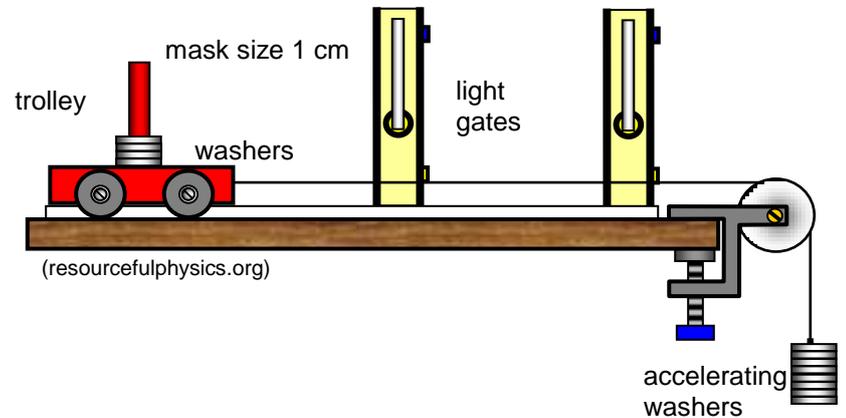


## Variation of force on the acceleration of an object

In this experiment, a trolley is accelerated by weights which are hanging on the end of a string which passes over a pulley. It is important to note that the mass which is being accelerated includes the mass of the weights on the end of the string. In this experiment the mass of the vehicle remains constant.



## Apparatus

a trolley, a white plastic track, a pulley, thread, twelve washers (mass 10 g each, or 10 g masses and a holder), metre rule, light gates and timer or stopwatches

## Instructions:

- Set up your apparatus as shown in the diagram.
- Compensate for friction by tilting the track slightly so that the trolley runs steadily down with no increase in speed when there is no force pulling it.
- Set up the interface to measure the acceleration of the trolley.
- The mass to be accelerated is the mass of the trolley and the washers while the accelerating force is the weight of the suspended washers .
- Allow the trolley to accelerate down the track and record the acceleration.
- Remove one washer from the trolley and add it to the suspended washers – the accelerating force is now increased but with the same total mass.
- Complete for other readings.

## Risk Assessment

- Masses may be heavy so care must be taken to not drop them.
- Placing a buffer at the end of the ramp or something soft for the trolley to land in is suggested so not to damage equipment.
- Do an electrical safety check by observing all the wires.
- Make sure the vehicle cannot become a trip hazard or land on feet, toes etc.
- Be observant to those around you.
- Do not block exits with the apparatus.

## Background

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5. [http://tap.iop.org/mechanics/newton/page\\_39590.html](http://tap.iop.org/mechanics/newton/page_39590.html)
6. [http://www.bbc.co.uk/schools/gcsebitesize/science/add\\_ocr\\_gateway/forces/motionrev1.shtml](http://www.bbc.co.uk/schools/gcsebitesize/science/add_ocr_gateway/forces/motionrev1.shtml)
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9. [http://www.antonine-education.co.uk/Pages/Physics\\_GCSE/Unit\\_2/Add\\_02\\_Forces\\_and\\_Motion/add\\_page\\_02.htm](http://www.antonine-education.co.uk/Pages/Physics_GCSE/Unit_2/Add_02_Forces_and_Motion/add_page_02.htm)
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11. <https://kellyoshea.blog/2011/11/16/building-the-unbalanced-force-particle-model/>