MGF 1106, Miami Dade Collge

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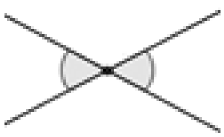
Summary Ch 10: Geometry

Angles:

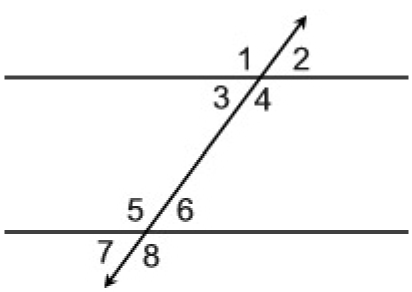
• Let α denote an angle. Classification: acute angle $\alpha < 90°$; right angle $\alpha = 90°$; obtuse angle $90 < \alpha < 180°$ and straight angle, $\alpha = 180°$.

• Let α and β denote two angles, then: Complementary angles: if the two angles are complementary $\alpha + \beta = 90°$. Supplementary angles: then, $\alpha + \beta = 180°$.

• The intersection of two lines produce four angles. The opposite angles formed are called vertical angles. We have proven in class that vertical angles have the same measure.
Vertical angles:



• When a transversal intersects with two parallel lines eight angles are produced:



Alternate interior angles have the same measure: $\angle 3 = \angle 6$ and $\angle 4 = \angle 5$;

Alternate exterior angles have the same measure: $\angle 1 = \angle 8$ and $\angle 2 = \angle 7$;

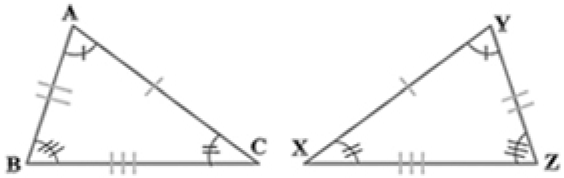
Corresponding angles have the same measure: $\angle 1 = \angle 5$; $\angle 2 = \angle 6$; $\angle 3 = \angle 7$; and $\angle 4 = \angle 8$.

Triangles:

• Classification by sides: Equilateral triangle, all sides have the same length; Isosceles triangle, two sides have the same length and angles opposite to these sides have the same measure; and the scalene triangle, in which all three sides are of different lengths.

• Sum of the interior angles of a triangle is 180° degrees. A proof of the theorem, here http://www.apronus.com/geometry/triangle.htm

• Similar triangles: figures that have the same shape, not necessarily the same size, are called similar figures. Triangles whose three angles have the same measure, are called similar triangles: *For similar triangles corresponding angles have the same measure and the ratios of length corresponding sides are proportional.*



These two triangles are similar to one another. The number of ticks indicate angles of equal measure and corresponding sides. That is, ∠B = ∠Z; while side AB correspond to side YZ. Then,

$$\frac{AB}{YZ} = \frac{BC}{XZ} = \frac{AC}{XY}$$

• The Pythagorean theorem: *the square of the length of the hypotenuse of a right triangle equals the sum of the squares of the lengths of the other two sides.* If **a** and **b** denote the legs of a right triangle, and **c** the hypotenuse, then $c^2 = a^2 + b^2$.

Polygons:

• Polygons: Any closed shape in the plane formed by three or more sides. Examples: triangle, quadrilateral, pentagon, hexagon, etc.

Quadrilaterals are classified as: *parallelograms* (pairs of opposite sides are parallel and equal in measure); *rhombus* (parallelogram with all sides of same length); *rectangle* (parallelogram with four right angles); *square* (rectangle with all sides equal) and *trapezoid* (a quadrilateral with only one pair of parallel sides).

• For a polygons of n sides, the sum of the interior angles is given by $(n-2)180°$. This is why: since the sum of the interior angles of a triangle is 180°, and any other polygon *contains* (n-2) triangles, a given polygon can be built by (n-2) non-overlapping triangles.

Area, Perimeter, Volume, Surface area:

Table 1 of Formulas

Shape	Area	Perimeter
Rectangle	$A = lw$	$P = 2l + 2w$
Square	$A = s^2$	$P = 4s$
Parallelogram	$A = bh$	$P = 4s$
Triangle	$A = \frac{1}{2}bh$	$P = a + b + c$
Trapezoid	$A = \frac{1}{2}(b_1 + b_2)h$	$P = a + b + c + d$
Circle	$A = \pi r^2$	$C = 2\pi r$

Table 2 of Formulas

Solid	Volume	Surface Area
Prism	$V = lwh$	$SA = 2lw + 2lh + 2wh$
Cube	$V = s^3$	$SA = 6S^2$
Pyramid	$V = \frac{1}{3}Bh$	—
Cylinder	$V = \pi r^2 h$	$SA = 2\pi rh + 2\pi r^2$
Cone	$V = \frac{1}{3}\pi r^2 h$	—
Sphere	$V = \frac{4}{3}\pi r^3$	$SA = 4\pi r^2$