PROCEDURE
• Determine the average acceleration as a quotient of force and mass.
• Determine the acceleration at any given point as a function of time.
• Determine the speed at any given point as a function of time.
• Record distance as a function of time.

SUMMARY
When uniformly accelerated motion takes place the velocity at any instant is linearly proportional to the time, while the relationship between distance and time is quadratic. These relationships are to be investigated in an experiment using a carriage going one step further from the thread. Since the mass $m_1$ of the carriage and $m_2$ of the weight hanging from the thread. Since the mass $m_2$ also undergoes acceleration, then the values to be used in equation (3) are:

This implies:

The evaluation software can display the values $s$, $v$ and $a$ as a function of time $t$. Applicability of equations (1) and (2) is checked by matching the results with various expressions using the acceleration $a$ as a parameter.

For constant acceleration $a$, the instantaneous velocity $v$ increases in proportion to the time $t$, assuming the centre of gravity was initially at rest:

The distance covered $s$ increases in proportion to the square of the time:

Constant acceleration results from a constant accelerating force $F$, as long as the mass $m$ being accelerated does not change:

These relationships are to be investigated in an experiment using a carriage on a roller track. The carriage is accelerated uniformly because it is pulled by a thread subjected to a constant force, which is provided by a weight of known mass attached to the other end of the thread, see Fig. 1. The pulley for the thread takes the form of a spoked wheel and the spokes periodically interrupt a photoelectric light barrier. A measuring interface is attached which measures the times $t_n$ when the spokes break the beam and sends that data to a computer for evaluation. The evaluation software calculates the distance covered at times $t_n$, along with the corresponding values for the time and acceleration at that instant.

Measurements are made for various combinations of accelerating force $F$ and accelerated mass $m$.

EVALUATION
The evaluation software can display the values $s$, $v$, and $a$ as a function of time $t$. Applicability of equations (1) and (2) is checked by matching the results with various expressions using the acceleration $a$ as a parameter. If $m_1$ is the mass of the carriage and $m_2$ is the mass of the weight hanging from the thread. Since the mass $m_2$ also undergoes acceleration, then the values to be used in equation (3) are:

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