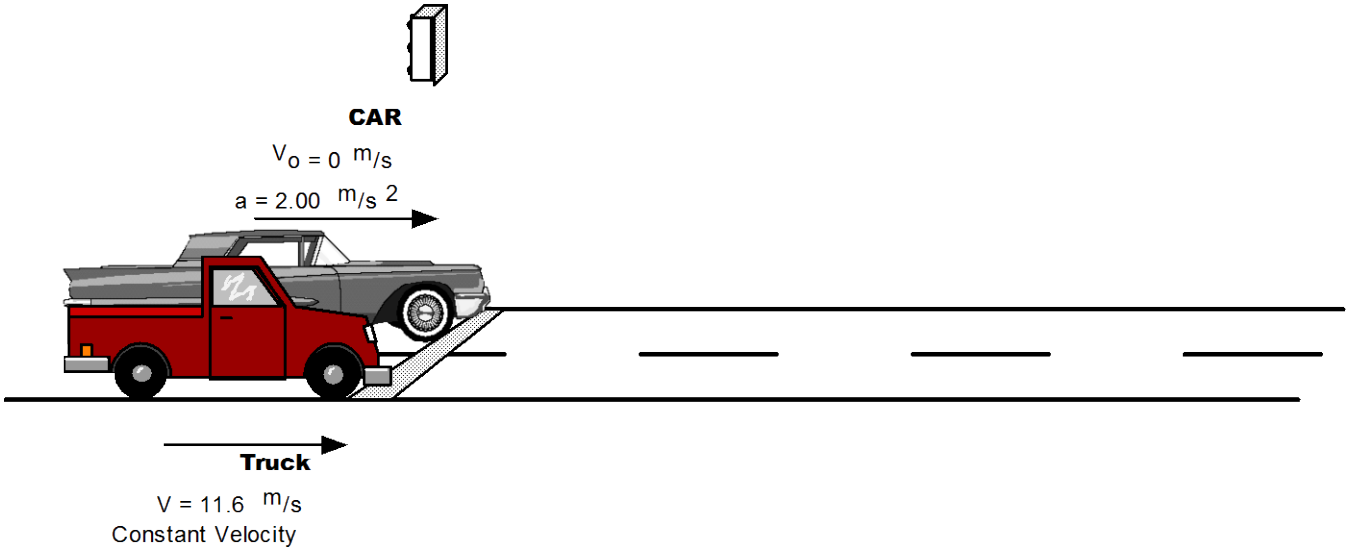
53 A car is at rest at a stop light. The moment the light turns green a truck rolls up the line with a CONSTANT velocity of 11.6 m/s. At the instant the truck is next to the car; the car begins to accelerate as shown.

a How much time does it take for the car to catch up to the truck?

b How much distance is covered when the from the start line to when the car catches up to the truck?

c What is the velocity of the car when it catches up to the truck?



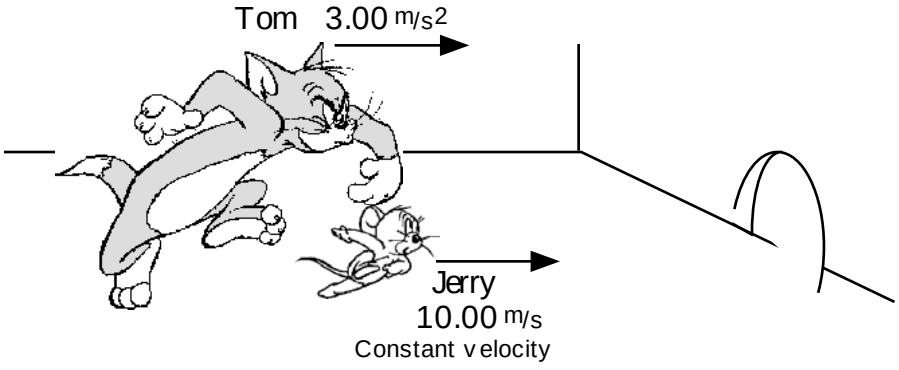

54 In the Savannahs of Africa a gazelle is running in a straight line with a constant velocity is 16.25 m/s. A cheetah is startled by the gazelle when she runs past. At the instant the cheetah and gazelle are side by side the cheetah accelerates after the gazelle from rest at 12.00 m/s2.

a How much time does it take for the cheetah to catch up to the gazelle?

b How much distance is covered when the from the start line to when the cheetah catches up to the gazelle?

c What is the velocity of the cheetah when it catches up to the gazelle?

55 Tom, the cat, is chasing Jerry, the mouse. Jerry runs past Tom at 10.00 m/s. At the instant Jerry passes Tom, Tom starts from rest and accelerates at 3.00 m/s2.




a How much time does it take for the Tom to catch up to Jerry?

b What is the velocity of the Tom when he catches up to the Jerry?

c The mouse hole is 2.1 meters away from Jerry when Tom began to chase Jerry. Will Jerry make it to the hole without being caught? (Support your answer with numbers.)

56 A Helicopter is hovering when a jet flies past it as shown. The instant the jet flies past the helicopter, it fires a rocket with the acceleration shown.

a The pilot of the jet will wait until the last possible moment to roll the jet from the incoming rocket. How much time does it take for the rocket to catch up to the jet?

*Corsair Jet*

252.50 m/s, 21.5 m/s $^2$

*Rocket* a = 62.00 m/s $^2$

*Helicopter* Hovering (v=0)

b How much distance is covered from where the rocket is fired to where the rocket would catch up to the jet?

c What is the velocity of the rocket when it catches up to the jet?

57. A pedestrian is running at his maximum speed of 6.0 m/s to catch a bus stopped at a traffic light. When he is 15 m from the bus, the light changes and the bus accelerates uniformly at 1.00 $^m/_{s^2}$. Does he make it to the bus? If so, how far does he have to run in order to catch it? If not, how close does he get?

58 A car starts from rest and accelerates at 0.500 g's from 50.0 m. the car then travels for 8.52 seconds at a constant velocity. It then slows down for 3.12 seconds with an acceleration of –2.50 $^m/_{s^2}$.

a What is the final velocity of the car?

b What was the total distance traveled by the car?

c What was the car's final acceleration in g's?

59 A top fuel dragster accelerates from a rest with an acceleration of 5.10 g's. Once the dragster reaches its top velocity of 145 $^m/_s$, it travels at a constant velocity for the rest of the 1/4 miles track. How much time did it take for the dragster to travel the length of the track?

60 A bus picks up a passenger and accelerates from a rest at 1.50 $^m/_{s^2}$ for 6.00 seconds. After the initial 6.0 seconds the bus accelerates at 2.50 $^m/_{s^2}$ for an additional 35.5 m. The bus then slams on the brake and accelerates at - 0.75 g's until it comes to a rest.

a What is the total time for the bus ride?

b What is the total distance covered by the bus?

61. Suppose that while traveling at 12.0 m/s, a driver sees a traffic light turn red. After 0.510 s has elapsed (their reaction time), the driver applies the brakes and the car slows at -6.20 m/s2. What is the stopping distance of the car, as measured from the point where the driver first notices the red light?

62. A drag racer-starting from rest-speeds up for 402 m with an acceleration of + 17.0 $^m/_{s^2}$. A parachute then opens, slowing the car down with an acceleration of - 6.10 $^m/_{s^2}$. How fast is the racer moving 350 m after the parachute opens?