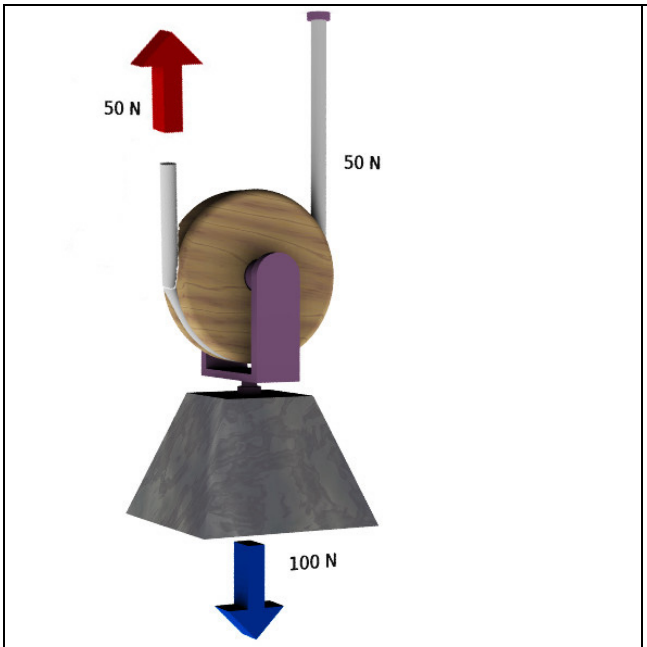
QUESTION:

1. why should pulleys be moving freely?

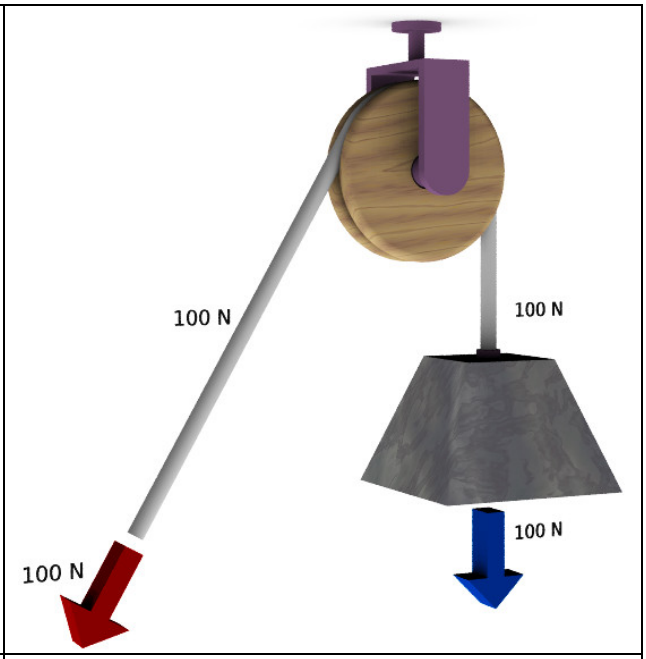
2. A FISHING BOAT has a maximum speed of 3 m/s in still water. it is in a river that is flowing at 2 m/s.what can be the max and mini speed of the boat with respect to the river bank?

SOLUTION

Pulleys should be moving freely, because a movable pulley has a mechanical advantage of two, and single fixed pulley hasn't a mechanical advantage, it only changes the direction of force on a rope.



Pic 1. Movable pulley



Pic 2. Fixed pulley

2. According to the Galilean addition of velocities, maximum speed of the boat with respect to the river bank is

$\upsilon_{max} = 3 + 2 = 5\ \mathrm{m/s}$, when the boat moves downstream.

Minimum speed of the boat with respect to the river bank is

$\upsilon_{min} = 3 - 2 = 1\ \mathrm{m/s}$ when the boat moves upstream.

ANSWER

2. $\upsilon_{max} = 5\ \mathrm{m/s}$

$\upsilon_{min} = 1\ \mathrm{m/s}$