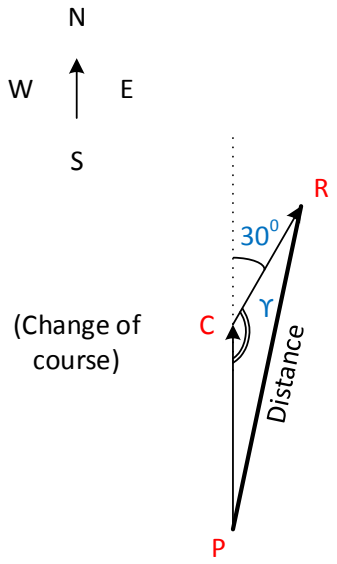
1. A ship leaves a port P and travels 30 km due north. Then it changes course and travels 20 km in a direction 30 degrees east of north to reach port R.

Calculate the distance from P to R?

Solution

Path and distance are shown on figure 1



Therefore, we may find the distance *PR* from triangle PCR (law of cosines) as:

$$PR = \sqrt{PC^2 + CR^2 - 2PC \cdot CR \cdot cos\gamma},$$

where $\gamma = 180^0 - 30^0 = 150^0$.

$$PR = \sqrt{30^2 + 20^2 - 2 \cdot 30 \cdot 29 \cdot \cos(150^0)} = 48 \text{ km}.$$

Answer: 48 km.