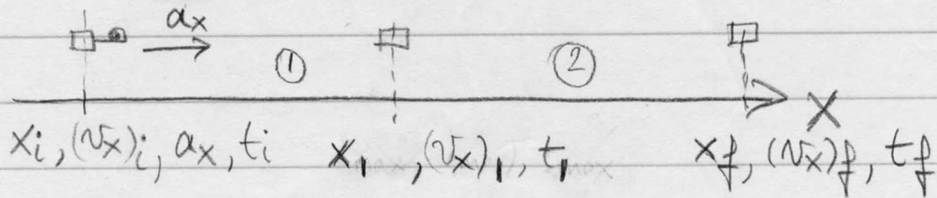


Chameleon's dinner

PREP



know

$$x_i = 0$$

$$x_f = 18 \text{ cm} = 18 \text{ cm} \frac{1 \text{ m}}{100 \text{ cm}} = 0.18 \text{ m}$$

$$(v_x)_i = 0$$

$$a_x = 250 \text{ m/s}^2$$

$$t_i = 0$$

$$t_1 = 20 \text{ ms} = 20 \text{ ms} \frac{1 \text{ s}}{1000 \text{ ms}} = 0.02 \text{ s}$$

$$t_f = 50 \text{ ms} = 0.05 \text{ s}$$

find

$$x_f = ?$$

$$(v_x)_f = ?$$

$$x_1 = ?$$

$$(v_x)_f = (v_x)_1$$

how far does the tongue travel in 50 ms?

SOLVE

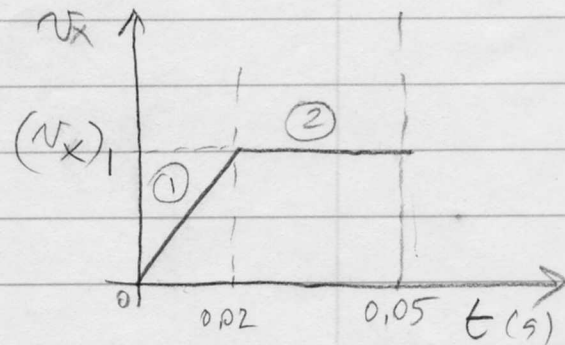
Segment ①:

$$\text{displacement } \Delta x_1 = \frac{1}{2} [(v_x)_1] (\Delta t_1)$$

$$(v_x)_1 = (v_x)_i + a_x \Delta t_1$$

$$= 0 + (250 \text{ m/s}^2) (0.020 \text{ s}) = 5.00 \text{ m/s}$$

$$\Rightarrow \Delta x_1 = \frac{1}{2} (5.00 \text{ m/s}) (0.020 \text{ s}) = 0.05 \text{ m}$$



Segment ②:

$$\text{displacement } \Delta x_2 = (v_x)_1 (\Delta t_2)$$

$$= (5.00 \text{ m/s}) (0.030 \text{ s}) = 0.15 \text{ m}$$

Final position: $x_f = x_i + \Delta x_1 + \Delta x_2 = 0.20 \text{ m} = 20 \text{ cm}$
of tongue after 50 ms.

\Rightarrow tongue extends beyond insect before it escapes