Answer on Question #51854, Physics, Mechanics | Kinematics | Dynamics

Question:

A man walks 5.0m due east and then 10.0m N30oE. Find his resultant displacement.

13.7 m, N15oE

14.6 m, N20oE

10.0 m, N15oE

14.6m, N70oE

Answer:

North component of vector equals:

$$d_N = d\cos\theta$$

where $\theta = 30°$ – angle between d and north.

East component of vector equals:

$$d_E = d\sin\theta$$

Total displacement to east equals:

$$5 + 10\sin 30° = 10\ m$$

Displacement to north equals:

$$10\cos 30° = \frac{10\sqrt{3}}{2}\ m = 5\sqrt{3}$$

Resultant displacement equals:

$$D = \sqrt{10^{\,2} + \left(5\sqrt{3}\right)^2} = 5\sqrt{7}\ m \cong 13.2$$

Angle between d and north equals:

$$\alpha = \arctan\frac{10}{5\sqrt{3}} = 49.1°$$

Resultant displacement:

$$13.2\ m\ N\ 49.1^\circ\ E$$