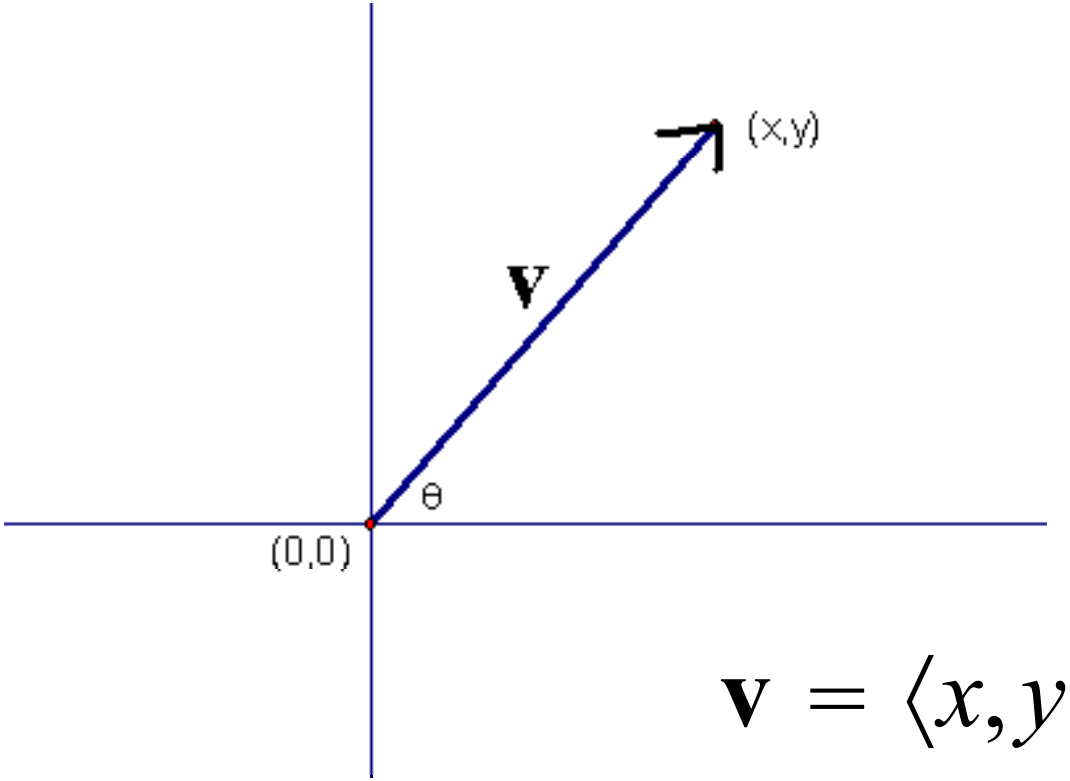
Applications Involving Vectors

MATH 1112

Three Ways to Express the Vector $\mathbf{v}$



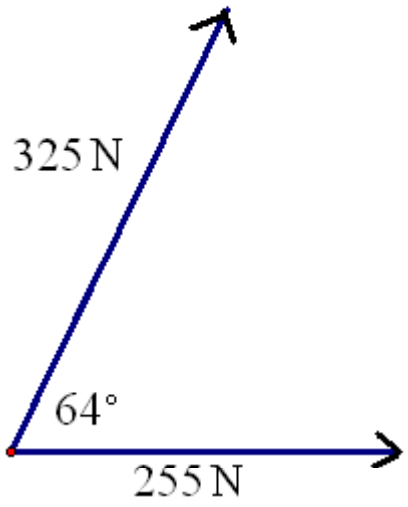
$$\mathbf{v} = \langle x, y \rangle$$

$$\mathbf{v} = x\mathbf{i} + y\mathbf{j}$$

$$\mathbf{v} = |\mathbf{v}|\cos(\theta)\mathbf{i} + |\mathbf{v}|\sin(\theta)\mathbf{j}$$

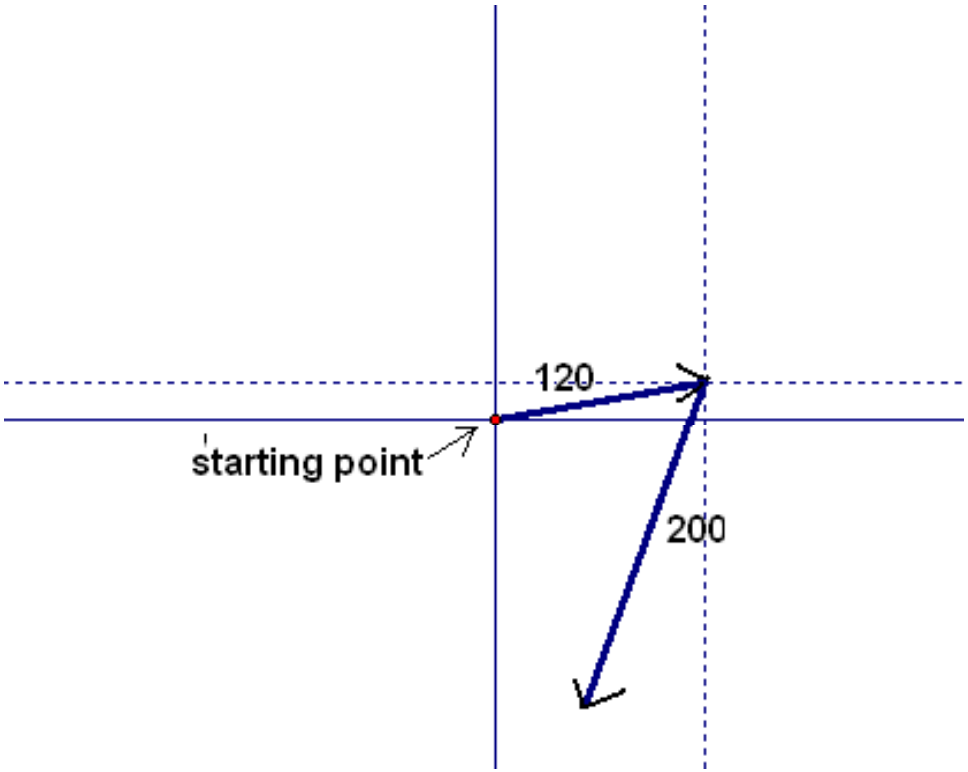
Problem: Two forces of $255\,\mathrm{N}$ and $325\,\mathrm{N}$ act on an object. The angle between the forces is 64°. Find the magnitude of the resultant force and the angle that it makes with the smaller force.

Answer: The resultant force is $493\,\mathrm{N}$ and the angle that it makes with the smaller force is 36°.



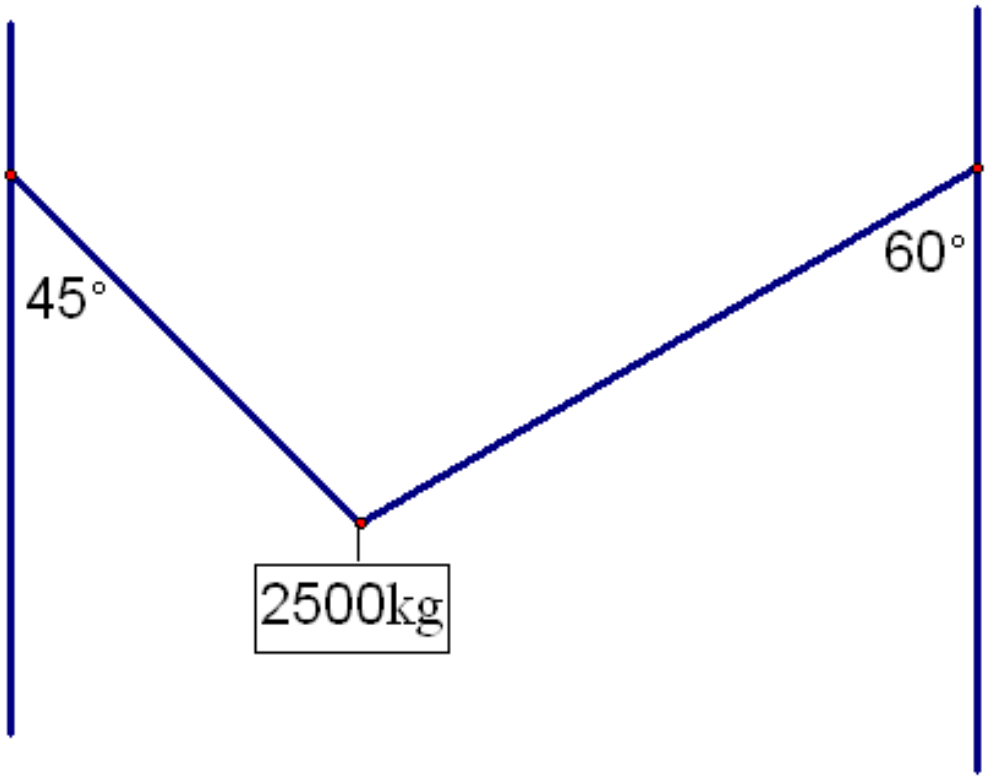
Problem: A ship sails first N80°E for 120 nautical miles and then S20°W for 200 nautical miles. How far is the ship from its starting point and in what direction from its starting point?

Answer: The ship is 174 nautical miles from its starting point in a direction of S15°E.

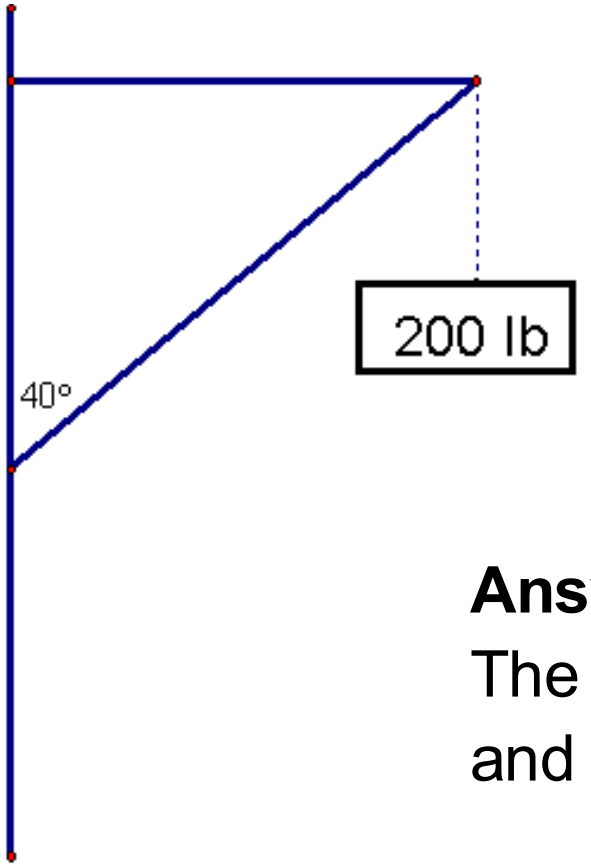


Problem: A 2500kg block is suspended by two ropes as shown. Find the tension in each rope.

Answer: The tension in the left rope is 2241kg and the tension in the right rope is 1830kg.



Problem: A weight of 200 pounds is supported by a frame made of two rods as pictured.
Find the forces exerted by the rods.



Answer:
The horizontal rod has 168 lbs tension and the vertical rod has 261 lbs compression.