

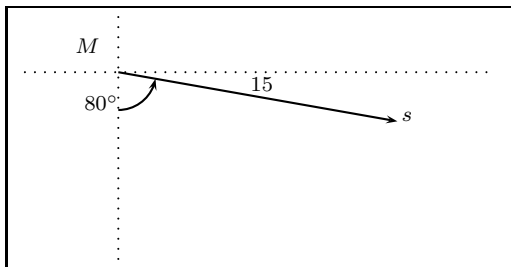
Precalculus, Section 8.1, #64  
Right-Triangle Trigonometry; Applications

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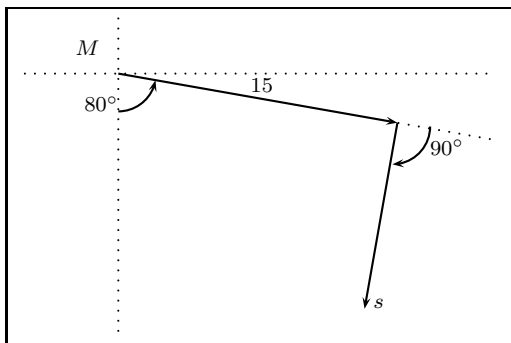
**Finding the Bearing of a Ship** A ship leaves the port of Miami with a bearing of  $S80^\circ E$  and a speed of 15 knots. After 1 hour, the ship turns  $90^\circ$  toward the south. After 2 hours, maintaining the same speed, what is the bearing to the ship from the port?<sup>1</sup>

Let's sketch a diagram. We'll use  $M$  for Miami and  $s$  for the ship.

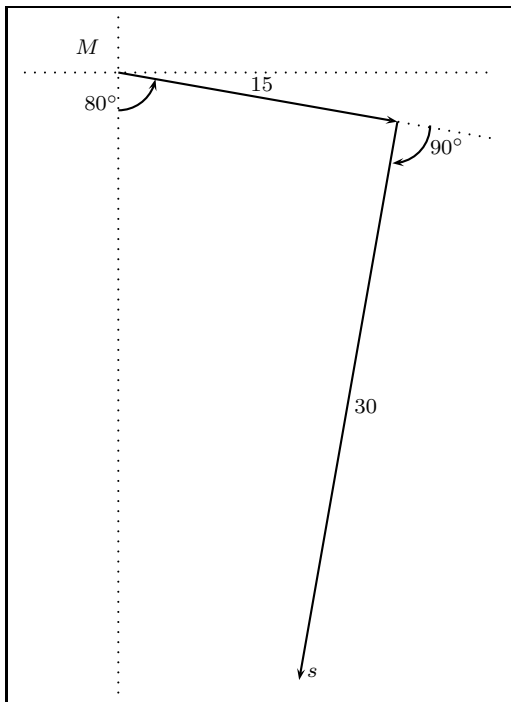
"A ship ... bearing of  $S80^\circ E$  ... speed of 15 knots. After 1 hour ..."



"...ship turns  $90^\circ$  toward the south ..."



"...after 2 hours ... same speed ..."

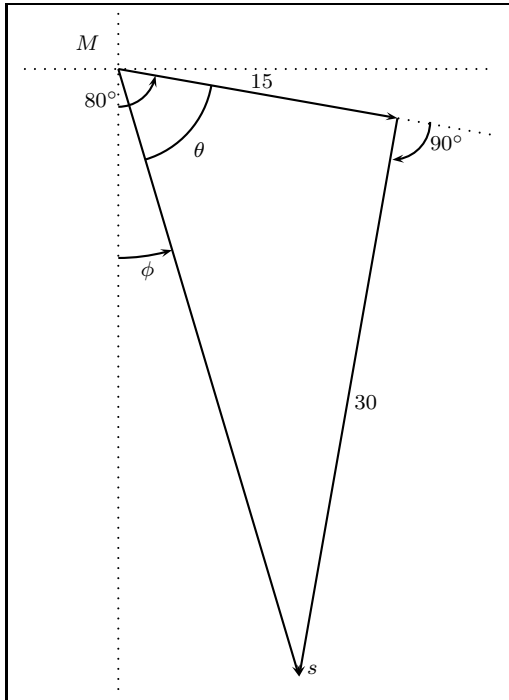


<sup>1</sup>Sullivan, *Precalculus: Enhanced with Graphing Utilities*, p. 518, #64.

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We'll draw the line from Miami to the ship's location and use the angle  $\phi$  of that line to find the bearing. We'll also name angle  $\theta$  to help with the computation.



From the diagram,

$$\theta = 80 - \phi$$

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From the triangle,

$$\tan(\theta) = \frac{30}{15}$$

so

$$\begin{aligned}\theta &= \tan^{-1}(2) \\ &\approx 63.43\end{aligned}$$

so

$$\begin{aligned}\phi &\approx 80 - 63.43 \\ &= 16.56\end{aligned}$$

Thus the bearing from the port to the ship is about S16.6°E.