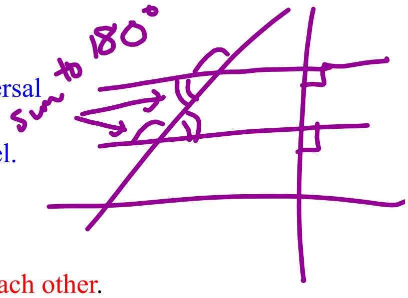
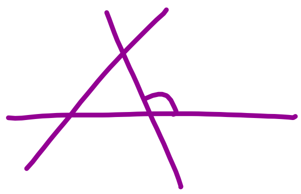
Theorem 17: Equal corresponding angles mean that lines are parallel.
Corollary 1: Equal alternate interior angles mean that lines are parallel.
Corollary 2: Supplementary interior angles on the same side of a transversal mean that lines are parallel.
Corollary 3: In a plane, two lines perpendicular to a third line are parallel.



The Parallel Postulate – Through a point not on a line, there is exactly one line parallel to the given line.
Theorem 18: In a plane, two lines parallel to a third line are parallel to each other.

Theorem 19: Parallel lines form equal corresponding angles.
Corollary 1: Parallel lines form equal alternate interior angles.
Corollary 2: Parallel lines form supplementary interior angles on the same side of a transversal.
Corollary 3: In a plane, a line perpendicular to one of two parallel lines is also perpendicular to the other.

Theorem 20: The Triangle Sum Theorem – The sum of the angles of a triangle is 180°.
Corollary 1: If two angles of one triangle are equal to two angles of another triangle, the third angles are equal.
Corollary 2: The acute angles of a right triangle are complementary.
Corollary 3: Each angle of an equilateral triangle is 60°.



Theorem 21: An exterior angle of a triangle is equal to the sum of the remote interior angles.

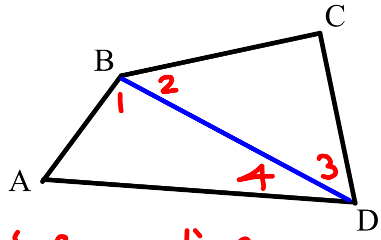
Theorem 22: The AAS Theorem – If two angles and the side opposite one of them in one triangle are equal to the corresponding parts of another triangle, the triangles are congruent.

Theorem 23: The HL Theorem – If the hypotenuse and a leg of one right triangle are equal to the corresponding parts of another right triangle, the triangles are congruent.

7.1 – Quadrilaterals (4-sided polygon)

Def: A diagonal of a polygon is a line segment that connects any two nonconsecutive vertices.

Theorem 24: The sum of the angles of a quadrilateral is 360°.



Given: ABCD is a quadrilateral.

Prove: $\angle A+\angle B+\angle C+\angle D=360°$

Proof:

Statements	**Reasons**
1. Draw BD	2 points define a line
2. $\angle A+\angle 1+\angle 4=180°$ and $\angle 2+\angle 3+\angle C=180°$	Triangle Sum Theorem
3. $\angle A+\angle 1+\angle 4+\angle 2+\angle 3+\angle C=360°$	Addition
4. $\angle 1+\angle 2=\underset{\angle B}{\angle ABC}$ and $\angle 3+\angle 4=\underset{\angle D}{\angle CDA}$	Betweenness of Rays Theorem
5. $\angle A+\underset{\angle B}{\angle ABC}+\angle C+\underset{\angle D}{\angle CDA}=360°$	Substitution (#4 into #3)

Def: A rectangle is a quadrilateral each of whose angles is a right angle.

Corollary to Theorem 24: A quadrilateral is equiangular iff it is a rectangle. $a \leftrightarrow b$

Given: ABCD with $\angle A=\angle B=\angle C=\angle D$.
Prove: ABCD is a rectangle.

If a quadrilateral is equiangular then it is a rectangle. $a \to b$ statement

Given: ABCD is a rectangle.
Prove: $\angle A=\angle B=\angle C=\angle D$.

If a quadrilateral is a rectangle then it is equiangular. $b \to a$ converse

$\Rightarrow$ Given ABCD w/ $\angle A=\angle B=\angle C=\angle D$

1. $\angle A+\angle B+\angle C+\angle D=360°$ — by Quadrilateral Sum Theorem
2. $\angle A+\angle A+\angle A+\angle A=360°$ — substitution

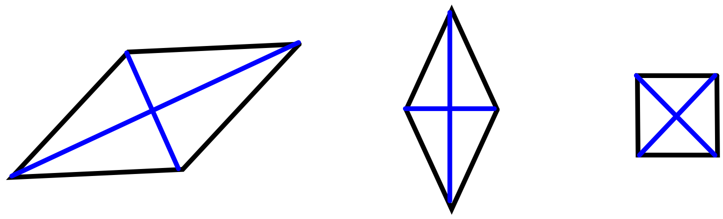
2.5 $4\angle A=360°$, $\angle A=90°$ — simplification & division

3. $\angle B=90°, \angle C=90°, \angle D=90°$ — substitution
4. ∠'s A, B, C, & D are right ∠'s — 90° ∠'s are right
5. ABCD is a rectangle — def'n of a rectangle

$\Leftarrow$ Given ABCD is a rectangle.

1. ∠'s A, B, C, D are right — def'n of rectangle
2. $\angle A=\angle B=\angle C=\angle D$ — right ∠'s are =

Each of the figures below is a rhombus.



What seems to be true about

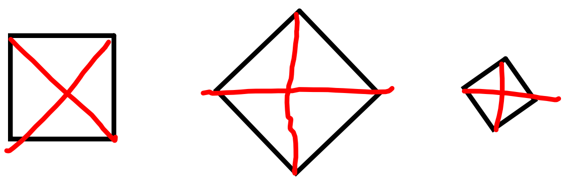
19. the sides of a rhombus?

- opposite sides are parallel
- all sides are equal

20. the diagonals of a rhombus?

- perpendicular
- bisect each other

Each of the figures below is a square.



What property do you think squares have in common with

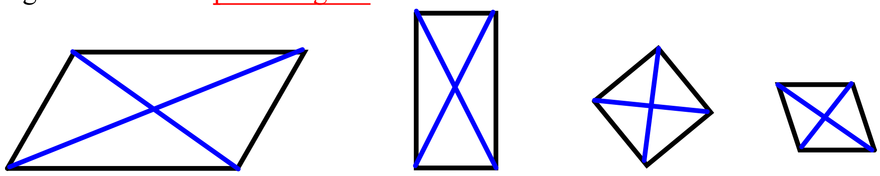
21. rectangles

-equiangular right angles
-opposite sides parallel

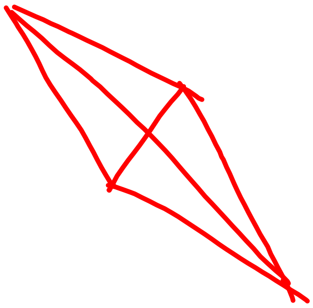
22. rhombuses?

- all equal sides
- diagonals bisect eachother & are perpendicular
- opposite sides are parallel

Each of the figures below is a parallelogram.



What seems to be true about



23. The opposite sides of a parallelogram?

parallel & equal length

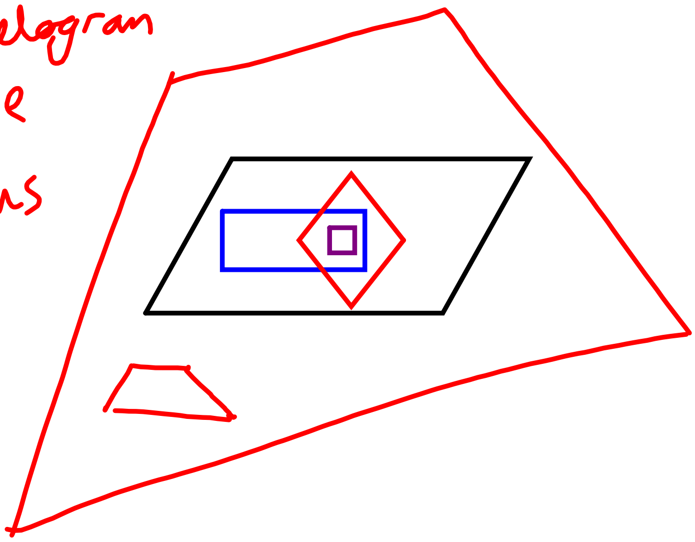
24. The opposite angles of a parallelogram?

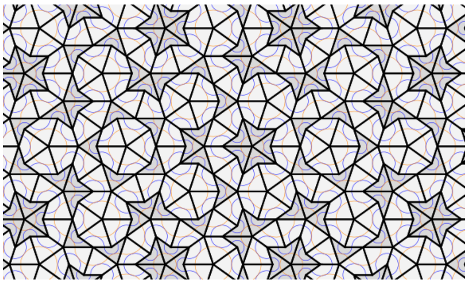
equal

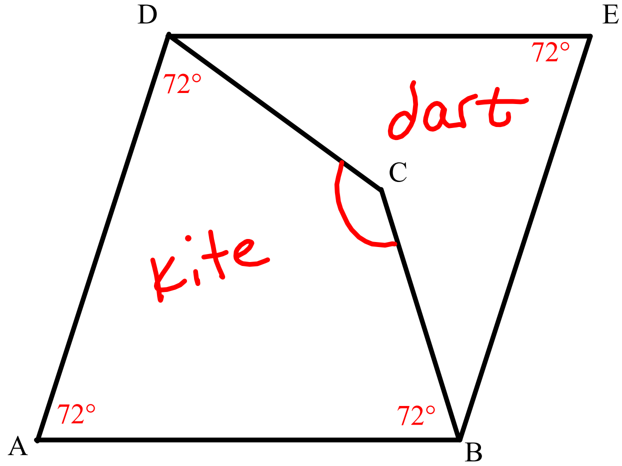
25. The diagonals of a parallelogram?

bisect each other

parallelogram
rectangle
rhombus
square







28. Which Penrose tile is convex?

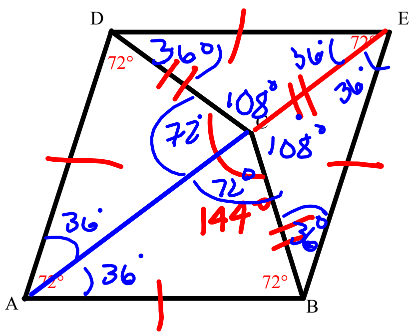
Kite

29. Find the measure of ∠BCD.

$72° + 72° + 72° + \angle BCD = 360°$

$\angle BCD = 144°$

30. Draw AC and CE.



The figure is drawn so that AB=BE=ED=DA and CB=CE=CD.

31. How do you know that ΔADC ≅ΔABC and ΔEDC ≅ΔEBC?

SAS SSS

Find the measures of the rest of the angles.

32. What do all four triangles in the figure have in common?

isosceles

33. What seems to be true about points A, C, and E?

collinear

34. Why?

∠ACD & ∠DCE form a linear pair

35. Does the figure appear to have line symmetry? Why or why not?

yes, along line AE

36. If a quadrilateral is equilateral, does it follow that it is also equiangular? Why or why not?

not necessarily; not all rhombuses are rectangles (only squares!)