

Concepts Points, Lines, and Angles

Based on power point presentations by Pearson Education, Inc.
Revised by Ingrid Stewart, Ph.D.

Learning Objectives

1. Memorize the definition of points and lines.
2. Memorize the definition of angles.
3. Name angles.
4. Measure angles.
5. Determine special angles.
6. Determine the relationships of angles formed by certain intersecting lines.

NOTE: This lesson contains some examples. You can find more examples in the “Examples” document also located in the appropriate MOM Learning Materials folder.

1. Definition of Points and Lines (1 of 3)

Point

A **point** is represented as a small dot. Its name is usually a capital letter. For example,



Line

A **line** extends to infinity to the right and left. This is indicated by two arrows, For example,



Its notation is usually a combination of any two of its points with a line drawn over them. Please note the line over the letters begins and ends with an arrow! For example,

\overleftrightarrow{AB} or \overleftrightarrow{BA}

Definition of Points and Lines (2 of 3)

Line Segment

A **line segment** is a portion of a line joining two points.



Its notation is usually a combination of its two end points with a line drawn over them. For example,

\overline{AB} or \overline{BA}

Please note that the line over the letters does NOT end in arrows as is the case with an infinitely long line.

Definition of Points and Lines (3 of 3)

Ray

A **ray** is formed when the line starts at a point, but then extends to infinity either on the right or the left. This is expressed with an arrow. For example,



Its notation is usually a listing of any two of its points listed in order of the direction of the arrow with a ray drawn over them. The arrow shows the direction of the ray! For example,

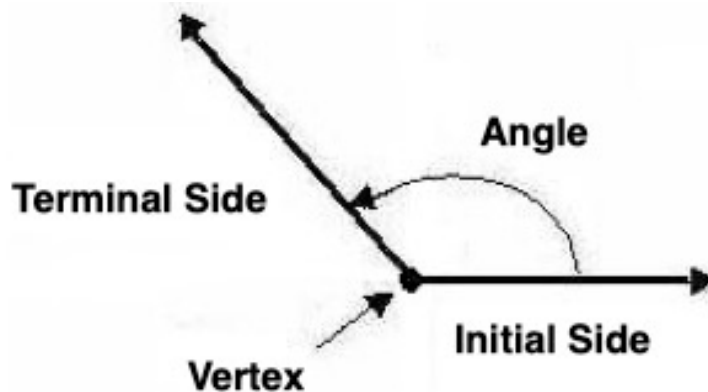
\overrightarrow{AB}

2. Definition of Angles

Angle

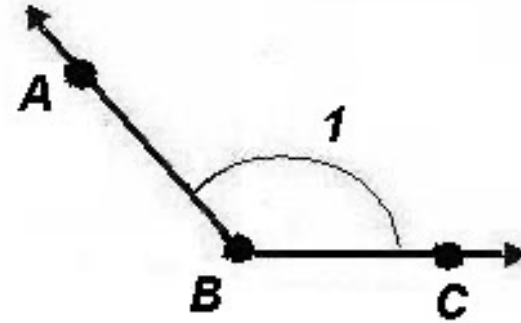
An **angle** is determined by rotating a ray about its endpoint. The rotation of the ray about its endpoint is usually indicated with an arc in between the **initial** and **terminal** sides.

- The starting position of the ray is called the **initial side** of the angle.
- The position after rotation is called the **terminal side** of the angle.
- The point where the initial and the terminal side meet is called the **vertex** of the angle.



3. Angle Names

Given the angle on the right, we can name it several different ways:



1. We can place a number or letter in between the two rays, say 1, and then name the angle 1. See picture below.
2. We can also use the letters of points on the rays together with the vertex point. In the picture below, we would say angle ABC or angle CBA, either way, as long as the letter for the vertex point is in the middle.

**NOTE: Instead of writing “angle”, the symbol \angle is often used instead!
For example, we write $\angle ABC$ ” instead of angle ABC.**

3. Finally, we can use the letter for the vertex point alone. In the picture below, we would say $\angle B$ (angle B).

4. Angle Measure (1 of 4)

Most commonly, angles are measured in degrees. This is indicated by the circle symbol $^{\circ}$ placed in the upper right-hand corner of a number. For example, 45° (pronounced “45 degrees”).

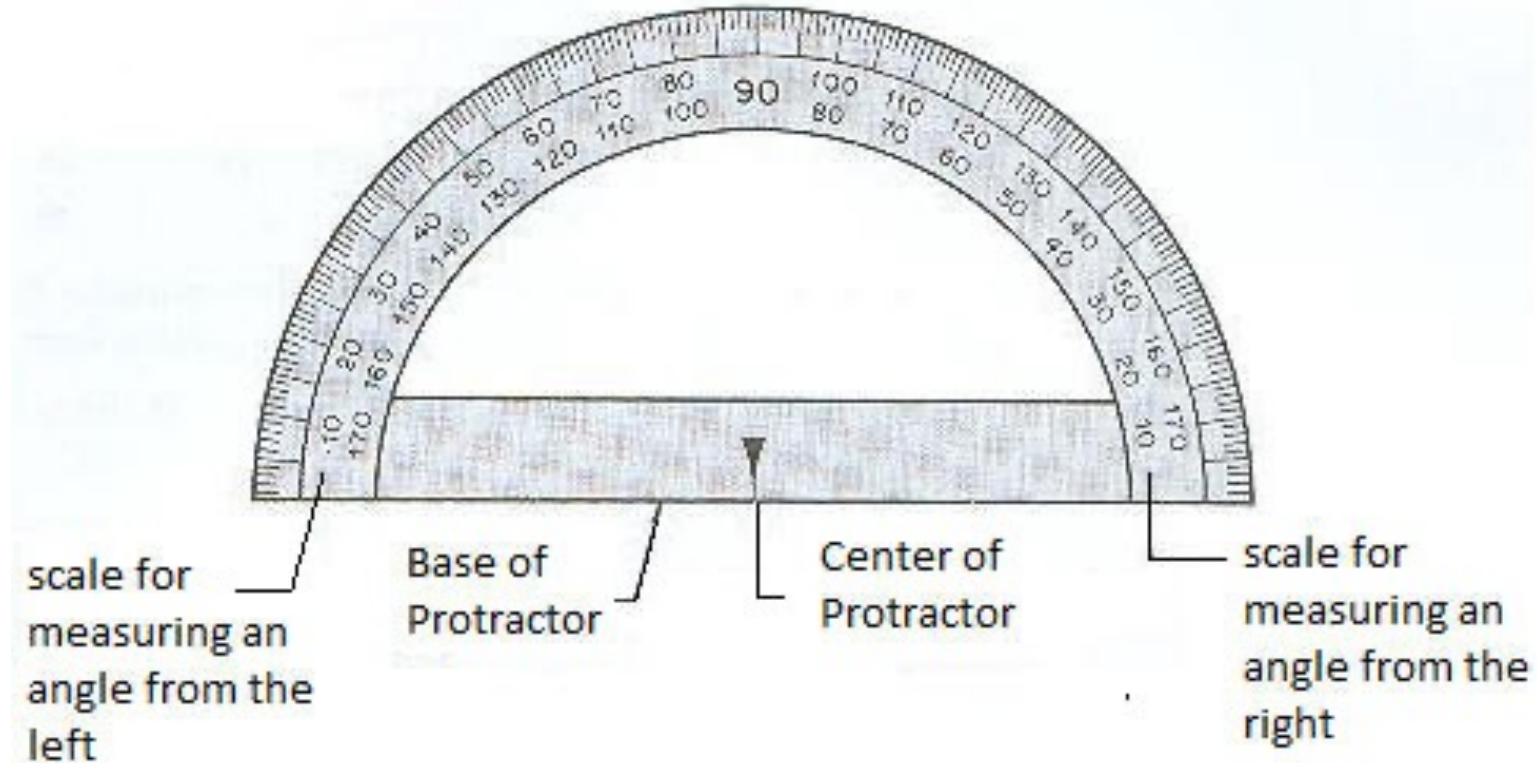
Degrees can further be divided into minutes (') and seconds (") as follows:

$1^{\circ} = 60'$ (minutes) using the apostrophe on the computer keyboard

$1' = 60''$ (seconds) using the quotation mark on the keyboard

Angle Measure (2 of 4)

We use a **protractor** to measure angles. Below is a picture of one type.



Please note that the protractor has the same scale to the right and left of 90°.

Angle Measure (3 of 4)

Measuring Procedure

- Place the base of the protractor along one side of the angle with the point on your protractor that indicates its "center" on the vertex of the angle.

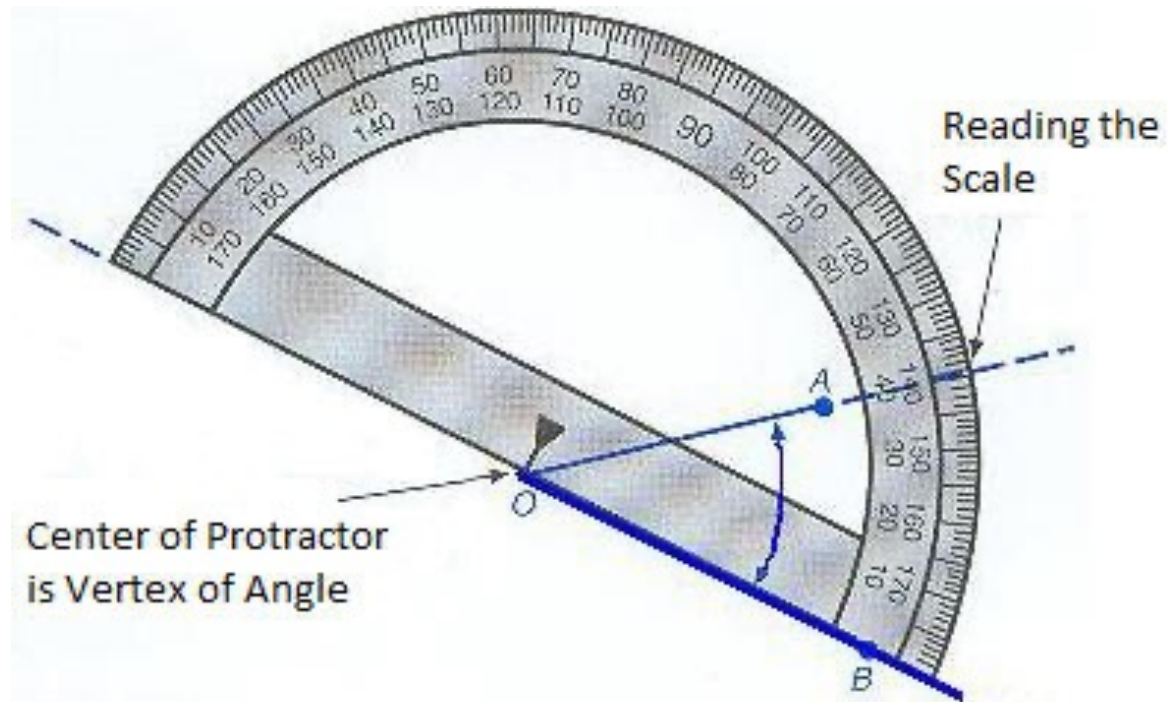
Please note that the "center" of the protractor is somewhere along or close to the base of the protractor. Be very careful! Not all protractors have user-friendly centers.

- Depending on the location of the other side of the angle, either choose the scale that has the zero-degree reading on the right side of the protractor or on the left side. Read the measurement where this side crosses the scale of the protractor.

Angle Measure (4 of 4)

Example:

Find the measurement of $\angle AOB$.



The measurement of $\angle AOB$ is 40° .

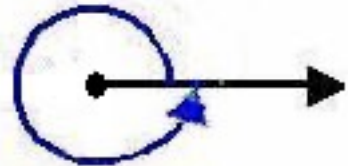
5. Special Angles (1 of 3)

0° (Zero-Degree Angle)



One ray indicates the initial and the terminal side.

360° (360-Degree Angle)



Unlike the 0° , there is a curved arc showing that the terminal side moved through a rotation of 360° .

Special Angles (2 of 3)

Right Angles



Angles whose measure is exactly 90° .

Please note that the RIGHT ANGLE is usually indicated by a rectangle drawn between the terminal and initial side.

Straight Angles



Angles whose measure is exactly 180° .

Special Angles (3 of 3)

Acute Angles

Angles whose measure is greater than 0° but less than 90° .

Obtuse Angles

Angles whose measure is greater than 90° but less than 180° .

Complementary Angles

Two angles are called complementary when their sum is 90° .

Supplementary Angles

Two angles are called supplementary when their sum is 180° .