

REFERENCE POINT (FRAME OF REFERENCE) ANSWERS:

Use your definition for **Reference Point (Frame of Reference)**, the F.O.R story, and the examples given in class to help you identify the **Reference Point** in each of the following situations. Please use a **COMPLETE SENTENCE** to explain the reference point you selected and why. **Note:** Some have more than one correct answer and it is **possible** to have a reference point that is **moving**, although it is usually stationary (not moving)).

1. A car moves past people standing on the sidewalk.
Reference Point: **the people or sidewalk**
2. A passenger on a train sees a ball roll down the aisle past a piece of trash.
Reference Point: **the floor or piece of trash or people's feet or the chairs**
3. A plane flying in the sky during the middle of the day.
Reference Point: **the clouds or the ground (sometimes it is hard to know which way the plane is traveling if there is not a good reference point in the sky)**
4. A passenger on a train looks out the window and sees a horse running in front of a red barn on a large farm.
Reference Point: **the barn or the grass**
5. A person standing near a railroad track sees a train pass by and then notices an airplane fly overhead in the same direction as the train, but at a much faster speed.
Reference Point: **for the train – tracks or the ground for the plane – the train**
6. A passenger in a hot air balloon looks down and sees a train moving backwards.
Reference Point: **the ground or the trees or the track**
7. A couple on a date sees a shooting star going across the star-filled night sky.
Reference Point: **the stars**
8. A blue whale swims past a boat anchored off the coast.
Reference Point: **the boat or the coast**
9. An arrow flies past a tree and a bird and hits an apple on top of a man's head.
Reference Point: **The tree or the bird or the apple or the man**
10. The sun rising over the horizon.
Reference Point: **the horizon or the SUN**
11. A person standing inside an elevator going down.
Reference Point: **there is no frame of reference or reference point**
12. A pilot trying to land a plane in the middle of a cold winter night. The runway has no visible lights because they are covered by two feet of snow.
Reference Point: **None – that is why pilots will use IFR to land**

Bonus: Name the two ways you know you are moving? **You feel movement (due to acceleration) or you have a reference point you can see to compare objects in motion.**

DISTANCE vs. DISPLACEMENT

Adopted from Prentice Hall (Last Updated 10/28/2015)

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- **Distance** is a measurement of “**how far**” an object has traveled over time.
 - **Example:** I walked 5 km to school and 5 km to get back home.
I walked a **total distance of 10 km** today.
 - **Displacement** is a measurement of how far from your starting location you end up.
 - **Example:** I walked to school in the morning and back home after school.
My **total displacement** was **0 km**.
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DIRECTIONS: Use your understanding of **measuring distance** vs. **measuring the displacement** of an object to determine the distance and displacement for each situation below (include units):

1. A plane flies 3000 km to Madison, Wisconsin to visit the world’s largest petting zoo.
*The total distance is: **3000 km** The total displacement is: **3000 km***
2. After visiting the petting zoo you fly back home to Los Angeles.
*The total distance for the trip is: **6000 km** The total displacement was: **0 km***
3. A racecar at the Indy 500 does 200 laps around a 4 km **oval** racetrack.
*The total distance is: **800 km** The total displacement is: **0 km***
*What is the total distance in miles? **500 miles (thus the Indy 500)***
4. A runner runs the 100 meter dash in 10 seconds.
*The total distance is: **100 m** The total displacement is: **100 m***
5. Mr. Caldwell paddles from Newport Beach to Catalina Island which is 40 km away.
*The total distance is: **40 km** The total displacement is: **40 km***
6. Mr. Caldwell paddles back from Catalina Island, but comes ashore in Laguna Beach (not Newport Beach) which is also 40 km away from Catalina Island. Laguna Beach is 10 km south of Newport Beach.
*The total distance is: **80 km** The total displacement is: **10 km***
7. You sit quietly at your desk for 50 minutes.
*The total distance is: **0 m** The total displacement is: **0 m***
8. The motorcycle (in the picture below) travels from the house to the factory.
*The total distance is: **200 m** The total displacement is: **120 m***

