Discuss academic honesty.

Def: **point** - a location in space, we place a dot and label with a capital letter.

Def: A **line** can be constructed from any two points using a **straightedge**. The line through points A and B is denoted by $\overleftrightarrow{AB}$, otherwise we typically label the line with a lowercase letter.

Three or more points usually determine several lines, but if they lie on just one line, then we say the points are **collinnear**.

Any three noncollinear points determine a **plane**. At first we will stick to points in a single plane, discussing **plane figures** or **plane shapes**.

Remember from Section 8.2 that two lines in the same plane are **parallel** if and only if they are the same line, or have no points in common. If two lines are not parallel, then their common point is called their **point of intersection**.

♦ What are the possible arrangements of two and three lines in a plane?

Def: Given three lines, i, j, k, if there is a point which is on all three lines, the lines are **concurrent**.

Def: If r and s are distinct lines and t is a line which intersects each of them, but not at the same point, then t is called a **transversal** to r and s.

The points on the line $\overleftrightarrow{AB}$ between A and B (inclusive) form the **line segment** $\overline{AB}$. Remember that AB is the length of $\overline{AB}$.

Two segments $\overline{AB}$ and $\overline{CD}$ are **congruent** if $AB = CD$, we write $\overline{AB} \cong \overline{CD}$.

The point M on $\overline{AB}$ halfway between A and B is called the **midpoint** of $\overline{AB}$.

A **ray** is half of a line. It starts at its **endpoint**, P, and contains all the points on the line which are on one side of P. If Q is any other point on the ray, then we label it $\overrightarrow{PQ}$.

If two rays have a common endpoint, they form an **angle**. The rays $\overrightarrow{AB}$ and $\overrightarrow{AC}$ forms the angle $\angle BAC$ (or $\angle CAB$). The **vertex** is the common endpoint of the rays (here A), and is the middle of the three letters in the name of the angle. The rays $\overrightarrow{AB}$ and $\overrightarrow{AC}$ are the **sides** of the angle. If there is only one angle at a given vertex, we can simply say $\angle A$.

If the sides of the angle are not on the same line, then the angle separates the plane into two parts: the **interior** and the **exterior** of the angle. The points along a line segment connecting the sides of the angle are in the interior.

The size of an angle is measured by the rotation required to get from one side of the angle to the other, pivoting on the vertex. This size is called the **measure** of the angle, typically denoted $m(\angle A)$. Generally the measure is given in **degrees**, where there are 360°in a full rotation. The rotation is generally imagined to pass through the interior of the angle, so that it is between 0°and 180°.

A **zero angle** has measure 0°. **Acute angles** have measure strictly between 0°and 90°. A **right angle** has measure 90°. **Obtuse angles** have measure strictly between 90°and 180°. A **straight angle** has measure 180°. A **reflex angle** has measure strictly between 180°and 360°, and is the measure of the exterior of the angle.

Two lines l and m that intersect at right angles are called **perpendicular lines**. We write $l \perp m$. Similarly, any two rays, two segments, or a segment and a ray are perpendicular if they are contained in perpendicular lines.

Two angles are congruent if, and only if, they have the same measure. We write $\angle P \cong \angle Q$.

Figure 11.6 shows useful tools for measuring and drawing geometric figures.

Example 11.2b is interesting.

Two angles are **complementary** if the sum of their measures is 90°. Two angles are **supplementary** if the sum of their measures is 180°. Two angles with a common side but nonoverlapping interiors are **adjacent angles**.

Two nonadjacent angles formed by two intersecting lines are called **vertical angles**.

Theorem: Vertical angles have the same measure.

When two lines l and m are intersected at two points by a transversal t, the **corresponding angles** are the ones on the same 'quadrant' formed by the transversal with each line.

If l and m are parallel, we get the **corresponding-angles property** - namely that the corresponding angles are congruent. Conversely, if two lines in a plane are cut by a transversal and some pair of corresponding angles is congruent, then the lines are parallel.

Example 11.3 - measuring corresponding angles

When two lines l and m are intersected at two points by a transversal t, the **alternate-interior angles** are the ones on opposite sides of the transversal between the two lines.

Theorem: Two lines cut by a transversal are parallel if and only if a pair of alternate interior angles is congruent.

Theorem: The sum of the measures of the angles in a triangle is 180°.

An **exterior angle** of a polygon is an angle which is adjacent to a vertex angle when one extends a side of the polygon past the vertex.

Example 11.4: Show that $m(\angle 4) = m(\angle 1) + m(\angle 2)$.

Def: **altitude of a triangle** - a line through a vertex of the triangle that is perpendicular to the line containing the opposite side of the triangle.

Example 11.5 - Showing that the altitudes of a triangle are concurrent.

Directed angles have one side specified as the **initial side** and the other side specified as the **terminal side**. The measure of a directed angle is the number of degrees you would need to rotate the initial side to get the to the terminal side. Rotating in the counterclockwise direction is considered positive, and clockwise is considered negative.

Example 11.6 - Measuring directed angles.