ — 4. substitution
5. $BD = CE$ — 5. substitution

11. **TRAVEL** Refer to the figure. DeAnne knows that the distance from Grayson to Apex is the same as the distance from Redding to Pine Bluff. Prove that the distance from Grayson to Redding is equal to the distance from Apex to Pine Bluff.


Given: $GA = RP$

Prove: $GR = AP$

| | |
|---|---|
| 1. $GA = RP$ | 1. given |
| 2. $GR = GA + AR$<br>$AP = AR + RP$ | 2. segment addition |
| 3. $GR = RP + AR$ | 3. substitution |
| 4. $GR = AP$ | 4. substitution |