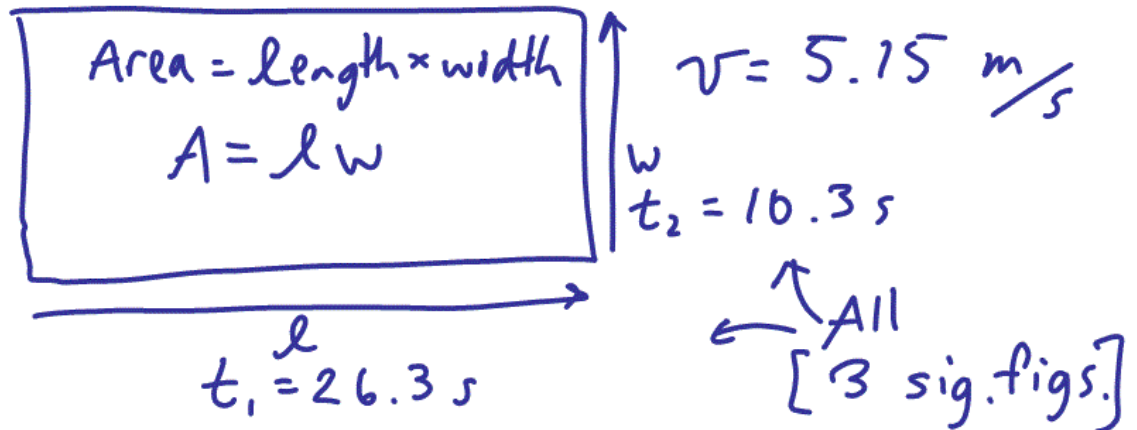Example: When **not** to round

You wish to estimate the area of a rectangular field of length ℓ and width w. To estimate distances, you drive a tractor at a known speed of $v = 5.15$ m/s along the edges of the field. It takes you a time of 26.3 s to travel the length of the field, and then 10.3 s to travel the width. What is the area of the field?

$$\boxed{\begin{array}{c} Area = length \times width \\ A = \ell w \end{array}}$$

$v = 5.15$ m/s

w
$t_2 = 10.3$ s

ℓ
$t_1 = 26.3$ s

$\nwarrow$ All
[3 sig. figs.]

Use Eq. 2.6 for $\bar{v} = \dfrac{\Delta x}{t}$, solve for distance Δx

$$\Delta x = \bar{v} t$$

In our case: $\ell = vt_1$, $w = v t_2$

$$\ell = \left(5.15 \, \frac{m}{s}\right)(26.3 \, s)$$ → Don't round intermediate calculations!

$$= 135.445 \, m$$
$$= 135 \, m \; \times$$
$$\ell = 135.445 \, m$$

$$w = \left(5.15 \, \frac{m}{s}\right)(10.3 \, s)$$
$$= 53.045 \, m$$
$$= 53.0 \, m$$
$$w = 53.045 \, m$$

$$A = \ell w$$
$$= 135 \, m \times 53.0 \, m$$

$$A = 135.445 \, m \times 53.045 \, m$$
$$= 7184.68 \, m^2$$

$A = 7155\ m^2$

$A = 7160\ m^2$ ✗

WRONG!!!!

$A = 7180\ m^2$

↑ correct!