

### Answer on Question #46580 – Physics - Mechanics | Kinematics | Dynamics

A person walks 34 m East and then walks 36 m at an angle  $34^\circ$  North of East. What is the magnitude of the total displacement?

Answer in units of m

#### Solution:

We have two displacements:  $r_1$  (when person walks 34 m East),  $r_2$  (when person walks 36 m at an angle  $34^\circ$ ) and total displacement  $r$ .

Displacement along the X-axis:

$$r_{1x} = 34 \text{ m}$$

$$r_{2x} = 36 \text{ m} \cdot \cos(34^\circ) = 29.9 \text{ m}$$

$$r_x = r_{1x} + r_{2x} = 34 \text{ m} + 29.9 \text{ m} = 63.9 \text{ m}$$

Displacement along the Y-axis:

$$r_{1y} = 0$$

$$r_{2y} = 36 \text{ m} \cdot \sin(34^\circ) = 20.13 \text{ m}$$

$$r_y = r_{1y} + r_{2y} = 0 + 20.13 \text{ m} = 20.13 \text{ m}$$

Using the Pythagorean Theorem:

$$r^2 = r_y^2 + r_x^2$$
$$D = \sqrt{r_y^2 + r_x^2} = \sqrt{(63.9 \text{ m})^2 + (20.13 \text{ m})^2} = 67 \text{ m}$$

**Answer:** the magnitude of total displacement is equal to 67 m.