

Stage DE:

Givens:

$$\begin{aligned}x_D &= 295.06 \text{ m} & V_{Dx} &= -20 \text{ m/s} \\y_D &= 43.61 \text{ m} & V_{Dy} &= -8 \text{ m/s} \\y_E &= 0 \text{ m}\end{aligned}$$

Step 1: Find the time the rocket takes to fall from D to E.

y-dir:

$$\begin{aligned}y_E &= \frac{1}{2}at^2 + V_{Dy}t + y_D \\0 &= -8t + 43.61 \\t &= \underline{5.451 \text{ s}}\end{aligned}$$

Step 2: Find the displacement from D to E.

x-dir:

$$\begin{aligned}\Delta x_{DE} &= \frac{1}{2}(V_{Ex} - V_{Dx})t \\ \Delta x_{DE} &= \frac{1}{2}(-20 + (-20))(5.451) \\ \Delta x_{DE} &= (-20)(5.451) \\ \Delta x_{DE} &= \underline{-109.03 \text{ m}}\end{aligned}$$

Stage AE:

Givens:

$$\begin{aligned}x_D &= 295.06 \text{ m} & \Delta x_{DE} &= -109.03 \text{ m}\end{aligned}$$

Step 1: Find the total displacement.

$$\begin{aligned}\Delta x &= x_D + \Delta x_{DE} \\ \Delta x &= 295.06 + (-109.03)\end{aligned}$$

$\Delta x = 186.0 \text{ m East}$
