

Thought Experiments

Day 7 – Philosophical Method

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A standard thought experiment physics students are asked to perform in homework problems is this: “Compute the change in the earth’s orbital speed if the earth were suddenly to double in mass.”

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Physics students are also asked to answer “what if” questions like this one: “How would your life be different if acceleration due to gravity were twice its current value?”

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Everyone agrees that legitimate thought experiments should not require us to imagine logically impossible things, like an object that is entirely black and entirely green at the same time.

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 - This idea is due to John Norton
 - Some of these pairs are very old, others are quite contemporary

Thought experiment / Anti-thought experiment pairs

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Then there could be infinitely long lines

AB and CD:

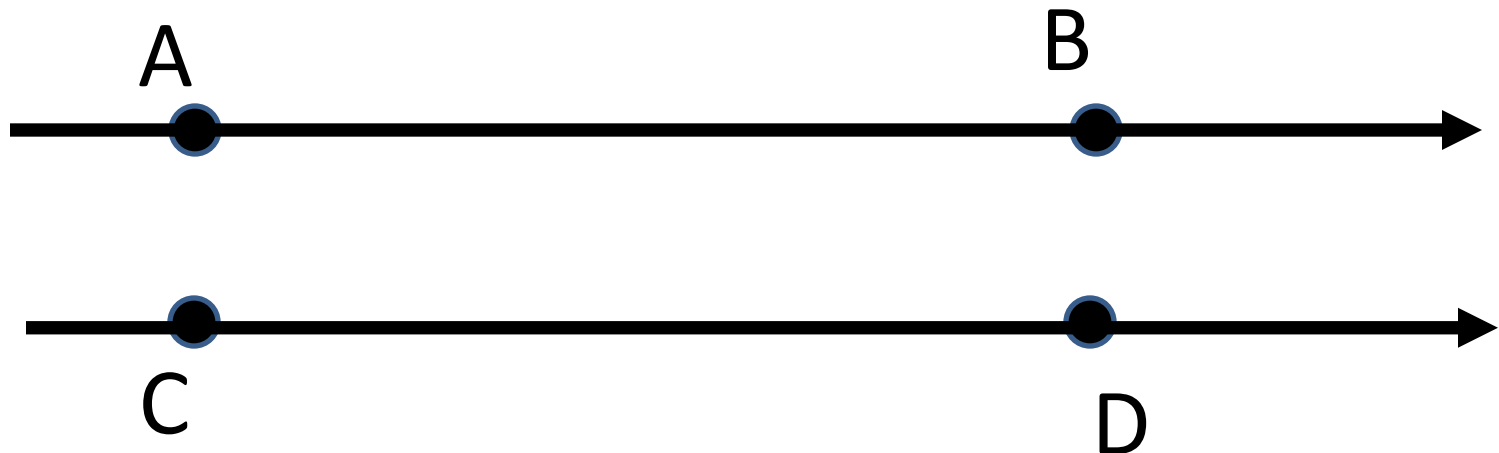
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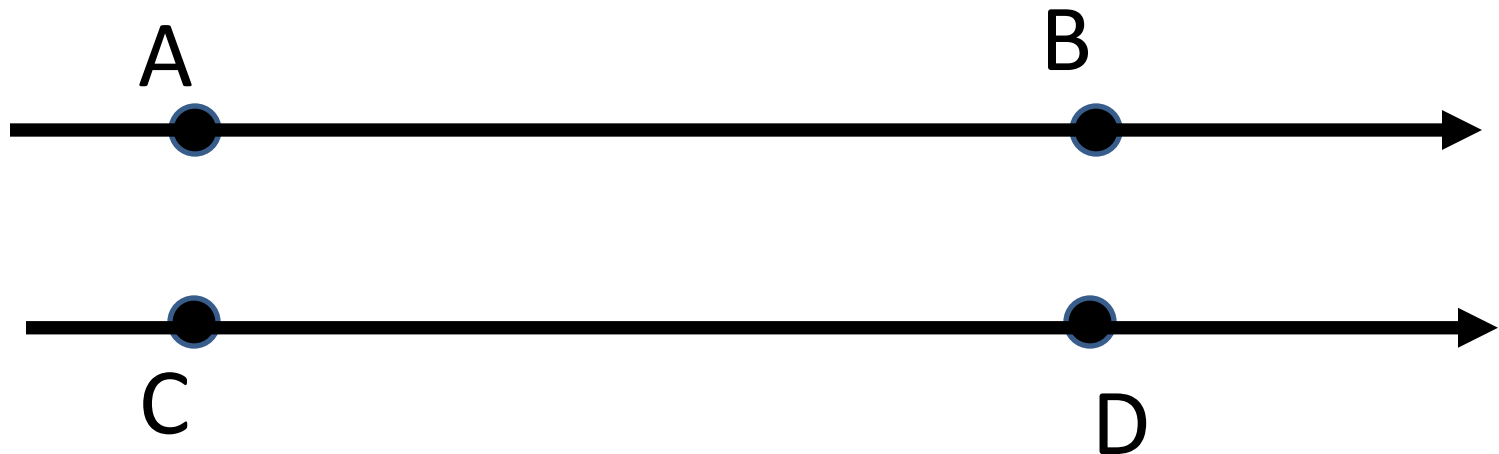


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Suppose the universe is infinite.

Now rotate line AB clockwise.

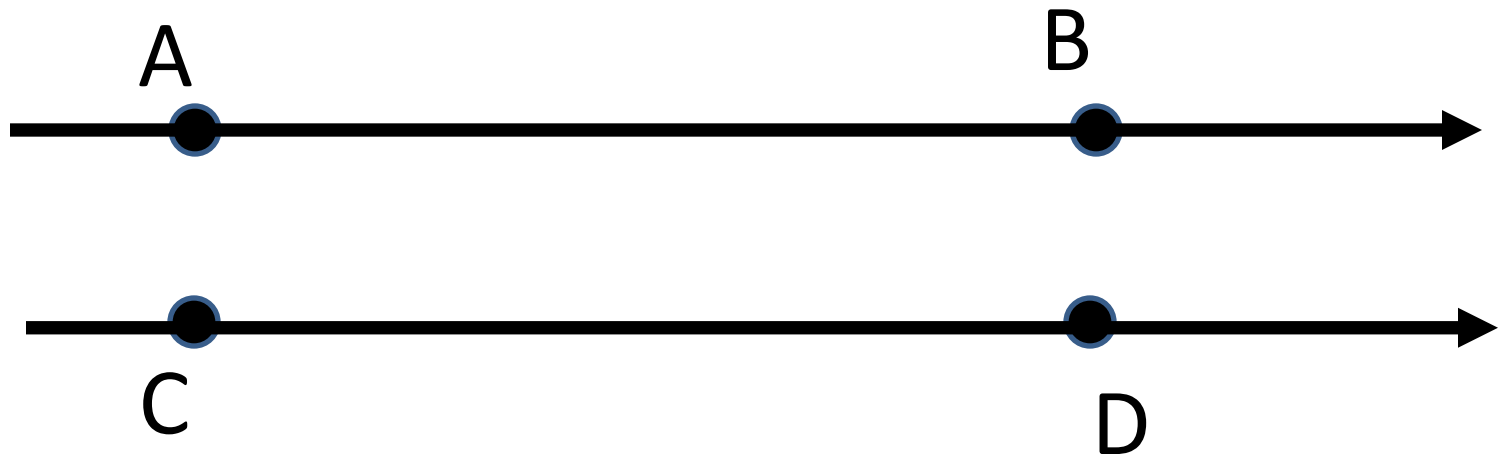


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**Now rotate infinite line AB clockwise about A.
At what angle does it first cross infinite line CD?**

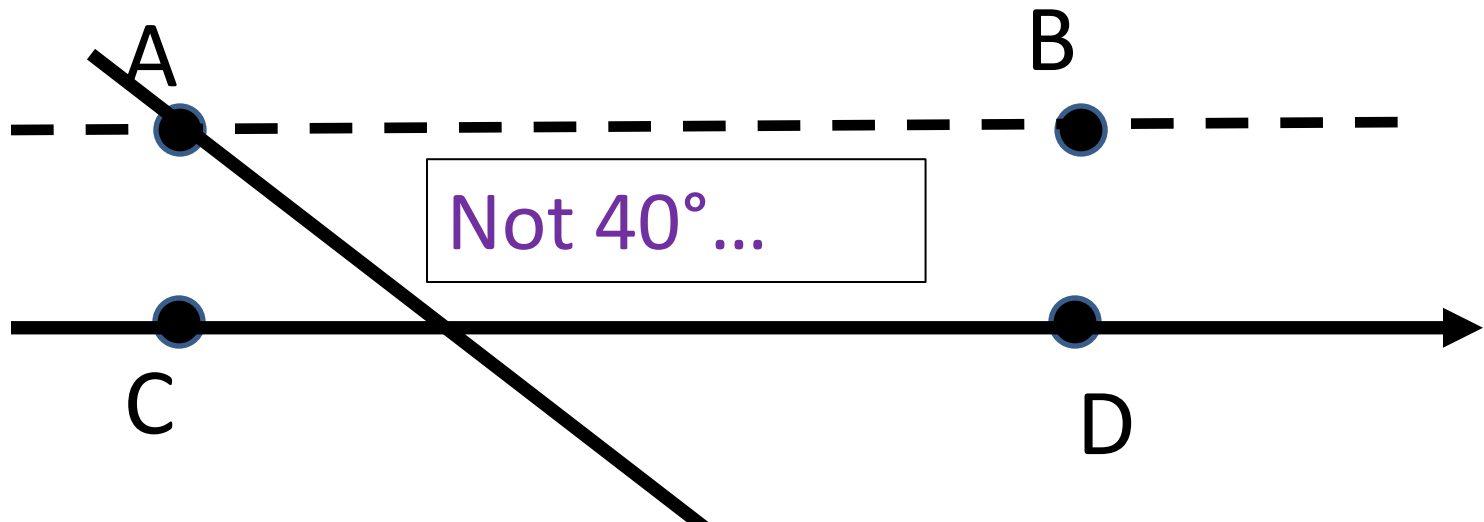


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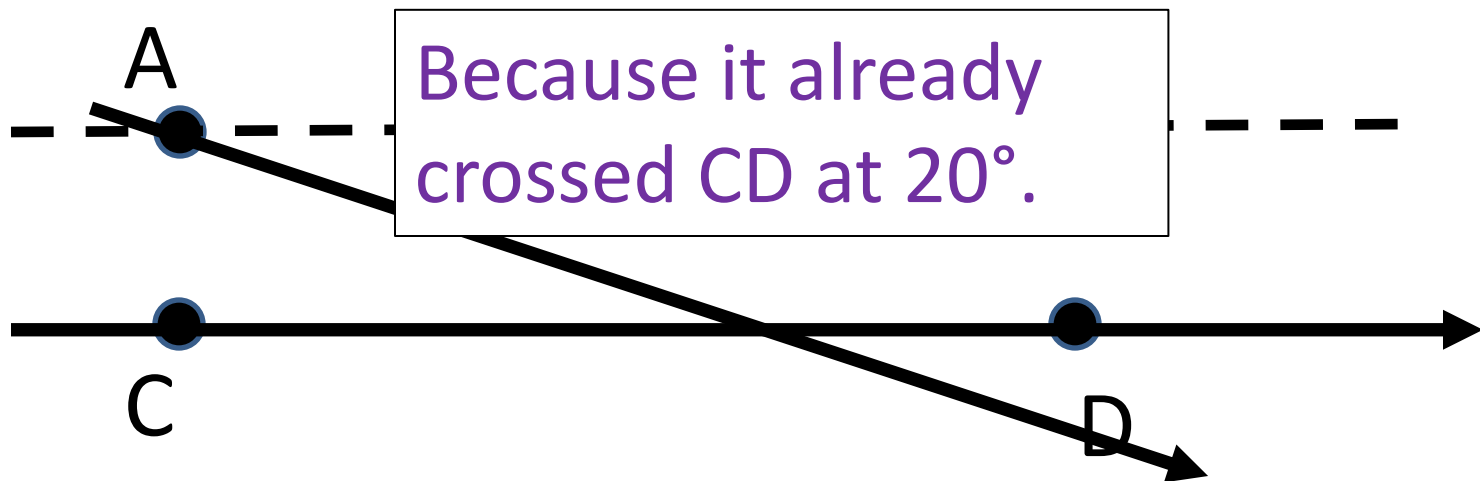


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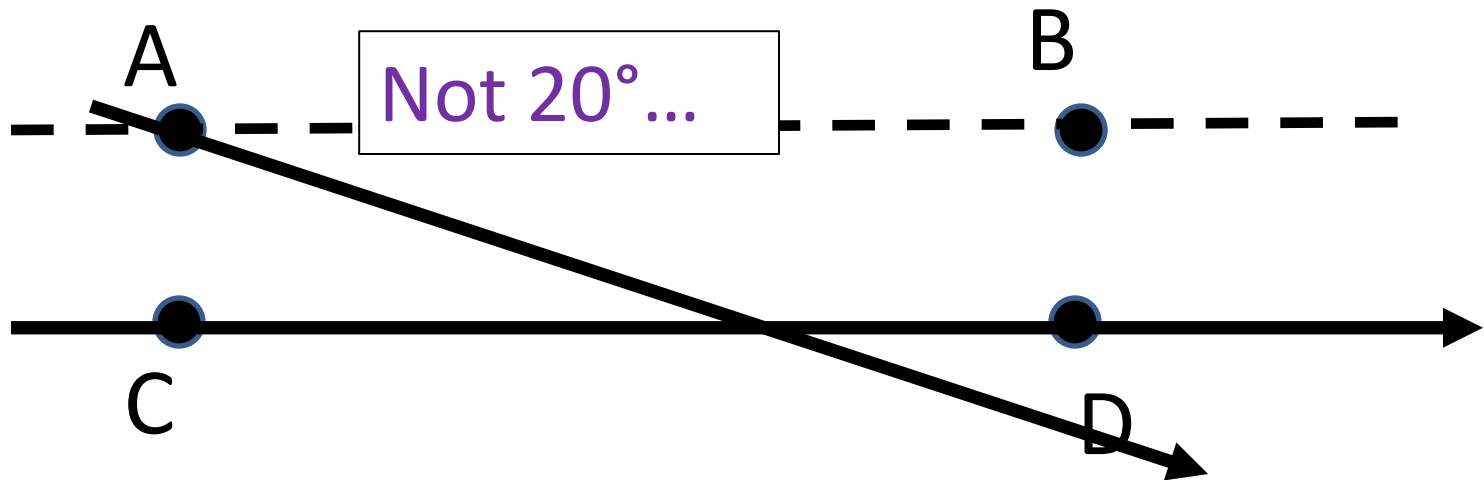


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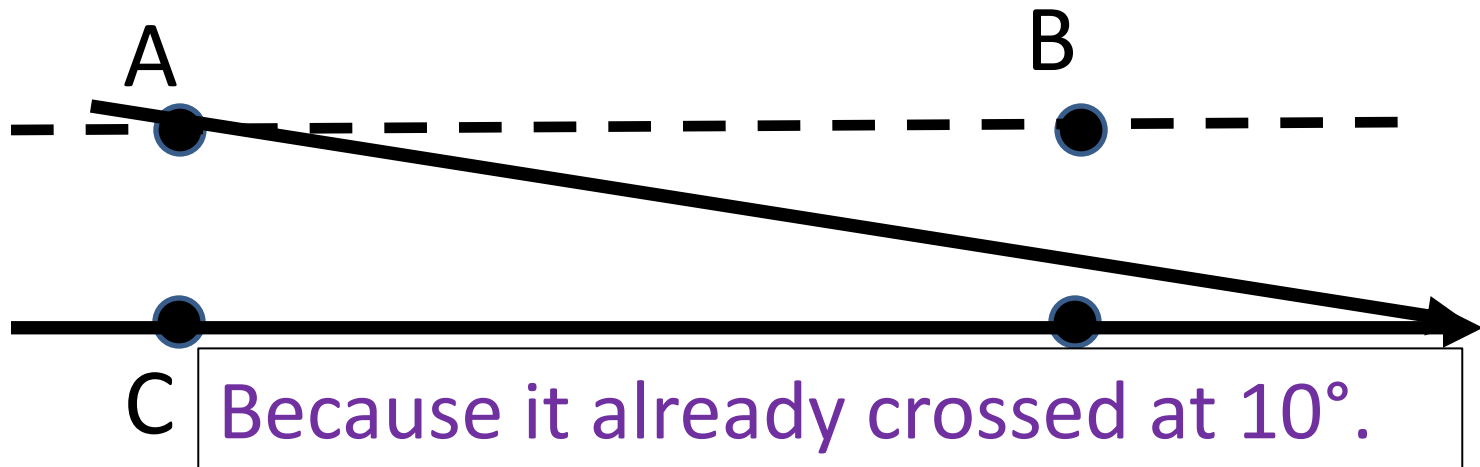


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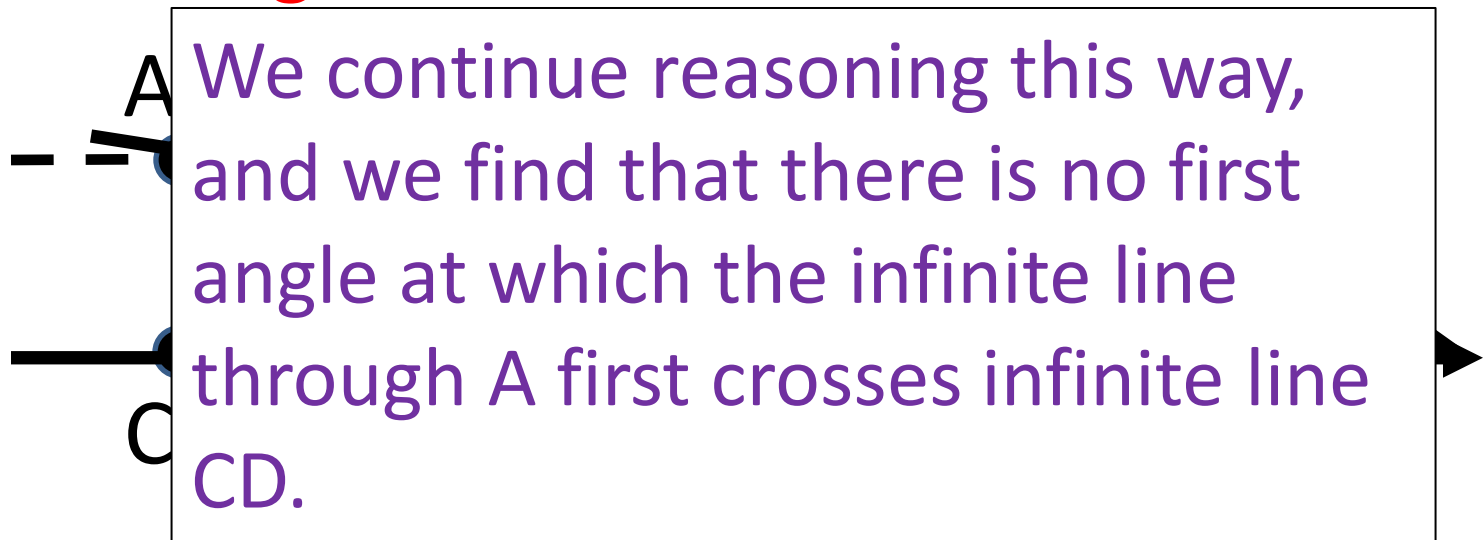
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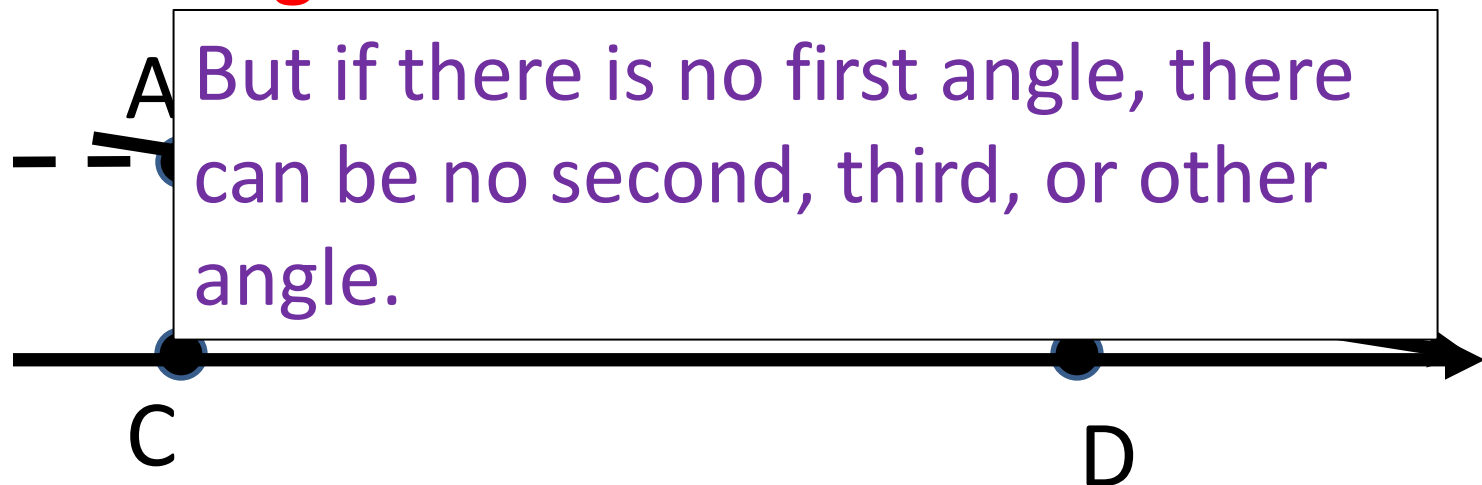
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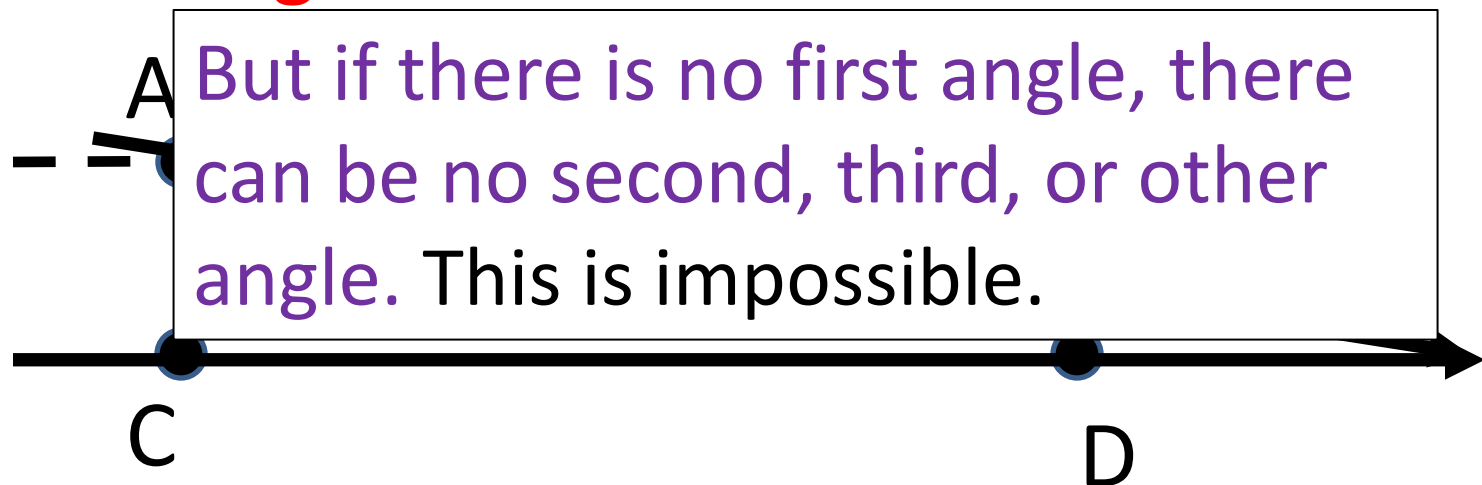
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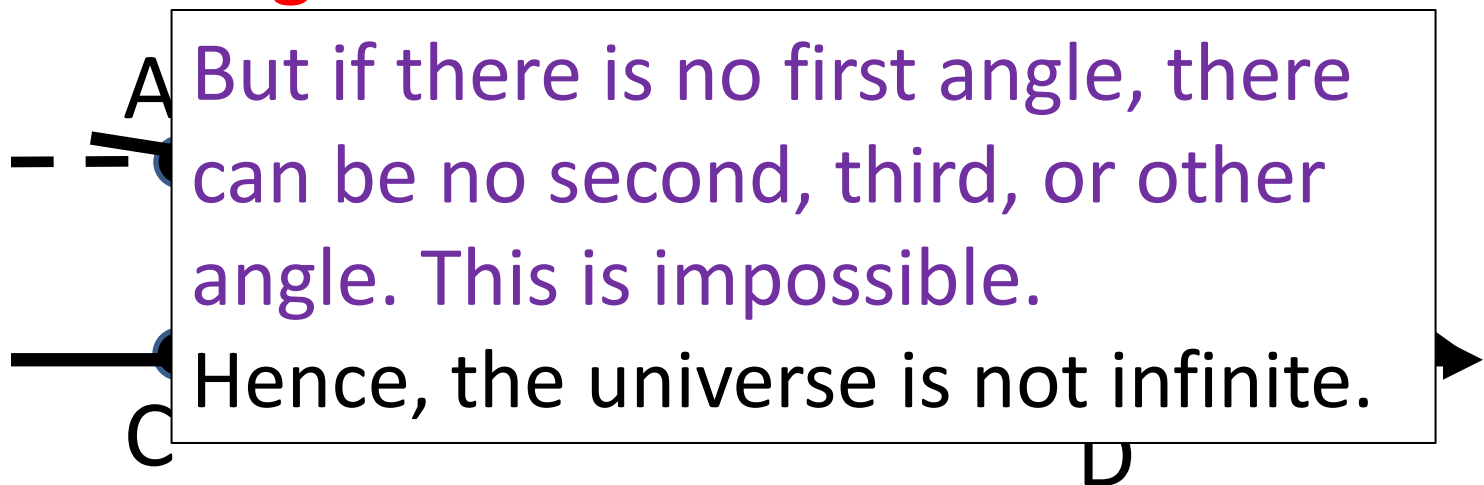
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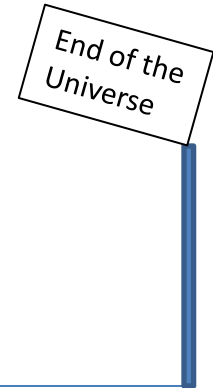
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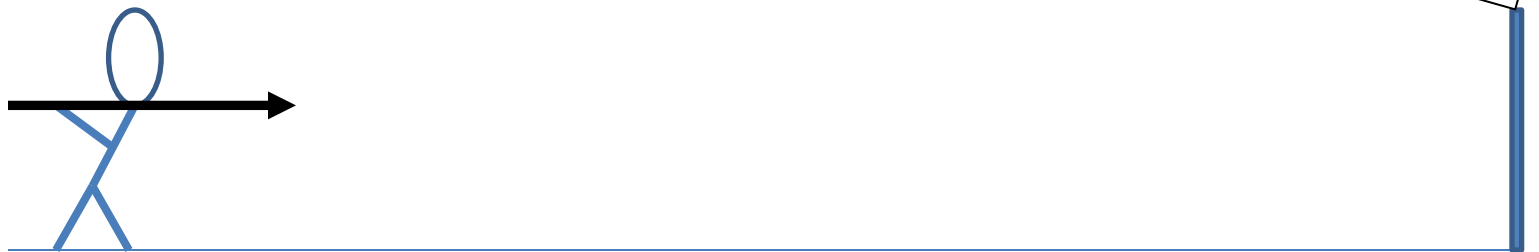
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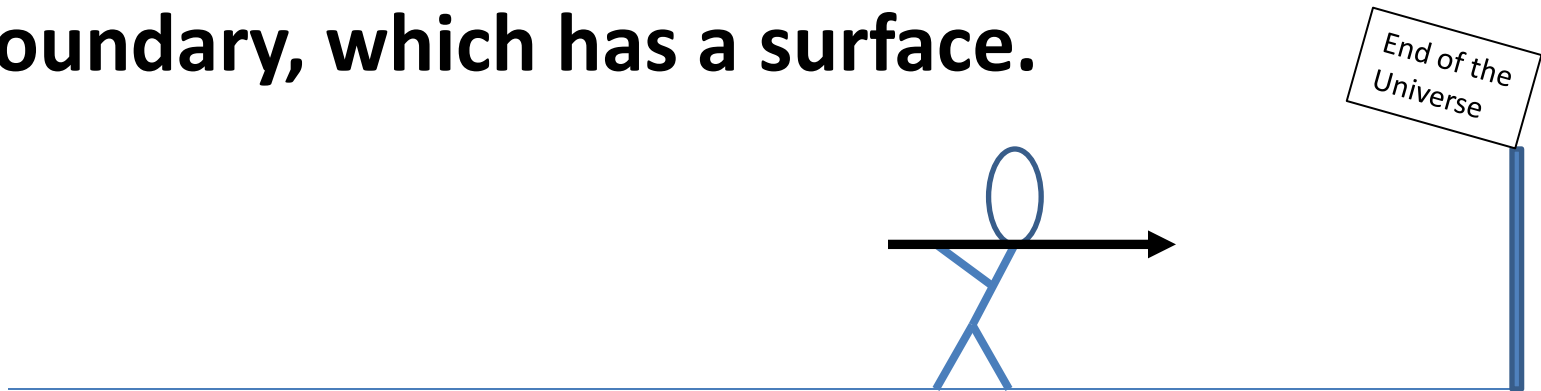


Walk up to the boundary, and throw your spear at it.

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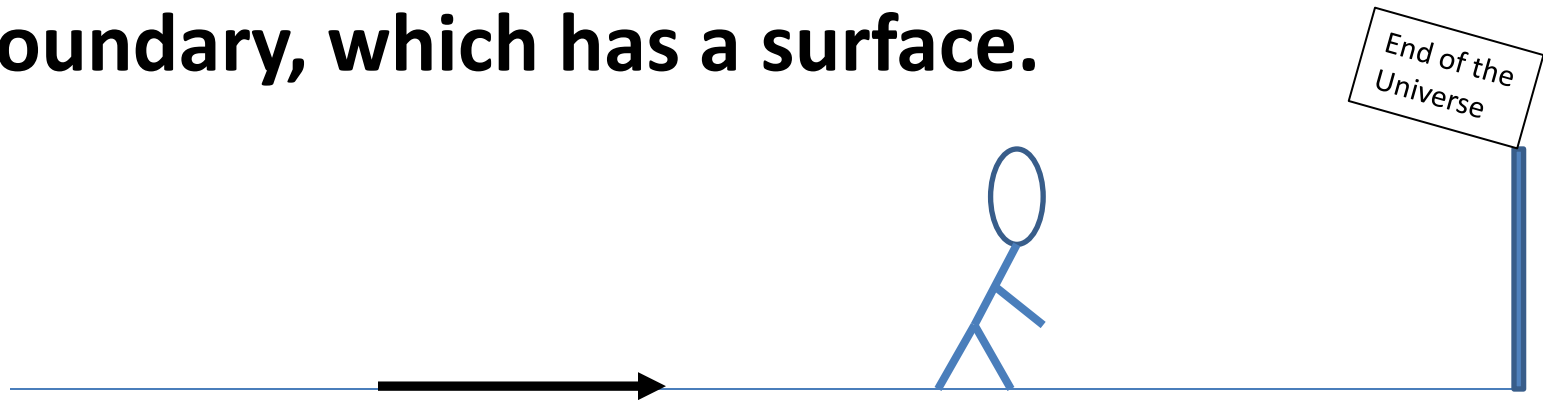
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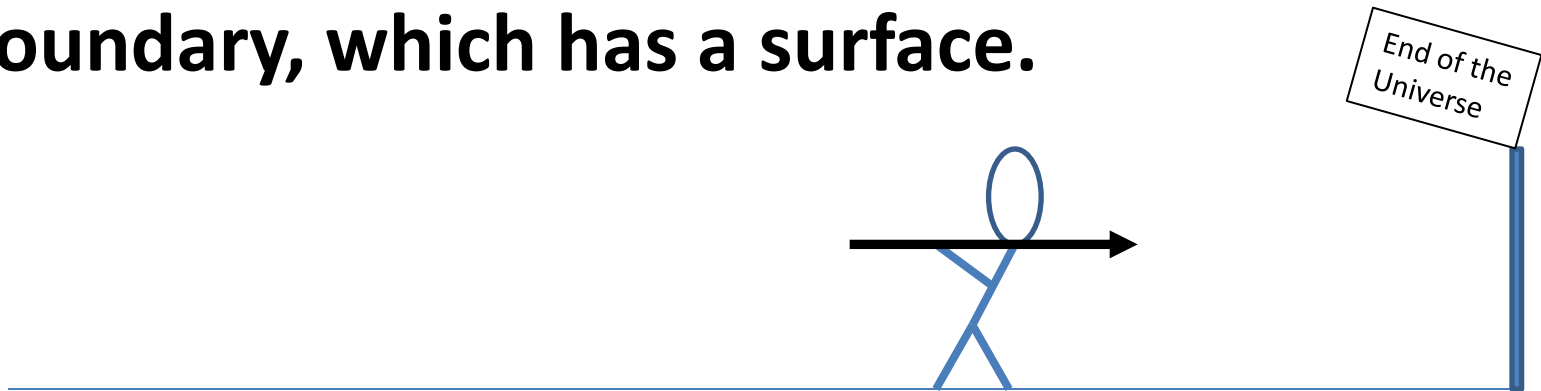


If your spear bounces off, then the surface is not a boundary at all, but a solid wall.

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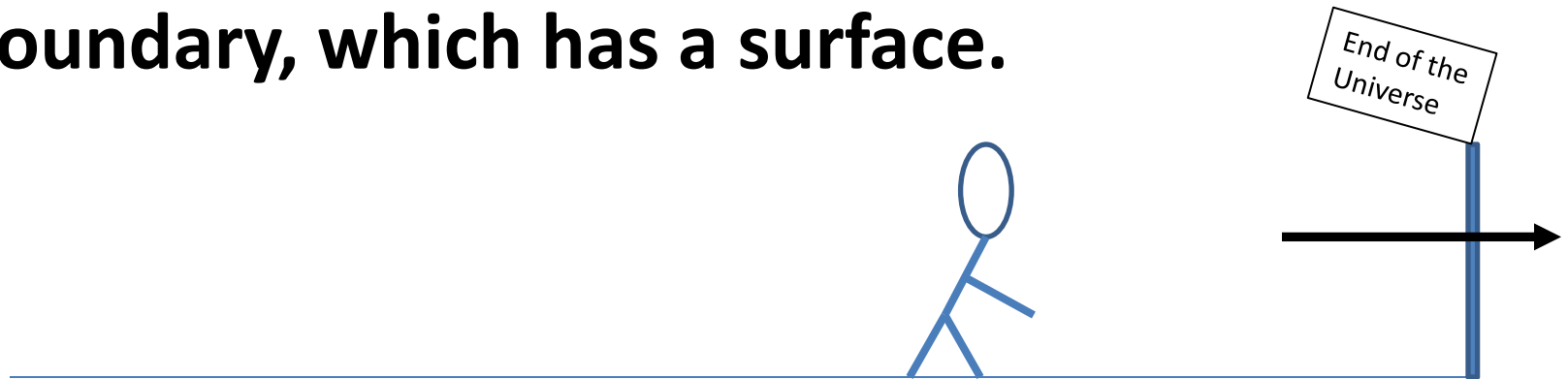
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If your spear penetrates the wall, then there is something beyond the surface, and it is not a boundary in this case either.

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Since your spear must either penetrate or bounce off, and in both cases this is not actually a boundary, **then the universe can have no boundary.**

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Since your spear must either penetrate or bounce off, and in both cases this is not actually a boundary, then the universe can have no boundary. **Therefore the universe is not finite.**

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 - Tamar Gendler suggests that, in these cases where there are conflicting thought experiments, we can make sense of the thought experiments, but we cannot arrive at conclusions based on them. **We should look elsewhere for grounds on which to base conclusions.**

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 - **it makes contradictory assumptions** 😊
 - **there is another thought experiment (or a different way to describe the same thought experiment) which tempts many to make the opposite conclusion** 😊