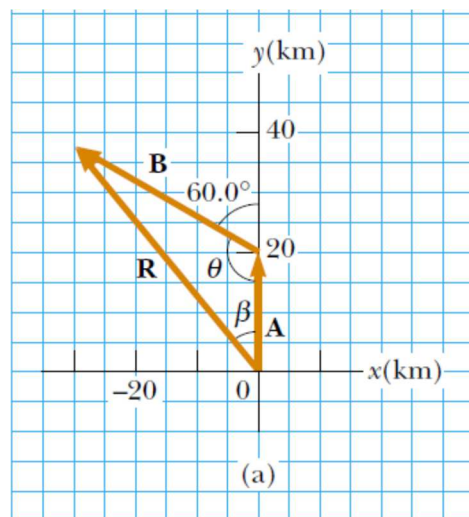


Physics I (PHYS1210)

Sheet (3)
Vectors

1. The Cartesian coordinates of a point in the xy plane are $(x, y) = (-3.50, -2.50)$ m. Plot the point and Find its polar coordinates.
2. A car travels 20.0 km due north and then 35.0 km in a direction 60.0° west of north, as shown in Figure ... Find the magnitude and direction of the car's resultant displacement.



3. Find the sum of two vectors A and B lying in the xy plane and given by:

$$\mathbf{A} = (2.0\hat{\mathbf{i}} + 2.0\hat{\mathbf{j}}) \text{ m} \quad \text{and} \quad \mathbf{B} = (2.0\hat{\mathbf{i}} - 4.0\hat{\mathbf{j}}) \text{ m}$$

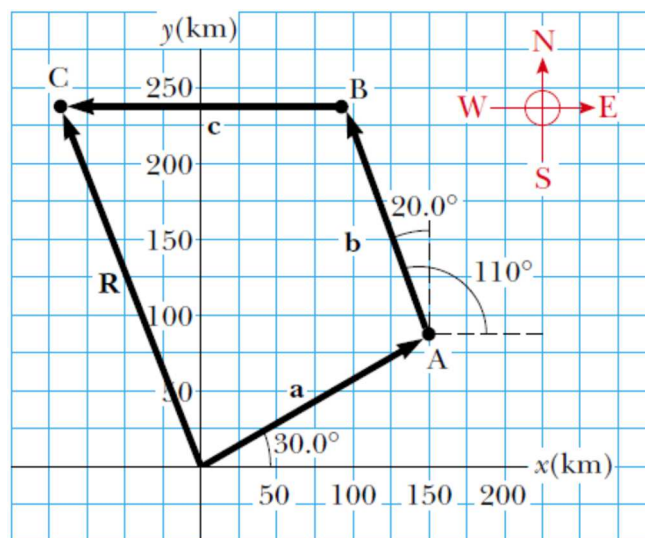
4. A particle undergoes three consecutive displacements:

$$\mathbf{d}_1 = (15\hat{\mathbf{i}} + 30\hat{\mathbf{j}} + 12\hat{\mathbf{k}}) \text{ cm}, \quad \mathbf{d}_2 = (23\hat{\mathbf{i}} - 14\hat{\mathbf{j}} - 5.0\hat{\mathbf{k}}) \text{ cm}$$

$$\mathbf{d}_3 = (-13\hat{\mathbf{i}} + 15\hat{\mathbf{j}}) \text{ cm}.$$

Find the components of the resultant displacement and its magnitude.

5. A hiker begins a trip by first walking 25.0 km southeast from her car. She stops and sets up her tent for the night. On the second day, she walks 40.0 km in a direction 60.0° north of east, at which point she discovers a forest ranger's tower.
- (A) Determine the components of the hiker's displacement for each day.
- (B) Determine the components of the hiker's resultant displacement R for the trip. Find an expression for R in terms of unit vectors.
6. A commuter airplane takes the route shown in Figure 3.20. First, it flies from the origin of the coordinate system shown to city A, located 175 km in a direction 30.0° north of east. Next, it flies 153 km 20.0° west of north to city B. Finally, it flies 195 km due west to city C. Find the location of city C relative to the origin.



7. Calculate the dot product of $C=(-4,-9)$ and $D=(-1,2)$.
8. Calculate the cross product between $a=(3,-3,1)$ and $b=(4,9,2)$.