****

**Given:** $\overbar{BC}≅\overbar{EF}$,

$M$is the midpoint of $\overbar{BC}$,

$N$ is the midpoint of $\overbar{EF}$

**Prove:** $BM=EN$

**Statements Reasons**

$\overbar{BC}≅\overbar{EF}$ Given

$M$is the midpoint of $\overbar{BC}$

$N$ is the midpoint of $\overbar{EF}$

$\overbar{BM}≅\overbar{MC}$ and $\overbar{EN}≅\overbar{NF}$ Midpoint Theorem

$BC=EF, BM=MC$ and $EN=NF$ Definition of $≅$ Segments

$BC=BM+MC$ and $EF=EN+NF$ Segment Addition

$BM+MC=EN+NF$ Substitution Property

$BM+BM=EN+EN$ Substitution Property

$2∙BM=2∙EN$ Substitution Property

$BM=EN$ Division Property

**Given:** $E is the midpoint of \overbar{AB} and \overbar{CD}$

$$\overbar{AB}≅\overbar{CD} $$

**Prove:** $AE=ED$

**Statements Reasons**

$E is the midpoint of \overbar{AB} and \overbar{CD}$ Given

$\overbar{AB}≅\overbar{CD} $

 $AE=\frac{1}{2}(AB)$ Definition of a Midpoint

 $ED=\frac{1}{2}(CD)$

$AB=CD$ Definition of $≅$ Segments

 $\frac{1}{2}\left(AB\right)=\frac{1}{2}(CD)$ Multiplication Property

 $AE=ED$ Substitution Property (Steps 2 & 4)


#  A B C D

**Given:** $AB=CD$

**Prove:** $\overbar{AC}≅\overbar{BD}$

**Statements Reasons**

 $AB=CD$ Given

 $AB+BC=AC$ Segment Addition

 $BC+CD=BD$

 $CD+BC=AC$ Substitution Property (Steps 1 & 2)

 $CD+BC=BC+CD$ Symmetric Property

 $AC=BD$ Substitution Property (Steps 2, 3, & 4)

 $\overbar{AC}≅\overbar{BD}$ Definition of $≅$ Segments



**Given:** $∠ABC+∠CBD=90$

$m∠ABC=3x-5$

$m∠CBD=2x+10$

**Prove:** $x=17$

**Statements Reasons**

$∠ABC+∠CBD=90$ Given

$m∠ABC=3x-5$

$m∠CBD=2x+10$

$3x-5+2x+10=90$ Substitution Property

$5x+5=90$ Substitution Property

$5x=85$ Subtraction Property

$x=17$ Division Property

**Given:** $∠ABC and ∠ABD are a linear pair$

$∠ABC=72^{o}$

**Prove:** $∠ABD=108^{o}$

**Statements Reasons**

$∠ABC and ∠ABD are a linear pair$ Given

$∠ABC=72^{o}$

$∠ABC and ∠ABD are supplementary$ Linear Pairs are Supplementary

$∠ABC+∠ABD=180^{o}$ Definition of Supplementary Angles

$72^{o}+∠ABD=180^{o}$ Substitution Property

$∠ABD=108^{o}$ Subtraction Property