Part II

1) A Blood Droplet

(The missing) Part 'E':

Assume that droplet was not dropped from rest; rather, $v_0 = 100$ cm/s UP (all else same).

All numerical values and concepts for first three parts of the problem still apply:

the length and time for window,

the acceleration due to gravity,

the instantaneous velocity at .1 sec,

the instantaneous velocity at the top of the window.

We can therefore jump straight to the fourth part and apply an identical thought process to the new v_0:

E. From how high above the television did the drop come?

We already have V at the top of the TV, so we'll look at the drop's trip from its starting location to the top of the TV. Thus V at top of TV will be Vf, and initial V will be V0. Find time first.

$V_0 = 0$ ← drop fell from rest

$a = 1000$ cm/s2 ← constant

$V_f = 250$ cm/s

$a = \bar{a} \equiv \frac{v - v_0}{t}$ → $1000 \equiv \frac{250-0}{t}$

$t = 250/1000 = 0.25$ s

$d = \frac{1}{2}at^2 + v_0t$

$d = \frac{1}{2}(1000)(0.25)^2 + 0$

$d = 500(0.0625)$

$d = 31.25)$

(*d*, for '***displacement***', means the same thing as $x - x_0$
v_f, ***for 'final velocity'***, means the same thing as v.)

$$v_0 = -100 \text{ cm/s}$$
$$a = 1000 \text{ cm/s}^2$$
$$v = 250 \text{ cm/s}$$

$$a \equiv \frac{v - v_0}{t}$$
$$1000 = \frac{250 - (-100)}{t}$$
$$1000t = 350$$
$$t = .350 \text{ sec}$$

$$x - x_0 = \frac{1}{2}at^2 + v_0t$$
$$x - x_0{}^{\nearrow 0} = \frac{1}{2}at^2 + v_0t$$
$$x = \frac{1}{2}(1000)(.350)^2 + (-100)(.350)$$
$$x \approx 61.25 - 35$$
$$x \approx -26.25 \text{ cm}$$

The droplet was thrust from approx. ***26.25 cm above*** the window