

Problem solving with acceleration

Equations: $V_f = V_i + at$ $\Delta x = V_i t + (1/2)at^2$ $V_f^2 = V_i^2 + 2a \Delta x$

For each problem: 1) Draw a picture, 2) write your knowns, 3) write your unknowns, 4) write the relevant equation, 5) isolate the unknown variable algebraically, and only then 6) plug in numbers.

1. An old VW Beetle goes for 0 to 30 m/s with an acceleration of 2.25 m/s^2 .
 - a. How long does it take for Beetle to reach this speed?
 - b. How far did the Beetle travel while accelerating?

2. A jet comes in for a landing with a speed of 70 m/s. Once the jet touches down it has a 800 meter runway in which to slow to 6 m/s. Find the acceleration of the jet as it slows down.

3. The heart accelerates blood from rest to a velocity of 26 cm/s.
 - a. If the displacement of the blood during the acceleration is 2 cm, determine the acceleration of the blood.
 - b. How much time does it take for the blood to reach this velocity?

4. The length of the barrel of a blowgun is 1.2 meters. Upon leaving the barrel, a dart has a speed of 14 m/s. Assuming that the dart is uniformly accelerated, how long does it take for the dart to leave the length of the barrel?

5. A snowmobile moves according to the velocity vs. time graph shown below.
 - a. Sketch a quantitative acceleration vs. time graph for the snowmobile.
 - b. Sketch a quantitative position vs. time graph for the snowmobile.
 - c. How far did the snowmobile go during the 60 second time interval?



