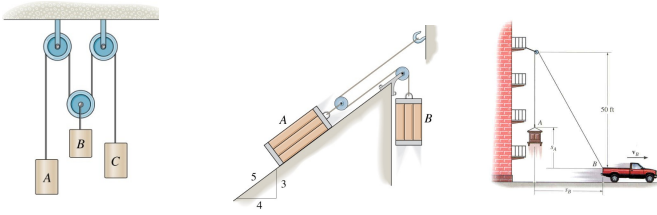


12.9 Dependent Motion

Dependent motion of particles moving along rectilinear paths:

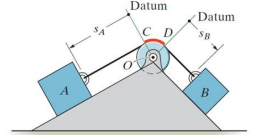


1

12.9 Dependent Motion

For the dependent motion of particles moving along **rectilinear paths**:

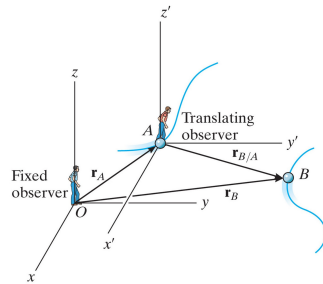
1. Define **position coordinates** (with + direction) from **fixed "datum" lines**, along the path of each particle.
2. Relate the **position coordinates to the cord length**. Segments that do not change in length may be left out.
3. If there's more than one cord, relate the position of a point on one cord to a point on another cord. Separate equations are written for each cord.
4. Differentiate the position equation(s) to relate velocities and accelerations. Keep track of signs.



2

12.10 Relative Motion

We use $\vec{v}_{B/A}$ to mean the velocity of B relative to A .



3

12.10 Relative Motion

Relative to a fixed reference frame (O):

$$\vec{r}_B = \vec{r}_A + \vec{r}_{B/A}$$

$$\vec{v}_B = \vec{v}_A + \vec{v}_{B/A}$$

$$\vec{a}_B = \vec{a}_A + \vec{a}_{B/A}$$

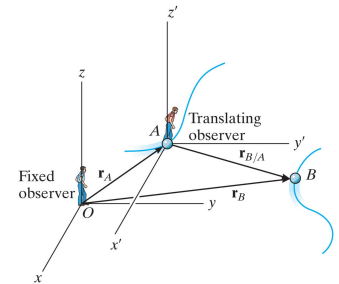
note:

$$\vec{r}_{B/A} = -\vec{r}_{A/B}$$

$$\vec{r}_B \text{ is really } \vec{r}_{B/O}$$

} same for \vec{v} and \vec{a}

for three reference frames: $\vec{r}_{A/B} = \vec{r}_{A/C} + \vec{r}_{C/B}$



4