***Postulate* 12**

Space separation postulate [4.5.ss-1] Given a plane in space. The set of all points that do not lie in the plane is the union of two sets S_1, S_2 (the book uses H_1 and H_2 we will reserve those for half-planes) such that each of the sets is convex, and if $P \in S_1$ and $Q \in S_2$ then $\overline{PQ}$ intersects the plane.

The two sets S_1 and S_2 are called half-spaces of the plane E that separates them. E is also called the face to each half-space.

***Theorem* 17** The sets S_1 and S_2 are not both empty.

***Theorem* 18** Neither of the sets S_1 and S_2 is empty.

***Theorem* 19** Each of the sets S_1 and S_2 contains at least four non-coplanar points.

***Theorem* 20** E is uniquely determined by S_1 (every half-space has only one face).

***Theorem* 21** Let H be a half plane with edge l, and let E be a plane that contains l but not H. Then all points of H are on the same side of E.

Definition 23

Dihedral angle If two half planes H and G have the same edge l, but do not lie in the same plane, then the set $H \cup G \cup l$ is called a dihedral angle.

Homework 6

1. The interior of a dihedral angle is always a convex set.
2. If P and Q are in different sides of a dihedral angle, then every point between P and Q is in the interior of the dihedral angle.

Angles and their Measure

***Postulate* 13** For every angle $\angle A$, $m\angle A$ is between 0 and 180.

***Postulate* 14**

The angle construction postulate Let $\overrightarrow{AB}$ be a ray on the edge of the half plane H. For every number r between 0 and 180, there is exactly one ray $\overrightarrow{AP}$ in H, with $m\angle PAB = r$.

Definition 24

Congruence of angles If two angles have the same measure then they are congruent.

Definition 25

Complementary Two angles are complementary if the sum of the measures is 90.

Definition 26

Supplementary Two angles are supplementary if the sum of the measures is 180.

Definition 27

Vertical Angles Two angles are called vertical angles if their sides form pairs of opposite sides.

***Theorem* 22**

Vertical Angle Theorem If two angles form a vertical pair then they are congruent.

***Theorem* 23** If two intersecting lines form one right angle then they form 4 right angles.