NAME _____ DATE _____ CLASS _____

Motion in One Dimension

Problem B

AVERAGE ACCELERATION

PROBLEM

In 1977 off the coast of Australia, the fastest speed by a vessel on the water was achieved. If this vessel were to undergo an average acceleration of 1.80 m/s^2, it would go from rest to its top speed in 85.6 s. What was the speed of the vessel?

SOLUTION

Given:

Unknown:

ADDITIONAL PRACTICE

1. In 1935, a French destroyer, *La Terrible,* attained one of the fastest speeds for any standard warship. Suppose it took 120.0 seconds at a constant acceleration of 0.19 m/s^2 for the ship to reach its top speed after starting from rest. Calculate the ship's final speed.

2.   South African frogs are capable of jumping as far as 10.0 m in one hop. Suppose one of these frogs makes exactly 15 of these jumps (150m total) in a time interval of 60.0 s.

      a.   What is the frog's average velocity?

      b.   If the frog suddenly applies the brakes and comes to a full stop 0.25 s from this speed, what is the frog's average acceleration?

3.   In the 1992 Summer Olympics, the German four-man kayak team covered 1 km in just under 3 minutes. Suppose that between the starting point and the 150 m mark the kayak steadily increases its speed from 0.0 m/s to 6.0 m/s, so that its average speed is 3.0 m/s.

      a.   How long does it take to cover the 150 m?

      b.   What is the magnitude of the average acceleration during that part of the course?

4.   In 1991 at Smith College, in Massachusetts, Ferdie Adoboe ran 1.00×10^2 m backward in 13.6 s. Find Ferdie's average acceleration during the first 2.0 seconds if Ferdie reaches a top speed of 7.36 m/s at the end of this time.

5.   A car starts from rest and begins to accelerate at a rate of 3 m/s^2. How fast is the car moving after 10 seconds?

6.   An airplane starts from rest and has an acceleration of 5 m/s^2. How long was it on the runway before takeoff if the plane reaches a final speed before takeoff of 75 m/s?

7   A remote control car is moving down the hall. While in motion the car begins to accelerate with a rate of 2 m/s^2 for 3 seconds and reaches a new top speed 8 m/s, what was the car's initial velocity?