

Chapter C8: Force and Energy Practice

Physics I

College of the Atlantic

1. Let \vec{U} have a magnitude of 10 m/s and a direction due west. Let \vec{W} have a magnitude of 5 m/s and a direction of 37 degrees north of east. What is $\vec{U} \cdot \vec{W}$?
2. Consider two displacement vectors: $\vec{v}_1 = [3m, -4m]$ and $\vec{v}_2 = [2m, -2m]$. Calculate $\vec{v}_1 \cdot \vec{v}_2$. Calculate the angle between \vec{v}_1 and \vec{v}_2 .
3. A 1000 kg car rolls down a 37 degree incline at a constant speed of 20 m/s.
 - (a) In one second, what energy transfer does the gravitational interaction give to the car?
 - (b) Where does this energy transfer go?
 - (c) What is the change in the gravitational potential energy of the cart in one second?
4. A person stands on a tree on which there is a rope swing. The person lets go of the tree and swings back and forth. At the bottom of the arc, the person is three meters lower than where they started.
 - (a) What interactions is the person participating in?
 - (b) Which of these interactions change the person's kinetic energy?
 - (c) What is the person's speed at their lowest point?
5. A car goes over the crest of a hill at 20 m/s. The car then coasts to the bottom of the hill, 50 meters below. Ignoring friction, what is the car's speed at the bottom?