2 Dimensions-not lines

definitions & theorems from Origametry by Daniel Heath.

While working in a group make sure you:

- Expect to make mistakes but be sure to reflect/learn from them!
- Are civil and are aware of your impact on others.
- Assume and engage with the strongest argument while assuming best intent.

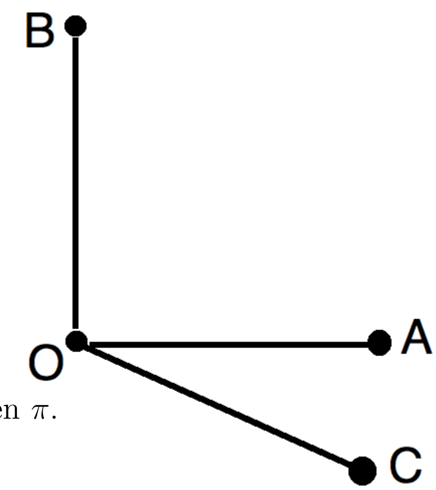
Definition 4.8. *Two rays with common endpoint B are called an* angle *with* vertex *B. If $A \neq B$ is on one ray, and $C \neq B$ is on the other, then the angle is denoted by $\angle ABC$.*

If $\overrightarrow{BA}$, $\overrightarrow{BC}$ are the same ray, then we call $\angle ABC$ a degenerate *angle. If they are opposite rays, then we call $\angle ABC$ a* straight *angle. If $\angle ABC$ is neither degenerate nor straight, we say tha tit is a* proper angle*. If $\angle ABC$ is a straight angle and $D \notin \overleftrightarrow{AC}$, then we call angles $\angle ABD$ and $\angle DBC$* supplementary *angles.*

Postulate 4. *Let $\overrightarrow{OA}$ be given. Then there is a 1-1 correspondence, called a* protractor*, between all rays $\overrightarrow{OB}$ with the real numbers in the interval $(-\pi, \pi]$ that sends $\overrightarrow{OA}$ to 0 and $\overrightarrow{OB}$ to some number $x \in (-\pi, \pi]$. The number p assigned to a ray $\overrightarrow{OP}$ by the protractor is called its* coordinate*. Furthermore:*

- *$\overrightarrow{OB}$ has coordinate 0 if and only if $\angle AOB$ is degenerate.*
- *$\overrightarrow{OB}$ has coordinate π if and only if $A - O - B$, that is if $\angle AOB$ is straight.*

1. Consider a protractor that sends $\overrightarrow{OA}$ to 0 on the Figure below.



   (a) Use your protractor to estimate $\angle AOB$

   (b) Use your protractor to find $\angle AOA$.

   (c) Use your protractor to find $\angle AOC$.

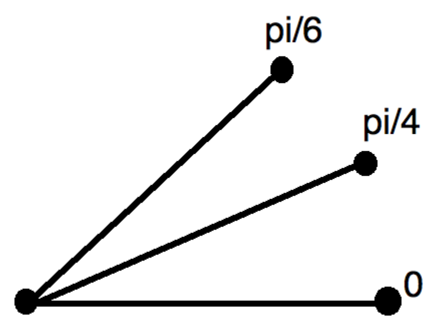
   (d) If possible, draw an angle that is greater then π.

Definition 3.1. *If* $\overrightarrow{OA}$ *and* $\overrightarrow{OB}$ *are arbitrary rays with coordinates* a *and* b *respectively, then the* angle measure $\mu(\angle AOB)$ *between* $\overrightarrow{OA}$ *to* $\overrightarrow{OB}$ *is defined as:*

$$\mu(\angle AOB) = \begin{cases} |a-b| & \text{if } |a-b| \leq \lambda \\ 2\lambda - |a-b| & \text{if } |a-b| > \lambda \end{cases}$$

Postulate 5. *Let* $\overrightarrow{OA}$, $\overrightarrow{OB}$, *and* $\overrightarrow{OC}$ *be distinct rays. Then* $\mu(\angle AOB) + \mu(\angle BOC) = \mu(\angle AOC)$ *if and only if* B *is in the interior of* $\angle AOC$.

2. Consider the following angles with the measurements of a protractor given. Does this satisfy Postulate 5? Why or why not?



3. Consider the following:

   Theorem 4.17. *Angles supplementary to angles with equal measures have equal measures.*

   (a) Provide an example that highlights the truth of the theorem.

   (b) Prove Theorem 4.17