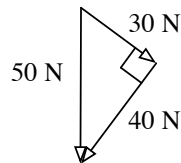## Concept:

This demo is an excellent aid to teaching vectors and statics. To facilitate this, draw the following vector diagram:

Explain that the 50 N weight of the car can be resolved into components of 30 N parallel to the incline and 40 N perpendicular to the incline and that these values are determined by the geometry of the 3-4-5 incline. Thus, the 50 N weight of the car can be balanced (canceled) by the 30 N and 40 N tensions provided by the two cables.

Equipment:

- Suspended Block Apparatus
- Suspended Block Cart (5 kg)
- (7) 1 kg Weights
- 100 Newton Scale

Procedure:

1. Weigh the cart to show that it is 5 kg.

2. Set the car on the incline to show that it rolls down the incline in the absence of other forces.

3. Ask your students: "Given an incline plane with sides 3, 4, and 5 units long, what should the masses of the parallel and perpendicular components to the incline be in order to balance the 5 kg car?"

4. Thread the cable through the pulley at the top of the incline and hang three 1 kg weights from its end.

5. Thread the other cable through the other pulley and hang four 1 kg weights from its end.

6. Move the cart so that the cables are perpendicular to each other.

7. Move the incline away from the cart and show that the cart is in static equilibrium. Thus, the weight of the 5kg car is supported by the parallel tension provided by a 3 kg mass and perpendicular tension provided by a 4 kg mass.