

Reaction Timer Test

Teacher's notes

Aim

To find out and compare how fast hand-eye reactions are.

Objective

Pupils watch for a change in traffic lights. They click on a button as fast as they can when they see the light changing from red to green. They have 3 attempts with each hand. Their results are recorded as an average of the last 2 attempts.

Carrying out the online experiment

Click on the Reaction Timer icon to start.

Login to the online experiment by entering the LEA and school code. **'Submit'**. **'Next'** (These are available from your school or can be requested from us.)

(Note- If you experience any difficulty accessing the experiment pop-up pages it could mean they are being blocked. If this is the case, you will need to have the ExperimentsAtSchool site put on your school's list of permitted websites. See your ICT technician or email us for further information.)

Pupils then proceed to the next pop-up page where they need to enter some details in the spaces provided. **'Next'**.

It is a good idea to give pupils a project code as this is for you to retrieve your classes' data.

Clicking on **'Next'** will take you to the instructions to start the experiment.

As soon as the light changes from red to green, pupils need to click as fast as they can on the red light.

They repeat this 3 times for each hand. The average of their last 2 attempts for each hand is recorded.

Clicking on **'Next'** then **'Submit'** takes them to a summary pop-up page showing their results.

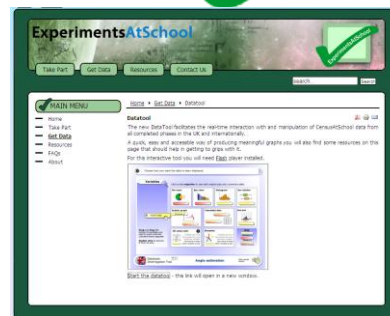


Reaction Timer Test

After finishing the experiment pupils can use the Data Interrogation Tool to analyse random samples of data from all schools who have taken part in this experiment.

From the home page of ExperimentsAtSchool click on **'Get Data'** **'Data Tool'** **'Start the Data Tool'**. Click on the **'ExperimentsAtSchool'** icon.

Also see *ExperimentsAtSchool* Data Tool worksheet in Resources.



Possible investigations

Do you improve with practise?

Repeat the experiment a number of times e.g. 5, and compare the results to see if the reaction times get quicker.

Have females got quicker reaction times than males?

Compare the data from females and males.

Do older pupils have quicker reaction times than younger pupils?

Compare data from experiments done by pupils of different ages.

Do pupils from different regions have different reaction times?

Compare data from experiments done by pupils from different regions.

Do pupils have quicker reactions in the morning or the afternoon?

Compare data from pupils from before 12 noon and after 12 noon. (The data is time and date stamped when it is gathered on the data base.)

Use random samples of data available for download from the website.

Pupil worksheets

There are some pupil worksheets available to download from the reaction timer web page. These help the pupils to design their experiment as well as considering some facts and information related to reaction time.

Reaction Time
Beat the Gun!

How fast can you react?
What factors can affect reaction time?
When is a quick reaction vital?

Task A
Think of some situations where a quick reaction time is vital. E.g. Survival: an antelope trying to escape from a cheetah; a person avoiding being burnt.

How make a list of some of the possible factors in humans that could affect how quickly they can react?

Task B
You are going to investigate human reaction times. You need to think of a statement or hypothesis to test and consider how you are going to conduct your experiment. (Page 2 has an example worksheet to help you in your investigation.)

You can gather data using the ExperimentsAtSchool website at www.experimentsatschool.org.uk. Here you can test the reaction times of yourself, classmates, friends, or family members. Remember to read the instructions carefully.

You can also use the datasets available to download which have data from pupils of 100 schools and data from children in the UK, New Zealand and South Australia. There are demonstration versions of the New Zealand and South Australian reaction times as well.

Remember data you collect yourself is called Primary Data and data you use from the website is called Secondary Data.

FACT
It takes about 0.1 seconds for the information to be processed by the brain. The time taken to react is usually between 0.2 and 0.3 seconds. The time taken to react is usually between 0.2 and 0.3 seconds. The time taken to react is usually between 0.2 and 0.3 seconds.

Beat the Gun - Worksheet

1) Write down your hypothesis or statement that you are going to test below.

For example:
People will have faster reactions using the hand they normally write with.
Older people have slower reactions than young people.
People who play computer games have faster reactions than those who don't.

My hypothesis is: _____

2) Explain how you are going to find evidence to support or contradict your hypothesis. How many people are you going to test? How many times should each person do the test? How will you make sure it is a fair test? Are you testing reactions to sight or sound?

I am going to test _____ people. Each person will do the test _____ times.
I am testing reactions to _____.
To make this a fair test I am _____.

3) Tabulate and present your data. You may decide to work out averages or group your data. Stem and leaf diagrams and bar charts are useful to show your data.

4) Conclusions: What have you found out? Can you be sure your conclusions are correct? Is there anything else you could do to be more certain?

The Science of Reaction Times

Reaction time is the time it takes the brain to translate visual information into four voluntary (or sometimes) motor commands and actions i.e. moving your finger to click the mouse. This involves the time the signal takes to travel. The flow of information along the initial and motor nerve pathways is fairly constant even with lots of practice. However practice affects the associative centres in the brain, so you can respond faster to what is happening.

The diagram shows the path of an action potential from the eye to the brain and back to the hand. It labels the eye, optic nerve, brain, and hand. The path is numbered 1 to 6, showing the sequence of events from the eye to the brain and back to the hand.

Extension Ideas

Does noise affect reaction time?
Test reaction times with and without music playing. Some people claim that the use of music, such as classical or hard-rock affects their performance.

Is your reaction time different for sound and sight?
To test this you need to be able to see and hear the start of the test at the same time. You could use a computer to start the test. You could use a computer to start the test. You could use a computer to start the test.

Does tiredness affect reaction time?
Test reaction times at different times during the day.

Does caffeine affect reaction time?
Test the reaction times of those who have had coffee at breakfast or coffee spent those who have not had coffee.

Do distractions affect reaction time?
Try carrying an object next to the computer or have a conversation with the participant or start a telephone. Test reaction times with the distraction.

Practical Reaction Test
Use a ruler or a specially designed reaction timer. One possible way of doing this is described on a pupil worksheet from the Physics Feedback.
<http://www.experimentsatschool.org.uk>
You could enter the results of the experiment with the ExperimentsAtSchool online version.

Investigate braking and stopping distance while driving. How fast a reaction time is needed for safe driving?
Are there certain jobs in which a fast reaction time is vital?

Pupils could also try the fun **'Sheep Dash'** from the BBC as an additional related activity. www.bbc.co.uk/science/humanbody/sleep/sheep