Megafun Kinematics Worksheet

(1) $v_i = 0$
$v_f = -22\ m/s$
$a = -9.8\ m/s^2$

(a) $v_f = v_i + at$
$-22 = -9.8t$
$t = \underline{2.2\ s}$

(b) $d = v_i t + \frac{1}{2}at^2$
$= \frac{1}{2}(-9.8)(2.2s)^2$
$= \underline{23.7\ m}$

(2) (a) $v_i = 15\ m/s$
$v_f = 0$
$a = -3.5 m/s^2$

$v_f = v_i + at$
$0 = 15 - 3.5t$
$t = 4.29\ s$ to stop
he is then thrown back in the same amount of time
∴ the total time is $\underline{8.57\ s}$

(b) $v_i = 0$
$v_f = ?$
$a = -3.5\ m/s^2$ (he is speeding up, but moving backwards)
$t = 4.29\ s$

$v_f = v_i + at$
$= -3.5(4.29)$
$= \underline{-15\ m/s}$ → the same speed that he hit the elastic with, but in the opposite direction

(c) $v_i = 15\ m/s$
$v_f = 0$
$a = -3.5\ m/s^2$
$d = ?$

$v_f^2 = v_i^2 + 2ad$
$0 = (15)^2 + 2(-3.5)d$
$-225 = -7d$
$d = \underline{32.1\ m}$

(3) $v_i = 35$ m/s
$v_f = ?$
$d = 50$ m
$a = -7$ m/s^2

$v_f^2 = v_i^2 + 2ad$
$= (35)^2 + 2(-7)(50)$
$\sqrt{v_f^2} = \sqrt{525}$
$v_f = 22.9$ m/s

(4) $v_i = 0$ m/s
$v_f = -25$ m/s
$d = -1000$ m
$t = ?$
$a = ?$

$d = \left(\frac{v_i + v_f}{2}\right) t$
$-1000 = \left(\frac{0 - 25}{2}\right) t$
$t = 80$ s

$v_f^2 = v_i^2 + 2ad$
$(-25)^2 = 2a(-1000)$
$a = -.31$ m/s^2

(5) $t = 0.3$ s
$a = -9.8$ m/s^2
$d = -1.5$ m
$v_i = ?$

$d = v_i t + \frac{1}{2} a t^2$
$-1.5 = v_i (.3) + \frac{1}{2}(-9.8)(.3)^2$
$-1.5 = .3 v_i - .441$
$v_i = -3.53$ m/s.

(6)(a) $v_i = 2.8$ m/s
$d = ?$
$v_f = 0$
$a = -9.8$ m/s^2

$v_f^2 = v_i^2 + 2ad$
$0 = (2.8)^2 + 2(-9.8)d$
$0 = 7.84 - 19.6d$
$d = .4$ m

(b) $2.45_m + .4$ m $= 2.85$ m reach.
$3.048 - 2.85 = 0.198$ m short

6 (c) $3.048 - 2.45 = 0.598\ m$ to reach.

$d = 0.598\ m$
$v_i = ?$
$a = -9.8\ m/s^2$
$v_f = 0$

$v_f^2 = v_i^2 + 2ad$
$0 = v_i^2 + 2(-9.8)(.598)$
$\sqrt{v_i^2} = \sqrt{11.72}$
$v_i = 3.42\ m/s$