



## Technician and Teacher Sheet

### Apparatus

A Push Button Switch connected to input A on the Wireless Switch Sensor

One Timing Mat connected to input B of the Wireless Switch Sensor

Tape measure to determine the distance from the responder's eye to the sole of their foot

A piece of card with a hole in it to hide the tester's hand from view

EasySense software App

### Data Recording Setup

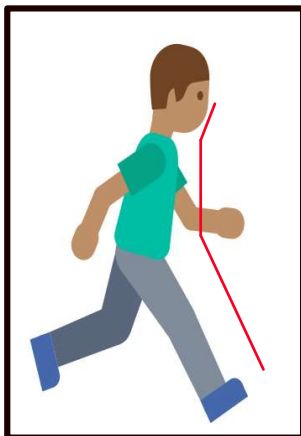
Setup: Mode-Timing, Timing Mode - Time, From A to B

### Introduction

Reaction time is the quickest time an individual can respond to stimulus.

The smallest theoretical connection consists of two neurons, a sensory neuron receiving the stimulus and a motor neuron activating the muscles, glands, etc. The chain that can carry the message can do so at a high speed. A reaction time below 0.2 seconds is unlikely, given the above limitations we humans have "hard-wired" into us.

This experiment is going to test how fast one can react and what might affect this. It demonstrates how sport science can monitor and improve an athlete's performance.



Measure  
Here: L

### The overall Response Time Is Made Up From Several Components:

- A: Time taken for the stimulus to reach the brain,  $T_s$
- B: Time needed for the brain to take action,  $T_b$
- C: The time taken for the brain to send signal to the muscles,  $T_r$

The total time,  $T = T_s + T_b + T_r$

### Method

1. Assemble the apparatus, which consists of a Push Button Switch, one Timing Mat and a Wireless Switch Sensor.
2. Connect the Push Button Switch and the Timing Mat to the Wireless Switch Sensor, connections A and B. Turn on the sensor.
3. Start EasySense and use the Devices icon to connect to the Wireless Switch Sensor.
4. In Setup, choose Mode - Timing; Timing Mode -Time, Where? From A to B. Ensure that the eye-to-sole distance, L, (above) is known.
5. Get one of the participants to be the stimulus starter (Push Button Switch A). Their switch can be hidden behind a piece of card with a hole in it, red LED visible. A guide to the usage is given below.
6. The starter needs to press the Push Button Switch A and release it as quickly as possible.
7. The responder (B) must react as fast as possible to the red LED using the Timing Mat.
8. A quick test run often helps before the data is gathered.
9. Try to collect at least ten recordings and find the average response time, T.
10. Work out the speed from  $L/T$ .

## Recording Notes

Use the distance from the responder's eye to the sole of their foot as the separation between sensors. It represents the time taken for the stimulus to be perceived and the response sent down to the muscles activating the foot pressing the switch.

An assumption is being made that the eye is in effect the first "push button switch", the speed of light being so fast that the time delay from the switch from the eye of the responder is insignificant. See the diagram above for the path to take. The exact path is not critical as there is timing latency due to "brain processing" anyway.

We as scientists are after a consistent recording protocol to allow comparison.

## Software Knowledge

Connecting the Switch Sensor to the software

Using the Setup to configure timing

Changing the data display from the Graph option

## Further Work

1. Use the stopping times for cars to see how much of the reaction time affects the reaction distances.
2. Does gender affect the reaction times?
3. Use something to distract (such as sound) and see how that affects the response time.
4. Does being physically fit affect the reaction time?