34, 38, 41, 44

9-23 HW

33 → 36, 38, 41, 44

33)

Given:
$V_0 = 0\ m/s$
$a = 9.80\ m/s^2$

$V = 90\ km/h = 25\ m/s$

wanted: $T = ?$

$V = V_0 + aT \qquad T = \frac{V - V_0}{a} = \frac{25\ m/s - 0\ m/s}{9.80\ m/s^2} = 2.6\ s$

---

34)

Given:
$a = 9.80\ m/s^2$
$T = 3.50\ s$

wanted: $X = ?$

$X = X_0 + V_0 t + \frac{1}{2} a T^2$

$X = \frac{1}{2} a T^2 = .5(9.80\ m/s^2)(3.50\ s^2) = 60.0\ m$

---

35)

Given:
$X = 380\ m$
$a = 9.80\ m/s^2$
$X_0 = 0\ m$
$V_0 = 0\ m/s$

wanted:
$T = ?$
$V = ?$

A) $X = X_0 + V_0 t + \frac{1}{2} a T^2$

$T^2 = \frac{X}{.5a} = \frac{380\ m}{.5(9.80\ m/s^2)} = 8.8\ s$

B) $V = V_0 + aT$

$V = 0\ m/s + (9.80\ m/s^2)(8.8\ s) = 86\ m/s$

---

36)


Given:
$V_0 = 25\ m/s \qquad a = -9.80\ m/s^2$
$V = 0\ m/s$

wanted:
$X = ?$
$T = ?$

$V^2 = V_0^2 + 2a(X - X_0)$

$(X - X_0) = \frac{V^2 - V_0^2}{2a}$

A) $= \frac{0\ m/s - 25\ m/s^2}{2(-9.80\ m/s^2)}$

$X = 32\ m$

B) $X = X_0 + V_0 t + \frac{1}{2} a T^2$

$32\ m = 0\ m + 0\ m/s\ T + \frac{1}{2}(9.80\ m/s^2)(T^2)$

$T = 2.5\ s \times 2$ (up + down)

$T_{TOTAL} = 5.1\ s$

38, 41, 44

Challenge # 46.49

2.6

38)

$T_{Total} = 3.3s$

$a = -9.80 m/s^2$

Want: $V_0 = ?$

$X = X_0 + V_0 t + \frac{1}{2} a t^2$

$X - X_0 - \frac{1}{2} a t^2 = V_0$

$V_0 = 0m - 0m - .5(-9.80 m/s^2)(3.3s)$

A) $V_0 = 16.2 m/s$

B) $X = X_0 + V_0 t + \frac{1}{2} a t^2$

$X = 0m + (16 m/s)(1.65s) + .5(-9.80 m/s^2)(1.65s)^2$

$X = 13.6m$

$X = 14m$

---

41)

Given

$V_0 = 5.50 m/s$

$X_0 = 105m$

$a = -9.80 m/s^2$

$X = 0m$

Want: $T = ?$

$X = X_0 + V_0 t + \frac{1}{2} a T^2$

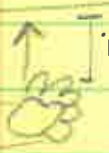
$0m = 105m + (5.50 m/s) t + .5(9.80 m/s^2) T^2$

$0m = 105m + 5.50 m/s T - 4.90 m/s^2 T^2$

$T = 5.23s$

---

44)



Given

$a = -9.80 m/s$

$V_0 = 20.0 m/s$

$X = 12.0m$

Want: A) $V = ?$ B) $T = ?$

$V^2 = V_0^2 + 2a(X - X_1)$

$V^2 = (20.0 m/s)^2 + 2(-9.80 m/s^2)(12.0m)$

a) $V = \pm 12.8 m/s$

B) $X = X_0 + V_0 t + \frac{1}{2} a T^2$

$12m = 0m + 20.0 m/s t + .5(-9.80 m/s) t^2$

$0 = -12.0m + 20.0 m/s t - 4.90 m/s^2 T^2$

b) $T = .731s$

$T = 3.35s$

c) Because it passes 12.0m on its way up & down.