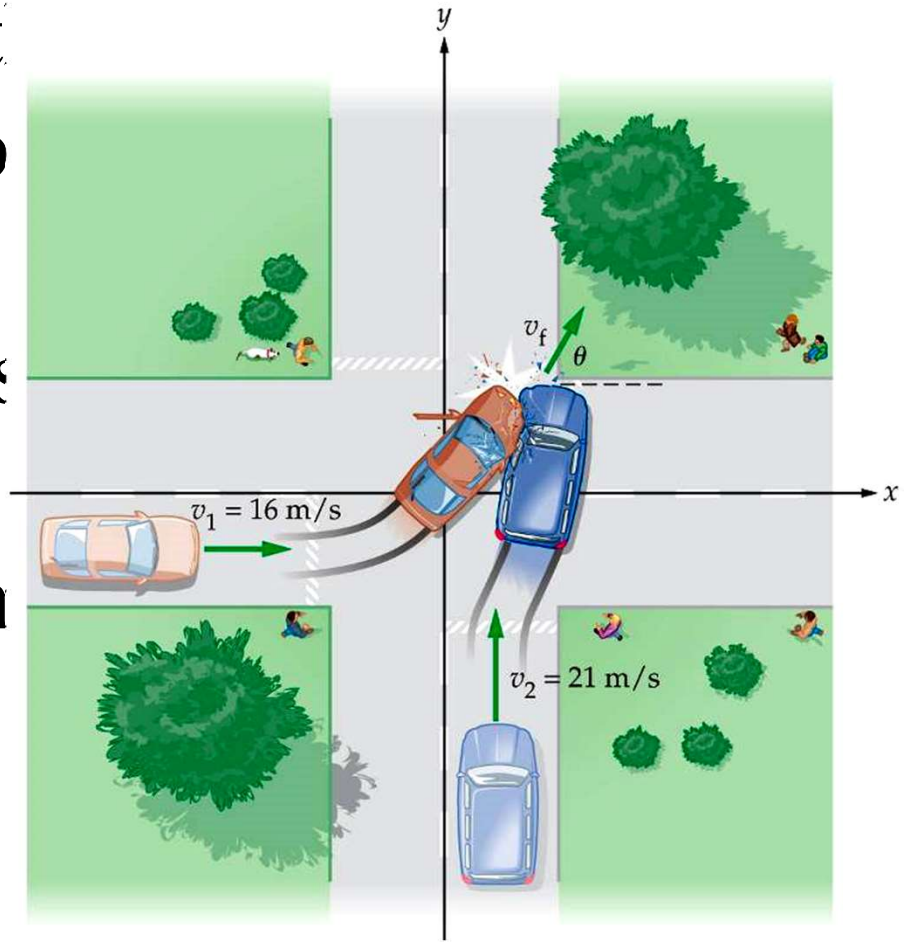
Problem Solving Day

Good day to ask questions

2D Collisions Example: Car Accident

An eastward car strikes a nort
at an intersection, and the two
unit. A property owner on the
the intersection claims that his
down in the collision. Should
damages by the insurance con

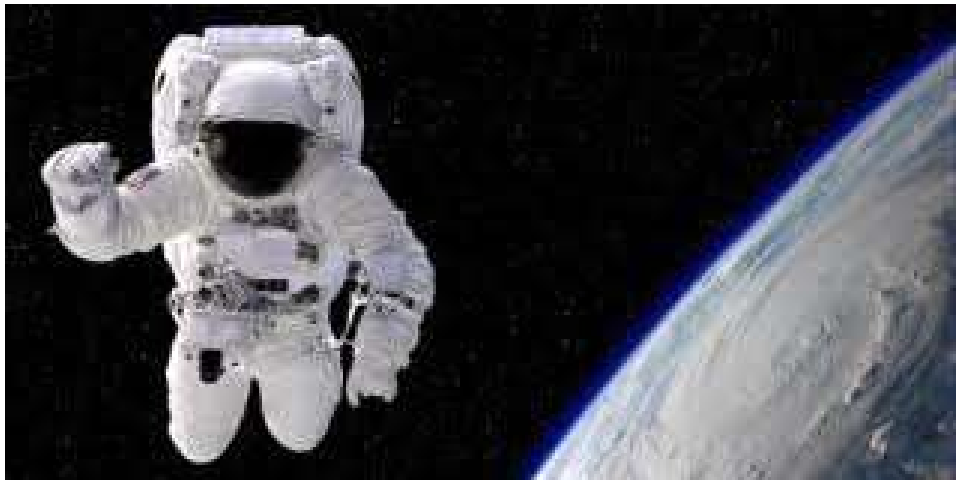


A. Yes, seems possible

B. No, it's impossible

Let the eastward car have a mass of 1250 kg and a speed of 16 m/s and the northward car a mass of 1100 kg and a speed of 21 m/s. Find the velocity after the collision.

Old video online



An astronaut in her space suit has a total mass of $m_1 = 87$ kg, including her oxygen tank. Her tether line loses its attachment to her spacecraft and she is too far to grab on! Initially at rest with respect to her spacecraft, she throws her oxygen tank of mass $m_2 = 12.0$-kg away from her spacecraft with a speed $v = 8.00$ m/s to propel herself back toward the spacecraft.

Determine the maximum distance she can be from the craft and still return within 2.00 min (the amount of time the air in her helmet remains breathable).

Old video online

How much will running into a zombie slow you down?

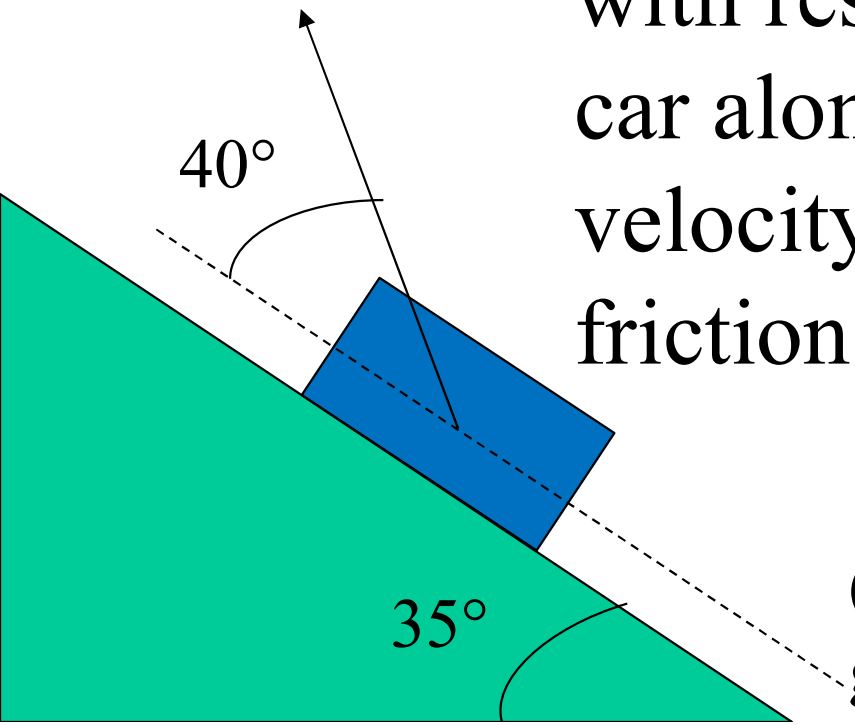
ZOMBIE PLAN

THERE ARE 2 KINDS OF PEOPLE IN THE WORLD
THOSE WHO HAVE A PLAN FOR WHEN
ZOMBIES TAKE OVER THE EARTH AND THOSE WHO DONT
WE CALL THOSE LAST PEOPLE DINNER

A 75.0 kg ice skater moving at 10.0 m/s crashes into a stationary skater of equal mass. After the collision, the two skaters move as a unit at 5.00 m/s. Suppose for this problem the average force a skater can experience without breaking a bone is 4500 N. If the impact time is 0.100 s, does a bone break for either skater?

Goal: Combine inclines, friction and angles to give practice on setup

An amateur tow truck driver is trying to pull a 1500 kg car on a steep incline of 35 degrees. **Find the tension** in his cable that is at an angle of 40 degrees with respect on the incline to move the car along the incline at a constant velocity. Take the coefficient of kinetic friction to be 0.4.



(I made up this problem to review the above goals, so the numbers may not be realistic.)