Find the true speed and bearing. Wind vector: N11E (degrees) 55mph. Airspeed: 500mph. Direct fight bearing: N35.2E (degrees)

$$\alpha = 35,2 - 11 = 24,2°$$

To find the true speed use Law of cosine:

$$c = \sqrt{a^2 + b^2 - 2 \cdot a \cdot b \cdot cos\alpha}$$

$\vec{a}$ – wind vector;

$\vec{b}$ – vector of the direct flight;

$\vec{c}$ – true bearing vector;

α – angle between wind vector and direct flight vector.

$$\vec{c} = \sqrt{55^2 + 500^2 - 2 \cdot 55 \cdot 500 \cdot \cos(180° - 24,2°)} = \sqrt{253025 - 50166,606}$$
$$= 550,628$$

To find the true bearing use the Law of sine

$$\frac{55}{\sin\beta} = \frac{500}{\sin(180° - \alpha)}$$

β – angle between $\vec{c}$ and $\vec{a}$.

$$\beta = arcsin\left(\frac{55 \cdot \sin(180° - \alpha)}{500}\right) = 2,584°$$

The true bearing is

$$35,2° - 2,584° = 32,616°$$

The true speed is 550,628 mph, and bearing is 32,616°.