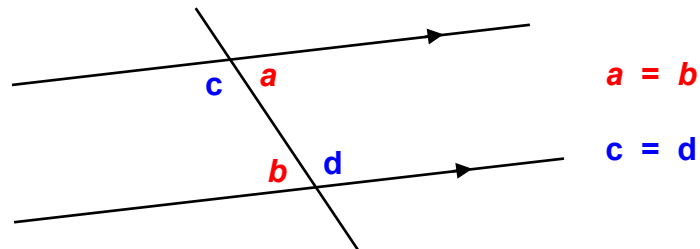




## Appendix B: Geometry Facts and Theorems

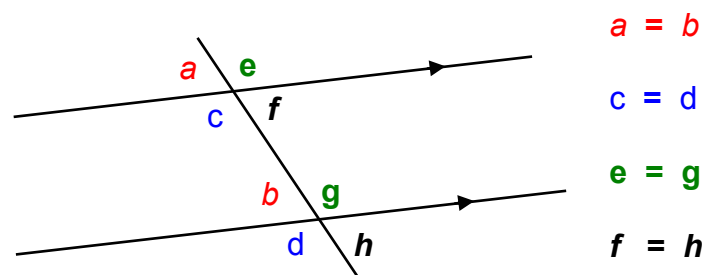
### Alternate Angle Theorem:

When a transversal intersects two parallel lines, the alternate angles are equal.



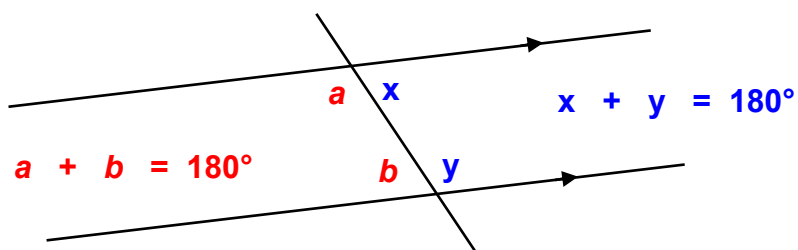
### Corresponding Angle Theorem:

When a transversal intersects two parallel lines, the corresponding angles are equal.



### Interior Angle Theorem:

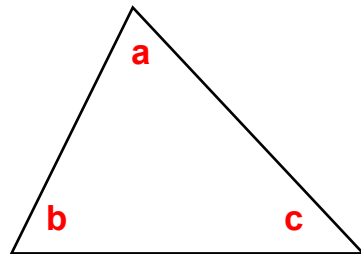
When a transversal intersects two parallel lines, the interior angles add to  $180^\circ$  (are supplementary.)





### Triangle Angle Sum Theorem:

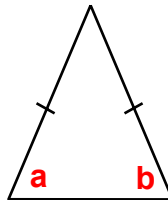
The sum of the interior angles of any triangle is  $180^\circ$ .



$$a + b + c = 180^\circ$$

### Isosceles Triangle Theorem:

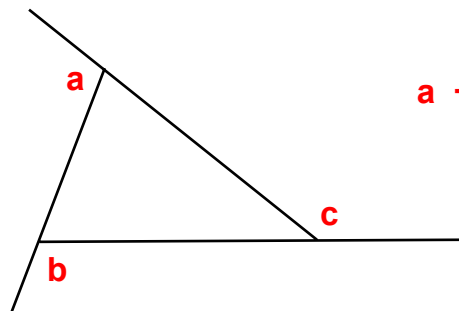
In an isosceles triangle, the base angles are equal.



$$a = b$$

### Exterior Angle Sum Theorem

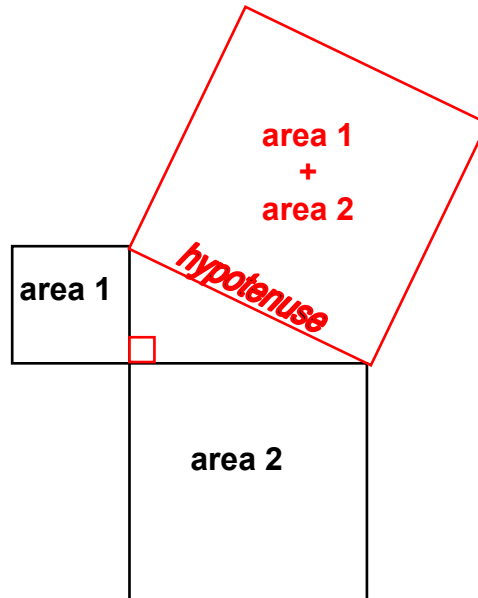
The sum of the exterior angles of any triangle is  $360^\circ$ .



$$a + b + c = 360^\circ$$

**Pythagorean Theorem:**

In a right triangle, the area of the square on the hypotenuse is equal to the sum of the areas of the squares on the other two sides.

**Converse Theorems**

If the opposite sides of a quadrilateral are equal, then they are also parallel. That is, the quadrilateral is a parallelogram.

If two alternate angles are equal, then the lines intersected by the transversal are parallel.

If two corresponding angles are equal, then the lines intersected by the transversal are parallel.

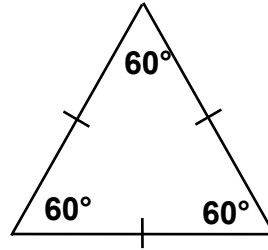
If two interior angles add to  $180^\circ$ , then the lines intersected by the transversal are parallel.

If the areas of the squares on two sides of a triangle add to the area of the square on the third side, then the triangle is a right triangle.

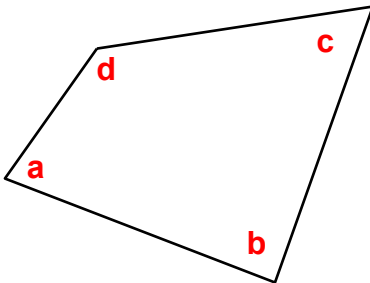


### Other Theorems and Facts

Each angle in an **equilateral** triangle is  $60^\circ$ .

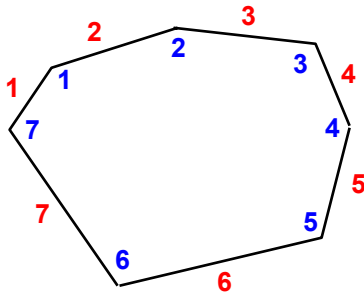


The sum of the **interior** angles of any **quadrilateral** is  $360^\circ$ .

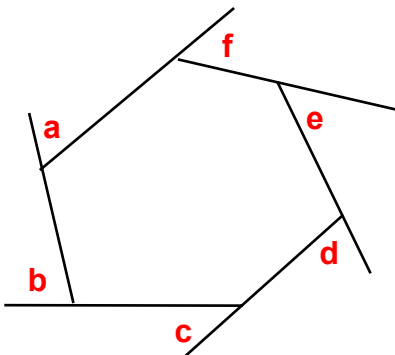


$$a + b + c + d = 360^\circ$$

For any **polygon**, the number of **sides** = the number of **interior angles** (or vertices).



The sum of the **exterior** angles of any polygon is  $360^\circ$ .

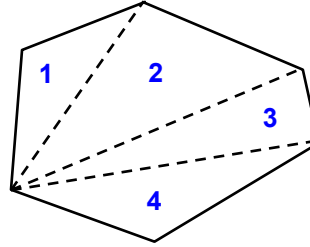
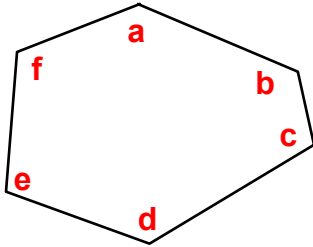


$$a + b + c + d + e + f = 360^\circ$$



The sum of the **interior** angles of any polygon can be found by dividing the polygon into non-overlapping triangles. Each triangle contributes  $180^\circ$ .

The sum of interior angles = the number of triangles  $\times$   $180^\circ$ .



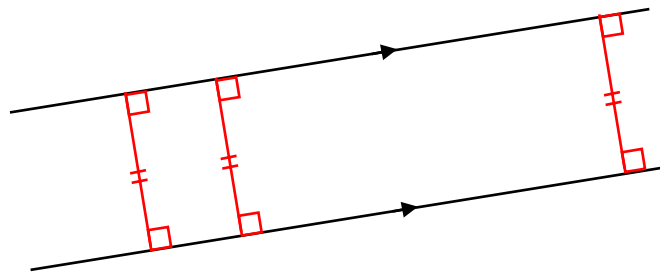
$$a + b + c + d + e + f = (4 \text{ triangles}) \times 180^\circ = 720^\circ$$

The number of non-overlapping triangles = number of sides - 2

For a regular polygon,

Each interior angle = the sum of the interior angles  $\div$  number of angles (or sides).

The perpendicular distance between two parallel lines is the same no matter where you are on the lines.



In similar triangles, the angles in one triangle *equal* matching angles in the other. However, the sides of one triangle are *multiples* of matching sides of the other.

If the three sides of one triangle equal the three sides of another triangle then they are *congruent* triangles. The angles of one triangle will equal the corresponding angles of the other triangle.