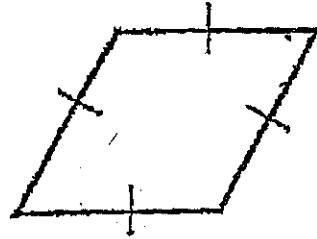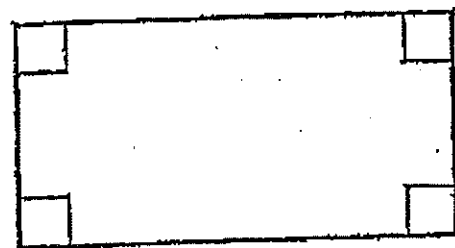Geo / Trig

7.4 Properties of Special Parallelograms

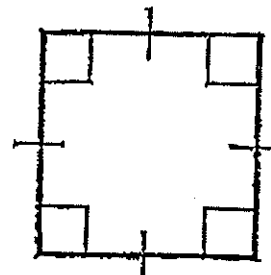**_Special types of parallelograms_**

> Def. – A **_Rhombus_** is a parallelogram
  with four congruent sides.

> Def. – A **_Rectangle_** is a parallelogram
  with four right angles.

> Def. – A **_Square_** is a parallelogram with
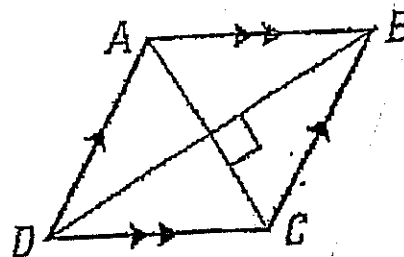 four right angles and four congruent sides.

Theorems about special parallelograms (The next 3 Theorems also work for a square)

> Thm. 7.11 – **_Rhombus Diagonals Theorem_**

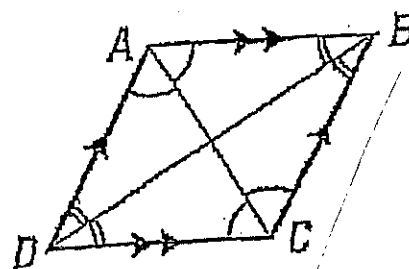A parallelogram is a rhombus if and only if its diagonals are
perpendicular.

$ABCD$ is a rhombus if and
only if $\overline{AC} \perp \overline{BD}$.

➢ Thm. 7.12 – *Rhombus Opposite Angles Theorem*

A parallelogram is a rhombus
if and only if each diagonal bisects a pair
of opposite angles.

$ABCD$ is a rhombus if and
only if $\overline{AC}$ bisects $\angle DAB$ and
$\angle BCD$ and $\overline{BD}$ bisects $\angle ADC$ and $\angle CBA$.
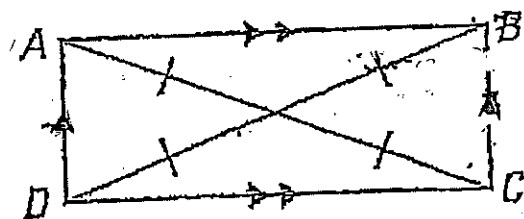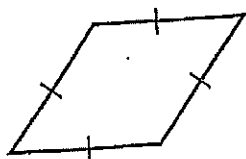

➢ Thm. 7.13 – *Rectangle Diagonals Theorem*

A parallelogram is a rectangle
if and only if its diagonals are congruent.

$ABCD$ is a rectangle if and
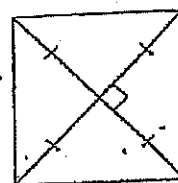only if $\overline{AC} \cong \overline{BD}$.

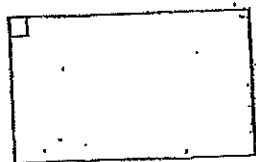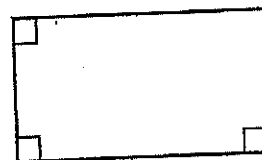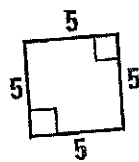Each quadrilateral is a parallelogram. Decide what type of parallelogram is given.
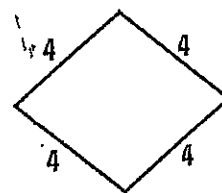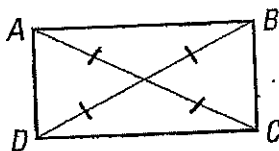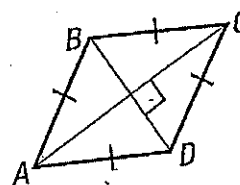
1.

2.

3.

4.

5.

6.

7.

8.

Decide whether the statement is *always, sometimes, or never* true.

9. A rhombus is a square. _____

10. The diagonals of a rectangle are perpendicular. _____

11. The opposite angles of a rhombus are supplementary. _____

12. A square is a rectangle. _____

13. The diagonals of a rectangle bisect each other. _____

14. The consecutive angles of a rhombus are supplementary. _____

15. A rectangle is a square. _____

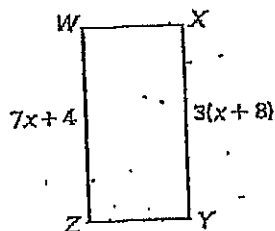Match the quadrilateral with the given properties.

16. The diagonals are congruent. _____   A. Parallelogram

17. Both pairs of opposite sides are congruent. _____   B. Rectangle

18. Both pairs of opposite sides are parallel. _____   C. Square

19. All angles congruent. _____   D. Rhombus

20. The diagonals bisect each angle. _____

21. All sides are congruent. _____

22. The diagonals are perpendicular. _____

Solve for each variable.

23. *DEFG* is a rhombus.

$(7x-28)^\circ$
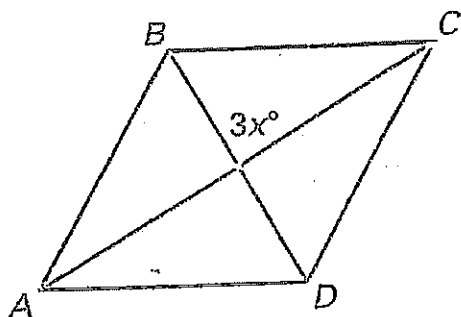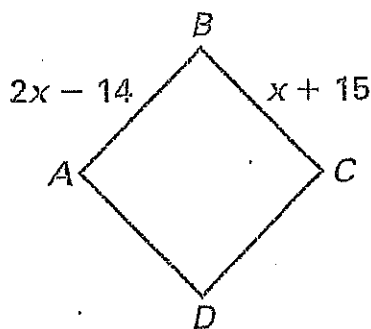
$(10x-13)^\circ$
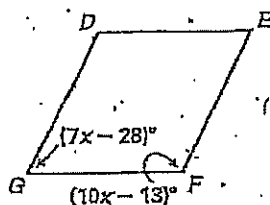
24. *WXYZ* is a rectangle.

$7x+4$

$3(x+8)$

ABCD is a rhombus.

ABCD is a square.

25.

$3x°$

26.

$2x - 14$

$x + 15$
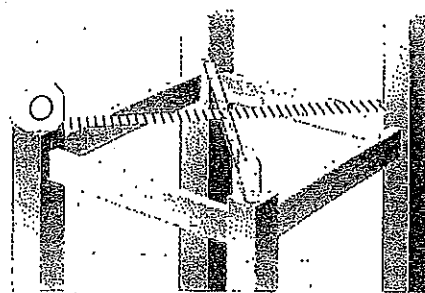
27. If you measure the diagonals of the chair and find out that they are equal, then what type of quadrilateral is the part of the chair that was measured?

28. You then find out that where the diagonals meet are all 90 degrees. What can you conclude about the quadrilateral?

EX # 27-28

29. Quadrilateral ABCD is a rhombus. Find the measure of all the numbered angles in the diagram.

HW:pp.393 – 395 #13 – 16, 23 – 27 odd, 29 – 34, 37 – 54, 65 – 70
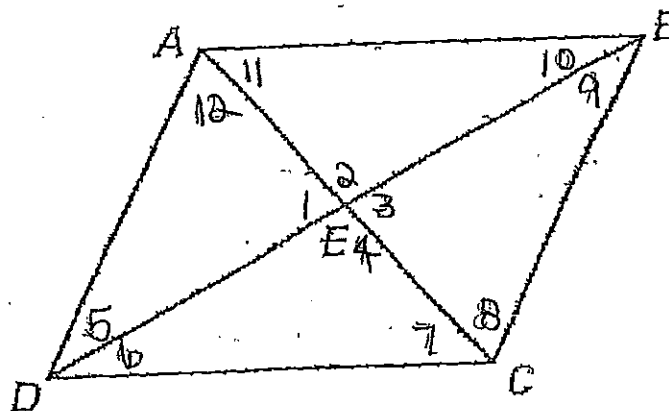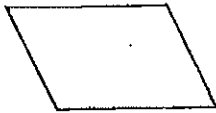
Name:_____   Date:_____

Geometry

Practice Worksheet 6.4 – Special Parallelograms

a.

.Parallelogram

b.

Rectangle

c.

Rhombus

d.

Square

In Exercises 1–10, refer to the quadrilaterals shown above. For each Exercise, state which quadrilaterals satisfy the given condition.

1. All angles are right angles.

2. Opposite sides are equal.

3. Diagonals are equal.

4. Diagonals bisect each other.

5. Opposite angles are equal.

6. Diagonals are perpendicular.

7. Each diagonal bisects two angles.

8. All sides are equal.

9. Diagonals are perpendicular bisectors of each other.

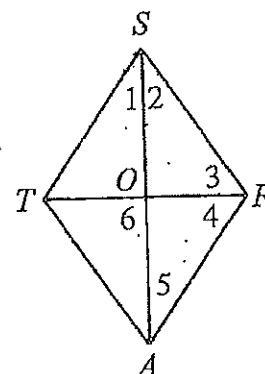10. When a diagonal is drawn, two congruent triangles are formed.

STAR is a rhombus.

11. Suppose ∠1 = 25°.
    Find the measure of each numbered angle.

12. Suppose ∠5 = 32°.
    Find the measure of each numbered angle.

13. Suppose $SA = 8$ and $TR = 6$.
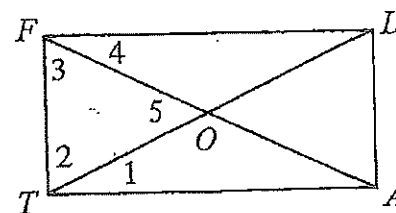   Find SO and TO.

14. Suppose $RA = 10$.
    Find the perimeter of *STAR*.

FLAT is a rectangle.

15. Suppose $FL = 12$ and $LA = 5$.
    Find the perimeter of *FLAT*.

16. Suppose $FA = 13$. Find TL.

17. Suppose $FA = 14$. Find FO and TO.

18. Suppose ∠1 = 20°.
    Find the measure of each numbered angle.

19. Suppose ∠2 = 75°.
    Find the measure of each numbered angle.

20. Suppose ∠5 = 24°.
    Find the measure of each numbered angle.

DEFG is a square.

21. Find the measure of each numbered angle.

22. If $DO = 8$, find GE.