Problems with Kinematic Equations

Acceleration = *a*, Final velocity = *v*, Initial velocity = *v0*, Time interval = *t*, Displacement = *x-x0* = *Δx*

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1. A sports car accelerates from rest to 90 km/h in 6 s.
a. What is its average acceleration in km/h per s?
b. Express the above acceleration in m/s2.

2. A jetliner, traveling northward, is landing with a speed of 69 m/s. Once the jet touches down, it has 750 m of runway in which to reduce its speed to 6.1 m/s. Compute the average acceleration (magnitude and direction) of the plane during landing.

3. A car traveling in a straight road with an initial velocity of 15 m/s accelerates at a constant rate of 6 m/s2 for 45 m. Find the time interval during which the car accelerated?

4. A nucleus that captures a stray neutron must bring the neutron to a stop within the diameter of the nucleus by means of the *strong force.* That force, which “glues” the nucleus together, is approximately zero outside the nucleus. Suppose that a stray neutron with an initial speed of 2.4 × 107 m/s is just barely captured by a nucleus with diameter *d* = 1.4 × 10-14 m. Assuming that the strong force on the neutron is constant, find the magnitude of that force. The neutron's mass is 1.67 × 10-27 kg. (Newton’s second law: F = ma)