

**B:(20 pts) Airplane Heading**

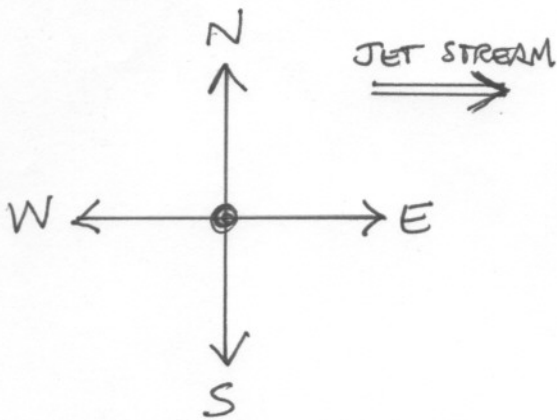
An airplane is flying from Saint Louis to New Orleans, 600 miles due South. The plane will fly with an airspeed (i.e., relative to the air) of 500 miles/hour. During the entire flight, the jet stream is blowing from West to East at 100 miles/hour (motion of the air relative to the ground). In order to arrive in New Orleans by flying in a straight line, the pilot must aim the airplane at an angle  $\theta$  away from true South. What is the speed  $V$  of the plane relative to the ground? How long (time  $T$ ) will the flight take? What is  $\theta$ ? Is this to the East or to the West of true South?

•(6ts)  $V =$  \_\_\_\_\_ (miles/hour)

•(6pts)  $T =$  \_\_\_\_\_ (hours)

•(4pts)  $\theta$ [degrees] = \_\_\_\_\_

•(4pts) Circle EAST or WEST.



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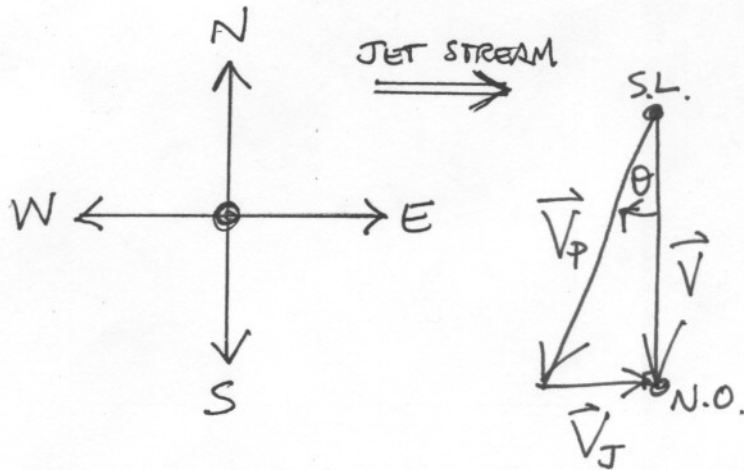
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• (6pts)  $V = \underline{490}$  (miles/hour)

• (6pts)  $T = \underline{1.22}$  (hours)

• (4pts)  $\theta$  [degrees] = 11.5°

• (4pts) Circle EAST or WEST.



JET STREAM:  $V_J = 100 \text{ mi/h}$

AIR SPEED:  $V_P = 500 \text{ mi/h}$

GROUND SPEED:  $V = ?$

$D = 600 \text{ mi}$

$\sin \theta = \frac{V_J}{V_P}$

$\theta = \underline{11.5370^\circ} \approx \boxed{11.5^\circ}$   
WEST

$V = \sqrt{V_P^2 - V_J^2} = \underline{489.898 \frac{\text{mi}}{\text{h}}}$   
 $\approx \boxed{490 \text{ mi/h}}$

$D = VT, T = D/V$   
 $= \underline{1.22474 \text{ h}}$   
 $\approx \boxed{1.22 \text{ h}}$