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# Chapter 3 Homework

## QUESTIONS

### 10. Does the odometer of a car measure a scalar or a vector quantity? What about the speedometer?

The odometer of a car measures a scalar quantity. The speedometer also measures a scalar quantity.

### 16. A projectile is launched at an upward angle of $30^\circ$ to the horizontal with a speed of 30m/s. How does the horizontal component of its velocity 1.0s after launch compare with its horizontal component of velocity 2.0s after launch, ignoring air resistance? Explain.

The projectile will be farther away after 2 seconds than it is at 1 second. It's velocity in the horizontal direction will not change, though, because the force of gravity will only have an effect on the vertical velocity.

### 17. A projectile has the least speed at what point in its path?

A projectile has the least speed at the apex of it's climb and the termination of it's path.

### 19. A person sitting in an enclosed train car, moving at a constant velocity, throws a ball straight up into the air in her reference frame.

#### (a) Where does the ball land?

The ball lands where it started on the train.

#### (b) Where does the ball land if the car accelerates?

The ball lands in the negative x direction in relation to it's starting position in the train's reference frame.

#### (c) Where does the ball land if the car deccelerates?

In the train's reference frame, the ball will land +x from where it started.

#### (d) Where does the ball land if the car rounds a curve?

In this case, the ball will land offset by some value of z and likely an offset of x as well.

**(e) Where does the ball land if the car moves with constant velocity but is open to the air?**

Assuming air resistance, the ball will land behind it's starting position, that is the -x direction.

## MISCONCEPTION QUESTIONS

**4. Which of the following equations correctly expresses the relation beween vectors $\vec{A}, \vec{B},$ and $\vec{C},$ shown in Fig 3-36?**

**6. A bullet fired horizontally from a rifle begins to fall**

**9. Two balls having different speeds roll off the edge of a horizontal table at the same time. Which hits the floor sooner?**

**10. You are riding in an enclosed train car moving at 90km/h. If you throw a baseball straight up, where will the baseball land?**

**11. Which of the three kicks in Fig. 3-38 is in th eair for the longest time? They all reach the same maximum height $h$. Ignore air resistance.**

**13. A hunter is aiming horizontally at a monkey who is sitting in a tree. the monkey is so terrified when it sees the gun that it falls off the tree. At that very instant, the hunter pulls the trigger. What will happen?**

## PROBLEMS

**1. A car is driven 245 km west and then 118 km southwest ($45°$). What is the displacement of the car from the point of origin (magnitude and direction)? Draw a diagram.**

**2.**

**8.**

**9.**

**10.**

**32.**

**34.**

**36.**

**47.**