

7.2 Velocity

<p>A Velocity Velocity is a vector and the measurement unit is m/s or km/h.</p>	<p>Ex 1. Convert $5m/s$ into km/h.</p>
<p>B Relative Velocity The relative velocity of the object B traveling at \vec{v}_B relative to the object A traveling at \vec{v}_A is given by: $\vec{v}_{BA} = \vec{v}_B - \vec{v}_A$</p>	<p>Note. If A is at rest ($\vec{v}_A = \vec{0}$) then: $\vec{v}_{BA} = \vec{v}_B$</p>
<p>Ex 2. A car is traveling at $\vec{v}_c = 100km/h[E]$, a motorcycle is traveling at $\vec{v}_m = 80km/h[W]$, a truck is traveling at $\vec{v}_t = 120km/h[N]$ and an SUV is traveling at $\vec{v}_s = 100km/h[SW]$. Find the relative velocity of the car relative to: a) motorcycle b) truck c) SUV</p>	
<p>C Boat Velocity The boat velocity relative to ground is vector sum between the boat velocity relative to water \vec{v}_{bw} and the water velocity relative to ground \vec{v}_{wg} : $\vec{v}_{bg} = \vec{v}_{bw} + \vec{v}_{wg}$</p>	<p>D Plane Velocity The plane velocity relative to ground is vector sum between the plane velocity relative to air \vec{v}_{pa} and the air velocity relative to ground \vec{v}_{ag} : $\vec{v}_{pg} = \vec{v}_{pa} + \vec{v}_{ag}$</p>
<p>Ex 3. A river flows eastward with $4m/s$. A motorboat heads downstream the river between two towns which are $50km$ apart along the south bank of the river. If the motorboat speed in still water is $12m/s$, find: a) the speed of the motorboat relative to the ground when traveling downstream</p>	<p>Ex 4. A plane is scheduled to travel from the airport A to an airport B where $\vec{AB} = 600km[060^\circ]$. The speed of the plane relative to air is $300km/h$ and a strong wind of $100km/h$ is blowing eastward. a) Draw a diagram to illustrate the situation.</p>

<p>b) the time required to cover the distance between the towns downstream</p> <p>c) the speed of the motorboat relative to the ground when traveling upstream</p> <p>d) the time required to cover the distance between the towns upstream</p>	<p>b) In what direction should the pilot head the plane?</p> <p>c) What is the speed of the plane relative to ground?</p> <p>d) How long will the trip last?</p>
<p>Ex 5. A river is $800m$ wide and flows eastward at $10m/s$. Peter is driving a motorboat heading always perpendicular to the current. The speed of the motorboat in still water is $20m/s$.</p> <p>a) Draw a diagram to illustrate the situation.</p> <p>b) What is the speed of the boat relative to ground?</p> <p>c) How long does it take to cross the river?</p> <p>d) How much downstream does Peter reach the opposite bank?</p>	<p>Ex 6. Jane can swim at $5m/s$ in still water. She wishes to swim across a river $200m$ wide to a point directly opposite from where she is standing. The river flows westward at $4m/s$ and she is standing on the South bank of the river.</p> <p>a) Draw a diagram to illustrate the situation.</p> <p>b) What is the speed of Jane relative to ground?</p> <p>c) In what direction must Jane head?</p> <p>d) How long does it take to cross the river?</p>

Reading: Nelson Textbook, Pages 365-368

Homework: Nelson Textbook: Page 369 #1, 3, 4, 6, 9, 11, 13, 14