

Question #78419, Physics / Molecular Physics | Thermodynamics

1. A golfer takes three putts to get the ball into the hole. The first putt displaces the ball 3.66m north, the second 1.83m southeast, and the third 0.99m southwest. What are

I. Magnitude, and

II. The direction of the displacement needed to get the ball into the hole on the first putt.

Solution

$$\mathbf{d}_1 = (0, 3.66)$$

$$\mathbf{d}_2 = (1.83 \cos 45, -1.83 \sin 45) = \left(1.83 \frac{\sqrt{2}}{2}, -1.83 \frac{\sqrt{2}}{2}\right)$$

$$\mathbf{d}_3 = (-0.99 \cos 45, -0.99 \sin 45) = \left(-0.99 \frac{\sqrt{2}}{2}, -0.99 \frac{\sqrt{2}}{2}\right)$$

$$\mathbf{d} = \mathbf{d}_1 + \mathbf{d}_2 + \mathbf{d}_3 = \left(1.83 \frac{\sqrt{2}}{2} - 0.99 \frac{\sqrt{2}}{2}, 3.66 - 1.83 \frac{\sqrt{2}}{2} - 0.99 \frac{\sqrt{2}}{2}\right)$$

I.

$$d = \sqrt{\left(1.83 \frac{\sqrt{2}}{2} - 0.99 \frac{\sqrt{2}}{2}\right)^2 + \left(3.66 - 1.83 \frac{\sqrt{2}}{2} - 0.99 \frac{\sqrt{2}}{2}\right)^2} = 1.77 \text{ m.}$$

II.

$$\theta = \tan^{-1} \left(\frac{\left(3.66 - 1.83 \frac{\sqrt{2}}{2} - 0.99 \frac{\sqrt{2}}{2}\right)}{\left(1.83 \frac{\sqrt{2}}{2} - 0.99 \frac{\sqrt{2}}{2}\right)} \right) = 70.4^\circ \text{ north to east.}$$

Answer provided by <https://www.AssignmentExpert.com>