

## Stage 1 Physics

### Practical Investigation: Newton's Second Law

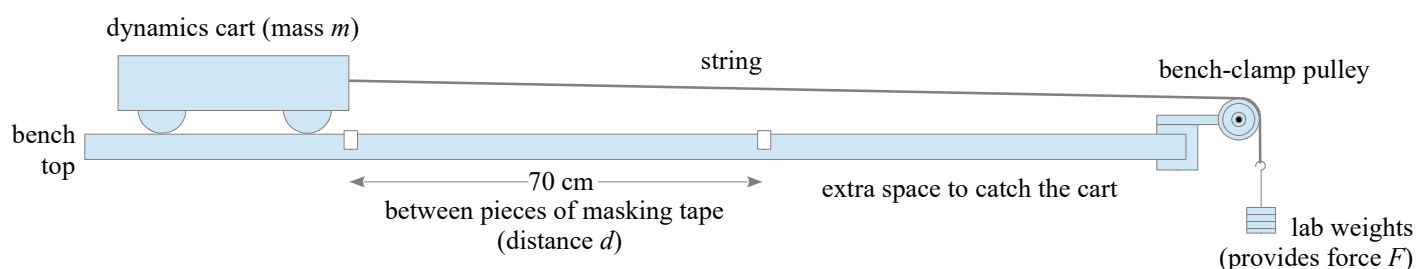
**Purpose:** To investigate the relationship between the force applied to an object and the acceleration it experiences.

#### Equipment:

- dynamics cart
- stopwatch
- string
- bench-clamp pulley
- 20 N spring balance
- measuring tape
- set of 50g lab weights
- masking tape

#### Procedure:

1. Write an hypothesis for the relationship between the force on the cart and the acceleration it experiences.
2. Use the 20 N spring balance to measure the mass of the dynamics cart.
3. Set up the equipment as shown below, placing pieces of masking tape to show where the start and end points of the cart's motion will be.



4. Remove all lab weights from the mass hanger so that it has a mass of 50 g.
5. Pull back the dynamics cart so the front of the cart is level with the masking tape.
6. Release the cart and start the stopwatch at the same time.
7. When the front of the cart reaches the second piece of masking tape, stop the stopwatch and catch the cart so it doesn't collide with the pulley. Record the time taken.
8. Repeat steps 5 to 7 two more times and calculate the average time.
9. Repeat steps 5 to 8 six more times, adding 50 g to the lab weight hanger each time (to a maximum of 350 g total mass).
10. Use the formula  $a = \frac{2d}{t^2}$  to calculate the measured acceleration for each weight.
11. Calculate the downwards force provided by each weight, using  $F = mg$ .

#### Report:

Write a report including the following:

- Hypothesis
- Manipulation and Collaboration
- Results
- Calculations and Discussion
- Conclusion