69. The statement that the stoneflies have "constant speed along a straight path" means we are dealing with constant velocity motion (Eq. 2-2 with v_{avg} replaced with v_{s} or v_{ns}, as the case may be).

(a) We set up the ratio and simplify (using d for the common distance).

$$\frac{v_{\text{s}}}{v_{\text{ns}}} = \frac{d/t_{\text{s}}}{d/t_{\text{ns}}} = \frac{t_{\text{ns}}}{t_{\text{s}}} = \frac{25.0}{7.1} = 3.52$$

(b) We examine Δt and simplify until we are left with an expression having numbers and no variables other than v_{s}. Distances are understood to be in meters.

$$\begin{aligned} t_{\text{ns}} - t_{\text{s}} &= \frac{2}{v_{\text{ns}}} - \frac{2}{v_{\text{s}}} \\ &= \frac{2}{(v_{\text{s}}/3.52)} - \frac{2}{v_{\text{s}}} \\ &= \frac{2}{v_{\text{s}}}(3.52 - 1) \\ &\approx \frac{5}{v_{\text{s}}} \end{aligned}$$