

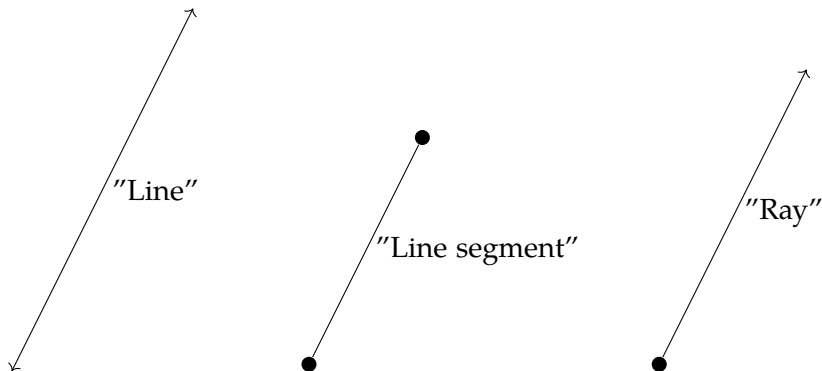


## CHAPTER 1

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# Angles

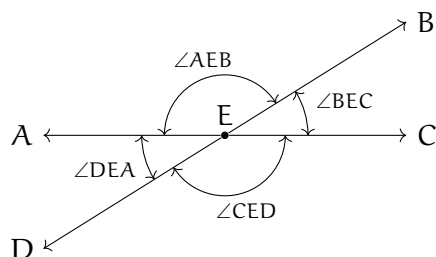
In the following recommend videos, the narrator talks about lines, line segments, and rays. When mathematicians talk about *lines*, they mean a straight line that goes forever in two directions. And if you pick any two points on that line; the space between them is a *line segment*. If you take any line, pick a point on that line and discard all the points on one side of the point, that is a *ray*. All three have no width.



Watch the following videos from Khan Academy:

- Introduction to angles: <https://youtu.be/H-de6Tkxej8>
- Measuring angles in degrees: <https://youtu.be/92aLiyeQj0w>

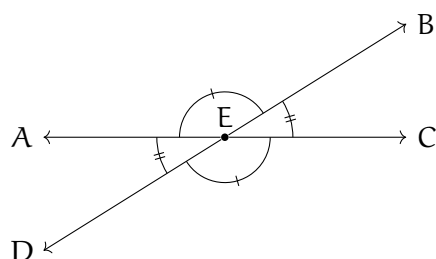
When two lines cross, they form four angles:



What do we know about those angles?

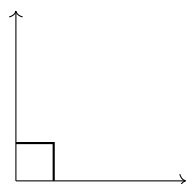
- The sum of any two adjacent angles add to be  $180^\circ$ . So, for example,  $m\angle AEB + m\angle BEC = 180^\circ$ . We use the phrase “add to be  $180^\circ$ ” so often that we have a special word for it: *supplementary*.
- The sum of all four angles is  $360^\circ$ .
- Angles opposite each other are equal. So, for example,  $m\angle AEB = m\angle CED$ .

In a diagram, to indicate that two angles are equal we often put hash marks in the angle:



Here the two angles with a single hash mark are equal and the two angles with double hash marks are equal.

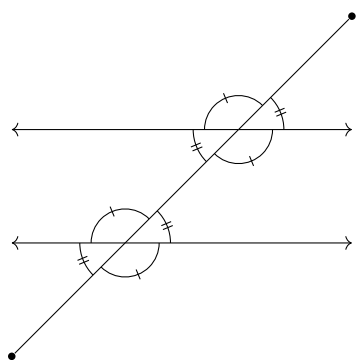
When two lines are perpendicular, the angle between them is  $90^\circ$  and we say they meet at a *right angle*. When drawing diagrams, we indicate right angles with an elbow:



When an angle is less than  $90^\circ$ , it is said to be *acute*. When an angle is more than  $90^\circ$ , it is said to be *obtuse*.



If two lines are parallel, line segments that intersect both lines, form the same angles with each line:



This is a draft chapter from the Kontinua Project. Please see our website (<https://kontinua.org/>) for more details.





## APPENDIX A

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# Answers to Exercises

