

**PHYSICS**  
**INTERNAL ASSESSMENT**  
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# Investigating relationship between the force required for the shopping basket to move and the mass in the shopping basket

## Introduction

In this laboratory, the force that is used to push a shopping basket is going to be related to the weight in the shopping basket. It is well known that a light load in a shopping basket is easier to push than a heavy load. The experiment will involve the use of two identical shopping baskets, the first with one pack of soda while the second with six packs of soda. The same force will be used to push both shopping baskets and the acceleration and force in both cases compared using the equation in Newton's second law,  $F_{\text{net}} = ma$



The variables of the experiment are mass, distance traveled, time, and the surface (ground). The independent variable is the force used to push the shopping baskets and the distance to be covered, since I will choose them. The dependent variables are the distance travelled and the time taken to travel the distance since these will rely on the force applied. The constant in the experiment is the mass of the shopping basket and the mass of the soda packs. The research question in this experiment is to determine if there is a linear & proportional relationship between the force applied and the mass of the object being moved.

Therefore, the function of the experiment would be  $F=ma$ , where  $F$  is the force applied,  $m$  is the mass of the shopping basket and soda packs and “ $a$ ” is the acceleration (dependent variable)

### **Design**

The equipment and materials required for this experiment are two shopping baskets, 7 packs of soda, a mechanical hanging scale, a tape measure, stop watch and a chalk.

First, the mass of one of the shopping baskets and the mass of one soda pack will be determined using the mechanical hanging scale. One pack of soda will then be placed in one shopping basket and the other six packs will be placed in the other basket. I will then draw a start line and a finishing line 10 meters away from the start line using the chalk. Afterwards, I will position the two baskets containing the soda packs at the starting line. I will then give a push on each basket using similar force. Immediately after giving the basket a push, I will use the stop watch to note the time it takes to cover the distance of 10 meters. To improve the accuracy and quality of the measurement, I will repeat the experiment three times and get the average time