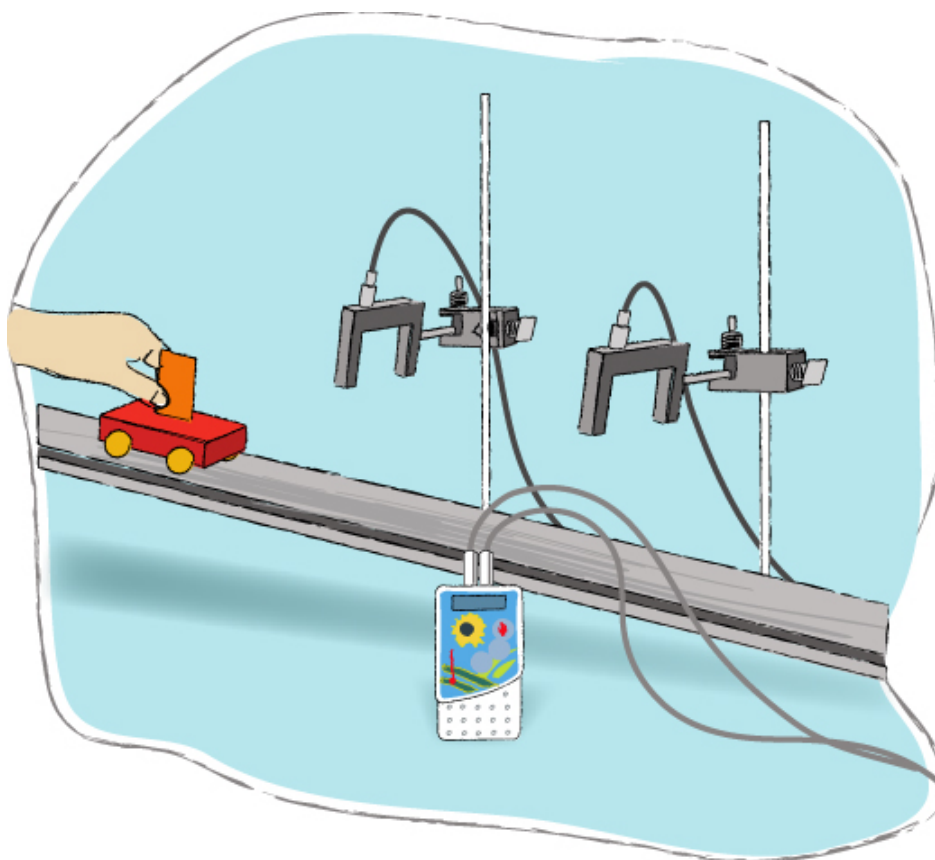


# Velocity



## We're going to...

Explore the notions of average and instantaneous velocities. We will use photogates. A photogate is made of an infrared light source which sends a narrow light beam to a light sensor on the other arm of the photogate. EcoLog XL uses its electronic clock to record the time whenever the light beam is blocked or unblocked. By using two photogates we can measure the time,  $\Delta t$ , it takes the cart to move from one gate to the other. Then we will feed EcoLab with the distance,  $\Delta x$ , between the two gates and let EcoLab calculate the average velocity according to:

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

## Getting started

- ✚ Mount two photogates along the incline, 60cm apart, so that the cart's flag will block the photogates when passing through them
- ✚ Connect the upper photogate to IN - A on EcoLog XL
- ✚ Connect the lower photogate to IN - B on EcoLog XL



- ✚ Measure the distance between the photogates and write it down
- ✚ Mark a launching point on the track, just above the upper photogate



**Note:** It is important to launch the cart from the same point at every try

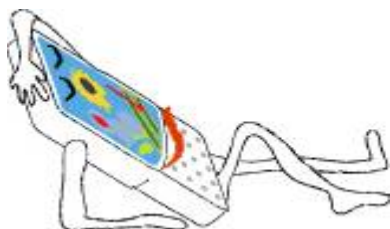
- ✚ Click **Display Workbook**  on the main toolbar.
- ✚ Click **Lets Go...** then click **Velocity**
- ✚ To start the experiment click **Launch**  on the lower toolbar

To show or hide the workbook click **Workbook**  on the main toolbar

- ✚ Enter the distance between the gates to the **Distance** edit box
- ✚ Click **OK**


## Let's go


1. Click **Run**  on the upper toolbar to begin
2. place the cart at the launching point and release it
3. Click on the relevant cell of the comment column in the table. Type in the distance between gates
4. Now move the upper photogate so that the distance between gates is 50 cm and release the cart from the launching point. Type in the new distance
5. Repeat this procedure for distances of: 40cm, 30cm, 20cm, 10cm and 5cm
6. Click **Stop**  on the upper toolbar



## What did we learn



Click **New**  on the lower toolbar to open a new text window and type in your answers to the following questions

(don't forget to save your answers - click **Save**  on the lower toolbar):

1. What is the average velocity of the cart?
2. Estimate the velocity of the cart at the lower gate
3. Describe the pattern of the graph
4. How would you define the instantaneous velocity at the lower gate?
5. How would you best measure the cart's instantaneous velocity at the lower gate?
6. Try it!

