

1) Given $\vec{a} = [8, 30^\circ]$ and $\vec{b} = [6, 240^\circ]$, use each of these methods to find the magnitude and **heading** of the resultant $\vec{r} = \vec{a} + \vec{b}$. The given angles are *headings*.

a) Careful measurement

b) Laws of Sines/Cosines

c) Be sure that both answers agree! Answers must be within 0.1 cm and 2° .

- 2) A ship sails at a speed of 20 knots on a **heading** of 325° . The water has a current of 7 knots on a **heading** of 250° . Find the ship's resultant magnitude and **heading**.
- 3) A boat is crossing a river with a speed of 20 mph and a **heading** of 30° . The river is flowing at a rate of 6 mph at a **heading** of 90° . Find the actual speed and **heading** of the boat.
- 4) A plane flies 200 mph at a **direction** of 320° . The air is moving with a wind speed of 60 mph at a **direction** of 190° . Find the plane's actual speed and **direction**.