Name:

Proofs Regents Review!

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2025

Triangle Proofs:

If it is not specified, prove triangles are congruent
To prove triangles are congruent, prove 3 pairs of sides/angles are congruent
To prove segments or angles, use CPCTC
<u>*If you get stuck, make something up and keep on going!</u>

1) Do a mini proof with your givens

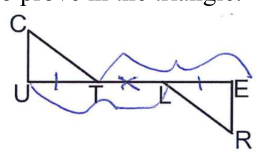
Line bisector creates two congruent segments
Midpoint creates two congruent segments
Angle bisector creates two congruent angles
Perpendicular lines create two congruent right angles
Parallel lines cut by a transversal create congruent alternate interior angles
*Perpendicular bisector is perpendicular and line bisector (1 pair of congruent right angles, 1 pair of congruent segs)
*If segments bisect each other, they are both cut in half (2 pairs of congruent segments)
*A median intersects a segment at its *midpoint*
*An altitude is *perpendicular* to the base

2) Use additional tools:

Vertical Angles are congruent (Look for an X)
Reflexive Property (A side/angle is in both triangles and is congruent to itself)
Isosceles Triangles (In a triangle, congruent angles are opposite congruent sides)
Addition and Subtraction Property (If you need more or less of a shared side)
*You must use three congruent statements to get one congruent statement for the triangles. The two that you are adding/subtracting and the one that you want to prove in the triangle.

7. Given: $\overline{UL} \cong \overline{TE}$
Prove: $\Delta CUT \cong \Delta REL$

Statements	Reasons
(1) $\overline{UL} \cong \overline{TE}$	(1) given
(2) $\overline{TL} \cong \overline{TL}$	(2) reflexive property
(3) $\overline{UT} \cong \overline{LE}$ (OS)	(3) subtraction property
$\overline{UL} - \overline{TL} \cong \overline{TE} - \overline{TL}$	



<table>
<tr><th>Parallelogram Theorems</th><th>Circle Theorems (Look for inscribed angles)</th></tr>
<tr><td>A parallelogram/rectangle/rhombus/square has:
Two pairs of opposite sides congruent
Two pairs of opposite sides parallel
Diagonals that bisect each other
Opposite angles congruent</td><td rowspan="3">Angles inscribed to the same arc are congruent
An angle inscribed to a semicircle is a right angle
A tangent and a radius/diameter form a right angles
All radii/diameters of a circle are congruent
Congruent arcs have congruent chords have congruent central angles
Parallel Lines intercept congruent arcs
Tangents drawn from the same point are congruent</td></tr>
<tr><td>A rectangle/square has:
Congruent right angles
Congruent diagonals</td></tr>
<tr><td>A rhombus/square has:
Consecutive sides congruent
Perpendicular diagonals
Diagonals that bisect the angles</td></tr>
</table>

To prove triangles are SIMILAR, prove AA $\cong$ AA
If asked to prove a proportion/multiplication:
1) Prove triangles are similar
2) Corresponding Sides of Similar Triangle are In Proportion (CSSTIP)
3) Cross Products are Equal

Work Backwards!

(3) $\Delta AED \sim \Delta CEB$	(3) $AA \cong AA$
(4) $\frac{AE}{ED} = \frac{CE}{EB}$	(4) CSSTIP
(5) $AE \cdot EB = CE \cdot ED$	(5) cross products are equal

Mini Proofs

If it is not specified, prove triangles are congruent
To prove triangles are congruent, prove 3 pairs of sides/angles are congruent
To prove segments or angles, use CPCTC
***If you get stuck, make something up and keep on going!**

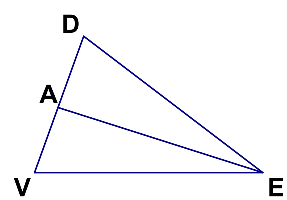
1) Do a mini proof with your givens

Altitude creates congruent right angles
Median creates congruent segments
Line bisector creates congruent segments
Midpoint creates congruent segments
Angle bisector creates congruent angles
Perpendicular lines create congruent right angles
When given parallel lines:
Corresponding angles are congruent OR Alternate interior angles are congruent OR Alternate exterior angles are congruent

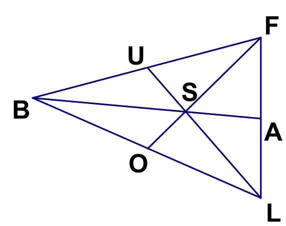
2) Use additional tools:

Vertical Angles are congruent (Look for an X)
Reflexive Property (A side/angle is congruent to itself)

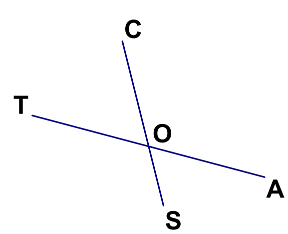
1. Given: A is the midpoint of $\overline{DV}$



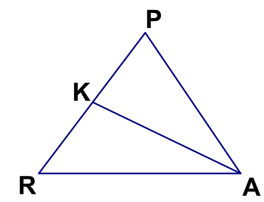
2. Given: U is the midpoint of $\overline{BF}$



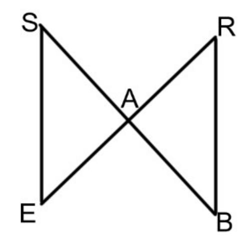
3. Given: $\overline{CS}$ bisects $\overline{TA}$



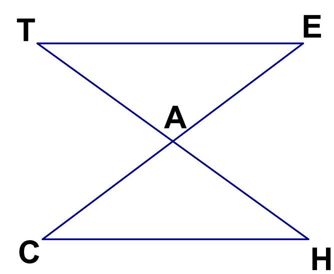
4. Given: $\overline{KA}$ bisects $\overline{PR}$



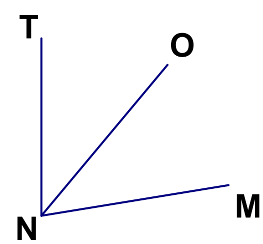
5. Given: $\overline{SB}$ and $\overline{RE}$ bisect each other



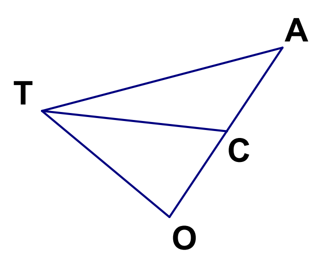
6. Given: $\overline{TH}$ and $\overline{CE}$ bisect each other



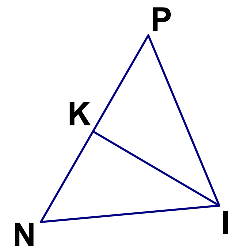
7. Given: $\overline{ON}$ bisects $\angle$ TNM



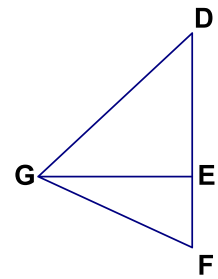
8. Given: $\overline{CT}$ bisects $\angle$ ATO



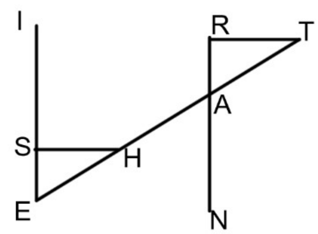
9. Given: $\overline{IK} \perp \overline{PN}$



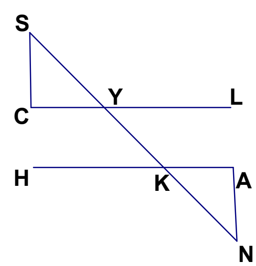
10. Given: $\overline{GE} \perp \overline{DF}$



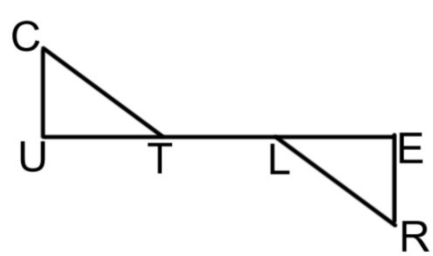
11. Given: $\overline{IE} \perp \overline{SH}$, $\overline{RN} \perp \overline{RT}$



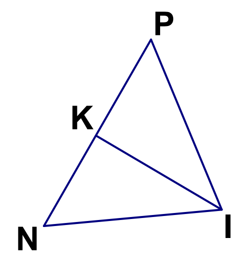
12. Given: $\overline{CL} \perp \overline{CS}$, $\overline{HA} \perp \overline{AN}$



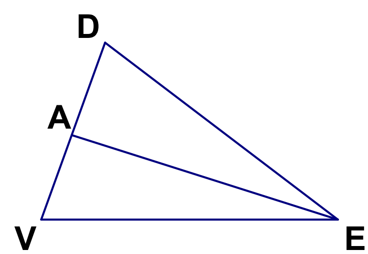
13. Given: $\overline{CU} \perp \overline{UE}$, $\overline{RE} \perp \overline{UE}$



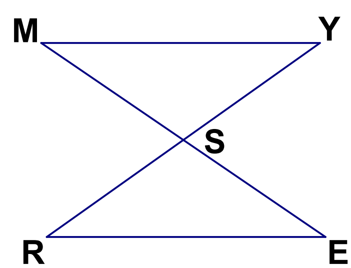
14. $\overline{IK}$ is the perpendicular bisector of $\overline{NP}$



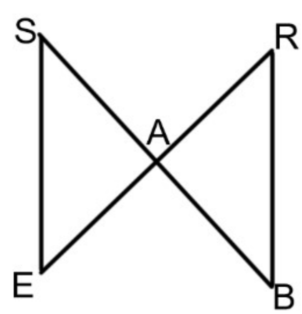
15. $\overline{EA}$ is the perpendicular bisector of $\overline{DV}$



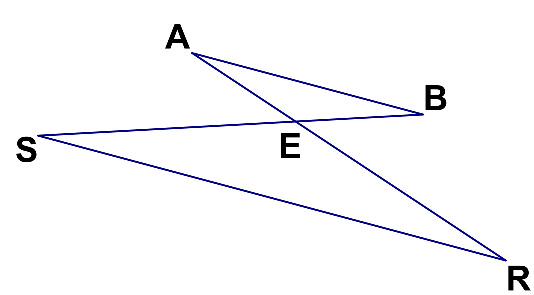
16. Given: $\overline{MY} \parallel \overline{RE}$



17. Given: $\overline{SE} \parallel \overline{RB}$

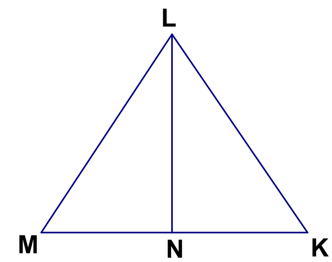


18. Given: $\overline{SR} \parallel \overline{AB}$

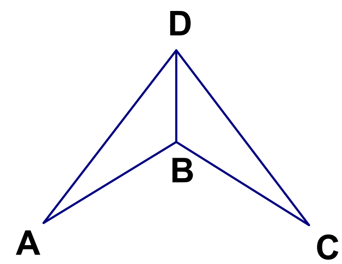


Reflexive Property and Vertical Angles

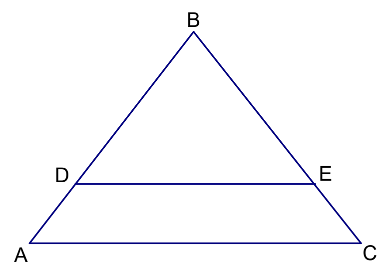
1. Given: None
Prove: $\Delta LNM \cong \Delta LNK$



2. Given: None
Prove: $\Delta DBA \cong \Delta DBC$

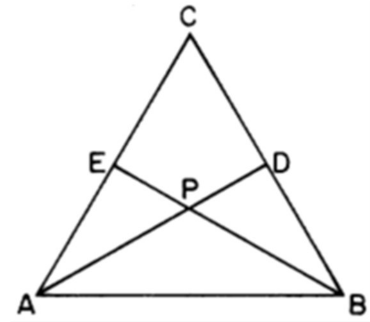


3. Given: None
Prove: $\Delta BDE \sim \Delta BAC$

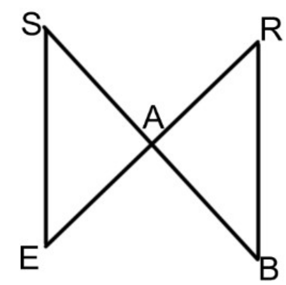


4. Given: None
Prove: $\Delta ABC \sim \Delta ADE$

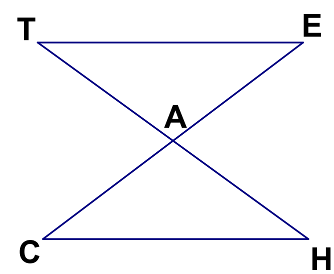
5. Given: None
Prove: $\Delta AEB \cong \Delta BDA$



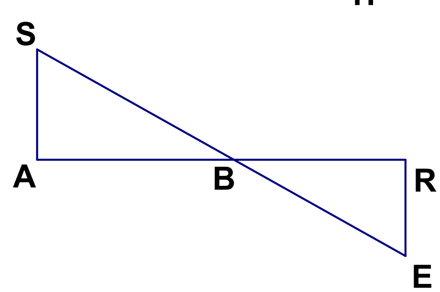
6. Given: None
Prove: $\Delta SAE \cong \Delta RAB$



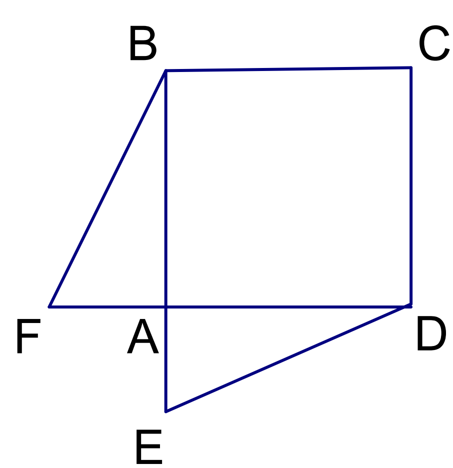
7. Given: None
Prove: $\Delta TAE \cong \Delta CAH$



8. Given: None
Prove: $\Delta SBA \cong \Delta EBR$

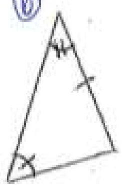


9. Given: None
Prove: $\Delta BAF \cong \Delta DAE$



Methods for Proving Triangles are Congruent

(6)



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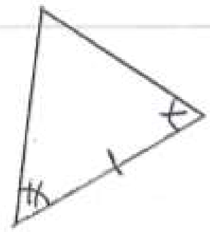

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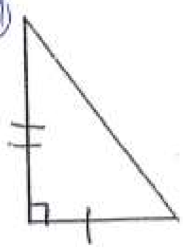

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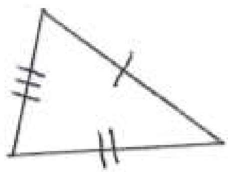

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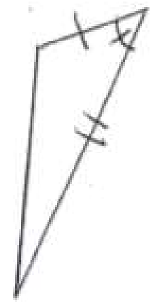

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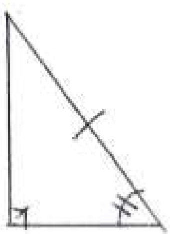

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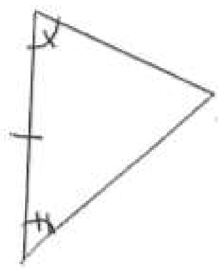

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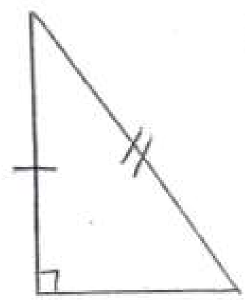

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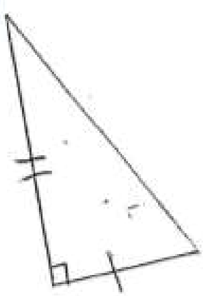

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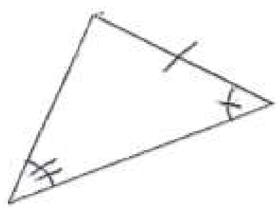

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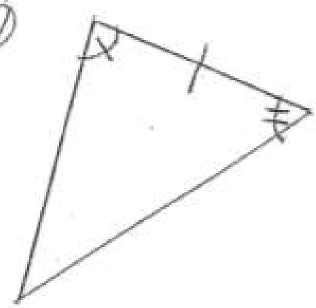
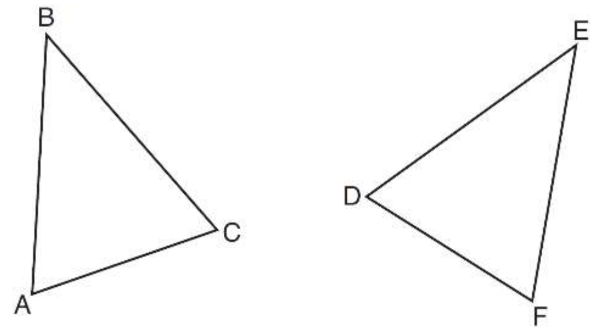


Congruent Triangle Methods with Sequences of Rigid Motions
If a sequence of rigid motions is performed, the image is CONGRUENT to the original!

1. Which statement is sufficient evidence that ΔDEF is congruent to ΔABC?

1) $AB = DE$ and $BC = EF$
2) $\angle D \cong \angle A$, $\angle B \cong \angle E$, $\angle C \cong \angle F$
3) There is a sequence of rigid motions that maps $\overline{AB}$ onto $\overline{DE}$, $\overline{BC}$ onto $\overline{EF}$, and $\overline{AC}$ onto $\overline{DF}$.
4) There is a sequence of rigid motions that maps point A onto point D, $\overline{AB}$ onto $\overline{DE}$, and $\angle B$ onto $\angle E$.



2. Triangles YEG and POM are two distinct non-right triangles such that $\angle G \cong \angle M$. Which statement is sufficient to prove $\triangle YEG$ is always congruent to $\triangle POM$?

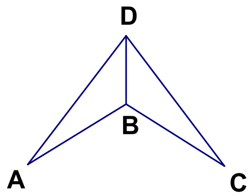
1) $\angle E \cong \angle O$ and $\angle Y \cong \angle P$
2) $\overline{YG} \cong \overline{PM}$ and $\overline{YE} \cong \overline{PO}$
3) There is a sequence of rigid motions that maps $\angle E$ onto $\angle O$ and $\overline{YE}$ onto $\overline{PO}$.
4) There is a sequence of rigid motions that maps point Y onto point P and $\overline{YG}$ onto $\overline{PM}$.

3. In the two distinct acute triangles ABC and DEF, $\angle B \cong \angle E$. Triangles ABC and DEF are congruent when there is a sequence of rigid motions that maps

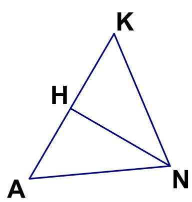
1) $\angle A$ onto $\angle D$, and $\angle C$ onto $\angle F$
2) $\overline{AC}$ onto $\overline{DF}$, and $\overline{BC}$ onto $\overline{EF}$
3) $\angle C$ onto $\angle F$, and $\overline{BC}$ onto $\overline{EF}$
4) point A onto point D, and $\overline{AB}$ onto $\overline{DE}$

Proving Triangles are Congruent

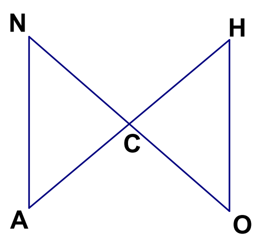
1. Given: $\overline{BD}$ bisects $\angle$ ADC
$\overline{AD} \cong \overline{DC}$
Prove: $\overline{AB} \cong \overline{BC}$



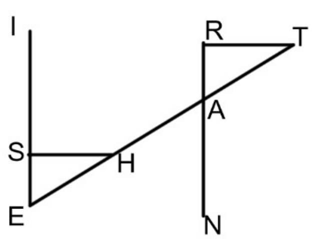
2. Given: $\overline{HN} \perp \overline{KA}$, $\overline{KN} \cong \overline{AN}$
Prove: $\angle HAN \cong \angle HKN$



3. Given: $\overline{NO}$ and $\overline{HA}$ bisect each other
Prove: $\overline{NA} \cong \overline{HO}$



4. Given: $\overline{IE} \parallel \overline{RN}$, $\overline{TR} \perp \overline{RN}$, $\overline{HS} \perp \overline{IE}$, $\overline{EH} \cong \overline{AT}$
Prove: $\overline{SH} \cong \overline{RT}$



Euclidean Similar Triangle Proofs

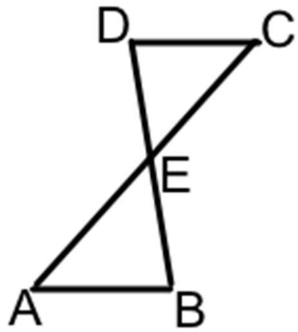
To prove triangles are SIMILAR, prove AA $\cong$ AA
If asked to prove a proportion/multiplication:

1) **Prove triangles are similar**
2) **Corresponding Sides of Similar Triangle are In Proportion (CSSTIP)**
3) **Cross Products are Equal**

Work Backwards!

1. Given $\overline{AB} \parallel \overline{DC}$

   Prove: $\overline{DC} \bullet \overline{EB} = \overline{AB} \bullet \overline{DE}$



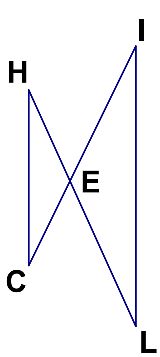
2. Given: $\overline{BC} \perp \overline{AC}$

   $\overline{DE} \perp \overline{AB}$

   Prove: $\overline{AC} \bullet \overline{AD} = \overline{AE} \bullet \overline{AB}$

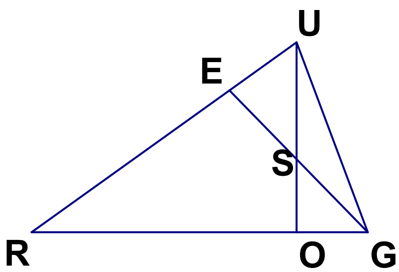
3. Given: $\angle HCE \cong \angle LIE$

   Prove: $\overline{CE} \bullet \overline{IL} = \overline{CH} \bullet \overline{EI}$



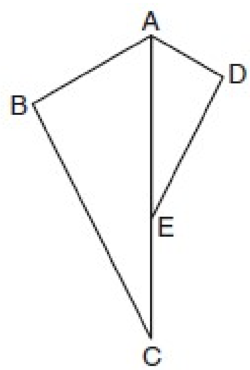
4. Given: $\overline{UO} \perp \overline{RG}$, $\overline{UR} \perp \overline{EG}$

Prove: $\dfrac{\overline{US}}{\overline{SO}} = \dfrac{\overline{EU}}{\overline{OG}}$

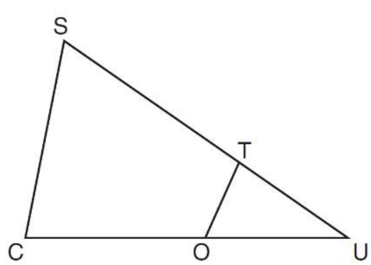


5. Given: $\overline{CA}$ bisects $\angle BAD$, $\angle ABC \cong \angle ADE$

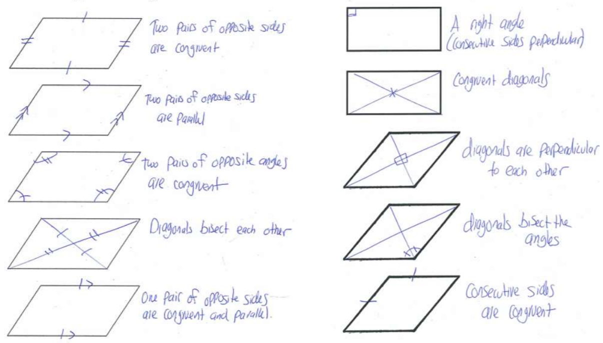
Prove: $\overline{BC} \bullet \overline{AE} = \overline{DE} \bullet \overline{AC}$



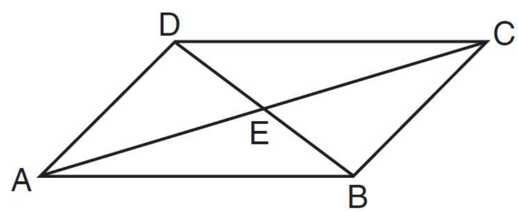
6. In $\triangle SCU$ shown below, points T and O are on $\overline{SU}$ and $\overline{CU}$, respectively. Segment OT is drawn so that $\angle C \cong \angle OTU$. Prove: $\overline{SC} \bullet \overline{OU} = \overline{OT} \bullet \overline{SU}$



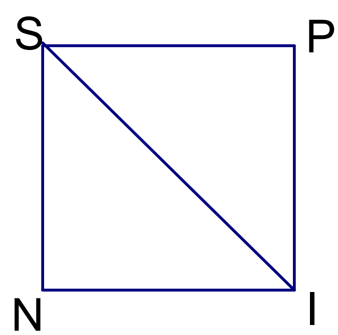
Euclidean Proofs with Parallelogram and Circle Theorems

Parallelogram Theorems	**Circle Theorems**
Parallelogram Properties  	**All radii/diameters of a circle are congruent** **Angles inscribed to the same arc are congruent** **An angle inscribed to a semicircle is a right angle** **A tangent and a radius/diameter form a right angles** Congruent arcs have congruent chords have congruent central angles Parallel Lines intercept congruent arcs Tangents drawn from the same point are congruent

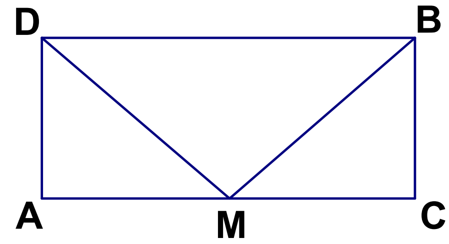
1. Given: Parallelogram *ABCD*.
Prove: $\Delta AED \cong \Delta CEB$



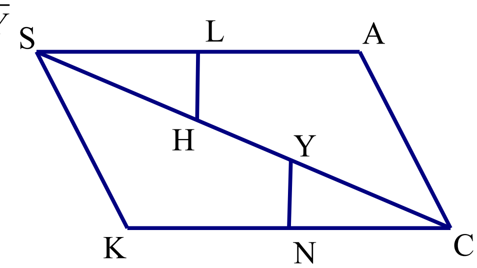
2. Given: SPIN is a square
Prove: $\Delta SNI \cong \Delta SPI$



3. Given: ABCD is a rectangle, M is the midpoint of $\overline{AC}$
Prove: $\overline{DM} \cong \overline{BM}$

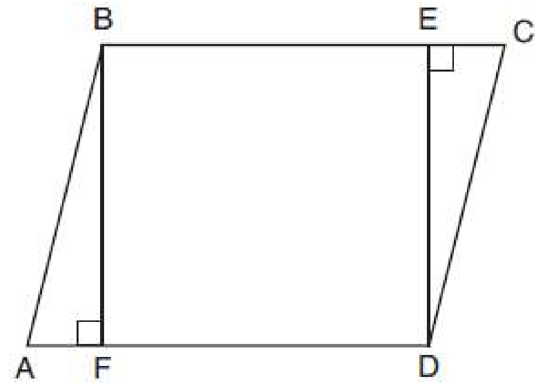


4. Given: SACK is a parallelogram, $\overline{HL} \perp \overline{SA}$, $\overline{YN} \perp \overline{KC}$, $\overline{HL} \cong \overline{NY}$
Prove: $\overline{SL} \cong \overline{CN}$



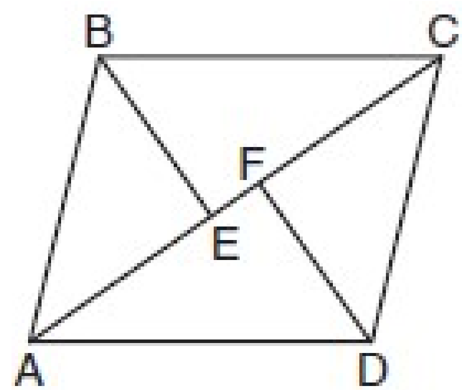
5. Given: Parallelogram $ABCD$, $\overline{BF} \perp \overline{AFD}$, and $\overline{DE} \perp \overline{BEC}$

Prove: $\overline{AF} \cong \overline{EC}$

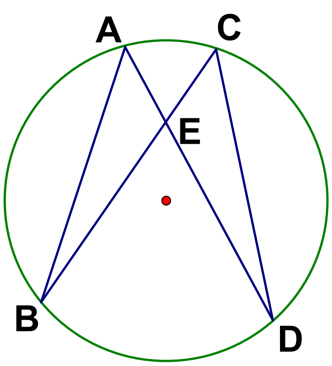


6. Given: ABCD is a parallelogram, $\overline{BE} \perp \overline{AC}$, and $\overline{DF} \perp \overline{AC}$.

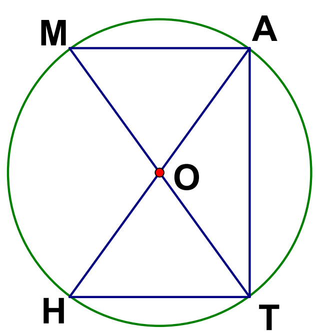
Prove: $\angle ABE \cong \angle CDF$



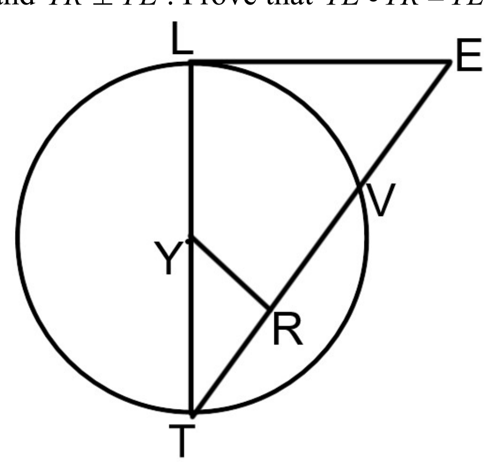
7. Given: Chords $\overline{AD}$ and $\overline{BC}$ of circle O intersect at E, $\overline{AB} \cong \overline{CD}$
Prove: $\overline{BE} \cong \overline{ED}$



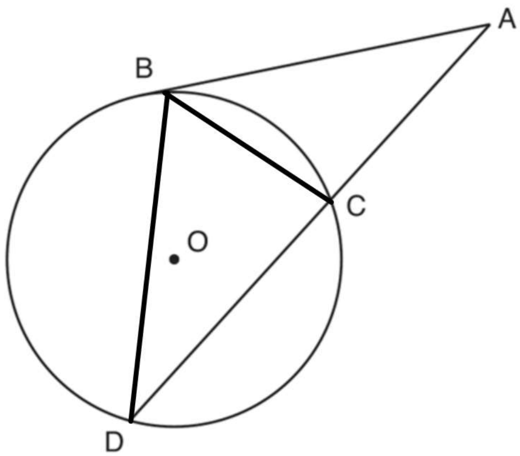
8. Given: Circle O with diameters $\overline{MOT}$ and $\overline{AOH}$.
Prove: $\overline{MA} \cong \overline{HT}$



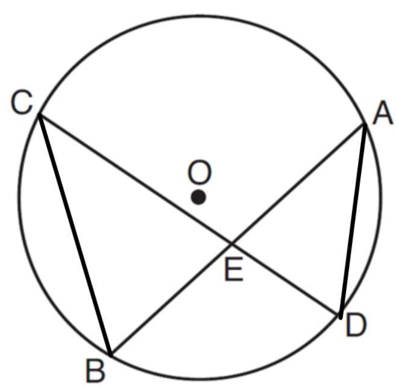
9. In circle Y, tangent $\overline{LE}$ is drawn to diameter $\overline{TYL}$ and $\overline{YR} \perp \overline{TE}$. Prove that $\overline{TE} \bullet \overline{TR} = \overline{TL} \bullet \overline{TY}$.



11. In the diagram below, secant $\overline{ACD}$ and tangent $\overline{AB}$ are drawn from external point A to circle O. Prove $(AC \cdot AD = AB^2)$

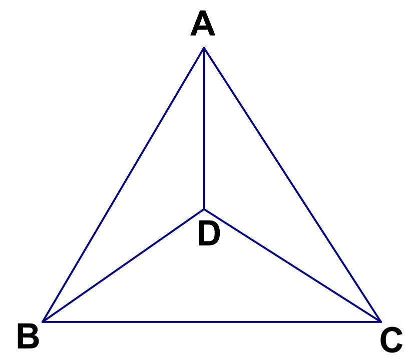


12. Given: Circle O, chords $\overline{AB}$ and $\overline{CD}$ intersect at E. Prove $AE \cdot EB = CE \cdot ED$.

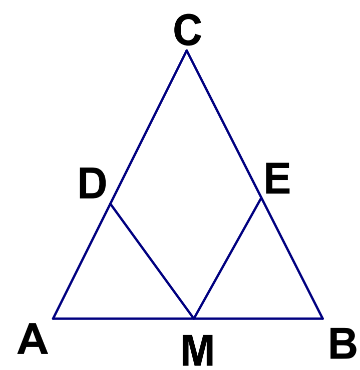


Proving Isosceles Mini Proofs
Use CPCTC to get a pair of sides/angles of a triangle to be congruent.

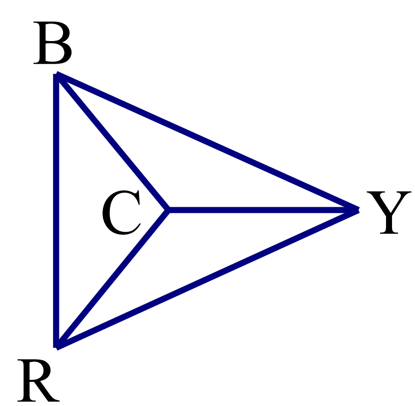
1. Given: $\Delta ADB \cong \Delta ADC$
Prove: ΔBAC is isosceles



2. Given: $\Delta ADM \cong \Delta BEM$
Prove: ΔACB is isosceles

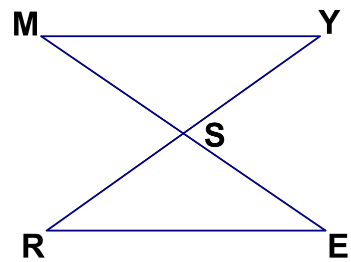


3. Given: $\Delta YCB \cong \Delta YCR$
Prove: ΔBYR is isosceles

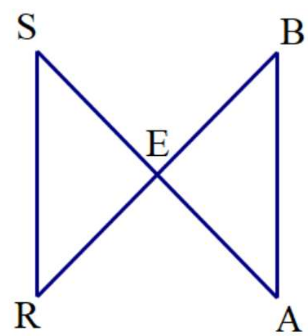


Proving Parallel Mini Proofs
-If given alternate interior angles are congruent, carve out the angles to find your Z and your parallel lines.
-If proving triangles are congruent, use CPCTC to get alternate interior angles congruent. Carve out the angles to find your Z and your parallel lines.
"Parallel lines cut by a transversal create congruent alternate interior angles."

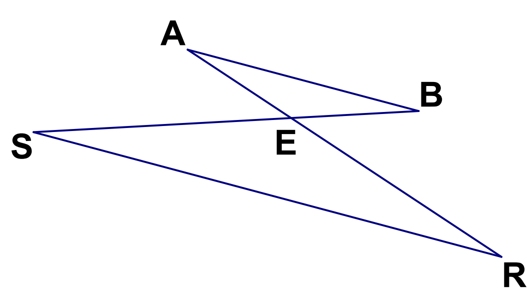
1. Given: $\angle M \cong \angle E$



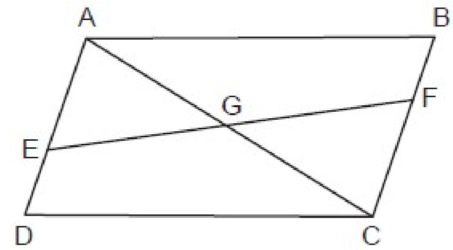
2. Given: $\angle S \cong \angle A$



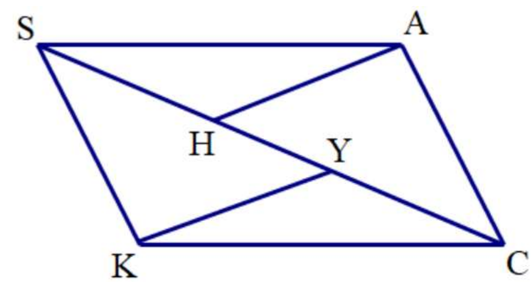
3. Given: $\angle S \cong \angle B$



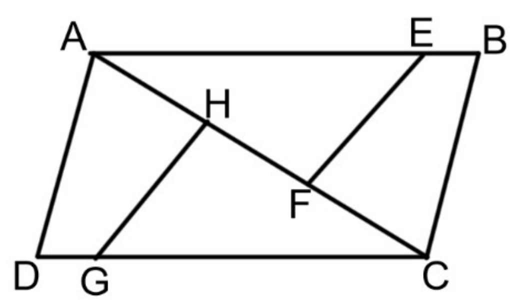
4. Given: $\angle EAG \cong \angle FCG$



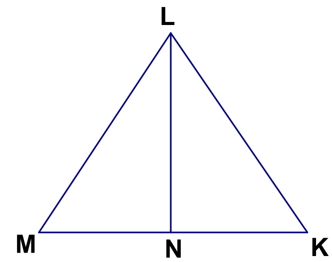
5. Given: $\angle ASH \cong \angle KCY$



6. Given: $\angle EAF \cong \angle GCH$

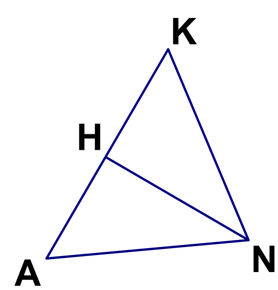


Triangle Proofs Using CPCTC
Prove the triangles are congruent
Use CPCTC in order to get what you need in order to prove what you are being asked to prove.
Midpoint/Bisector: CPCTC for two congruent sides/angles
Isosceles Triangle: CPCTC for two congruent sides/angles of the isosceles triangle.
Parallel: CPCTC for alternate interior angles.

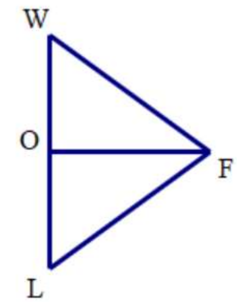


1. Given: $\overline{LN}$ bisects $\angle$ KLM
$\angle$ LKM $\cong$ $\angle$ LMK
Prove: N is the midpoint of $\overline{MK}$

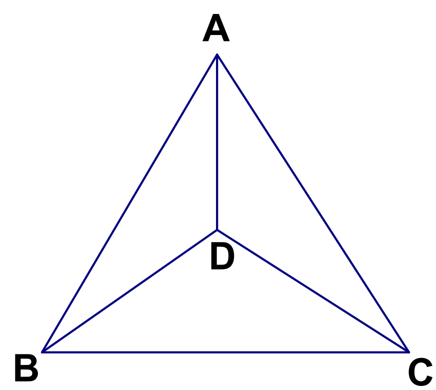
2. Given: $\overline{HN} \perp \overline{KA}$, $\overline{KN} \cong \overline{AN}$
Prove: $\overline{HN}$ bisects $\angle KNA$



3. Given: $\overline{OF}$ is the perpendicular bisector of $\overline{WL}$
Prove: ΔWFL is isosceles

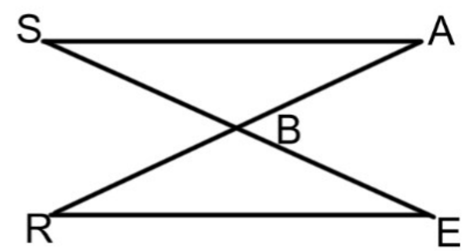


4. Given: $\angle ADB \cong \angle ADC$
$\overline{AD}$ bisects $\angle BAC$
Prove: ΔABC is isosceles

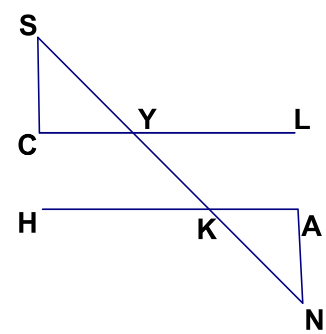


5. Given: $\overline{SE}$ and $\overline{AR}$ bisect each other.

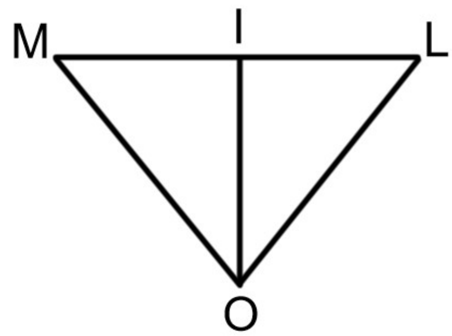
Prove that $\overline{SA} \parallel \overline{RE}$



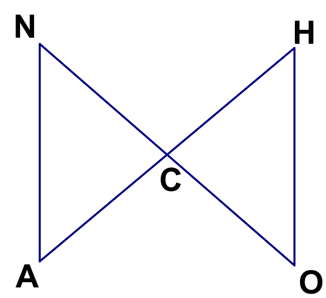
6. Given: $\overline{SC} \perp \overline{CL}$, $\overline{HA} \perp \overline{AN}$, $\overline{SY} \cong \overline{KN}$, and $\overline{SC} \cong \overline{AN}$.
Prove $\overline{CL} \parallel \overline{HA}$



7. Given: $\overline{OI}$ is the perpendicular bisector of $\overline{ML}$
Prove: ΔMLO is isosceles



8. Given: $\overline{NA} \parallel \overline{HO}$, $\overline{NA} \cong \overline{HO}$
Prove: $\overline{NO}$ bisects $\overline{HA}$

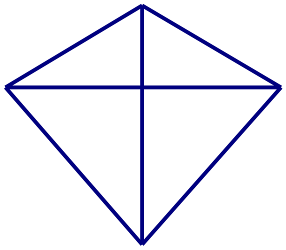


Perpendicular Bisector Proofs Multiple Choice

Perpendicular bisector creates

-two pairs of congruent triangles so all of their corresponding parts are congruent due to CPCTC

-two isosceles triangles

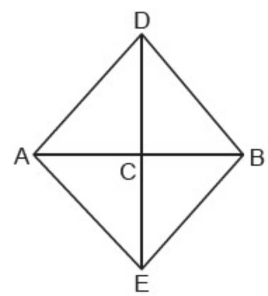


The top 2 small triangles are congruent and the top big triangle is isosceles

The bottom 2 small triangles are congruent and the bottom big triangle is isosceles

1. In the diagram below of quadrilateral *ADBE*, $\overline{DE}$ is the perpendicular bisector of $\overline{AB}$. Which statement is always true?

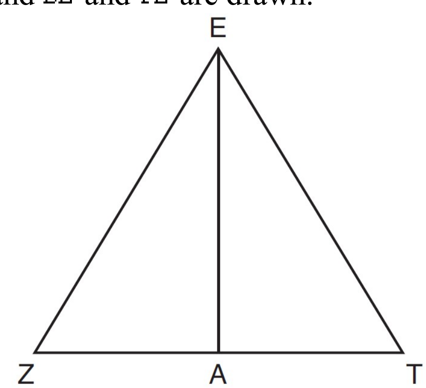
1) $\angle ADC \cong \angle BDC$
2) $\angle EAC \cong \angle DAC$
3) $\overline{AD} \cong \overline{BE}$
4) $\overline{AE} \cong \overline{AD}$



2. Line segment *EA* is the perpendicular bisector of $\overline{ZT}$, and $\overline{ZE}$ and $\overline{TE}$ are drawn.

Which conclusion can *not* be proven?

1) $\overline{EA}$ bisects angle *ZET*.
2) Triangle *EZT* is equilateral.
3) $\overline{EA}$ is a median of triangle *EZT*.
4) Angle *Z* is congruent to angle *T*.



3. Segment *CD* is the perpendicular bisector of $\overline{AB}$ at *E*. Which pair of segments does *not* have to be congruent?

1) $\overline{AD}, \overline{BD}$
2) $\overline{AC}, \overline{BC}$
3) $\overline{AE}, \overline{BE}$
4) $\overline{DE}, \overline{CE}$

4. In $\triangle ABC$, $\overline{BD}$ is the perpendicular bisector of $\overline{ADC}$. Based upon this information, which statements below can be proven?

I. $\overline{BD}$ is a median.

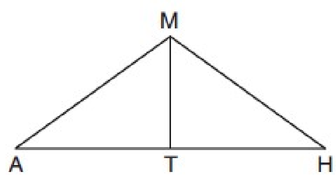
II. $\overline{BD}$ bisects $\angle ABC$.

III. $\triangle ABC$ is isosceles.

1) I and II, only
2) I and III, only
3) II and III, only
4) I, II, and III

5. In triangle *MAH* below, $\overline{MT}$ is the perpendicular bisector of $\overline{AH}$.
Which statement is *not* always true?

1) $\triangle MAH$ is isosceles. 2) $\triangle MAT$ is isosceles. 3) $\overline{MT}$ bisects $\angle AMH$. 4) $\angle A$ and $\angle TMH$ are complementary.

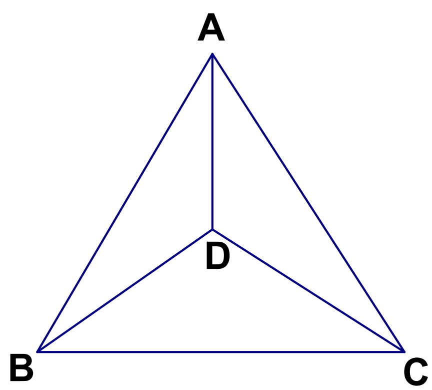


6. Segment *AB* is the perpendicular bisector of $\overline{CD}$ at point *M*. Which statement is always true?

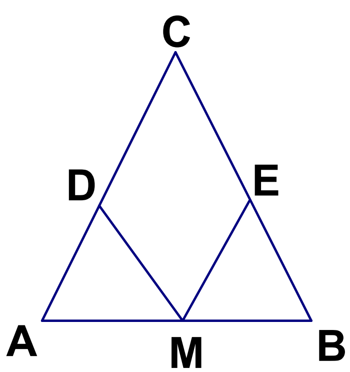
1) $\overline{CB} \cong \overline{DB}$
2) $\overline{CD} \cong \overline{AB}$
3) $\triangle ACD \sim \triangle BCD$
4) $\triangle ACM \sim \triangle BCM$

Isosceles Triangle Theorem Mini Proofs
In a triangle, congruent angles are opposite congruent sides
If the given sides/angles are not sides/angles of the triangles you are trying to prove,
if they make an isosceles triangle. Conclude the sides/angles opposite the ones you are given.

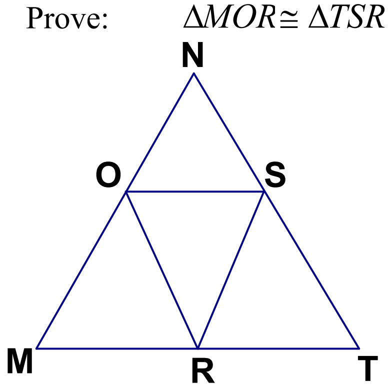
1. Given: $\angle ABC \cong \angle ACB$
Prove: $\Delta ADB \cong \Delta ADC$



2. Given: $\overline{CA} \cong \overline{CB}$
Prove: $\Delta ADM \cong \Delta BEM$



3. Given: $\overline{MN} \cong \overline{NT}$, $\angle ROS \cong \angle RSO$
Prove: $\Delta MOR \cong \Delta TSR$



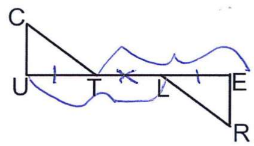
Addition/Subtraction Mini Proofs

Addition and Subtraction Property (If you need more or less of a shared side)

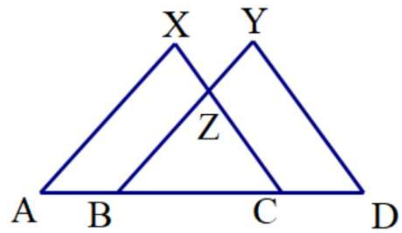
*You must use three congruent statements to get one congruent statement for the triangles. The two that you are adding/subtracting and the one that you want to prove in the triangle.

7. Given: $\overline{UL} \cong \overline{TE}$
Prove: $\Delta CUT \cong \Delta REL$

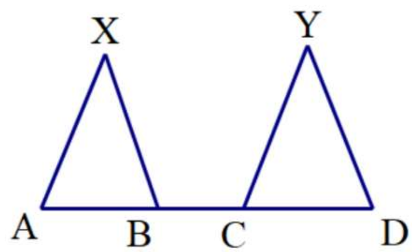
Statements	Reasons
① $\overline{UL} \cong \overline{TE}$	① given
② $\overline{TL} \cong \overline{TL}$	② reflexive property
③ $\overline{UT} \cong \overline{LE}$	③ subtraction property
$\overline{UL} - \overline{TL} \cong \overline{TE} - \overline{TL}$	



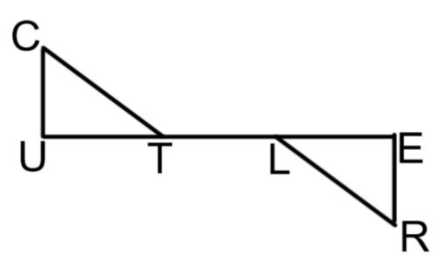
1. Given: $\overline{AB} \cong \overline{CD}$
Prove: $\Delta AXC \cong \Delta BYD$



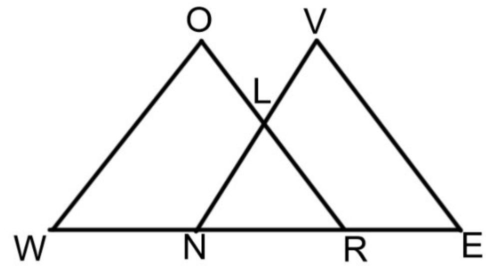
2. Given: $\overline{AC} \cong \overline{BD}$
Prove: $\Delta AXB \cong \Delta DYC$



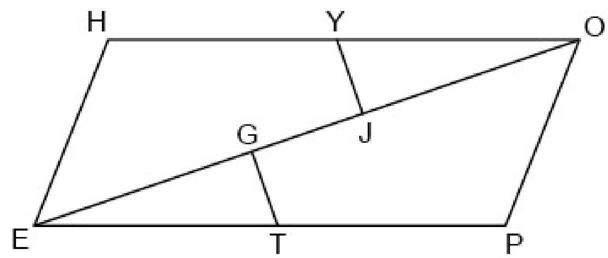
3. Given: $\overline{UL} \cong \overline{TE}$
Prove: $\Delta CUT \cong \Delta REL$



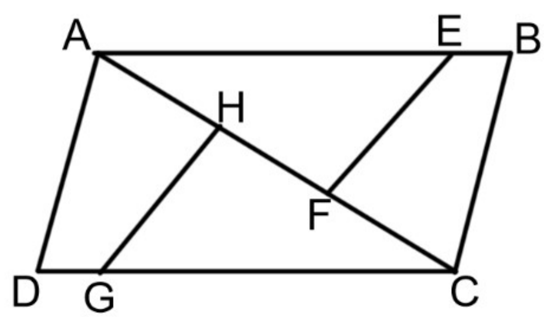
4. Given: $\overline{WN} \cong \overline{RE}$
Prove: $\Delta WOR \cong \Delta NVE$



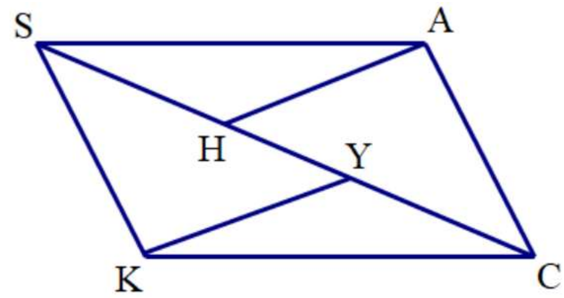
5. Given: $\overline{EJ} \cong \overline{GO}$
Prove: $\Delta TGE \cong \Delta YJO$



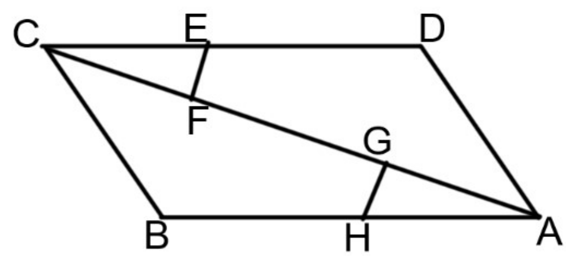
6. Given: $\overline{AE} \cong \overline{GC}$, $\overline{EB} \cong \overline{DG}$
Prove: $\Delta ABC \cong \Delta CDA$



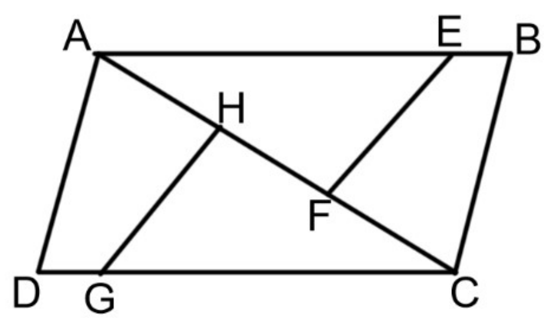
7. Given: $\overline{SY} \cong \overline{HC}$
Prove: $\Delta ASH \cong \Delta KCY$



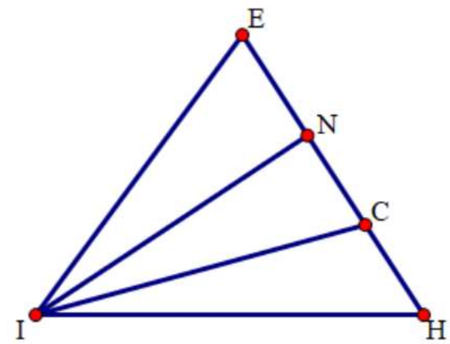
8. Given: $\overline{CE} \cong \overline{AH}$, $\overline{ED} \cong \overline{BH}$
Prove: $\Delta CDA \cong \Delta ABC$



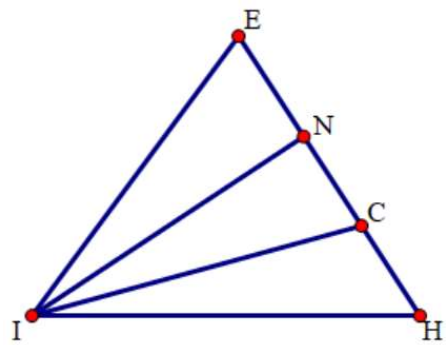
9. Given: $\overline{AH} \cong \overline{FC}$
Prove: $\Delta AFE \cong \Delta CHG$



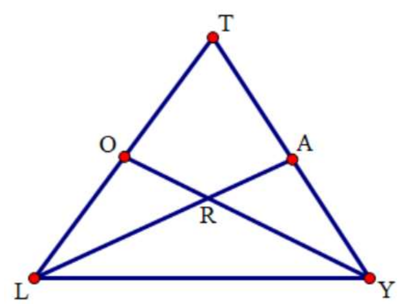
10. Given: $\angle EIN \cong \angle HIC$
Prove: $\angle EIC \cong \angle HIN$



11. Given: $\angle EIC \cong \angle HIN$
Prove: $\angle EIN \cong \angle HIC$



12. Given: $\angle TLA \cong \angle TYO$, $\angle ALY \cong \angle OYL$
Prove: $\angle TLY \cong \angle TYL$

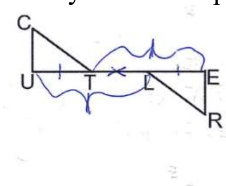


Triangle Proofs with Additional Tools

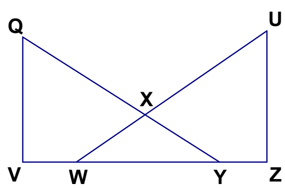
Vertical Angles are congruent (Look for an X)
Reflexive Property (A side/angle is congruent to itself)
Isosceles Triangles (In a triangle, congruent angles are opposite congruent sides)
Addition and Subtraction Property (If you need more or less of a shared side)
*You must use three congruent statements to get one congruent statement for the triangles. The two that you are adding/subtracting and the one that you want to prove in the triangle.

7. Given: $\overline{UL} \cong \overline{TE}$
Prove: $\overline{UT} \cong \overline{LE}$

statements	Reasons
① $\overline{UL} \cong \overline{TE}$	① given
② $\overline{TL} \cong \overline{TL}$	② reflexive property
③ $\overline{UT} \cong \overline{LE}$	③ subtraction property

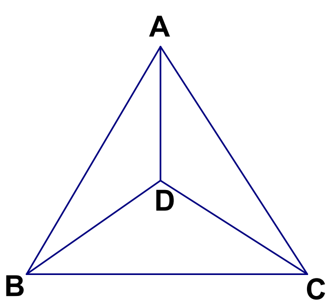


1. Given: $\overline{QV} \cong \overline{UZ}$, $\overline{VW} \cong \overline{YZ}$, $\overline{YQ} \cong \overline{WU}$
Prove: $\angle Q \cong \angle U$



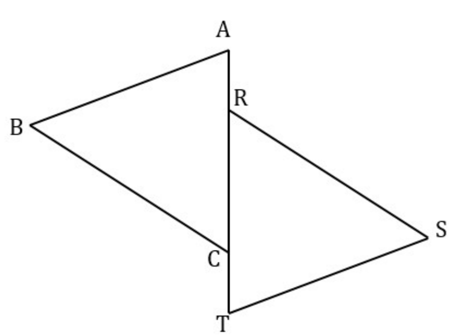
2. Given: $\angle ABC \cong \angle ACB$, $\overline{AD}$ bisects $\angle BAC$

Prove: $\overline{BD} \cong \overline{DC}$



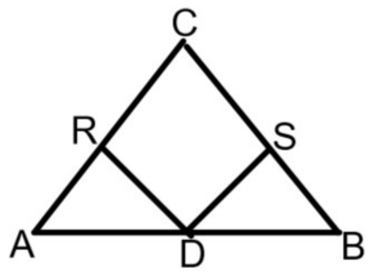
3. Given: $\angle B \cong \angle S$, $\overline{AB} \parallel \overline{ST}$, $\overline{AR} \cong \overline{TC}$

Prove: $\overline{BC} \cong \overline{SR}$



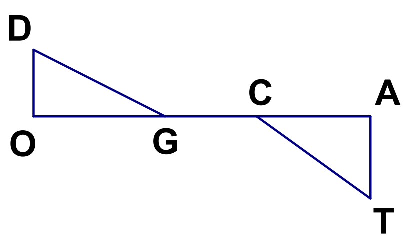
4. Given: In ΔABC, $\overline{CA} \cong \overline{CB}$, $\overline{AR} \cong \overline{BS}$, $\overline{DR} \perp \overline{AC}$, and $\overline{DS} \perp \overline{BC}$

Prove: $\overline{DR} \cong \overline{DS}$



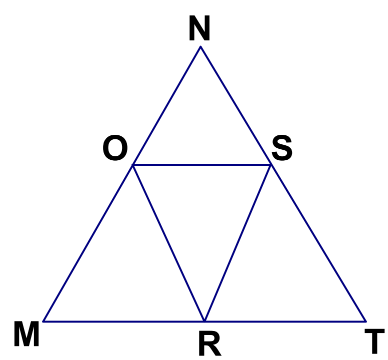
5. Given: $\overline{DO} \perp \overline{OA}$, $\overline{TA} \perp \overline{OA}$, $\overline{DO} \cong \overline{TA}$, $\overline{OC} \cong \overline{AG}$

Prove: $\overline{DG} \cong \overline{TC}$



6. Given: $\overline{MN} \cong \overline{NT}$, $\angle ROS \cong \angle RSO$, $\angle ORM \cong \angle SRT$

Prove: $\Delta MOR \cong \Delta TSR$

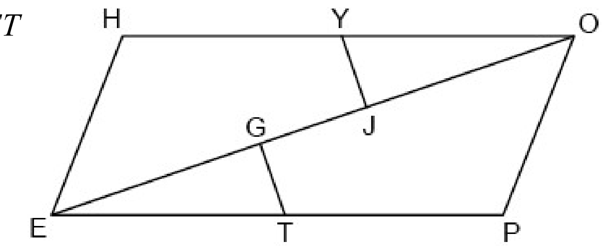


Proving Alternate Interior Angles Given a Parallelogram (Mini Proofs)

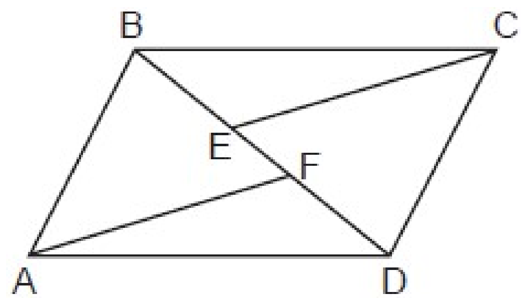
Given a Parallelogram, carve out the transversal to find the appropriate alternate interior angles and label them angle 1 and angle 2.

A parallelogram has parallel lines cut by a transversal which create congruent alternate interior angles.

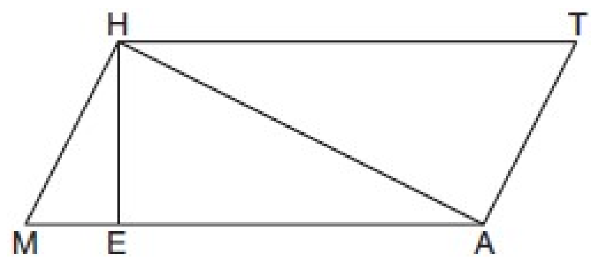
1. Given *HOPE* is a parallelogram, prove $\Delta JOY \cong \Delta GET$



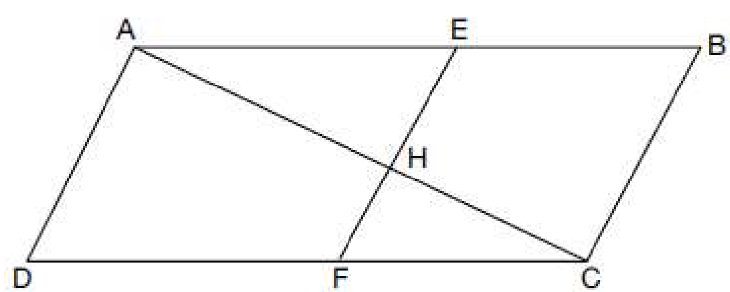
2. Given *ABCD* is a parallelogram, prove $\Delta BCE \cong \Delta DAF$



3. Given *MATH* is a parallelogram, prove $\Delta HAT \sim \Delta AEH$



4. Given *ABCD* is a parallelogram, prove $\Delta AEH \sim \Delta CFH$



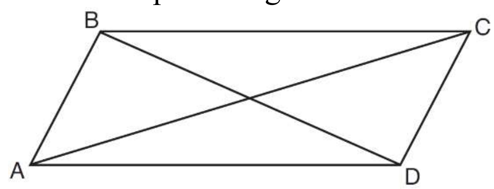
Proving Parallelogram Mini Proofs

To prove parallelograms: Always prove parallelogram first. You will probably have to use congruent triangles with CPCTC to get at least one of the properties.

1. Quadrilateral *ABCD* with diagonals $\overline{AC}$ and $\overline{BD}$ is shown in the diagram below.

Which information is *not* enough to prove *ABCD* is a parallelogram?

1) $\overline{AB} \cong \overline{CD}$ and $\overline{AB} \parallel \overline{DC}$
2) $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \cong \overline{DA}$
3) $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \parallel \overline{AD}$
4) $\overline{AB} \parallel \overline{DC}$ and $\overline{BC} \parallel \overline{AD}$



2. Quadrilateral *ABCD* has diagonals $\overline{AC}$ and $\overline{BD}$. Which information is *not* sufficient to prove *ABCD* is a parallelogram?

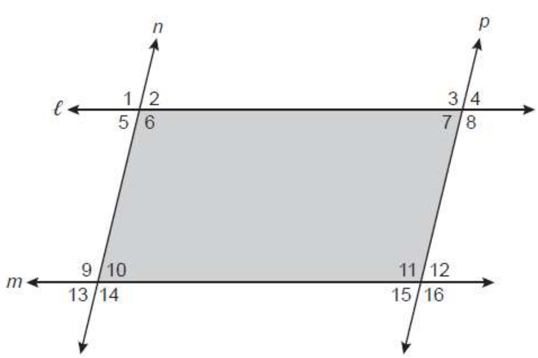
1) $\overline{AC}$ and $\overline{BD}$ bisect each other.
2) $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \cong \overline{AD}$
3) $\overline{AB} \cong \overline{CD}$ and $\overline{AB} \parallel \overline{CD}$
4) $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \parallel \overline{AD}$

3. Quadrilateral *BEST* has diagonals that intersect at point *D*. Which statement would *not* be sufficient to prove quadrilateral *BEST* is a parallelogram?

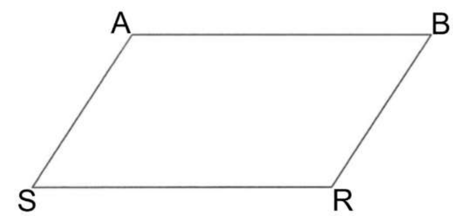
1) $\overline{BD} \cong \overline{SD}$ and $\overline{ED} \cong \overline{TD}$
2) $\overline{BE} \cong \overline{ST}$ and $\overline{ES} \cong \overline{TB}$
3) $\overline{ES} \cong \overline{TB}$ and $\overline{BE} \parallel \overline{TS}$
4) $\overline{ES} \parallel \overline{BT}$ and $\overline{BE} \parallel \overline{TS}$

4. In the diagram below, lines ℓ and *m* intersect lines *n* and *p* to create the shaded quadrilateral as shown.
Which congruence statement would be sufficient to prove the quadrilateral is a parallelogram?

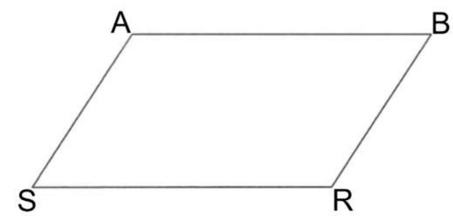
1) $\angle 1 \cong \angle 6$ and $\angle 9 \cong \angle 14$
2) $\angle 5 \cong \angle 10$ and $\angle 6 \cong \angle 9$
3) $\angle 5 \cong \angle 7$ and $\angle 10 \cong \angle 15$
4) $\angle 6 \cong \angle 9$ and $\angle 9 \cong \angle 11$



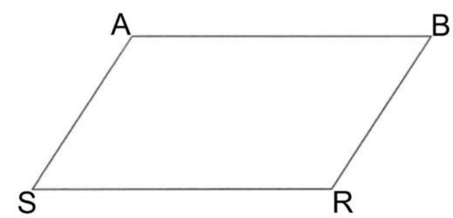
5. Given: $\overline{SA} \cong \overline{BR}$, $\overline{AB} \cong \overline{SR}$
Prove: SABR is a parallelogram



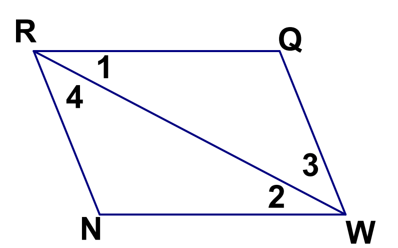
6. Given: $\overline{SA} \parallel \overline{BR}$, $\overline{AB} \parallel \overline{SR}$
Prove: SABR is a parallelogram



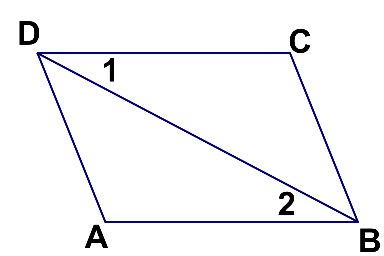
7. Given: $\overline{SA} \cong \overline{BR}$, $\overline{SA} \parallel \overline{BR}$
Prove: SABR is a parallelogram



8. Given: $\angle 1 \cong \angle 2$, $\angle 3 \cong \angle 4$
Prove: NRQW is a parallelogram

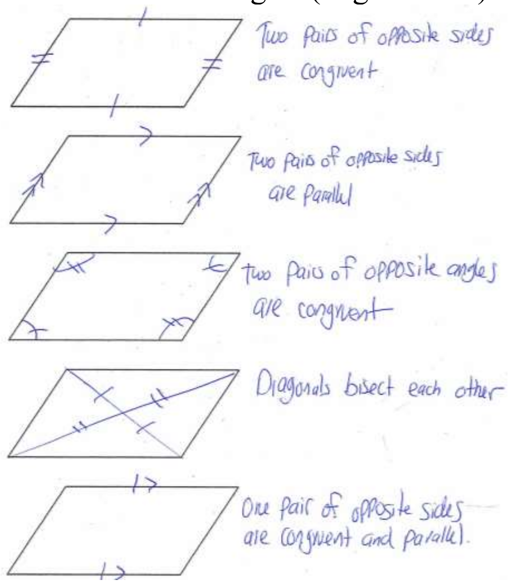


9. Given: $\overline{AB} \cong \overline{CD}$, $\angle 1 \cong \angle 2$
Prove: ABCD is a parallelogram



PART IV PARALLELOGRAM PROOFS!

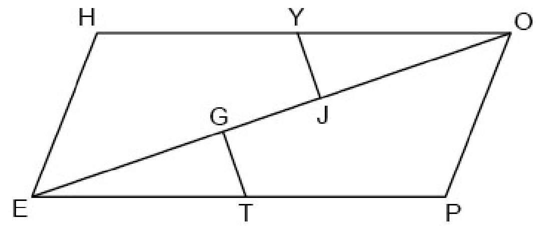
1) Prove the parallelogram (Pages 36-37). You may need to prove sides are parallel using alternate interior angles (Pages 20-21)



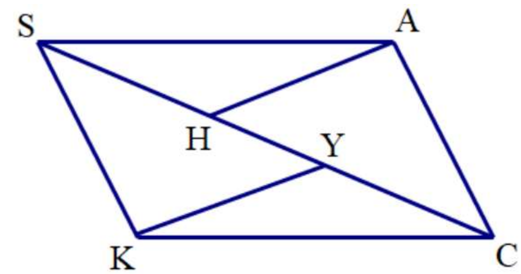
2) Use the parallelogram to prove corresponding parts of triangles are congruent (Pages 14-16). **Expect to prove alternate interior angles are congruent! (Page 35).** Opposite sides are congruent is also very common.

If proving sides/angles:	If proving multiplication
3) **Expect to use addition/subtraction property (Pages 29-31).** 4) State the triangles are congruent 5) State the sides/angles with reason CPCTC	3) Expect to use perpendicular lines form congruent right angles. **4) Work backwards to similar triangles (Pages 12-13)**

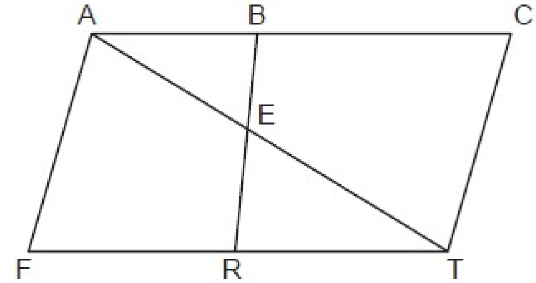
1. In quadrilateral *HOPE* below, $\overline{EH} \cong \overline{OP}$, $\overline{EP} \cong \overline{OH}$, $\overline{EJ} \cong \overline{OG}$, and $\overline{TG}$ and $\overline{YJ}$ are perpendicular to diagonal $\overline{EO}$ at points *G* and *J*, respectively. Prove that $\overline{TG} \cong \overline{YJ}$.



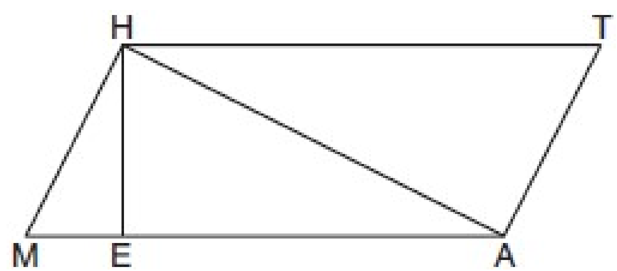
2. In quadrilateral SACK, $\angle KSY \cong \angle ACH$, $\overline{SK} \cong \overline{AC}$, $\overline{SY} \cong \overline{CH}$. Prove $\angle SAH \cong \angle CKY$



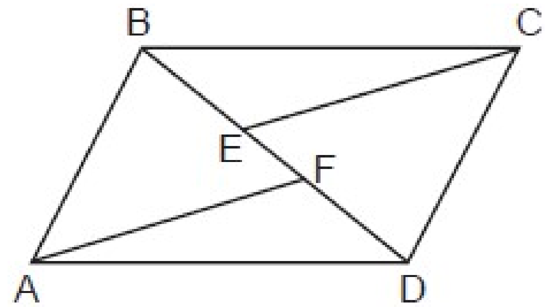
3. In the diagram below of quadrilateral $FACT$, $\overline{BR}$ intersects diagonal $\overline{AT}$ at E, $\overline{AF} \parallel \overline{CT}$, and $\overline{AF} \cong \overline{CT}$. Prove $(AB)(TE) = (AE)(TR)$



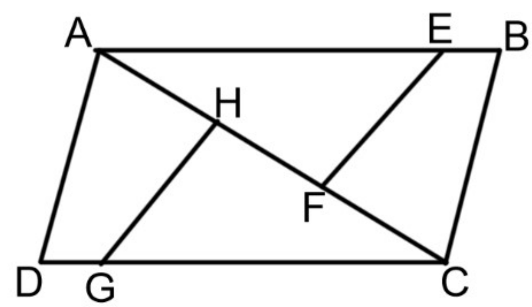
4. Given: Quadrilateral $MATH$, $\overline{HM} \cong \overline{AT}$, $\overline{HT} \cong \overline{AM}$, $\overline{HE} \perp \overline{MEA}$, and $\overline{HA} \perp \overline{AT}$.
Prove: $TA \bullet HA = HE \bullet TH$



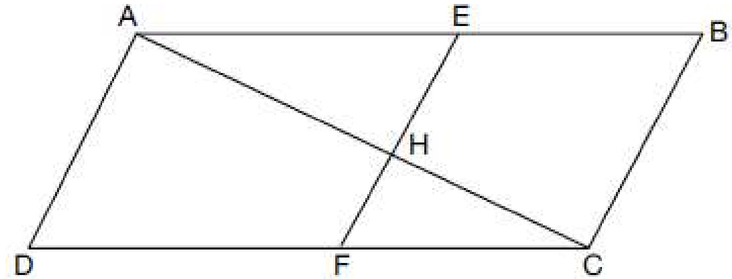
5. In the diagram of quadrilateral *ABCD* below, $\overline{AB} \cong \overline{CD}$, and $\overline{AB} \parallel \overline{CD}$. Segments *CE* and *AF* are drawn to diagonal $\overline{BD}$ such that $\overline{BE} \cong \overline{DF}$. Prove: $\angle BAF \cong \angle DCE$.



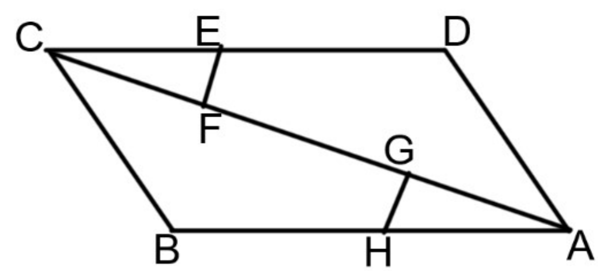
6. Given: $\overline{AE} \cong \overline{CG}$, $\overline{BE} \cong \overline{DG}$, $\overline{AH} \cong \overline{CF}$, $\overline{AD} \cong \overline{CB}$
Prove: $\overline{EF} \cong \overline{GH}$



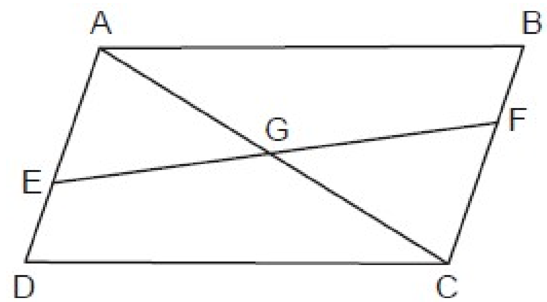
7. Given: Quadrilateral $ABCD$, $\overline{AC}$ and $\overline{EF}$ intersect at H, $\overline{AD} \parallel \overline{BC}$ and $\overline{AD} \cong \overline{BC}$. Prove: $(EH)(CH) = (FH)(AH)$



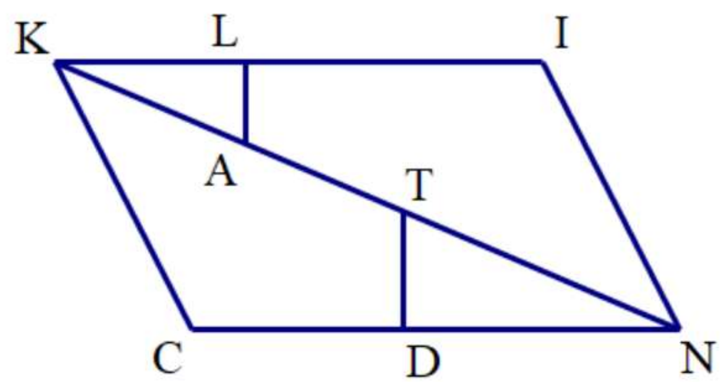
8. Given: $\overline{AB} \cong \overline{DC}$, $\overline{AD} \cong \overline{BC}$, $\overline{AF} \cong \overline{GC}$, $\overline{BH} \cong \overline{DE}$
Prove: $\overline{EF} \cong \overline{GH}$



9. Given: Quadrilateral $ABCD$, $\overline{AB} \cong \overline{CD}$, $\overline{AB} \parallel \overline{CD}$, diagonal $\overline{AC}$ intersects $\overline{EF}$ at G, and $\overline{DE} \cong \overline{BF}$. Prove: G is the midpoint of $\overline{EF}$.



10. Given: $\overline{KC} \parallel \overline{IN}$, $\overline{KC} \cong \overline{IN}$, $\overline{AL} \perp \overline{KI}$, $\overline{TD} \perp \overline{CN}$. Prove $\overline{KL} \bullet \overline{NT} = \overline{DN} \bullet \overline{KA}$



Proving Rectangles/Rhombuses/Squares MC and Mini Proofs

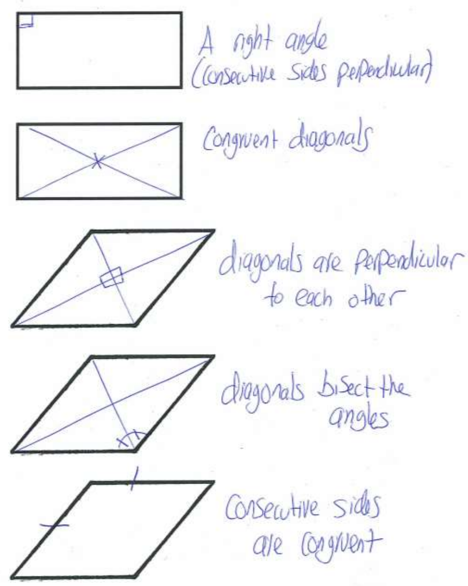
To prove a rectangle:
1) Prove it is a parallelogram
2) Prove one of the two rectangle pictures

To prove a rhombus:
1) Prove it is a parallelogram
2) Prove one of the three rhombus pictures

To prove a square:
1) Prove it is a parallelogram
2) Prove one of the two rectangle pictures AND one of the two rhombus pictures.

To prove a rectangle is a square:
Prove one of the three rhombus pictures

To prove a rhombus is a square:
Prove one of the two rectangle pictures



1. A parallelogram must be a rhombus when its
 1) Diagonals are congruent.
 2) Opposite sides are parallel.
 3) Diagonals are perpendicular.
 4) Opposite angles are congruent.

2. A parallelogram must be a rectangle when its
 1) diagonals are perpendicular
 2) diagonals are congruent
 3) opposite sides are parallel
 4) opposite sides are congruent

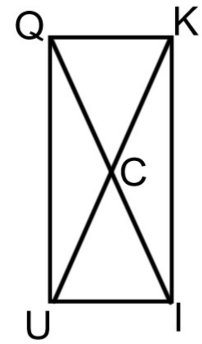
3. A rectangle must be a square when its
 1) angles are right angles
 2) diagonals are congruent
 3) consecutive sides are congruent
 4) opposite sides are parallel

4. A rhombus must be a square when
 1) its consecutive sides are congruent
 2) it has a right angle
 3) its opposite angles are congruent
 4) its diagonals are perpendicular to each other

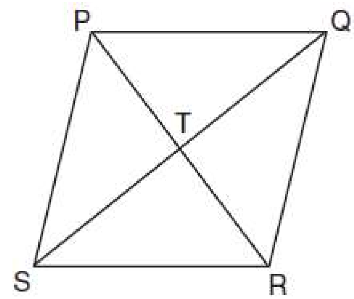
5. A parallelogram must be a rhombus when its
 1) diagonals bisect its angles
 2) opposite angles are congruent
 3) angles are right angles
 4) opposite sides are parallel

6. A rhombus must be a square when its
 1) diagonals bisect its angles
 2) opposite angles are congruent
 3) diagonals are congruent
 4) opposite sides are parallel

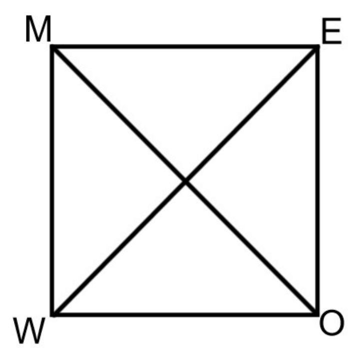
7. Given: *QUIK* is a parallelogram, $\overline{QI} \cong \overline{KU}$
Prove: *QUIK* is a rectangle



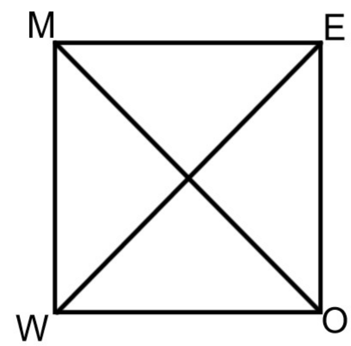
8. Given: *PQRS* is a parallelogram, $\overline{PR} \perp \overline{SQ}$.
Prove: *PQRS* is a rhombus



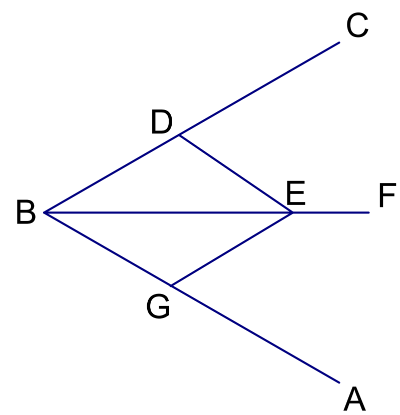
9. Given: *MEOW* is a rhombus, $\overline{MO} \cong \overline{WE}$
Prove: MEOW is a square



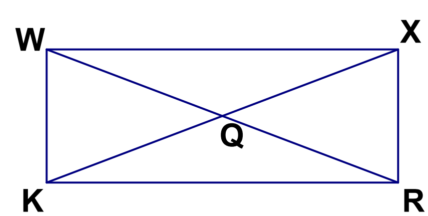
10. Given: *MEOW* is a rectangle, $\overline{ME} \cong \overline{EO}$
Prove: *MEOW* is a square



11. Given: *DEGB* is a parallelogram, $\overline{BF}$ bisects $\angle$CBA
Prove: *DEGB* is a rhombus



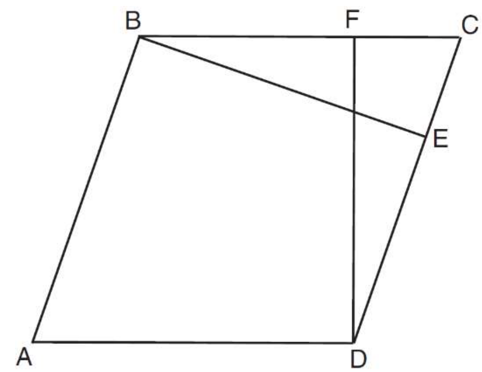
12. Given: *WXRK* is a parallelogram, $\overline{KW} \perp \overline{WX}$
Prove: *WXRK* is a rectangle



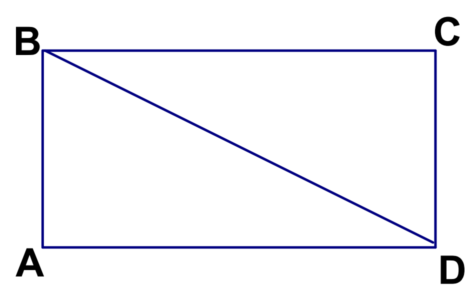
Proving Rectangle/Rhombus/Square Part IVs

1) If not given, prove parallelogram first.
2) Prove the triangles are congruent using givens and/or parallelogram properties.
3) Use CPCTC and/or the givens to prove one of the 3 rhombus proves or one of the two rectangle proves.

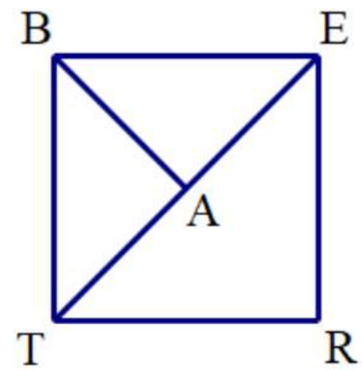
1. In the diagram of parallelogram *ABCD* below, $\overline{BE} \perp \overline{CED}$, $\overline{DF} \perp \overline{BFC}$, $\overline{CE} \cong \overline{CF}$.
Prove *ABCD* is a rhombus.



2. Given: $\overline{BC} \parallel \overline{AD}$, $\overline{BA} \perp \overline{AD}$, $\overline{BC} \perp \overline{CD}$
Prove: *ABCD* is a rectangle



3. Given: *BERT* is a rectangle, $\overline{BA}$ is the perpendicular bisector of $\overline{TE}$. Prove *BERT* is a square.



4. Given: Parallelogram *ABCD*, $\overline{BF} \perp \overline{AFD}$, and $\overline{DE} \perp \overline{BEC}$
Prove: *BEDF* is a rectangle