Name:

Common Core Geometry

Unit 8

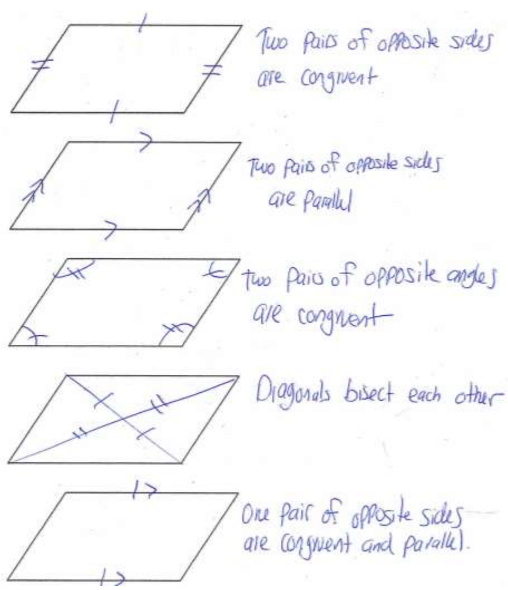
Quadrilateral Properties and Proofs

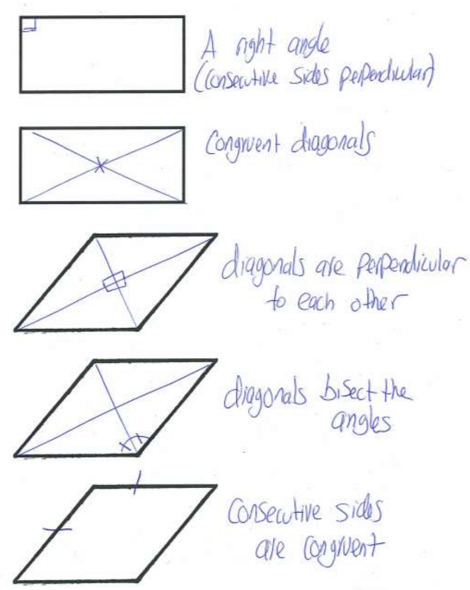
Mr. Schlansky

2025

Lesson 1: I can identify vocabulary for quadrilaterals by understanding the definitions
Opposite sides: sides that do not touch
Consecutive sides: sides that touch
Opposite angles: Angles that are diagonal from each other
Consecutive angles: Angles that are next to each other
Diagonals: Segments that extend from a vertex diagonally to the opposite vertex

Lesson 2: I can identify quadrilaterals by their properties





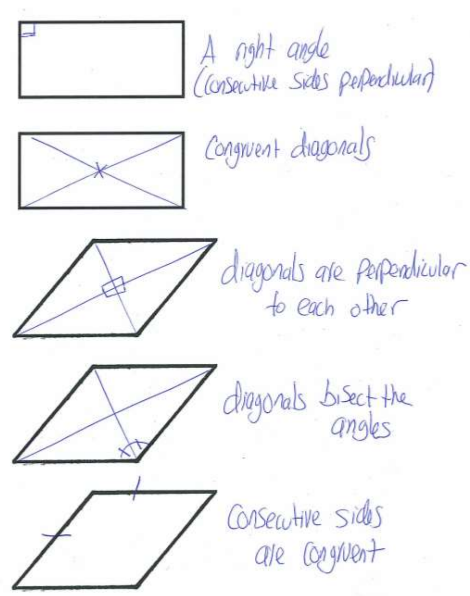
A trapezoid has 1 pair of opposite sides parallel and 1 pair of opposite sides not parallel
An isosceles trapezoid has congruent legs, congruent diagonals, congruent base angles
A

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



Lesson 3: I can find sides of quadrilaterals using parallelogram properties and algebra.
Create an equation using the notes from Lesson 2. If parts are equal, set them equal to each other.

Lesson 4: I can find the perimeter of a rhombus using Pythagorean Theorem.
A rhombus contains right angles (perpendicular diagonals)
A rhombus has diagonals that bisect each other (Cut the diagonals in half).
Use Pythagorean Theorem to find the side of the rhombus
Multiply the side by 4 (all sides are congruent) to find the perimeter.

Lesson 5: I can find angles of quadrilaterals by looking for linear pairs, angles of a triangle, angle of a quadrilateral, isosceles triangles, angle bisectors, and quadrilateral properties.
Angles of a Parallelogram: (Combined with Complex Triangle Problems)

1) Opposite angles of a parallelogram are congruent
2) Consecutive angles of a parallelogram are supplementary (add to 180)
3) The three angles of a triangle add to equal 180º. Look for triangles.
   *The four angles of a quadrilateral add to 360º.
4) Linear pairs add to 180º. Look for linear pairs.
5) Vertical angles are congruent. Look for an X (intersecting lines).
6) Isosceles triangle has congruent angles opposite congruent sides (given congruent sides).
7) Equilateral triangle has angles 60, 60, 60 (given equilateral triangle).
8) An angle bisector cuts an angle into two congruent halves (given bisected angles).
9) Use alternate interior angles are congruent using the parallel lines.

Lesson 6: I can prove alternate interior angles are congruent given a parallelogram by carving out the parallel lines and the transversal.
When given or having proved a parallelogram, LOOK FOR ALTERNATE INTERIOR ANGLES. Carve out the parallel lines and the transversal.

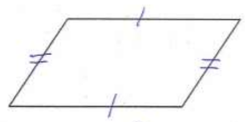
Lesson 7: I can prove triangles are congruent using parallelogram properties

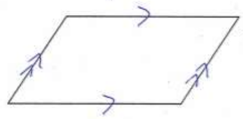
Parallelogram Theorems A parallelogram has **two pairs of opposite sides congruent** A parallelogram has **parallel lines cut by a transversal that form congruent alternate interior angles** A parallelogram has two pairs of opposite angles congruent A parallelogram has diagonals that bisect each other
Rectangle Theorems A rectangle has **congruent right angles** A rectangle has congruent diagonals A rectangle has **two pairs of opposite sides congruent.** A rectangle has parallel lines cut by a transversal that form congruent alternate interior angles A rectangle has two pairs of opposite angles congruent A rectangle has diagonals that bisect each other
Rhombus Theorems A rhombus has **consecutive sides congruent** A rhombus has perpendicular diagonals A rhombus has diagonals that bisect its angles A rhombus has two pairs of opposite sides congruent A rhombus has parallel lines cut by a transversal that form congruent alternate interior angles A rhombus has two pairs of opposite angles congruent A rhombus has diagonals that bisect each other
Square Theorems A square has **congruent right angles** A square has **consecutive sides congruent** A square has congruent diagonals A square has perpendicular diagonals A square has diagonals that bisect its angles A square has two pairs of opposite sides congruent A square has parallel lines cut by a transversal that form congruent alternate interior angles A square has two pairs of opposite angles congruent A square has diagonals that bisect each other
Isosceles Trapezoid Theorems A trapezoid has **parallel lines cut by a transversal that form congruent alternate interior angles** An isosceles trapezoid has congruent legs An isosceles trapezoid has congruent diagonals

Lesson 8: I can prove segments are parallel by carving out congruent alternate interior angles.

Given alternate interior angles are congruent, carve out the angle to identify your Z. The two lines that make up the Z are the parallel lines.
Parallel lines cut by a transversal create congruent alternate interior angles.

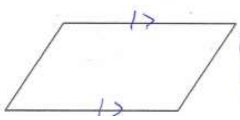
Lesson 9: I can prove parallelograms by knowing the five ways to prove parallelograms (Mini Proofs)
To prove a parallelogram, prove one of the five pictures below.


Two pairs of opposite sides are congruent


Two pairs of opposite sides are parallel


Two pairs of opposite angles are congruent

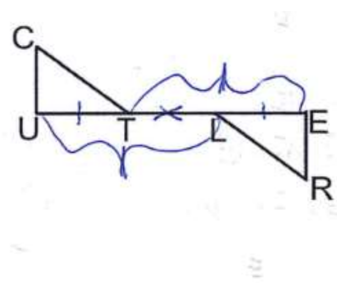

Diagonals bisect each other


One pair of opposite sides are congruent and parallel.

Lesson 10: I can prove segments congruent given parts of those segments using addition and subtraction properties.
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



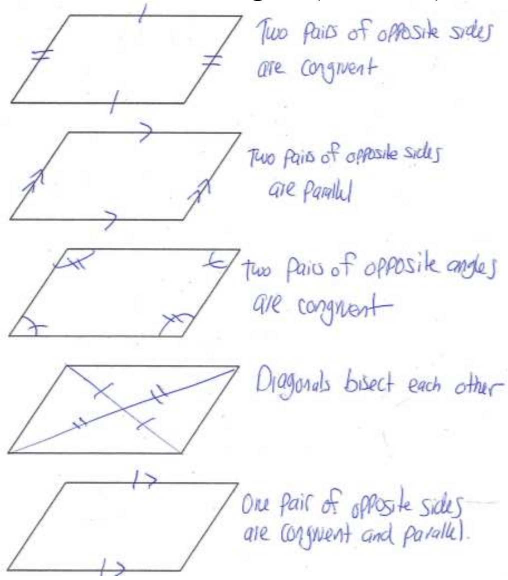
Lesson 11: I can prove multiplication by working backwards to prove triangles are similar using AA.
To prove triangles are SIMILAR, prove AA
Work Backwards!

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

To work backwards:
1) Put the segments being multiplied diagonal from each other in a proportion.
2) Look at the letters in the proportion horizontally and vertically. Whichever direction has letters that make a triangle, those are your triangles to prove similar.
3) Prove triangles are similar using

Lesson 12: I can complete Part IV parallelogram proofs by proving a parallelogram and using the parallelogram to prove triangles are congruent.

1) Prove the parallelogram (Lesson 9). You may need to prove sides are parallel using alternate interior angles (Lesson 8)



2) Use the parallelogram to prove corresponding parts of triangles are congruent (Lesson 7). **Expect to prove alternate interior angles are congruent! (Lesson 6).** Opposite sides are congruent is also very common.

If proving sides/angles:	If proving multiplication
3) **Expect to use addition/subtraction property (Lesson 10).** 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 (Lesson 11)**

Lesson 13-14: I can prove rectangles, rhombuses, and squares by knowing how to prove each shape.

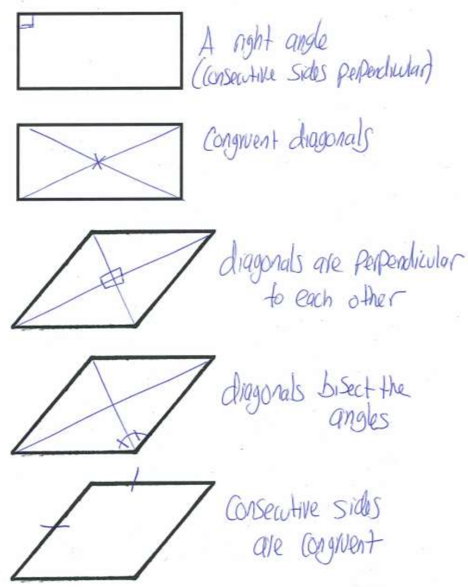
To prove a rectangle:
1) Prove it is a parallelogram
2) Prove one of the two rectangle pictures

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



Lesson 15: I can complete Part IV rectangle, rhombus, and square proofs by knowing the two rectangle proves, the 3 rhombus proves, and proving both a rectangle and a rhombus in order to prove a square.

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.

*Refer to same notes from Lesson 14.

Lesson 16: I can prepare for my quadrilateral properties test by practicing!

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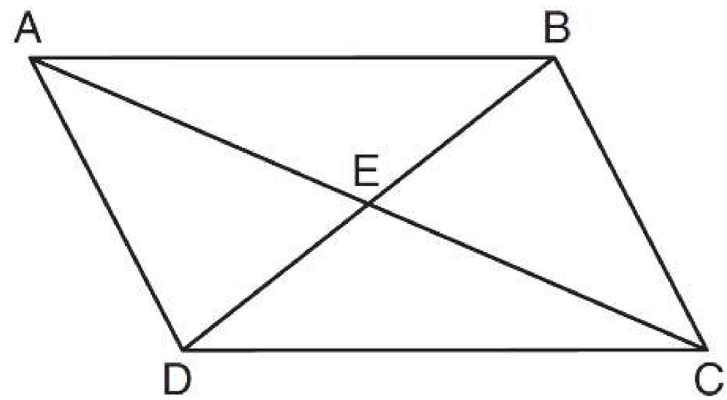
Quadrilateral Vocabulary



1. Name two pairs of *opposite* sides.

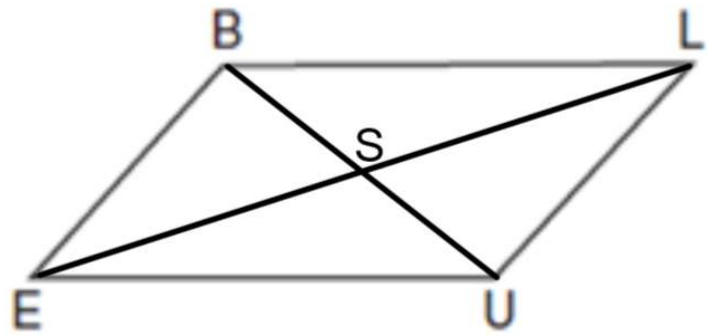
2. Name four pairs of *consecutive* sides.

3. Name two pairs of *opposite* angles.

4. Name four pairs of *consecutive* angles.

5. Name the two diagonals.

6. Name two pairs of *opposite* sides.



7. Name four pairs of *consecutive* sides.

8. Name two pairs of *opposite* angles.

9. Name four pairs of *consecutive* angles.

10. Name the two diagonals

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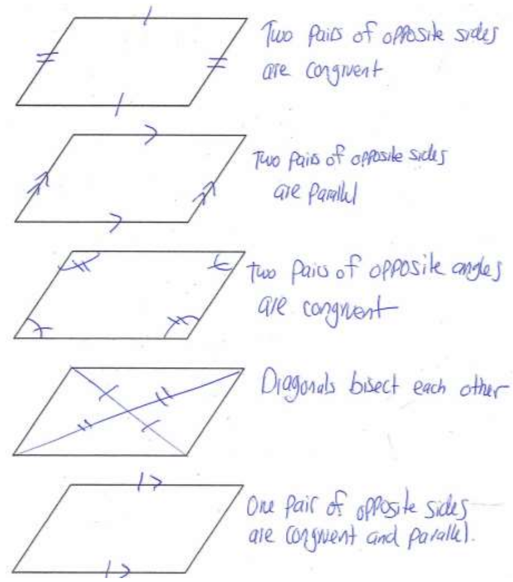
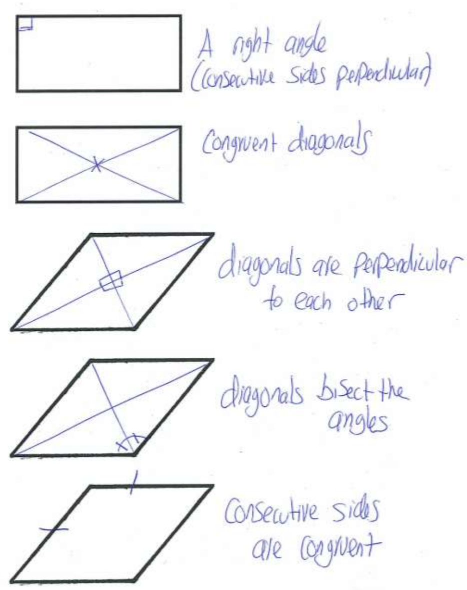
Quadrilateral Properties



1. A quadrilateral whose diagonals bisect each other and are perpendicular is a
 1) rhombus
 2) rectangle
 3) trapezoid
 4) parallelogram

2. If the diagonals of a quadrilateral do *not* bisect each other, then the quadrilateral could be a
 1) rectangle
 2) rhombus
 3) square
 4) trapezoid

3. A quadrilateral whose diagonals are always congruent and perpendicular to each other must be a
 1) rectangle
 2) rhombus
 3) square
 4) trapezoid



4. Which quadrilateral has diagonals that always bisect its angles and also bisect each other?
 1) rhombus
 2) rectangle
 3) parallelogram
 4) isosceles trapezoid

5. Which quadrilateral has diagonals that always are congruent and also bisect each other?
1) isosceles trapezoid
2) rectangle
3) rhombus
4) parallelogram

6. The diagonals of a quadrilateral are congruent but do not bisect each other. This quadrilateral is
1) an isosceles trapezoid
2) a parallelogram
3) a rectangle
4) a rhombus

7. Given three distinct quadrilaterals, a square, a rectangle, and a rhombus, which quadrilaterals must have perpendicular diagonals?
1) the rhombus, only
2) the rectangle and the square
3) the rhombus and the square
4) the rectangle, the rhombus, and the square

8. 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.

9. 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

10. A rectangle must be a square when its
1) angles are right angles
2) diagonals are congruent
3) diagonals are perpendicular to each other
4) opposite sides are parallel

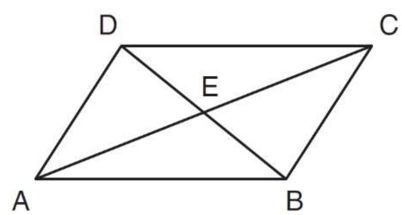
11. A rhombus must be a square when its
1) consecutive sides are congruent
2) diagonals are congruent
3) opposite angles are congruent
4) diagonals are perpendicular to each other

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

13. Which of the following properties does not make a parallelogram a rhombus?
1) diagonals bisect the angles
2) diagonals are perpendicular to each other
3) opposite angles are congruent
4) consecutive sides are congruent

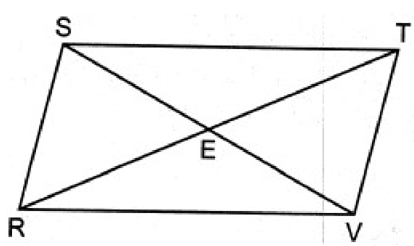
14. Which of the following properties does not make a rhombus a square?
1) Diagonals are congruent
2) Diagonals are perpendicular to each other
3) Angles are right angles
4) Consecutive angles are congruent

15. In the diagram below, parallelogram *ABCD* has diagonals $\overline{AC}$ and $\overline{BD}$ that intersect at point *E*.



Which expression is *not* always true?
1) $\angle DAE \cong \angle BCE$
2) $\angle DEC \cong \angle BEA$
3) $\overline{AC} \cong \overline{DB}$
4) $\overline{DE} \cong \overline{EB}$

16. In the diagram below of parallelogram *RSTV*, diagonals $\overline{SV}$ and $\overline{RT}$ intersect at *E*.



Which statement is always true?
1) $\overline{SR} \cong \overline{RV}$
2) $\overline{RT} \cong \overline{SV}$
3) $\overline{SE} \cong \overline{RE}$
4) $\overline{RE} \cong \overline{TE}$

17. If *ABCD* is a parallelogram, which statement would prove that *ABCD* is a rhombus?

1) $\angle ABC \cong \angle CDA$
2) $\overline{AC} \cong \overline{BD}$
3) $\overline{AC} \perp \overline{BD}$
4) $\overline{AB} \perp \overline{CD}$

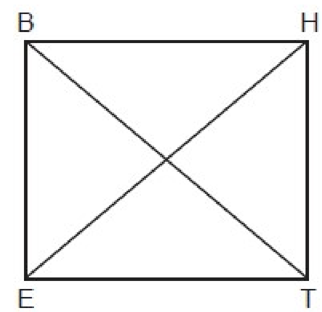
18. If *ABCD* is a parallelogram, which statement would prove that *ABCD* is a rectangle?

1) $\angle ABC \cong \angle CDA$
2) $\overline{AC} \cong \overline{BD}$
3) $\overline{AC} \perp \overline{BD}$
4) $\overline{AB} \perp \overline{CD}$

19. In rectangle *ABCD*, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at *E*. Which statement does *not* prove rectangle *ABCD* is a square?

1) $\overline{AC} \cong \overline{DB}$
2) $\overline{AB} \cong \overline{BC}$
3) $\overline{AC} \perp \overline{DB}$
4) $\overline{AC}$ bisects $\angle DCB$

20. Parallelogram *BETH*, with diagonals $\overline{BT}$ and $\overline{HE}$, is drawn below. What additional information is sufficient to prove that *BETH* is a rectangle?



1) $\overline{BT} \perp \overline{HE}$
2) $\overline{BE} \parallel \overline{HT}$
3) $\overline{BT} \cong \overline{HE}$
4) $\overline{BE} \cong \overline{ET}$

21. Parallelogram *EATK* has diagonals $\overline{ET}$ and $\overline{AK}$. Which information is always sufficient to prove *EATK* is a rhombus?

1) $\overline{EA} \perp \overline{AT}$
2) $\overline{EA} \cong \overline{AT}$
3) $\overline{ET} \cong \overline{AK}$
4) $\overline{ET} \cong \overline{AT}$

22. Which congruence statement is sufficient to prove parallelogram *MARK* is a rhombus?

1) $\overline{MA} \cong \overline{MK}$
2) $\overline{MA} \cong \overline{KR}$
3) $\angle K \cong \angle A$
4) $\angle R \cong \angle A$

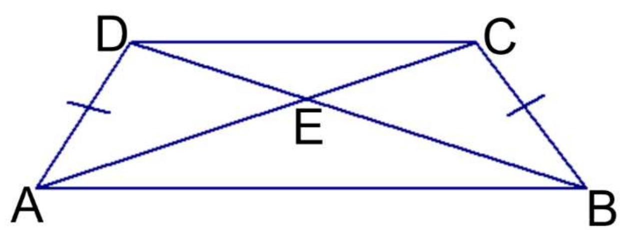
23. If $ABCD$ is a parallelogram, which additional information is sufficient to prove that $ABCD$ is a rectangle?

1) $\overline{AB} \cong \overline{BC}$
2) $\overline{AB} \parallel \overline{CD}$
3) $\overline{AC} \cong \overline{BD}$
4) $\overline{AC} \perp \overline{BD}$

24. In quadrilateral $TOWN$, $\overline{OW} \cong \overline{TN}$ and $\overline{OT} \cong \overline{WN}$. Which additional piece of information is sufficient to prove quadrilateral $TOWN$ is a rhombus?

1) $\overline{ON} \perp \overline{TW}$
2) $\overline{TO} \perp \overline{OW}$
3) $\overline{OW} \parallel \overline{TN}$
4) $\overline{ON}$ and $\overline{TW}$ bisect each other

25. In the diagram below, isosceles trapezoid ABCD has diagonals $\overline{AC}$ and $\overline{BD}$ that intersect at point E.



Which expression is *not* always true?

1) $\overline{AC} \cong \overline{DB}$
2) $\overline{DC} \parallel \overline{AB}$
3) $\overline{DE} \cong \overline{AE}$
4) $\overline{AD} \cong \overline{CB}$

26. Which statement would prove rectangle $CAMI$ is a square?

1) $\overline{CA} \cong \overline{AM}$
2) $\overline{CM} \cong \overline{AI}$
3) $\overline{CA} \cong \overline{MI}$
4) $\overline{MA} \perp \overline{AC}$

27. Which statement would prove parallelogram $MARK$ is a rectangle?

1) $\overline{MA} \cong \overline{MK}$
2) $\overline{MA} \cong \overline{RK}$
3) $\overline{MR} \perp \overline{AK}$
4) $\overline{MA} \perp \overline{AK}$

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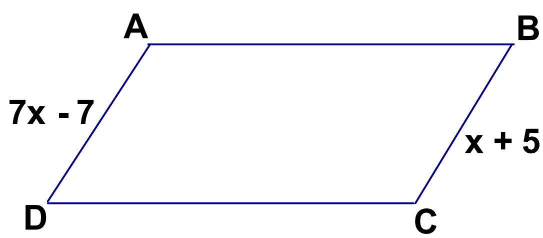
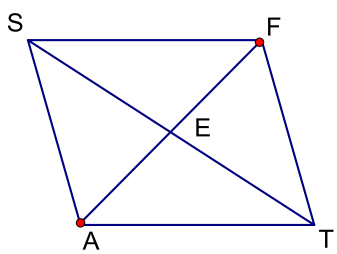
Quadrilateral Properties with Algebra Segments

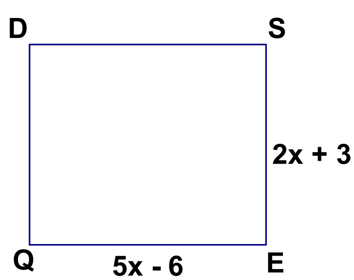
1. ABCD is a parallelogram. Find the measure of $\overline{AD}$ and $\overline{BC}$ and explain your answer.



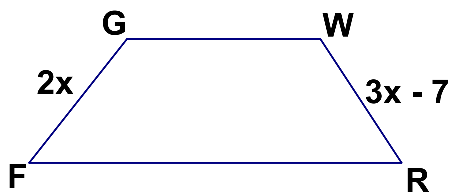
2. SFAT is a rhombus with $\overline{AE} = 2x - 3$ and $\overline{EF} = 5x - 21$.
Find $\overline{EF}$ and explain your answer.



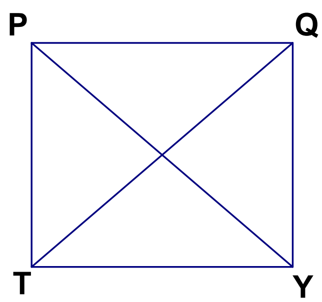
3. DSEQ is a square. $m\overline{QE} = 5x - 6$ and $m\overline{SE} = 2x + 3$. Find all sides of the square and explain your answer.



4. Quad FGWR is an isosceles trapezoid. Find $\overline{WR}$ and explain your answer.

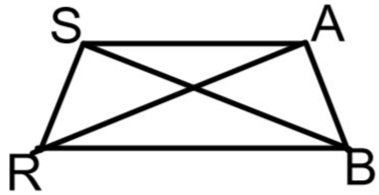


5. PQYT is a square. $\overline{QT} = 3x - 2$ and $\overline{PY} = 5x - 15$. Find $\overline{QT}$ and $\overline{PY}$ and explain your answer.



6. In rectangle ABCD, $\overline{AB} = x + 4$, $\overline{BC} = 4x$, $\overline{AC} = 6x - 2$, and $\overline{BD} = 3x + 4$. Find $\overline{AD}$.

7. In trapezoid SABR, $\overline{SA} = 2x + 2$, $\overline{SB} = 3x$, $\overline{RB} = 4x - 1$, and $\overline{AR} = 6x - 12$.
What value of x would make SABR an isosceles trapezoid?



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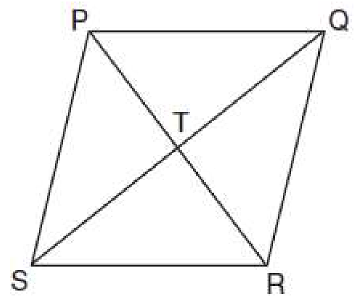
Perimeter of a Rhombus

1. In the diagram of rhombus *PQRS* below, the diagonals $\overline{PR}$ and $\overline{QS}$ intersect at point *T*, $PR = 16$, and $QS = 30$. Determine and state the perimeter of *PQRS*.



2. A rhombus has diagonals that measure 6 and 8. Find the perimeter of the rhombus.

3. A rhombus has diagonals that measure 10 and 24. Find the perimeter of the rhombus.

4. In parallelogram *LYSA*, $\overline{LY} \cong \overline{YS}$. If $\overline{LS} = 14$ and $\overline{YA} = 48$, find the perimeter of *LYSA*.

5. In parallelogram *MILO*, $\overline{ML}$ bisects $\angle IMO$. If $\overline{ML} = 20$ and $\overline{IO} = 48$, find the perimeter of *MILO*.

6. In parallelogram *ABCD* with $\overline{AC} \perp \overline{BD}$, $AC = 12$ and $BD = 16$. What is the perimeter of *ABCD*?

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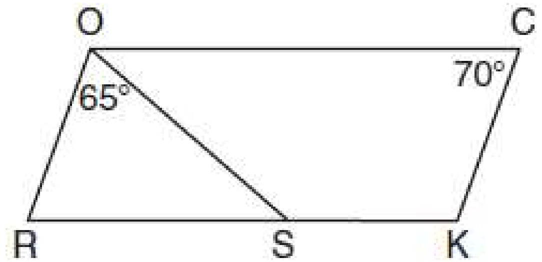
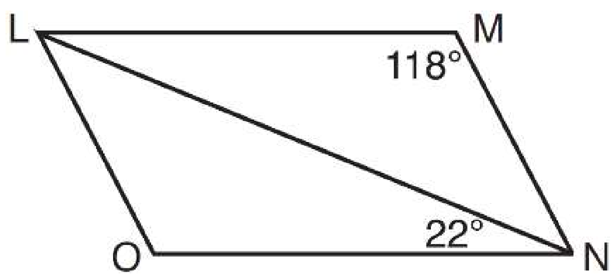
Complex Triangle Problems with Parallelograms

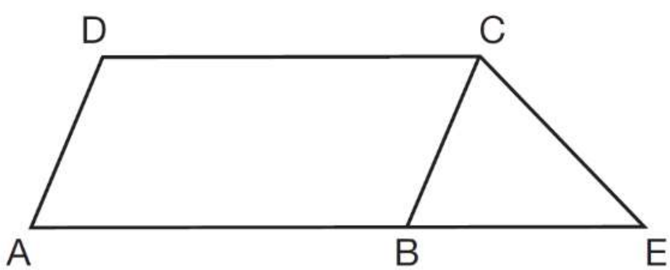
1. In the diagram below of parallelogram *ROCK*, $m\angle C$ is 70° and $m\angle ROS$ is 65°. What is $m\angle KSO$?



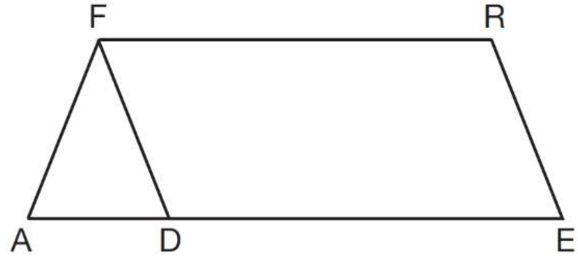
2. The diagram below shows parallelogram *LMNO* with diagonal $\overline{LN}$, $m\angle M = 118°$, and $m\angle LNO = 22°$. Find $m\angle NLO$.



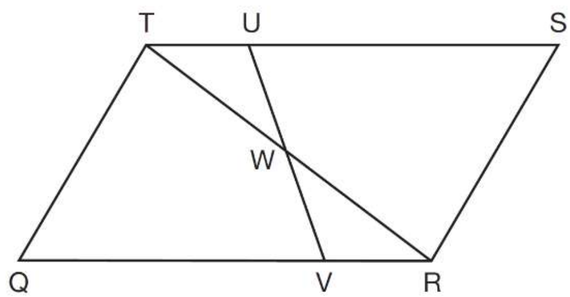
3. In the diagram below, *ABCD* is a parallelogram, $\overline{AB}$ is extended through *B* to *E*, and $\overline{CE}$ is drawn. If $\overline{CE} \cong \overline{BE}$ and $m\angle D = 112°$, what is $m\angle E$?



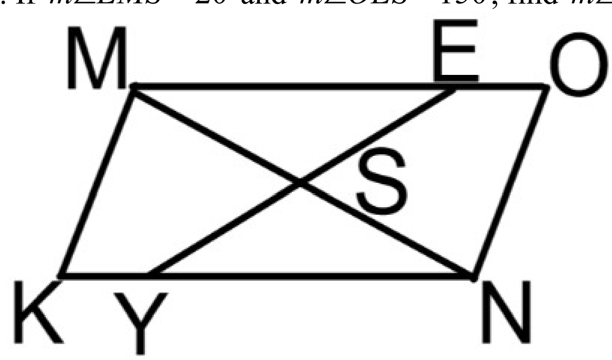
4. In the diagram of parallelogram $FRED$ shown below, $\overline{ED}$ is extended to A, and $\overline{AF}$ is drawn such that $\overline{AF} \cong \overline{DF}$. If $m\angle R = 124°$, what is $m\angle AFD$?



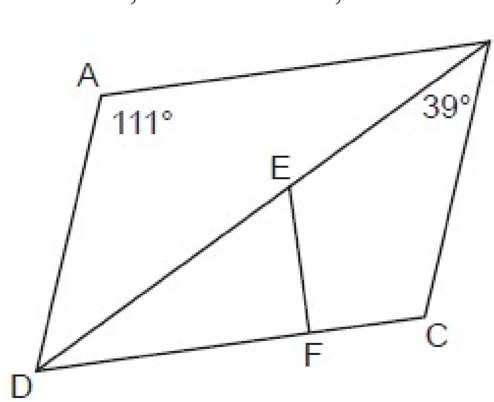
5. In parallelogram $QRST$ shown below, diagonal $\overline{TR}$ is drawn, U and V are points on $\overline{TS}$ and $\overline{QR}$, respectively, and $\overline{UV}$ intersects $\overline{TR}$ at W. If $m\angle S = 60°$, $m\angle SRT = 83°$, and $m\angle TWU = 35°$, what is $m\angle WVQ$?



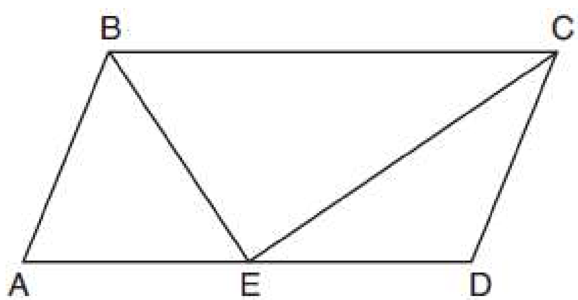
6. In parallelogram MONK shown below, diagonal $\overline{MN}$ is drawn, $\overline{MN}$ intersects $\overline{EY}$ at S. If $m\angle EMS = 20$ and $m\angle OES = 150$, find $m\angle NSY$.



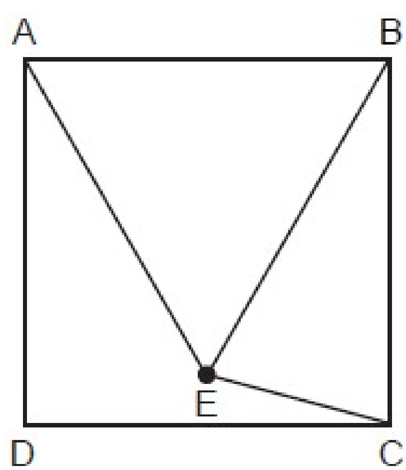
7. In the diagram below of parallelogram *ABCD*, diagonal $\overline{BED}$ and $\overline{EF}$ are drawn, $\overline{EF} \perp \overline{DFC}$, $m\angle DAB = 111°$, and $m\angle DBC = 39°$. What is $m\angle DEF$?



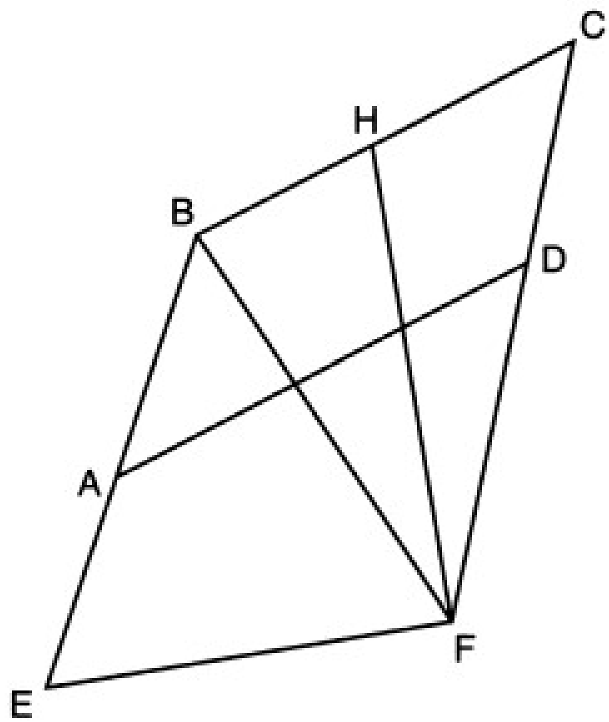
8. In parallelogram *ABCD* shown below, the bisectors of $\angle ABC$ and $\angle DCB$ meet at *E*, a point on $\overline{AD}$.
If $m\angle A = 68°$, determine and state $m\angle BEC$.



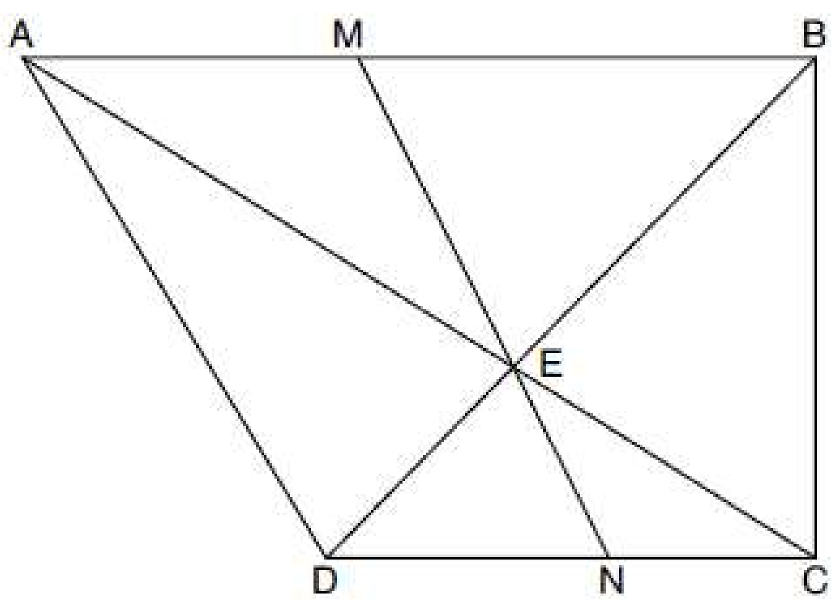
9. In the diagram below, point *E* is located inside square *ABCD* such that $\triangle ABE$ is equilateral, and $\overline{CE}$ is drawn. What is $m\angle BEC$?



10. Quadrilateral *EBCF* and $\overline{AD}$ are drawn below, such that *ABCD* is a parallelogram, $\overline{EB} \cong \overline{FB}$, and $\overline{EF} \perp \overline{FH}$. If $m\angle E = 62°$ and $m\angle C = 51°$, what is $m\angle FHB$?



11. Trapezoid *ABCD*, where $\overline{AB} \parallel \overline{CD}$, is shown below. Diagonals $\overline{AC}$ and $\overline{DB}$ intersect $\overline{MN}$ at *E*, and $\overline{AD} \cong \overline{AE}$. If $m\angle DAE = 35°$, $m\angle DCE = 25°$, and $m\angle NEC = 30°$, determine and state $m\angle ABD$.



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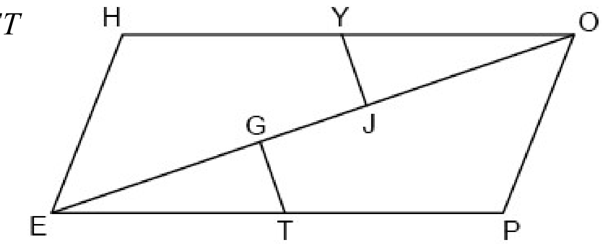
Proving Alternate Interior Angles Given Parallelogram Mini Proofs (PR1)

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



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

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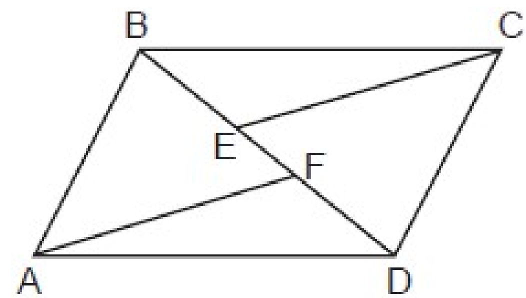
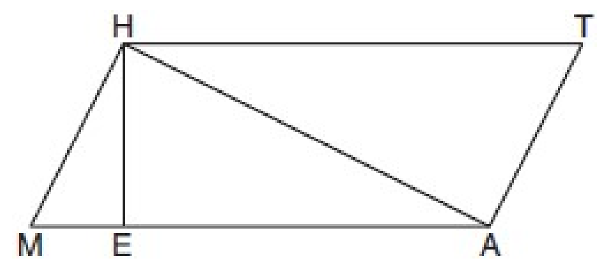
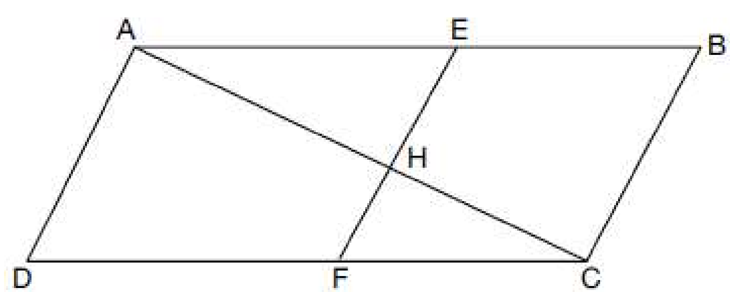


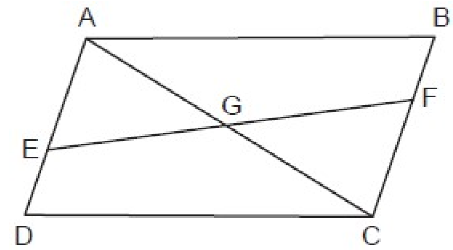
3. Given *MATH* is a parallelogram, prove $\Delta HAT \sim \Delta AEH$



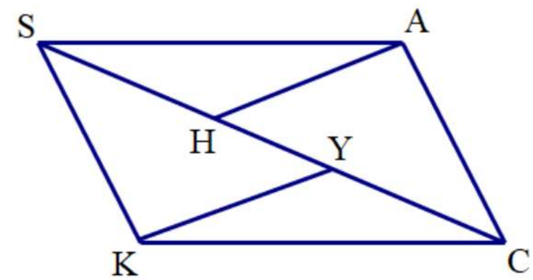
4. Given *ABCD* is a parallelogram, prove $\Delta AEH \sim \Delta CFH$



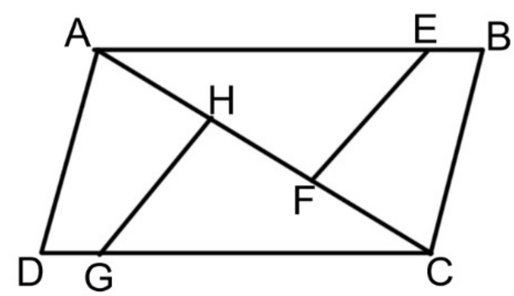
5. Given *ABCD* is a parallelogram, prove $\Delta AEG \cong \Delta CFG$



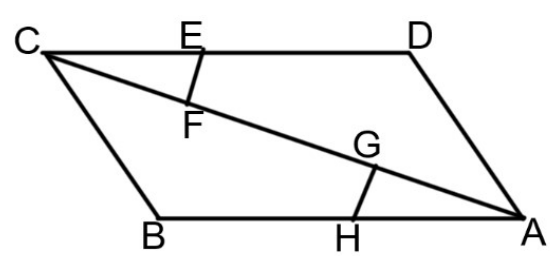
6. Given *SACK* is a parallelogram, prove $\Delta ASH \cong \Delta KCY$



7. Given *ABCD* is a parallelogram, prove $\Delta EAF \cong \Delta GCH$



8. Given *ABCD* is a parallelogram, prove $\Delta EFC \cong \Delta HGA$ $\overline{EF} \cong \overline{GH}$



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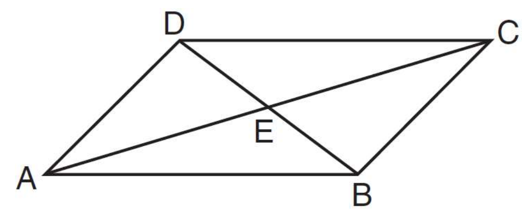
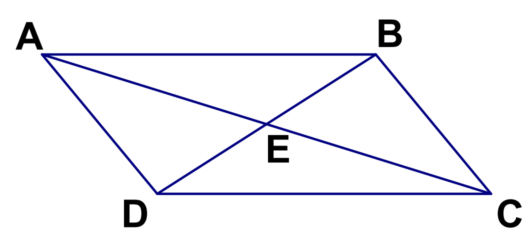
Triangle Proofs Given Parallelograms (PR 2)

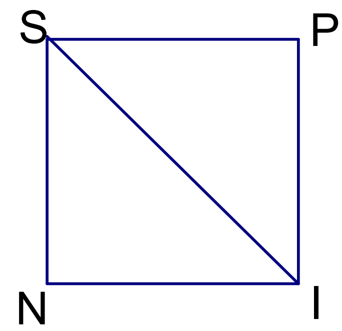
1. Given: Parallelogram *ABCD*.
Prove: $\Delta AED \cong \Delta CEB$



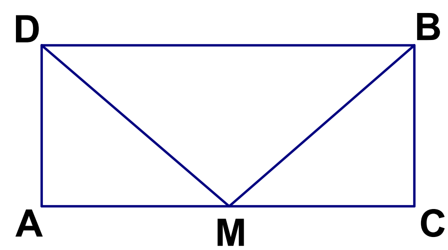
2. Given: ABCD is a parallelogram
Prove: $\Delta AED \cong \Delta CEB$



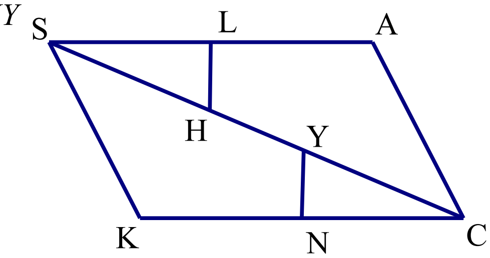
3. Given: SPIN is a square
Prove: $\Delta SNI \cong \Delta SPI$



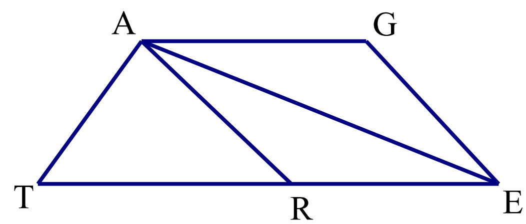
4. Given: ABCD is a rectangle, M is the midpoint of $\overline{AC}$
Prove: $\overline{DM} \cong \overline{BM}$



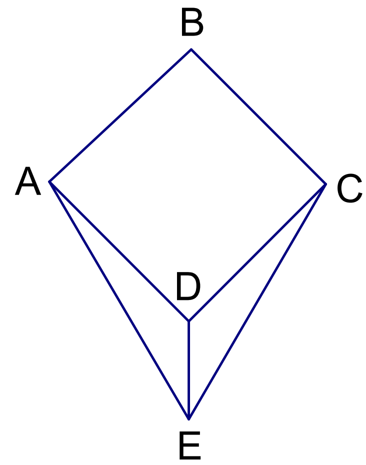
5. Given: SACK is a parallelogram, $\overline{HL} \perp \overline{SA}$, $\overline{YN} \perp \overline{KC}$, $\overline{HL} \cong \overline{NY}$
Prove: $\overline{SL} \cong \overline{CN}$



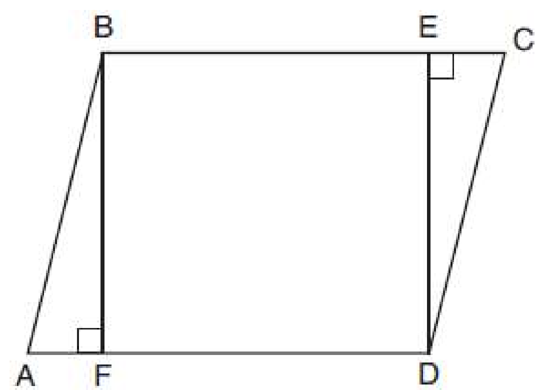
6. Given: TAGE is a trapezoid, $\angle AGE \cong \angle ARE$
Prove: $\overline{AR} \cong \overline{GE}$



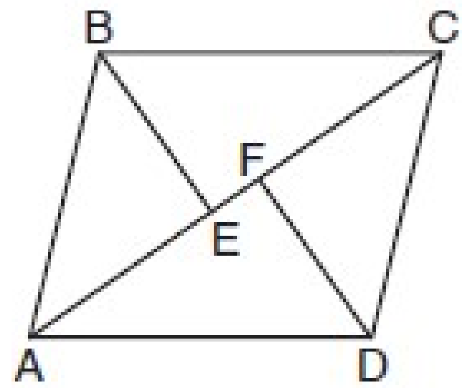
7. Given: ABCD is a rhombus, $\overline{AE} \cong \overline{CE}$
Prove: $\angle ADE \cong \angle CDE$



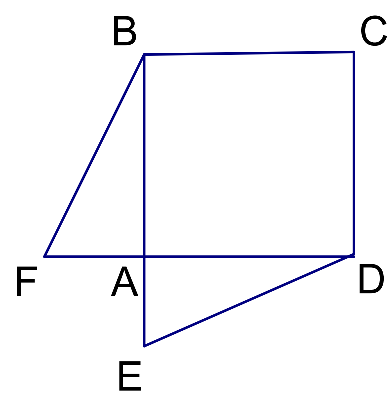
8. Given: Parallelogram $ABCD$, $\overline{BF} \perp \overline{AFD}$, and $\overline{DE} \perp \overline{BEC}$
Prove: $\overline{AF} \cong \overline{EC}$



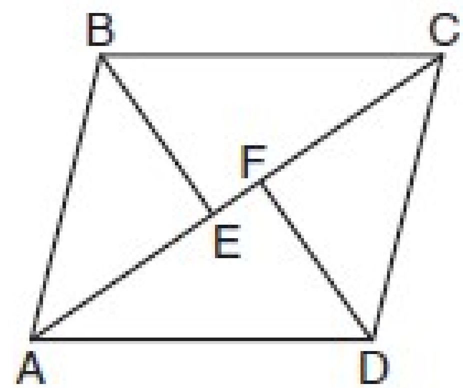
9. Given: ABCD is a parallelogram, $\overline{BE} \perp \overline{AC}$, and $\overline{DF} \perp \overline{AC}$.
Prove: $\angle ABE \cong \angle CDF$



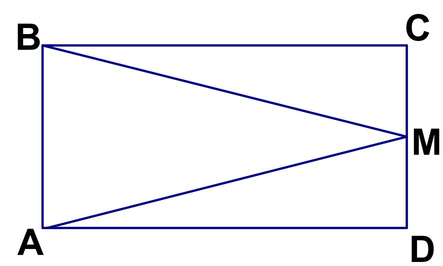
10. Given: ABCD is a square, $\overline{FA} \cong \overline{AE}$
Prove: $\overline{BF} \cong \overline{DE}$



11. Given: ABCD is a rhombus, $\overline{BE} \perp \overline{AC}$, and $\overline{DF} \perp \overline{AC}$.
Prove: $\Delta ABE \cong \Delta ADF$



12. Given: ABCD is a rectangle, M is the midpoint of $\overline{CD}$
Prove: $\overline{BM} \cong \overline{AM}$



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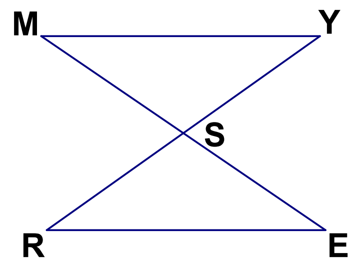
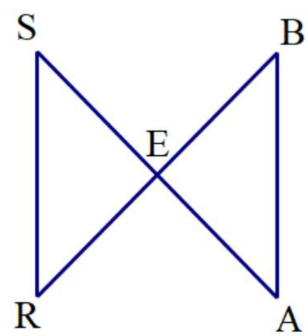
Proving Parallel Mini Proofs (PR3)

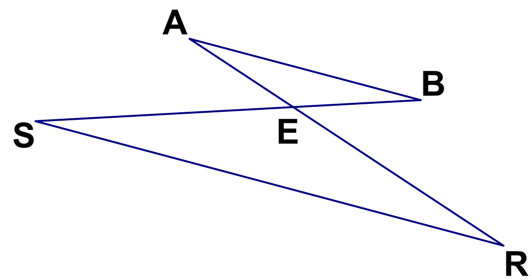
1. Given: $\angle M \cong \angle E$



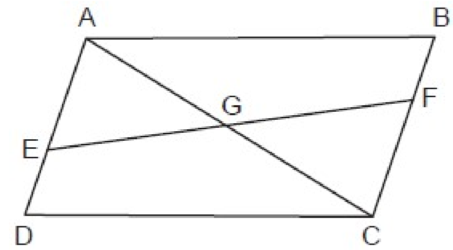
2. Given: $\angle S \cong \angle A$



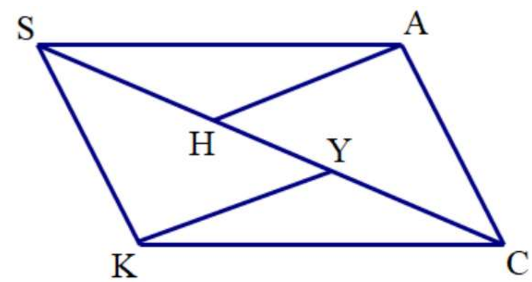
3. Given: $\angle S \cong \angle B$



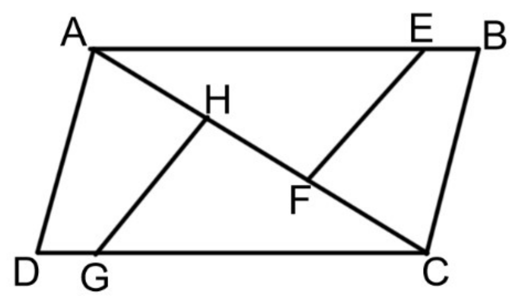
4. Given: $\angle EAG \cong \angle FCG$



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



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



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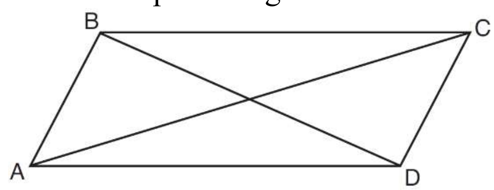
Proving Parallelograms Mini Proofs (PR4)

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?

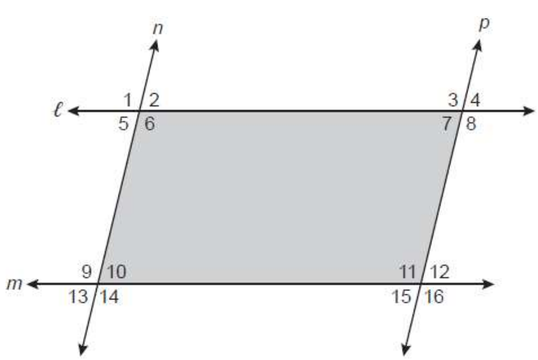
1) $\overline{AC}$ and $\overline{BD}$ bisect each other.
2) $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \cong \overline{AD}$
3) $\overline{AB} \cong \overline{CD}$ and $\overline{AB} \parallel \overline{CD}$
4) $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \parallel \overline{AD}$

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

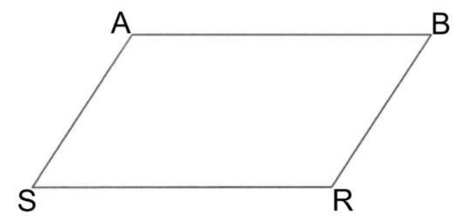
1) $\overline{BD} \cong \overline{SD}$ and $\overline{ED} \cong \overline{TD}$
2) $\overline{BE} \cong \overline{ST}$ and $\overline{ES} \cong \overline{TB}$
3) $\overline{ES} \cong \overline{TB}$ and $\overline{BE} \parallel \overline{TS}$
4) $\overline{ES} \parallel \overline{BT}$ and $\overline{BE}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

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?

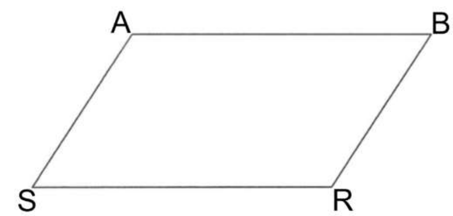
1) $\angle 1 \cong \angle 6$ and $\angle 9 \cong \angle 14$
2) $\angle 5 \cong \angle 10$ and $\angle 6 \cong \angle 9$
3) $\angle 5 \cong \angle 7$ and $\angle 10 \cong \angle 15$
4) $\angle 6 \cong \angle 9$ and $\angle 9 \cong \angle 11$



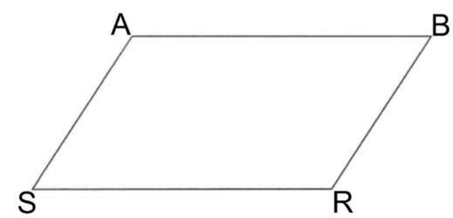
5. Given: $\overline{SA} \cong \overline{BR}$, $\overline{AB} \cong \overline{SR}$
Prove: SABR is a parallelogram



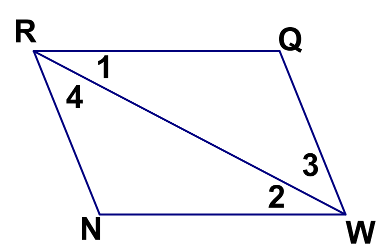
6. Given: $\overline{SA} \parallel \overline{BR}$, $\overline{AB} \parallel \overline{SR}$
Prove: SABR is a parallelogram



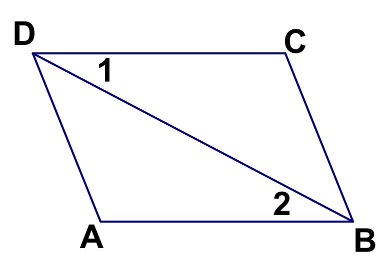
7. Given: $\overline{SA} \cong \overline{BR}$, $\overline{SA} \parallel \overline{BR}$
Prove: SABR is a parallelogram



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



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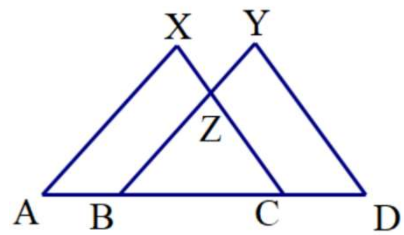
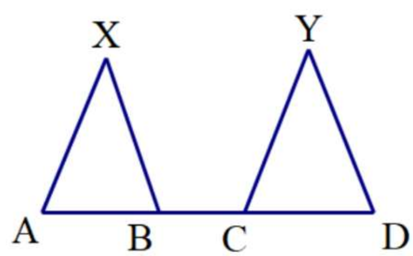
Addition and Subtraction Property Mini Proofs (PR5)

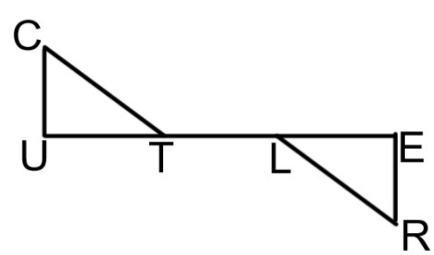
1. Given: $\overline{AB} \cong \overline{CD}$
Prove: $\Delta AXC \cong \Delta BYD$



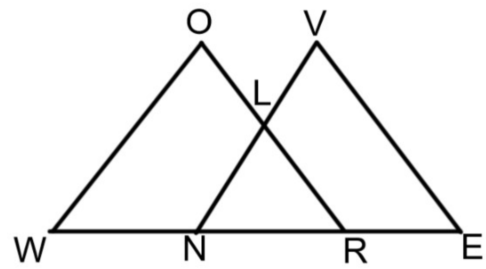
2. Given: $\overline{AC} \cong \overline{BD}$
Prove: $\Delta AXB \cong \Delta DYC$



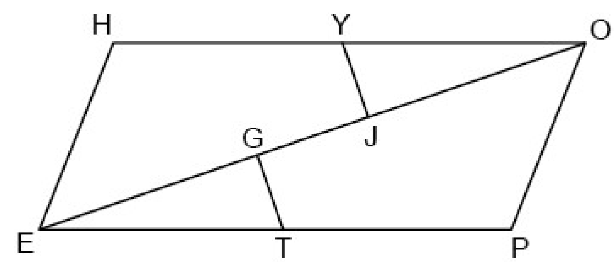
3. Given: $\overline{UL} \cong \overline{TE}$
Prove: $\Delta CUT \cong \Delta REL$



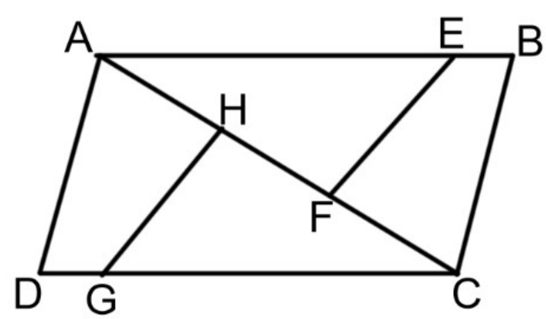
4. Given: $\overline{WN} \cong \overline{RE}$
Prove: $\Delta WOR \cong \Delta NVE$



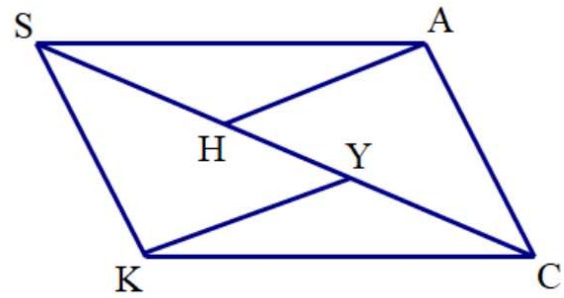
5. Given: $\overline{EJ} \cong \overline{GO}$
Prove: $\Delta TGE \cong \Delta YJO$



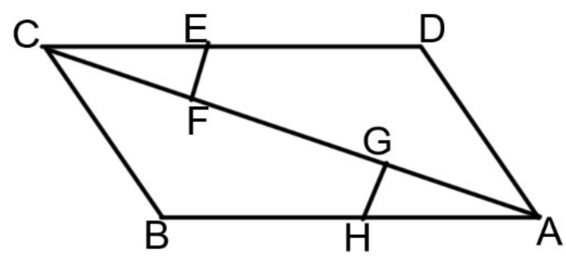
6. Given: $\overline{AE} \cong \overline{GC}$, $\overline{EB} \cong \overline{DG}$
Prove: $\Delta ABC \cong \Delta CDA$



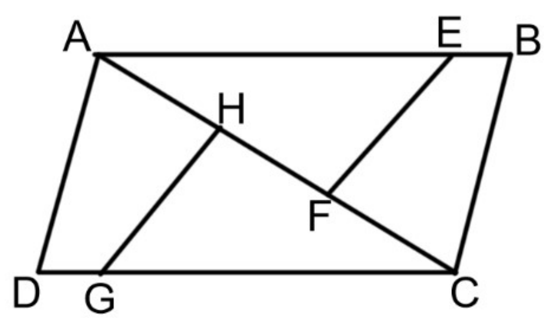
7. Given: $\overline{SY} \cong \overline{HC}$
Prove: $\Delta ASH \cong \Delta KCY$



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: $\Delta AFE \cong \Delta CHG$



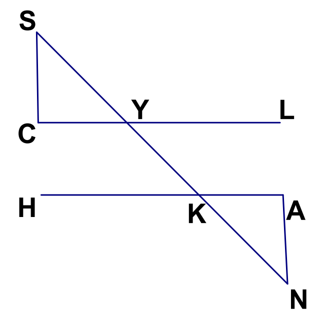
Name ______________ Date __________

Mr. Schlansky Geometry

Proving Multiplication Mini Proofs (PR6)

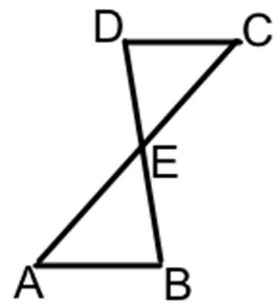
1. Given: None

   Prove: $\overline{SC} \bullet \overline{NK} = \overline{NA} \bullet \overline{SY}$



2. Given: None

   Prove: $\overline{CD} \bullet \overline{AE} = \overline{AB} \bullet \overline{CE}$

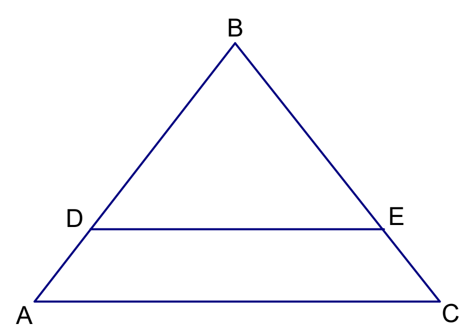


3. Given: None

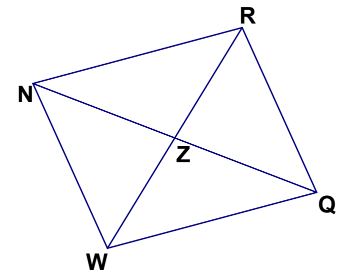
   Prove: $\overline{AC} \bullet \overline{DE} = \overline{AE} \bullet \overline{BC}$

4. Given: None

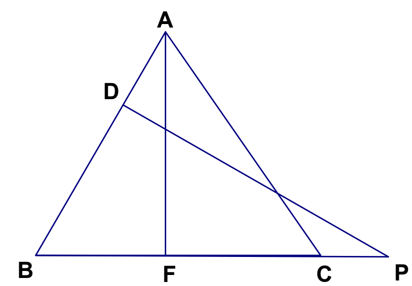
   Prove: $\overline{BE} \bullet \overline{AB} = \overline{DB} \bullet \overline{BC}$



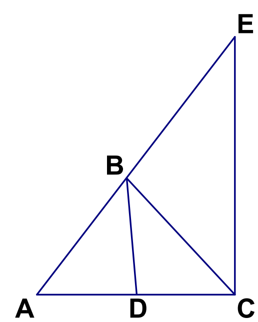
5. Given: None
Prove: $\overline{RZ} \bullet \overline{QW} = \overline{RQ} \bullet \overline{ZW}$



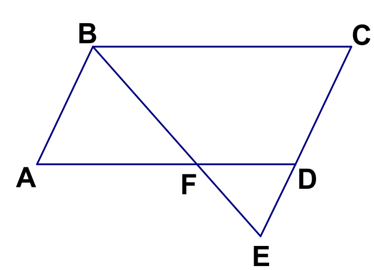
6. Given: None
Prove: $\overline{FC} \bullet \overline{PB} = \overline{DB} \bullet \overline{AC}$



7. Given: None
Prove: $\overline{AD} \bullet \overline{EA} = \overline{BA} \bullet \overline{AC}$



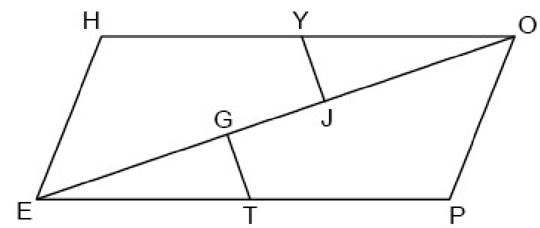
8. Given: None
Prove: $\overline{AB} \bullet \overline{DF} = \overline{AF} \bullet \overline{FE}$



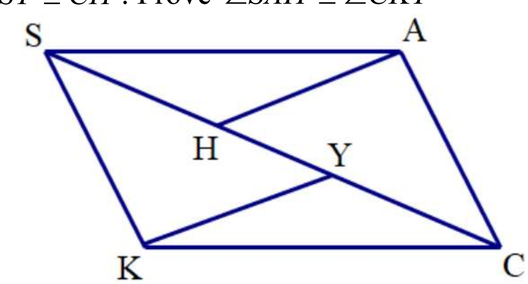
Name ____________ Date _____________
Mr. Schlansky Geometry

Parallelogram Proofs Part IV

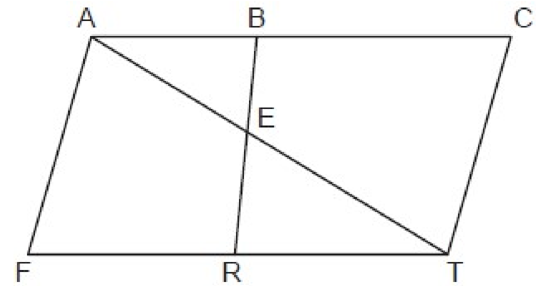
1. In quadrilateral *HOPE* below, $\overline{EH} \cong \overline{OP}$, $\overline{EP} \cong \overline{OH}$, $\overline{EJ} \cong \overline{OG}$, and $\overline{TG}$ and $\overline{YJ}$ are perpendicular to diagonal $\overline{EO}$ at points *G* and *J*, respectively. Prove that $\overline{TG} \cong \overline{YJ}$.



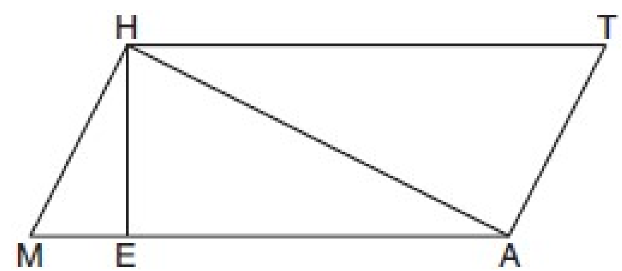
2. In quadrilateral SACK, $\angle KSY \cong \angle ACH$, $\overline{SK} \cong \overline{AC}$, $\overline{SY} \cong \overline{CH}$. Prove $\angle SAH \cong \angle CKY$



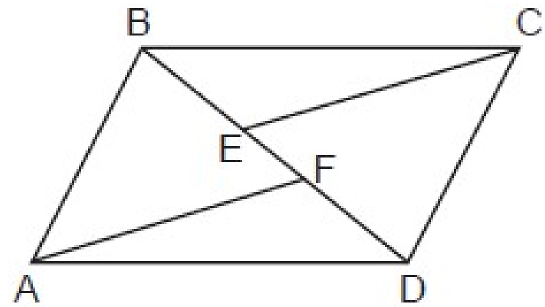
3. In the diagram below of quadrilateral $FACT$, $\overline{BR}$ intersects diagonal $\overline{AT}$ at E, $\overline{AF} \parallel \overline{CT}$, and $\overline{AF} \cong \overline{CT}$. Prove $(AB)(TE) = (AE)(TR)$



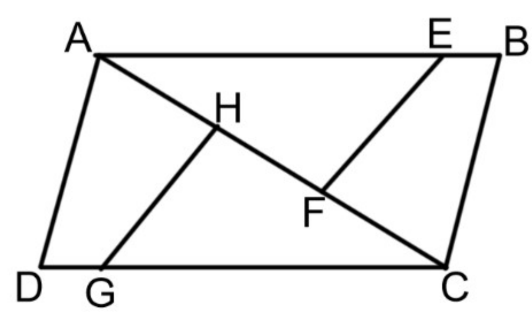
4. Given: Quadrilateral $MATH$, $\overline{HM} \cong \overline{AT}$, $\overline{HT} \cong \overline{AM}$, $\overline{HE} \perp \overline{MEA}$, and $\overline{HA} \perp \overline{AT}$.
Prove: $TA \bullet HA = HE \bullet TH$



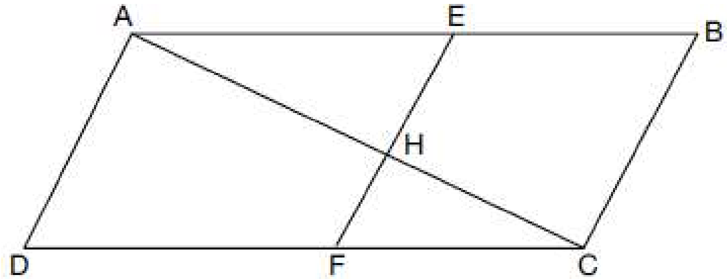
5. In the diagram of quadrilateral *ABCD* below, $\overline{AB} \cong \overline{CD}$, and $\overline{AB} \parallel \overline{CD}$. Segments *CE* and *AF* are drawn to diagonal $\overline{BD}$ such that $\overline{BE} \cong \overline{DF}$. Prove: $\angle BAF \cong \angle DCE$.



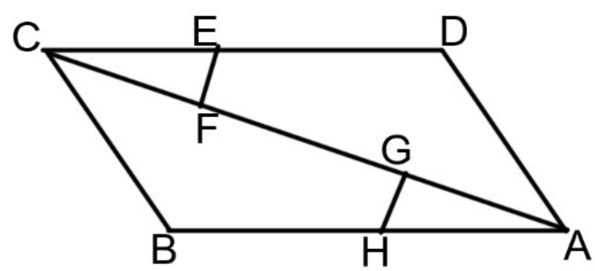
6. Given: $\overline{AE} \cong \overline{CG}$, $\overline{BE} \cong \overline{DG}$, $\overline{AH} \cong \overline{CF}$, $\overline{AD} \cong \overline{CB}$
Prove: $\overline{EF} \cong \overline{GH}$



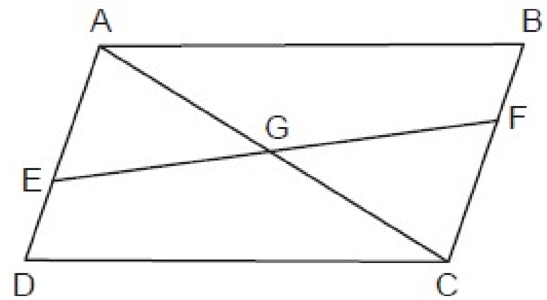
7. Given: Quadrilateral $ABCD$, $\overline{AC}$ and $\overline{EF}$ intersect at H, $\overline{AD} \parallel \overline{BC}$ and $\overline{AD} \cong \overline{BC}$. Prove: $(EH)(CH) = (FH)(AH)$



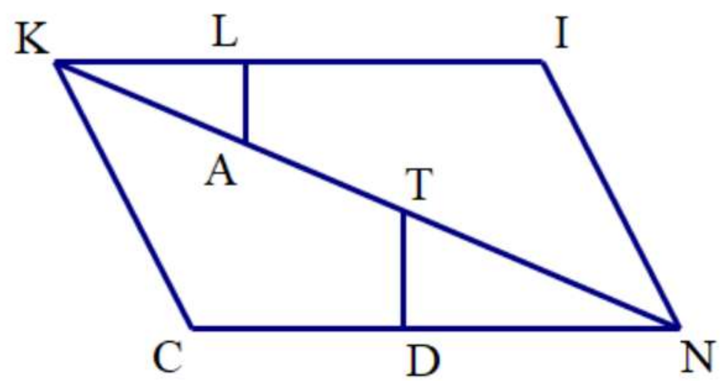
8. Given: $\overline{AB} \cong \overline{DC}$, $\overline{AD} \cong \overline{BC}$, $\overline{AF} \cong \overline{GC}$, $\overline{BH} \cong \overline{DE}$
Prove: $\overline{EF} \cong \overline{GH}$



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 $\overline{EF}$.



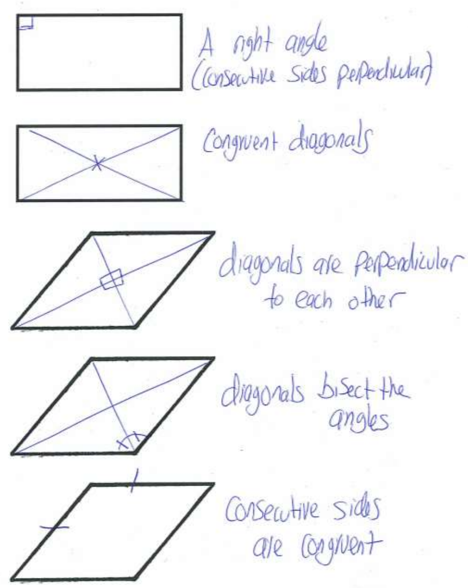
10. Given: $\overline{KC} \parallel \overline{IN}$, $\overline{KC} \cong \overline{IN}$, $\overline{AL} \perp \overline{KI}$, $\overline{TD} \perp \overline{CN}$. Prove $\overline{KL} \bullet \overline{NT} = \overline{DN} \bullet \overline{KA}$



Name ______________ Date ______________

Mr. Schlansky Geometry

Proving Rectangle/Rhombus/Squares MC



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

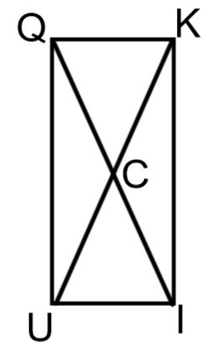
5. A parallelogram must be a rhombus when its
1) diagonals bisect its angles
2) opposite angles are congruent
3) angles are right angles
4) opposite sides are parallel

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

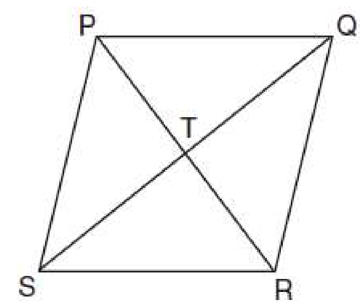
Name ____________ Date _____________
Mr. Schlansky Geometry

Proving Rectangles/Rhombuses/Squares Mini Proofs

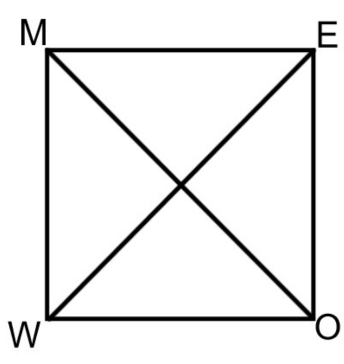
1. Given: *QUIK* is a parallelogram, $\overline{QI} \cong \overline{KU}$
Prove: *QUIK* is a rectangle



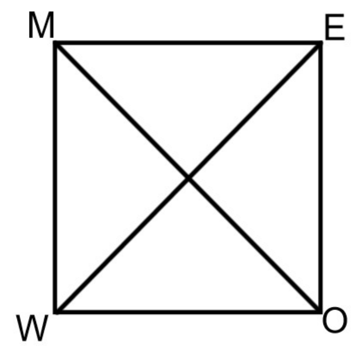
2. Given: *PQRS* is a parallelogram, $\overline{PR} \perp \overline{SQ}$.
Prove: *PQRS* is a rhombus



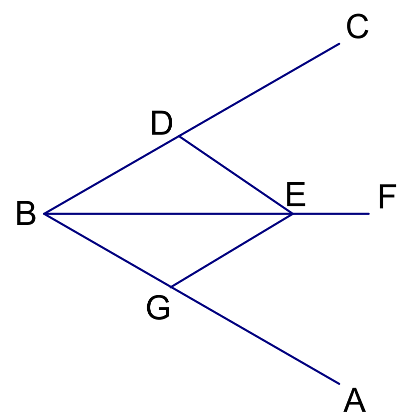
3. Given: *MEOW* is a rhombus, $\overline{MO} \cong \overline{WE}$
Prove: MEOW is a square



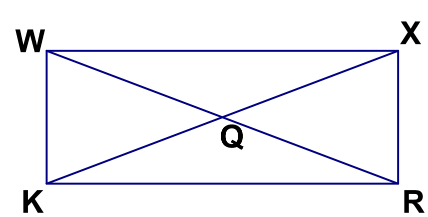
4. Given: $MEOW$ is a rectangle, $\overline{ME} \cong \overline{EO}$
Prove: $MEOW$ is a square



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



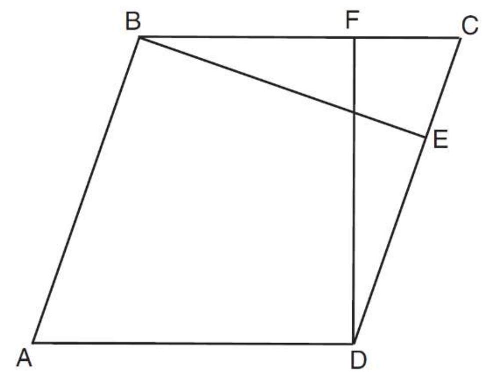
6. Given: $WXRK$ is a parallelogram, $\overline{KW} \perp \overline{WX}$
Prove: $WXRK$ is a rectangle



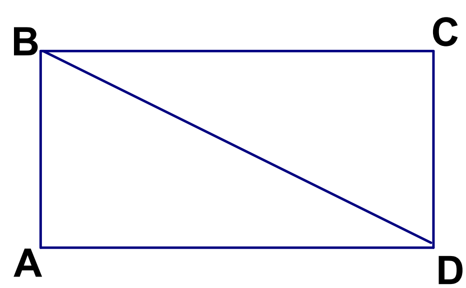
Name ____________ Date _____________
Mr. Schlansky Geometry

Proving Rectangle/Rhombus/Square Part IV

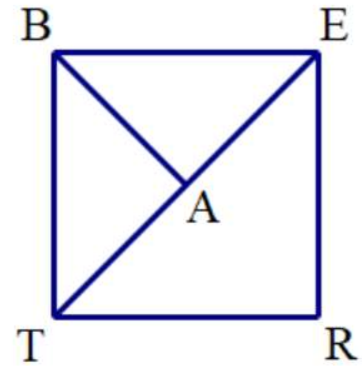
1. In the diagram of parallelogram *ABCD* below, $\overline{BE} \perp \overline{CED}$, $\overline{DF} \perp \overline{BFC}$, $\overline{CE} \cong \overline{CF}$.
Prove *ABCD* is a rhombus.



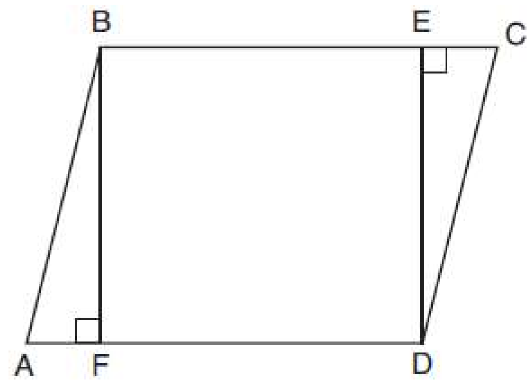
2. Given: $\overline{BC} \parallel \overline{AD}$, $\overline{BA} \perp \overline{AD}$, $\overline{BC} \perp \overline{CD}$
Prove: *ABCD* is a rectangle



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



Name ____________ Date _____________
Mr. Schlansky Geometry

Quadrilateral Properties Review Sheet

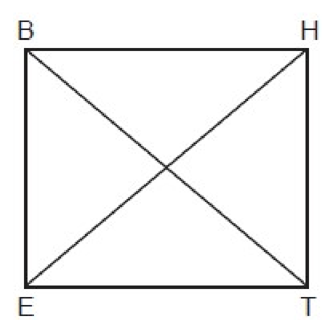
1. Which quadrilateral has diagonals that always bisect its angles and also bisect each other?
1) rhombus
2) rectangle
3) parallelogram
4) isosceles trapezoid

2. Given three distinct quadrilaterals, a square, a rectangle, and a rhombus, which quadrilaterals must have perpendicular diagonals?
1) the rhombus, only
2) the rectangle and the square
3) the rhombus and the square
4) the rectangle, the rhombus, and the square

3. 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.

4. 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

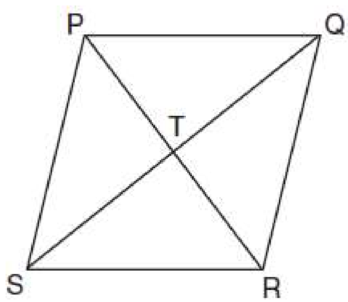
5. Parallelogram *BETH*, with diagonals $\overline{BT}$ and $\overline{HE}$, is drawn below. What additional information is sufficient to prove that *BETH* is a rectangle?
1) $\overline{BT} \perp \overline{HE}$
2) $\overline{BE} \parallel \overline{HT}$
3) $\overline{BT} \cong \overline{HE}$
4) $\overline{BE} \cong \overline{ET}$



6. Parallelogram *EATK* has diagonals $\overline{ET}$ and $\overline{AK}$. Which information is always sufficient to prove *EATK* is a rhombus?

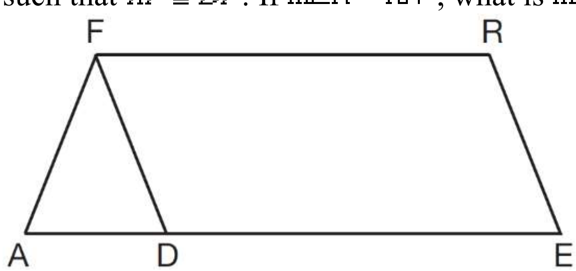
1) $\overline{EA} \perp \overline{AT}$
2) $\overline{EA} \cong \overline{AT}$
3) $\overline{ET} \cong \overline{AK}$
4) $\overline{ET} \cong \overline{AT}$

7. In the diagram of rhombus *PQRS* below, the diagonals $\overline{PR}$ and $\overline{QS}$ intersect at point *T*, $PR = 16$, and $QS = 30$. Determine and state the perimeter of *PQRS*.

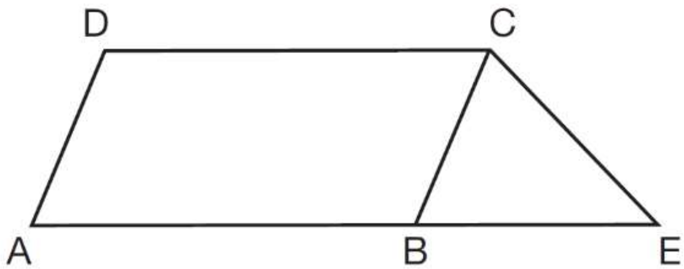


8. A rhombus has diagonals that measure 6 and 8. Find the perimeter of the rhombus.

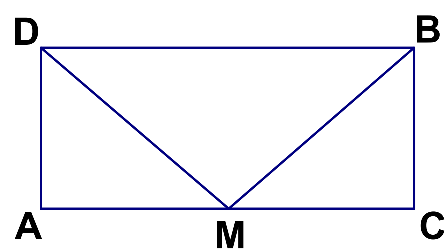
9. In the diagram of parallelogram *FRED* shown below, $\overline{ED}$ is extended to *A*, and $\overline{AF}$ is drawn such that $\overline{AF} \cong \overline{DF}$. If $m\angle R = 124°$, what is $m\angle AFD$?



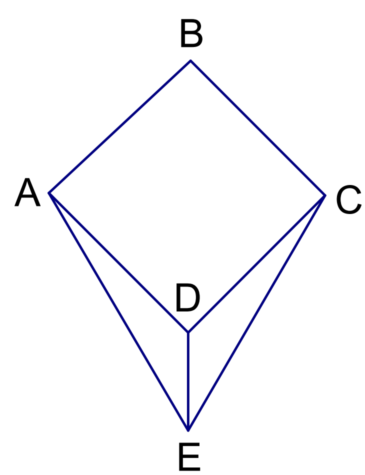
10. In the diagram below, *ABCD* is a parallelogram, $\overline{AB}$ is extended through *B* to *E*, and $\overline{CE}$ is drawn. If $\overline{CE} \cong \overline{BE}$ and $m\angle D = 112°$, what is $m\angle E$?



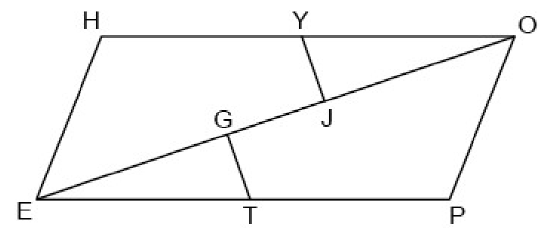
11. Given: ABCD is a rectangle, M is the midpoint of $\overline{AC}$
Prove: $\overline{DM} \cong \overline{BM}$



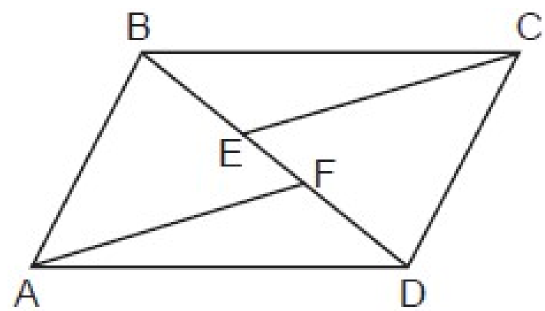
12. Given: ABCD is a rhombus, $\overline{AE} \cong \overline{CE}$
Prove: $\angle ADE \cong \angle CDE$



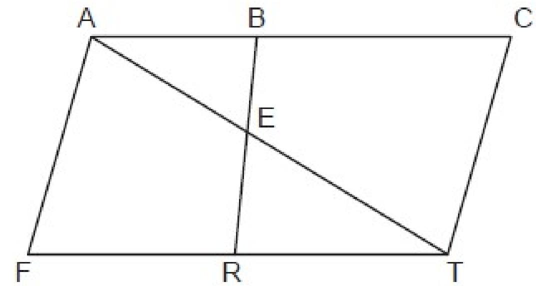
13. In quadrilateral *HOPE* below, $\overline{EH} \cong \overline{OP}$, $\overline{EP} \cong \overline{OH}$, $\overline{EJ} \cong \overline{OG}$, and $\overline{TG}$ and $\overline{YJ}$ are perpendicular to diagonal $\overline{EO}$ at points *G* and *J*, respectively. Prove that $\overline{TG} \cong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



14. 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: $\angle BAF \cong \angle DCE$.



15. 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 $(AB)(TE) = (AE)(TR)$



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