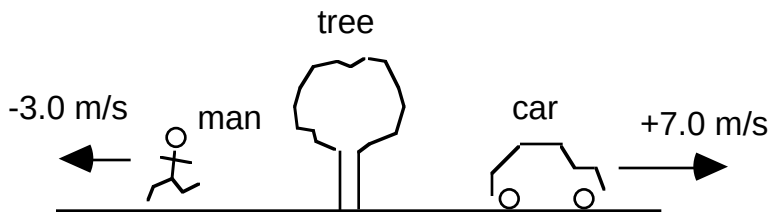
Relativity : Notes/W.S.-10

Relative Motion

In order to understand Albert Einstein's "Theory of Relativity", one must first understand the concept of relative motion.

In the diagram below, velocities of objects are relative to some other object.



The velocity of the man relative to the tree is -3.0 m/s.

The velocity of the car relative to the tree is +7.0 m/s.

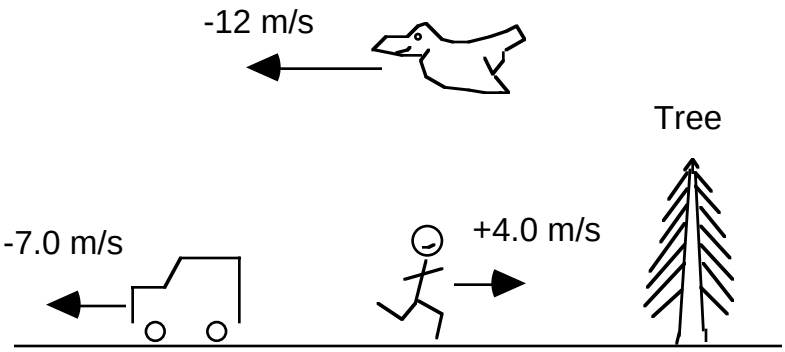
The velocity of the car relative to the man is +10. m/s.

The velocity of the man relative to the car is -10. m/s.

The way the velocities add as shown above is sometimes called Newtonian or Galilean relativity.

Problems:

1) The velocities shown below are relative to the ground (or tree). Answer the following questions.



The velocity of the man relative to the tree is _____ .

The velocity of the man relative to the truck is _____ .

The velocity of the bird relative to the man is _____ .

The velocity of the man relative to the bird is _____ .

The velocity of the bird relative to the truck is _____ .

The velocity of the truck relative to the bird is _____ .

2) A fighter plane has cannons directed forward and backward. The cannons fire bullets with a speed of 800. m/s relative to the plane. The plane flies east at 250. m/s.

a) What is the velocity of the bullets fired forward relative to the ground? _____

b) What is the velocity of the bullets fired backwards relative to the ground? _____

Answers: 1) +4.0 m/s, +11 m/s, -16 m/s, +16 m/s, -5.0 m/s, +5.0 m/s, 2)a) 1050. m/s east, b) 550. m/s west.