Thursday, November 22/12
Science 10

Announcements

1. Check Understanding Concepts - Page 465, #4, 5, 7 and 8

2. Displacement During Constant Acceleration

3. Understanding Concepts - Page 473, #5-8
   Optional -> #9

HW - P3 Page 473 #5-7

Understanding Concepts

1. Compare the calculations of the scalar quantities, speed and acceleration, with the calculations of the corresponding vector quantities. What is the same and what is different?
2. You are riding your bicycle at a constant velocity west. If you decide to increase your velocity, in what direction is your acceleration?
3. While riding in a car at 90 km/h [N], the brakes are suddenly applied. In what direction is the acceleration?
4. A rabbit, eating in a field, scents a fox nearby and races off. It takes only 1.8 s to reach a top velocity of 7.5 m/s [N]. What is the rabbit's acceleration during this time?
5. A bungee jumper is falling at a velocity of 25 m/s [down] when the bungee cord just starts to stretch. After the cord stretches for 2.5 s, the velocity is 11 m/s [down]. Assume that the acceleration is constant.
   (a) What is the acceleration of the jumper?
   (b) What is the total time for the jumper to slow down from 25 m/s [down] to zero?
6. A spacecraft needs to alter its course. The retrorockets fire for 213 s to produce an acceleration of $-3.25\ m/s^2$ [forward].
   (a) What is the change in velocity of the spacecraft?
   (b) What is the significance of the negative sign of the change in velocity?
   (c) If the velocity of the spacecraft before the rockets fired was 2635 m/s [forward], what is the velocity after the rockets have fired for 213 s?
7. A supertanker coming west into port started accelerating 2.0 h before arriving. If the ship slowed at $25\ km/h^2$ [E] before coming to a stop, what was the initial velocity?
8. A car travelling at 26 m/s brakes and accelerates at $-10 m/s^2$ for 2.5 s. Does the car come to a stop? Support your answer with an appropriate calculation.

Making Connections

9. When you are inside a car you are moving at the same velocity as the car. If the car stops suddenly, for a while you will continue moving. Describe the motion of a driver with and without deployment of an airbag.

#7. port ⟸ $\vec{v}_i$ (−)

$t = 2.0\,h$

$\vec{a} = 125\ \frac{km}{h^2}$

$\vec{v}_f = 0\ \frac{km}{h}$

$\vec{v}_i = ?$

$\vec{v}_f = \vec{v}_i + \vec{a}t$

$\vec{v}_f - \vec{a}t = \vec{v}_i + \vec{a}t - \vec{a}t$

$\vec{v}_f - \vec{a}t = \vec{v}_i$

$\vec{v}_i = \vec{v}_f - \vec{a}t$

$\vec{v}_i = 0\ \frac{km}{h} - 25\ \frac{km}{h^2}(2.0\,h)$

$\vec{v}_i = -50\ \frac{km}{h}$

The initial velocity is $50\ \frac{km}{h}$ [W].

Page 473 - **P3** - Do #5-7

Understanding Concepts

For questions 5 to 9, assume constant acceleration and calculate your answers from defining equations.

5. A dragster slows down from 28 m/s [N] to 13 m/s [N] in a time of 12 s using a parachute and brakes. Calculate the displacement during this acceleration.

6. A baseball pitcher throws the ball at 28 m/s [S] toward a batter. The ball is in contact with the bat for 2.0 ms and leaves the bat travelling at 46 m/s [N]. What is the displacement of the ball while in contact with the bat?

7. A golfer hits a golf ball sitting at rest on a tee. The ball leaves the club at 64 m/s after a displacement of 35 mm. For how long was the club in contact with the ball?

8. While driving along a highway at 25 m/s [N], a driver spots an animal crossing the road. She brakes sharply for 2.0 s. If the car's acceleration is 10 m/s^2 [S], what is the displacement of the car while braking?

☆ **9.** A speedboat travels at 6.0 m/s [E] for 90 s and then accelerates uniformly at 2.0 m/s^2 [E] for 5.0 s. Calculate the displacement of the speedboat.