

Math 409, Spring 2009  
Notes on Problem EG22

The ray  $\overrightarrow{AB}$  looks like this:



Colloquially, you might define a ray as something like

“half a line”

or

“part of a line”

or

“kind of like a line”.

or

“a line segment that starts at a point and goes on forever”

or

“a line segment that extends infinitely in some direction”.

But none of these definitions is mathematically precise in our axiom system, because they are either imprecise (particularly the first three definitions above) or misuse terms we've already defined (such as “line segment”) especially or depend on things that we haven't defined in our axiom system (such as “starts at”, “forever”, “infinitely”, “direction”).

On the other hand, here are some good words to use in defining a ray precisely:

- “set of points”
- “collinear” (see Definition 1)
- “line segment” (see Definition 6)
- “between” (see Definition 5)

Your definition should look something like this:

**Given two points  $A, B$ , the ray  $\overrightarrow{AB}$  is defined as the set of points  $C$  such that...**

Your job is to fill in the “...”.