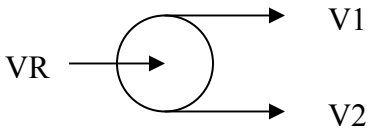
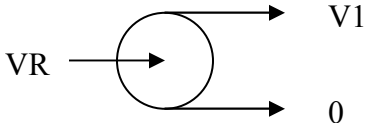
Pulleys and Kinematics

The following applies to ***movement***:



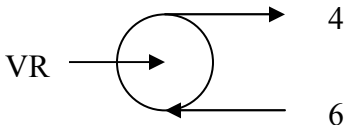
$VR = \frac{1}{2}(V1 + V2)$

Example:
This is a case where one end of the cable/rope is fixed and has a velocity of zero.



$VR = \frac{1}{2}(V1 + 0) = \frac{1}{2} V1$

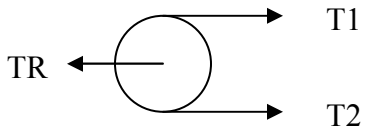
Example:
This is a case where one of the cable/rope ends is feeding in while the other is feeding out. In such a case it is important to maintain your assumed direction. (Positive to the right, in this case.)



$VR = \frac{1}{2}(4 + (-6)) = -1$ (VR moves to the left)

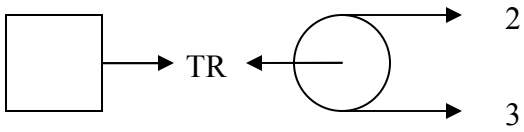
When dealing with directions you may be unsure of (in the case above, do you think VR is to the right, or to the left?), assume that the unknown moves in the 'positive' direction, and write you equations accordingly. If the result is negative, then that simply means that the motion or force is actually going in the other direction.

The following applies to ***forces***:



TR = T1 + T2

Example:



TR = 2 + 3 = 5
Note that the force on the load (the box) is TR to the right.
Thus, when determining the sum of forces on the load (box) the resultant force of the pulley is only one of the applied forces.