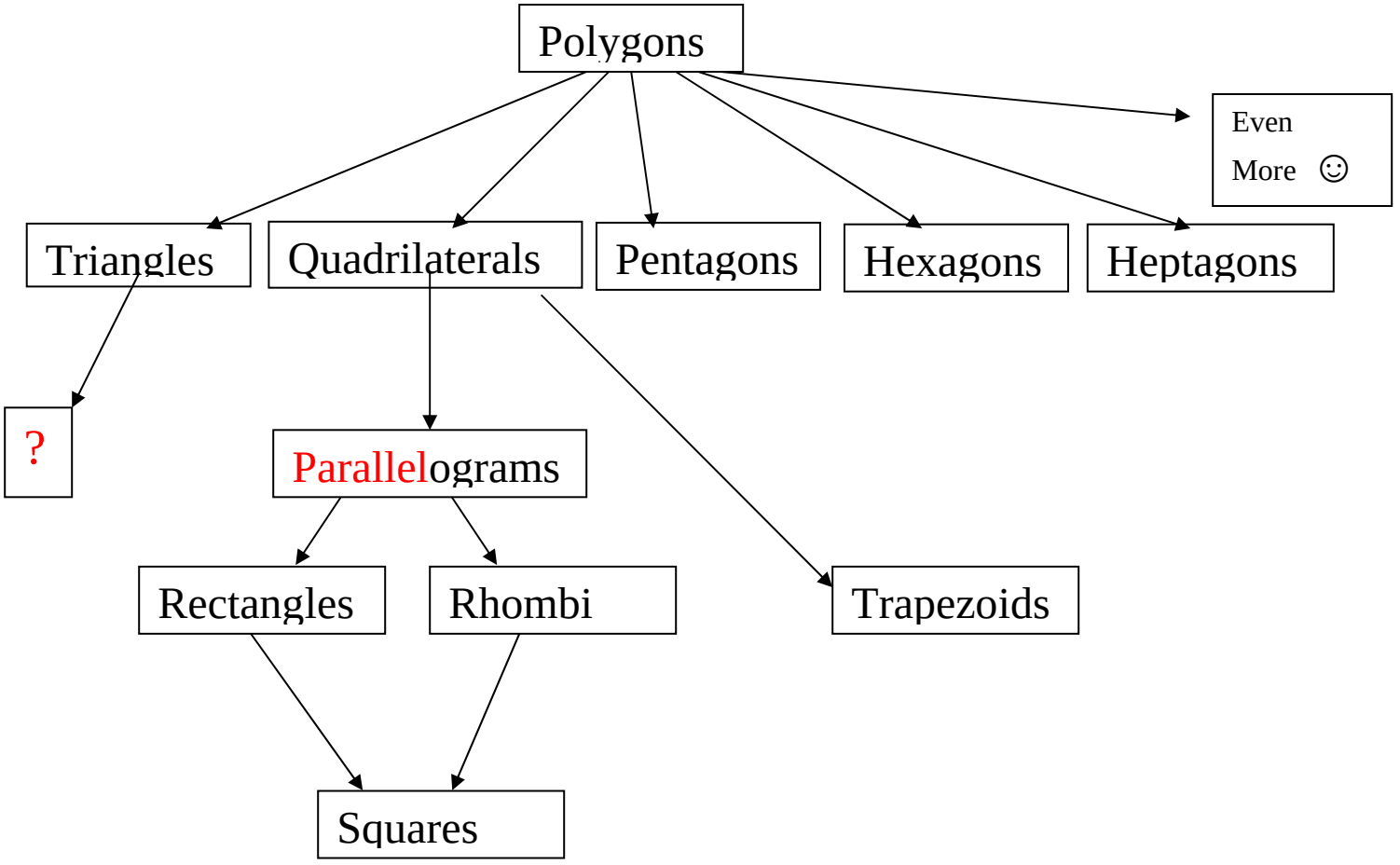
Geometry—Chapter 6

Geometry—Chapter 6-1

Parallelograms

Wait!! Is that like Telegrams???

Remember:

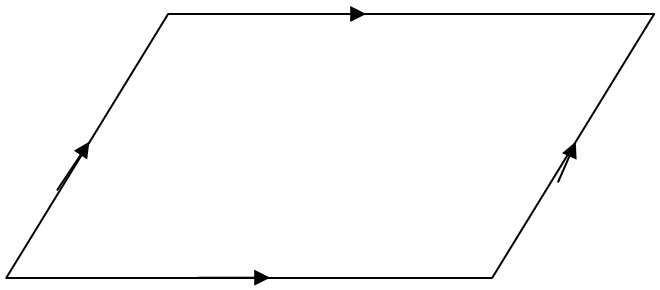


Def: Polygon→A figure in a plane that is:

- formed by 3 or more segments called sides,
- sides intersect only at their endpoints,
- no sides are collinear.

Def: Quadrilateral→a 4-sided polygon.

Def: Parallelogram→a quadrilateral in which <u>both pairs</u> of opposite sides are parallel.



Thm: Opp. sides of a //ogram are ≅ .

Thm: Opp. angles of a //ogram are ≅ .

Thm: Consecutive angles in a //ogram are supple.

Thm: Diagonals of a //ogram <u>bisect</u> each other.

Know that these properties apply to ALL parallelograms.

Using the above properties many, many problems can be solved…….Unfortunately only in the geometric world. ☹

☺

Geometry—Chapter 6-2

→Proving that a figure is a parallelogram←

A quad is a //ogram if any **ONE** of the following is true.

1. Both pairs of opp sides are **//.** (Def of a //ogram)
2. Both pairs of opp sides are **≅.**
3. Both pairs of opp angles are **≅.**
4. Diagonals bisect each other.
5. A pair of opp sides is both // and ≅.

Read the above ways that you can prove a quadrilateral is a parallelogram carefully so that you understand them.

Geometry—Chapter 6-3

Rectangles

Def: A rectangle is a quadrilateral with 4 right angles.

BUT wait!! Since a rectangle has 4 right angles then it also is a parallelogram. Why??

THUS: **All** the properties of a parallelogram are also properties of a rectangle.

Opp. sides of a //ogram are $\cong$.

Opp. angles of a //ogram are $\cong$.

Consecutive angles in a //ogram are supple.

Diagonals of a //ogram bisect each other.

NOW----Properties of a Rectangle

Thm: If a //ogram is a rectangle, then its diagonals are ≅.

Converse

Thm: If the diagonals a //ogram are ≅, then it is a rectangle.

Summary of the properties of a rectangle

1. Opp. sides are ≅ and //.
2. Opp. angles are ≅ and //.
3. Consecutive angles are supple.
4. Diagonals are ≅ and <u>bisect</u> each other.
5. All 4 angles are right angles.

Geometry—Chapter 6-4

Squares & Rhombi

Def: A square is a quadrilateral with 4 right angles AND 4 congruent sides.

Def: A rhombus is a quadrilateral with 4 congruent sides.

> Note: does not have to have right angles but could
> OH! NO! then will the COOL rhombus become a square?

A RHOMBUS has both pairs of opp sides congruent thus a rhombus is a parallelogram.

THUS: **All** the properties of a parallelogram are also properties of a rhombus.

Opp. sides of a rhombus are $\cong$.

Opp. angles of a rhombus are $\cong$.

Consecutive angles in a rhombus are supple.

Diagonals of a rhombus <u>bisect</u> each other.

NOW----Properties of a rhombus

Thm: The diagonals of a rhombus are perpendicular ($\perp$).

Thm: If the diagonals of a //ogram are $\perp$, then the //ogram is a rhombus.

Thm: Each diagonal of a rhombus bisects a pair of opp angles.

ATTENTION→Since a square is a quadrilateral and a parallelogram with 4 congruent sides, it also is a rhombus.
Remember the chart of Polygons????

Thus **ALL** the properties of a //ogram, rectangle, and rhombus are properties of a square.

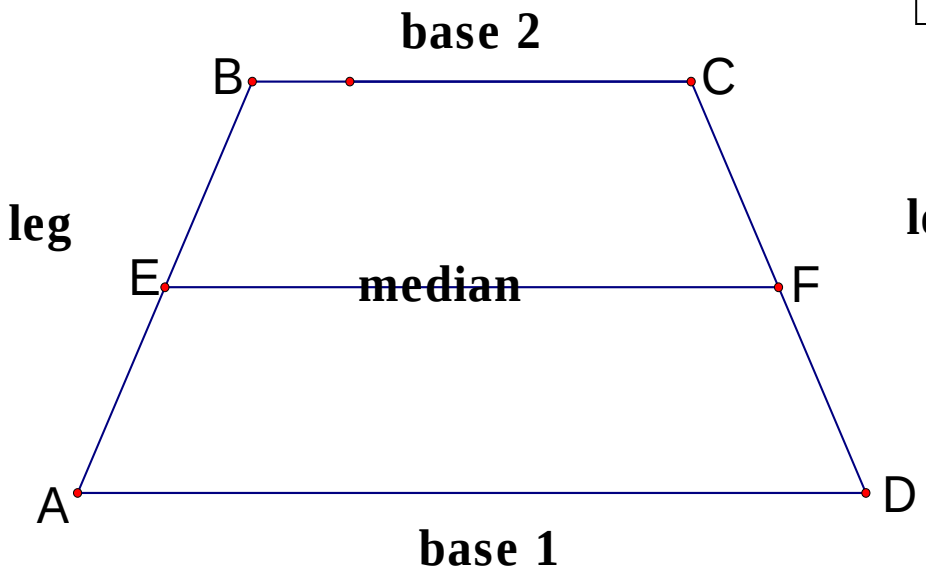
Question: Are all squares rhombi?
Are all rhombi squares?

Geometry—Chapter 6-5

Trapezoids

Def: A trapezoid is a quadrilateral with exactly one pair of parallel sides.

Trapezoid



A Very Special Trapezoid—**The Isosceles Trapezoid**

Def: An **isosceles trapezoid** is a trapezoid in which the legs are $\cong$.

Thm: Both pairs of base angles of an isosceles trapezoid are $\cong$.

Thm: The diagonals of an isosceles trapezoid are $\cong$.

Def: The **median** of a trapezoid is the segment that joins the midpts of the legs.

A neat/cool property or theorem of the median of a trapezoid is:

Thm: The median of a trapezoid is parallel to the bases, and its measure is ½ the sum of the measures of the bases.

$$m(median) = \frac{1}{2}\left[m(base1) + m(base2)\right]$$

A very good use for trapezoids—it traps ZOIDS