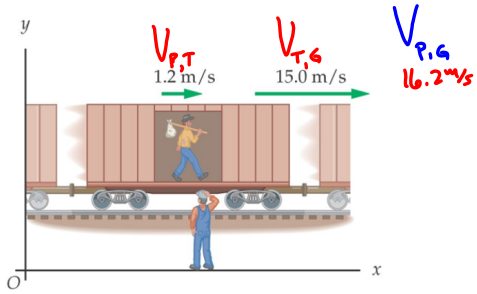
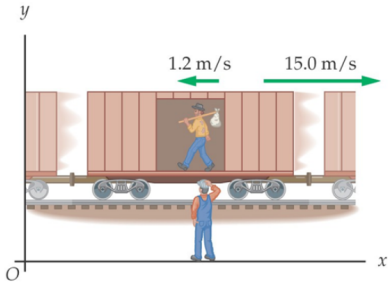
4.3 Relative Motion

4.4 I can solve relative velocity problems.

Relative Motion

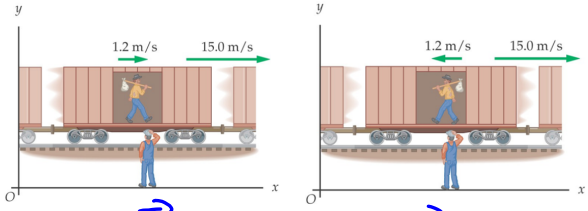


Relative Motion



Relative Motion

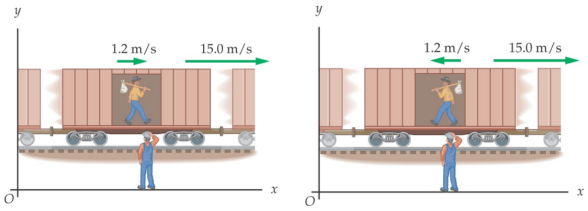
The speed of the passenger with respect to the ground depends on the relative directions of the passenger's speed and the train's speed.



$\vec{V}_{P,T} + \vec{V}_{T,G} = \vec{V}_{P,G}$

Relative Motion

$$\vec{v}_{ab} + \vec{v}_{bc} = \vec{v}_{ac}$$



RIVER BOAT

A boat has a maximum speed of 5.0 m/s relative to the water. If the boat is in a river that is flowing at 3.0 m/s south, what are the maximum and minimum velocities that the boat can obtain relative to the shore?

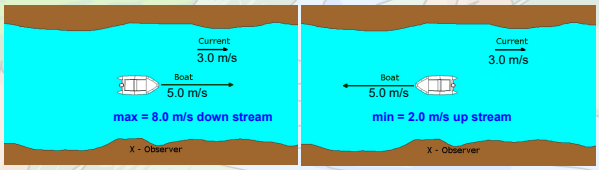
$\vec{V}_{B,W} + \vec{V}_{W,G} = \vec{V}_{B,G}$

$5\ m/s + 3\ m/s = 8\ m/s$

$-5\ m/s + 3\ m/s = -2\ m/s$

RIVER BOAT

A boat has a maximum speed of 5.0 m/s relative to the water. If the boat is in a river that is flowing at 3.0 m/s south, what are the maximum and minimum velocities that the boat can obtain relative to the shore?



RIVER BOAT

A boat has a maximum speed of 5.0 m/s relative to the water. If the boat drives due east across the river that is flowing 3.0 m/s south, what is the resulting velocity of the boat relative to the shore?

RIVER BOAT

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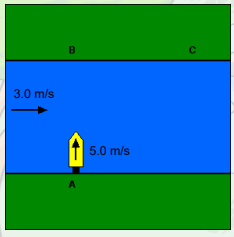


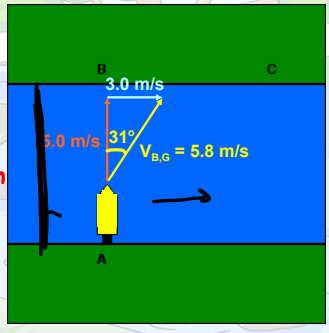
RIVER BOAT

$V_{B,G} = \sqrt{((5.0\ m/s)^2+(3.0\ m/s)^2)}$

$V_{B,G} = 5.8\ m/s$

$\theta = \tan^{-1}(3/5)$

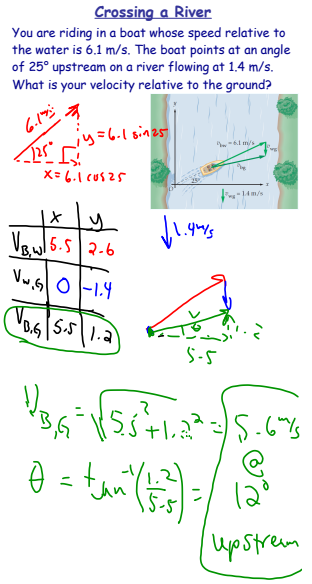
$\theta = 31^\circ$ downstream



Crossing a River

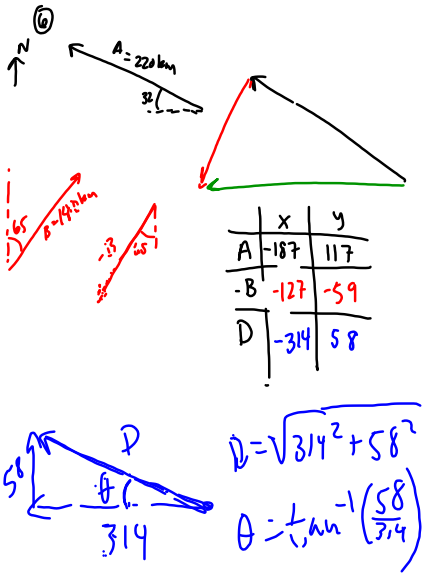
You are riding in a boat whose speed relative to the water is 6.1 m/s. The boat points at an angle of 25° upstream on a river flowing at 1.4 m/s. What is your velocity relative to the ground?

$\vec{V}_{B,W} + \vec{V}_{W,G} = \vec{V}_{B,G}$



HOMEWORK

Unit 4 Problems (8-10)



Attachments

River Crossing.ppt