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Position/Motion/Frame of Reference Notes
Quarter 4

Position

- Location of a _____ or _____
- When you describe a position you need to use _____ of the following:
  - _____ point
  - _____ & _____
- Why do you need to discuss two locations to describe the position of an object?
  - So, you _____ describe where a place is; so you can _____ it

Reference Point

- _____ to which you _____ _____ location
- Example:
  - You can describe where Santiago, Chile, is from the reference point of the city Brasília, Brazil, by saying that Santiago is about 1860 mi southwest of Brasília.
  - You can describe where Santiago, Chile, is from the latitude and longitude points of (33°S, 71°W).

Measuring Distance

- _____ways:
  - Along a _____ line/path
    - **Example:** If you were to travel from Brasília to Santiago, you would end up about 3000 kilometers from where you started.
  - _____length of a path
    - **Example:** During a hike, you are probably more interested in how far you have walked than in how far you are from your starting point.

Motion

- _____ of position over _____
- A change in position is _____ that motion happened
- The _____ of a moving object is a measure of how quickly or slowly the object changes position.
  - A _____ object moves _____ than a _____ moving object would in the _____ amount of _____.
  - CAN _____ direction

Relative Motion

- The _____-_____-_____ of the person observing a position/motion.
- How an _____ sees your motion depends on how it _____ with his

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_____ motion.

- Just as position is described by using a reference point, motion is described by using a _____ _____ _____.
- Relative Motion Animation:(notes)--

Frame of Reference

- The location of an observer, who may be in motion. How does your observation of motion depend on your own motion?
    - You observe motion relative to your own position.
    - Example (from textbook): Consider a student sitting behind the driver of a moving bus. The bus passes another student waiting at a street sign to cross the street.
    1. To the observer on the bus, the driver is not changing his position compared with the inside of the bus. The street sign, however, moves past the observer's window. From this observer's point of view, the driver is not moving, but the street sign is.
    2. To the observer on the sidewalk, the driver is changing position along with the bus. The street sign, on the other hand, is not changing position. From this observer's point of view, the street sign is not moving, but the driver is.

- You try it: (from textbook)
- Suppose you are in a train, and you cannot tell if you are stopped or moving. Outside the window, another train is slowly moving forward. Could you tell which of the following situations is happening?

1. Your train is stopped, and the other train is moving slowly forward.
2. The other train is stopped, and your train is moving slowly backward.
3. Both trains are moving forward, with the other train moving a little faster.
4. Your train is moving very slowly backward, and the other train is moving very slowly forward.

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- Actually, all four of these possibilities would look exactly the same to you. Unless you compared the motion to the motion of something outside the train, such as the ground, you could not tell the difference between these situations.

- In the following slides, what would be the frame of reference to describe the motion?

Car:

Boat:

Airplane:

Bridge:

Runners:

Spacecraft/Earth: