Casey hits a long fly ball over the heads of the outfielders. He runs 27.4m (90ft) from home plate to first base, then the same distance to 2nd base, to third base, and back to home plate. What is caseys total displacement?

Solution:

A displacement is a vector that is the shortest distance from the initial position to the final position. Initial position and final position coincide (Casey runs from home plate to plates and runs back to home plate).

Total displacement: $\vec{S} = \vec{0}$

Distance is a scalar quantity that refers to "how much ground an object has covered" during its motion.

Total distance: $S = S_1 + S_2$ (1),

where S_1 is distance from home plate to first base, to third base, to third base,

S_2 is distance from third base to home plate

$S_1 = 27.4\ m + 27.4\ m + 27.4\ m = 82.2\ m$ (2)

$S_2 = S_1 = 82.2\ m$ (3)

(2) and (3) in (1): $S = 164.4\ m$ (540 ft)

Answer:

Total displacement: $\vec{0}$