Geometry Study Guide

Name _____

Directions: Name two triangles that are congruent by ASA.

1.

$\triangle JIH \cong \triangle KLM$

2.

$\triangle RST \cong \triangle WVU$
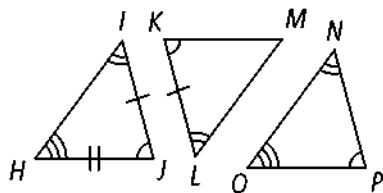
3. Given that ABCD is a parallelogram, a student wrote the proof below to show that a pair of its opposite angles are congruent.
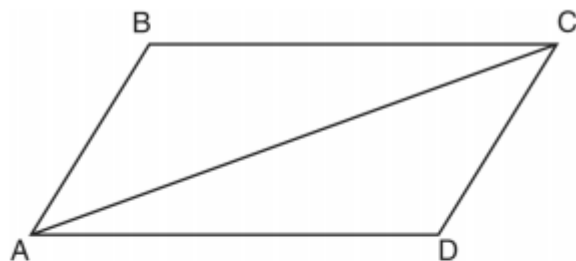
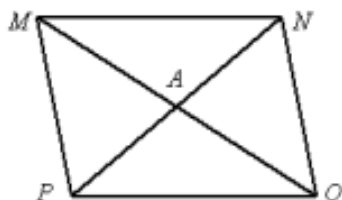| Statement	Reason
1. ABCD is a parallelogram.	1. Given
2. $\overline{BC} \cong \overline{AD}$ $\overline{AB} \cong \overline{DC}$	2. Opposite sides of a parallelogram are congruent.
3. $\overline{AC} \cong \overline{CA}$	3. Reflexive Postulate of Congruency
4. $\triangle ABC \cong \triangle CDA$	4. Side-Side-Side
5. $\angle B \cong \angle D$	5. _____

What is the reason justifying that $\angle B \cong \angle D$?

A. Opposite angles in a quadrilateral are congruent.

B. Parallel lines have congruent corresponding angles.

C. Corresponding parts of congruent triangles are congruent.

D. Alternate interior angles in congruent triangles are congruent.

4. Consider these statements:

- Every square is a rhombus.

- Quadrilateral ABCD is *not* a rhombus.

Which of these conclusions can be made using both statements?

A. ABCD is *not* a parallelogram.   B. ABCD is a rectangle.

C. ABCD is *not* a square.   D. ABCD is a trapezoid.

5. Which reason could be used to prove that a parallelogram is a rhombus?
1) Diagonals are congruent.
2) Opposite sides are parallel.
3) Diagonals are perpendicular.
4) Opposite angles are congruent.

6. Choose the statement that is NOT ALWAYS true.
   For any parallelogram _____.
   a. the diagonals bisect each other
   b. opposite angles are congruent
   c. the diagonals are perpendicular
   d. opposite sides are congruent
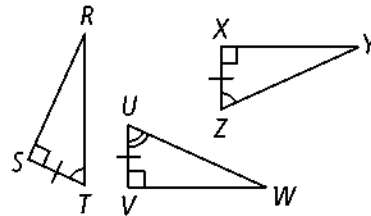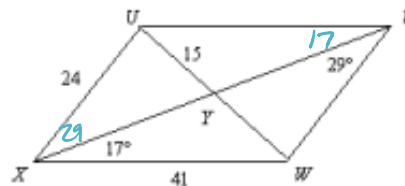
7. Find AM in the parallelogram if PN = 10 and MO = 19.

$AM = \frac{1}{2} MO.$

$AM = \frac{19}{2}$

$AM = 9.5$

8. Refer to the figure below.

17

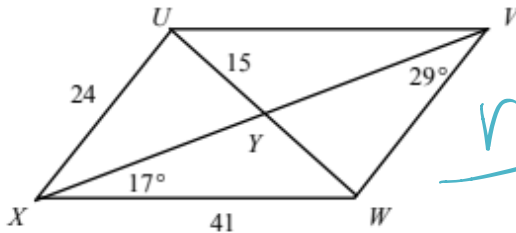Given: UVWX is a parallelogram, $m\angle WXV = 17°$, $m\angle WVX = 29°$, $XW = 41$, $UX = 24$, $UY = 15$
a. Find $m\angle WVU$. 46
b. Find WV. 24
c. Find $m\angle XUV$. 134
d. Find UW. 30

9. The diagonals of a quadrilateral are congruent but do not bisect each other. What is the shape?

A) Parallelogram   C) kite
B) isosceles trapezoid   D) rectangle

10. Refer to the figure below.

Given: UVWX is a parallelogram, $m\angle WXV = 17°$, $m\angle WVX = 29°$, $XW = 41$, $UX = 24$, $UY = 15$
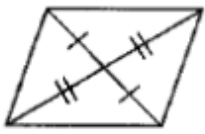

repeat

m $\angle$ WVU = _____

WV = _____

m $\angle$ XUV = _____

UW = _____

Are the following quadrilaterals parallelograms? Explain why if they are.

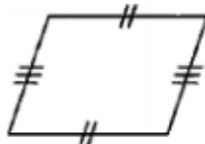11.   12.   13.   14.   15.

If diags bisect, then ☐.
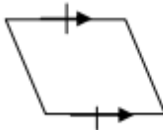
If one pair is both // & ≅, then ☐.

If opp sides ≅, then ☐.

If opp. sides ≅; then ☐.

no!

True or False:

10. If a quadrilateral is a parallelogram, then consecutive angles are complementary.   F.

11. If a quadrilateral is a parallelogram, then opposite angles are complementary.   F.

12. Which statement is true?
    a. All quadrilaterals are squares.
    b. All rectangles are squares.
    c. All parallelograms are quadrilaterals.
    d. All quadrilaterals are parallelograms.

13. Choose the statement that is NOT ALWAYS true. For a rhombus _____.
    a. each diagonal bisects a pair of opposite angles
    b. all four sides are congruent
    c. the diagonals are congruent
    d. the diagonals are perpendicular

14. The diagonals of a parallelogram always
    bisectors

15. If the diagonals of a parallelogram are perpendicular, then the parallelogram is also what type of figure?   rhombus

16. If the diagonals of a parallelogram are equal in length, then the parallelogram is also what type of figure?   rhombus

17. True or false: A rectangle is a parallelogram.

18. True or false: A quadrilateral has three diagonals.

19. True or false: A quadrilateral is a polygon with four angles.

20. True or false: A square is a rectangle.

21. True or false: Opposite angles in a parallelogram are supplementary.

22. True or false: Opposite sides of a parallelogram are congruent.

23. True or false: The sum of the measures of the angles of a quadrilateral is 180°.
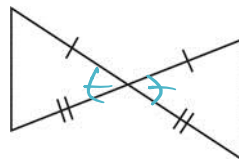
Directions: Would you use SSS or SAS to prove these triangles congruent? If there is not enough information to prove the triangles congruent by SSS or SAS, write *not enough information.* Explain your answer.
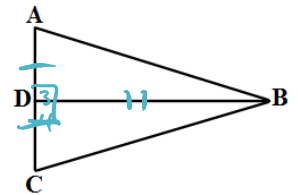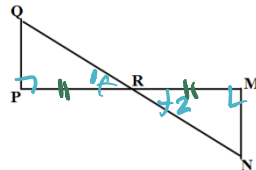
24.   25.
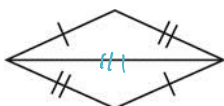
SSS   SAS

26. Given: $\overline{BD}$ is the perpendicular bisector of $\overline{AC}$
    Prove: $\triangle BAD \cong \triangle BCD$

Statements	Reasons
1) $\overline{BD}$ is the perpendicular bisector of $\overline{AC}$.	1) Given
2) $\angle 3$ & $\angle 4$ are right. ∡s.	2) Def. $\perp$
3) $\angle 3 \cong \angle 4$	3) All right ∡s $\cong$
4) $\overline{AD} \cong \overline{DC}$	4) midpt thm
5) $\overline{DB} \cong \overline{DB}$	5) reflexive
6) $\triangle BAD \cong \triangle BCD$	6) SAS

27. Given: $\angle P$ and $\angle M$ are right angles.
    R is the midpoint of $\overline{PM}$.
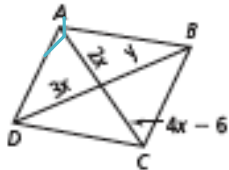   Prove: $\triangle PQR \cong \triangle MNR$

1. $\angle P$ & $\angle M$ are right. R is midpt. of $\overline{PM}$	1. given
2. $\angle F \cong \angle M$	2. All right ∡s $\cong$
3. $\angle 1 \cong \angle 2$	3. vert. ∡s thm
4. $\overline{PR} \cong \overline{RM}$	4. midpt. Thm
5. $\triangle PQR \cong \triangle MNR$	5. ASA

Directions: Find the values of the variables in each parallelogram (33 is a trapezoid).

28.
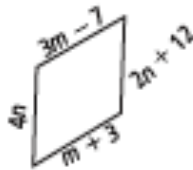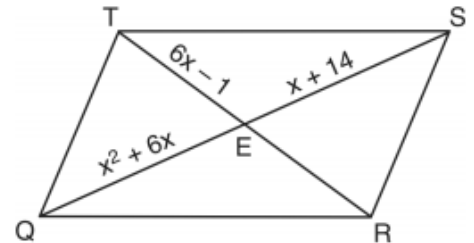
$2x = 4x - 6$
$-2x = -6$
$X = 3$

29.

$3n - 7 = m + 3$
$2m = 10$
$m = 5$

30.

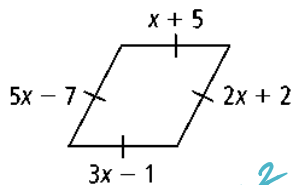$x^2 + 6x = x + 14$
$x^2 + 5x - 14 = 0$
$(x + 7)(x - 2) = 0$
$x = -7 \quad x = 2$

31.

$x + 5$
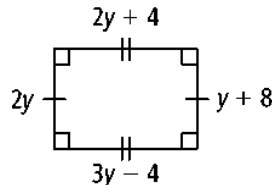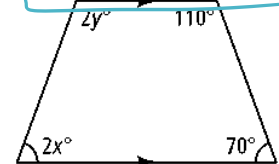$5x - 7$
$2x + 2$
$3x - 1$

$x + 5 = 2x + 2$
$X + 5 = 2x + 2$
$3 = x$

32.

$2y + 4$
$2y$
$y + 8$
$3y - 4$

$2y = y + 8$
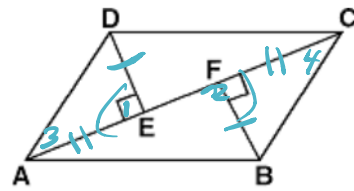$y = 8$

33.

$2y°$
$110°$
$2x°$
$70°$

$2x = 70 \qquad 2y = 110$
$X = 35 \qquad y = 55$

34.

Given: $\overline{DE} \perp \overline{AC}$
$\overline{BF} \perp \overline{AC}$
$\overline{AE} \cong \overline{FC}$
$\overline{DE} \cong \overline{FB}$

Prove: ABCD is a parallelogram

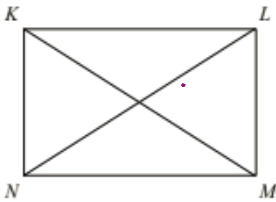| Statements	Reasons
1. $\overline{DE} \perp \overline{AC}$, $\overline{BF} \perp \overline{AC}$, $\overline{AE} \cong \overline{FC}$, $\overline{DE} \cong \overline{FB}$	1. given
2. $\angle 1$ & $\angle 2$ are right	2. Def $\perp$
3. $\angle 1 \cong \angle 2$	3. All right $\angle$s $\cong$
4. $\triangle DAE \cong \triangle BFC$	4. SAS
5. $\overline{DA} \cong \overline{CB}$, $\angle 3 \cong \angle 4$	5. CPCTC
6. $\overline{DA} \parallel \overline{CB}$	6. Converse alt. int. $\angle$ Thm
7. If	7. If 2 pair is $\parallel$ & $\cong$ then $\square$.

35. In order for a parallelogram to be a rectangle, what MUST be true about the diagonals?
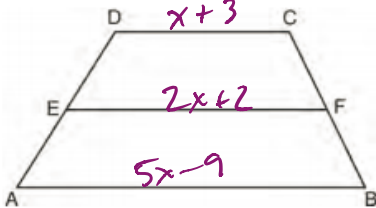
7. $ABCD$ is $\square$

$\cong$ to each other.

36. If you know a quadrilateral is a rhombus, what is true about the diagonals?

$\perp$

37. In rectangle *KLMN*, KM = 7x + 20 and LN = 55. Find the value of x.

$KM = 55$
$55 = 7x + 20$
$35 = 7x$
$\boxed{x = 5}$

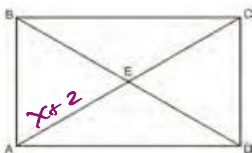**38.** Find the missing angles in the kite.

$\angle 1 = 39°$
$\angle 2 = 90$
$\angle 3 = 51°$

39. EF is the median of the trapezoid shown:

If AB = 5x – 9, DC = x + 3, and EF = 2x + 2, what is the value of x?

$\dfrac{x+3+5x-9}{2} = 2x+2$

$6x - 6 = 4x + 4$
$2x = 10$
$x = 5$

40. *ABCD* is a parallelogram. If m $\angle CDA$ = 66, then m $\angle BCD$ = ___?___. The diagram is not to scale.
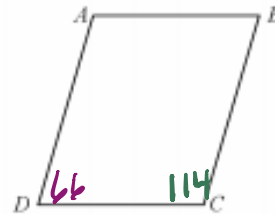
41. Find values of x and y for which *ABCD* must be a parallelogram. The diagram is not to scale.

$4x - 2 = x + 28$
$3x = 30$
$\boxed{x = 10}$

$4y - 7 = y + 14$
$3y = 21$

42. As shown in the diagram of rectangle *ABCD* below, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at E.
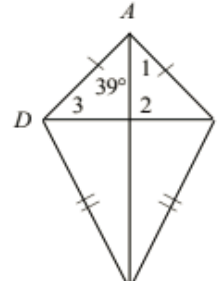

If AE = x + 2 and BD = 4x – 16, then the length of $\overline{AC}$ is

$2(x+2) = 4x - 16$
$2x + 4 = 4x - 16$
$20 = 2x$ $x = 10$

$\boxed{AC = 24}$

$y = 7$