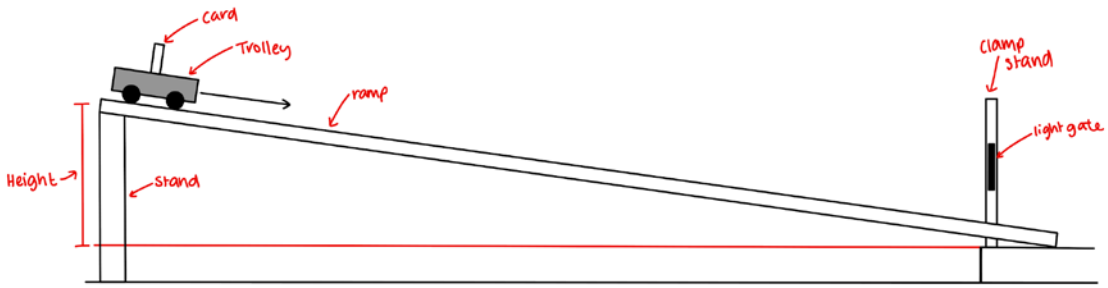
OCR A Physics GCSE

Topic P9: Practical Skills

PAG 3

PAG 03: Investigating the acceleration of a trolley down a ramp

Finding Average Speed



1. Measure the **time taken**, t, for the **front** of the trolley to pass the end of the ramp using a **stopwatch**
2. Measure the **distance travelled**, d, from the point of release to the end of the ramp using a **ruler**
3. Calculate the **speed**, v, using

$$v = \frac{d}{t}$$

Finding acceleration using two light gates

1. Attach a **card** to the top of the trolley/object and measure its **width** using a ruler
2. Release it from the top of the ramp, with one **light gate** just in front of release point, and the other at the bottom of the ramp
3. Use the **time taken** to travel **through** the light gate to work out **initial speed, u**, and **final speed, v**
4. Calculate **acceleration, a**, with the **time taken** to travel **from the first light gate to the second**, t, using:

$$v = u + at$$

Finding acceleration using one light gate

1. Same set up as before, but have **only one** light gate at the **bottom of the slope** set up so it will stop the stopwatch as the trolley passes through it
2. Start the stopwatch when the trolley is released at the top of the slope
3. Use the time measured by the light gate to calculate the **final velocity** of the trolley, v
4. **Initial velocity, u is zero** since the trolley was released from **rest**, so calculate acceleration from:

$$v = 0 + at$$

Finding acceleration using a stopwatch

1. Measure the **distance, s**, from the release point to the end of the ramp using a ruler
2. Measure the **time taken, t**, for the trolley to reach the end of the ramp using a stopwatch
3. Using the fact that the initial velocity is zero (since it was released from rest),
4. you can change the formula $s = ut + \frac{1}{2}at^2$ to $s = \frac{1}{2}at^2$
5. Rearrange to find acceleration: $a = \frac{2s}{t^2}$