Year 9 Reaction Time Depth Study

Name: _____   Class_____   Teacher _____

Overview:

If someone throws a ball towards your head, you may react by catching the ball, by ducking, or by blinking and turning your head. In each case, you must sense the arrival of a signal (i.e., the sight of the ball flying towards you), process this information and react to it.

In this Depth Study, you will study how your nervous system allows you to react to signals from the world around you.
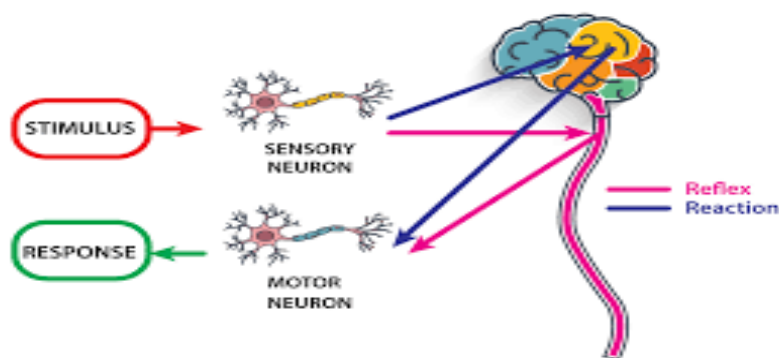
You will measure the reaction times to three different types of stimuli:

Visual, Auditory, and Tactile stimuli and compare which response is the fastest.

1. Creative an Appropriate Title:

(2 marks)

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2. Aim: In this investigation, I am trying to investigate how long it takes for human brain to react to different types of stimuli.

(2 marks)

3. Purpose of the experiment: (2 marks)

This experiment will help me understand how ……..

4. Background Information: (3 marks)

Now use the Internet and the library, together with many other organisations to obtain your background information on the following questions.

Question A

Define "reaction time" in living organisms? Why is reaction time important?

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Question B

Explain at least TWO Factors reaction time depends on. (Explain: relate Cause and Effect, provide Why and How?)

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Question C

Give TWO examples of situations where reaction time is useful for human beings.

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5. Bibliography - Referencing for the sources used (at least three sources).   (3 marks)

Check the last page of this logbook or our school website on how to write references correctly.

1.   2.   3.

Acronym	Term	Meaning
C	Currency	How recent is the information? *
R	Relevance	Is the information related to the topic under investigation?
A	Authority	Who published the information?
A	Accuracy	Is the information accurate and reliable?
P	Purpose	What is the intention of the information?

Assessing Secondary Sources

Reliability

The consistency of information between sources. Can be evaluated through showing that various sources all gave the same information.

Validity

The appropriateness of the information. Needs to consider:

- the author's credentials (are they qualified in that field)
- the purpose of the article - is it biased?
- is it current (not outdated - this is not "recent")
- is the publisher reputable?

Accuracy

The information needs to be both valid and reliable.

6. Assess the reliability and validity of secondary sources used for your research.   (2 marks)

Information collected by me is **reliable** because…

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The **sources** used by me to collect information are **valid** because…

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7. Hypothesis: What I predict will be the outcome.   (2 marks)

Use *If (what are you doing with independent variables)* ***then*** *(what do you predict will happen)* ***because*** (*a scientific explanation behind it*).

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8. Variables   (3 marks)

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│ **Independent Variable** [what will I change?]   │
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│ **Dependent Variable** [what will I measure?]   │
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│ The measurements will be taken using (scientific equipment).   │
│   │
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│ **Controlled Variables:** the variables that are kept the same throughout the experiment │
│ (because they would change the result if they were allowed to change). │
│   │
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Controlled group: [if there is any?]: Control drip in a scientific experiment is a group separate from the rest of the experiment, where the independent variable tested cannot influence the results.

9. Equipment. (2 marks)

A list of equipment and quantity needed to conduct the experiment (ensure that you include **quantities).**

10. Risk Assessment (3 marks)

Draw up a four-sided enclosed table in the space provided (ensure that there are at least **two risks** and **two minimisations** specific to YOUR experiment. Include a **Title and Column headings**.

Method

1. Have your partner sit on the chair with their dominant hand over the edge of the table.
2. To test the **visual response**, hold the ruler at the 30 cm mark so that the 0 cm end is just at your partner's index finger. Refer to the diagram at the bottom of the page.
3. Release the ruler, your partner is to grab it as fast as possible. Do not make any sounds or gestures that you are releasing the ruler. They must react to the visual stimulus of seeing the ruler being released. Record the centimetre mark in your results table.
4. Repeat step 3, four more times to get consistent results.
5. To record **auditory response**, have your partner sit on the chair as before and have their eyes closed. Ensure your partner's eyes are closed.
6. Instruct your partner that you will say the word "Release" as you release the ruler. Once they grab it record the centimetre mark in your results table.
7. Repeat step 6, four times to get consistent results.
8. To test **tactile response**, instruct your partner that you will touch the shoulder of their non dominant arm as you release the ruler. Their eyes must be closed too.
9. Give your partner no auditory cue that you are releasing, just a simple touch on the shoulder. Ensure your partner's eyes are closed.
10. Record the measurement in centimetres in results table.
11. Repeat steps 9-11, four times to get consistent results.
12. Convert all the centimetre readings into reaction time (seconds) using the conversion table on next page. Record reaction time in the results table.
13. Calculate average time (in seconds) for all different types of response and plot a suitable graph.
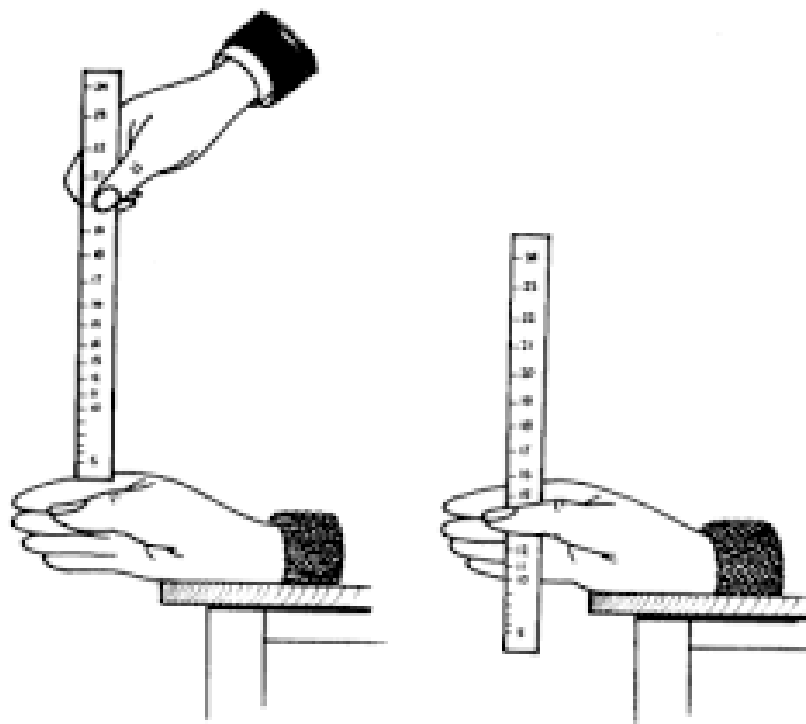
Conversion Table

Distance in cm	Time in seconds	Distance in cm	Time in seconds
1	0.045	21	0.207
2	0.064	22	0.212
3	0.078	23	0.217
4	0.090	24	0.221
5	0.101	25	0.226
6	0.111	26	0.230
7	0.120	27	0.235
8	0.128	28	0.239
9	0.136	29	0.243
10	0.143	30	0.247
11	0.150	31	0.252
12	0.156	32	0.256
13	0.163	33	0.260
14	0.169	34	0.263
15	0.175	35	0.267
16	0.181	36	0.271
17	0.186	37	0.275
18	0.192	38	0.278
19	0.197	39	0.282
20	0.202	40	0.286

11. My Experiment: Results Table   (4 marks)

Complete the **table** to record your results. Include:

- A Title

- Complete unfilled column headings
- Units of measurement in the column headings
- Calculate average (add the time for all the five trials, then divide by number of trials done)

Title _____

Stimuli	Measurement	Trials					
		1	2	3	4	5	Average
Visual	Distance (___)						
	Reaction Time (___)						
Audio	_____ (___)						
	_____ (___)						
Tactile	_____ (___)						
	_____ (____)						

Complete these questions using the Results table.

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1. Is it Discrete or Continuous data?

https://www.youtube.com/watch?v=cz4nPSA9rlc
https://www.youtube.com/watch?v=6IdJ1aPFDCs

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2. Are there five sets of data for each independent variable?

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3. Has the average been calculated for each variable?

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4. What type of graph is needed?

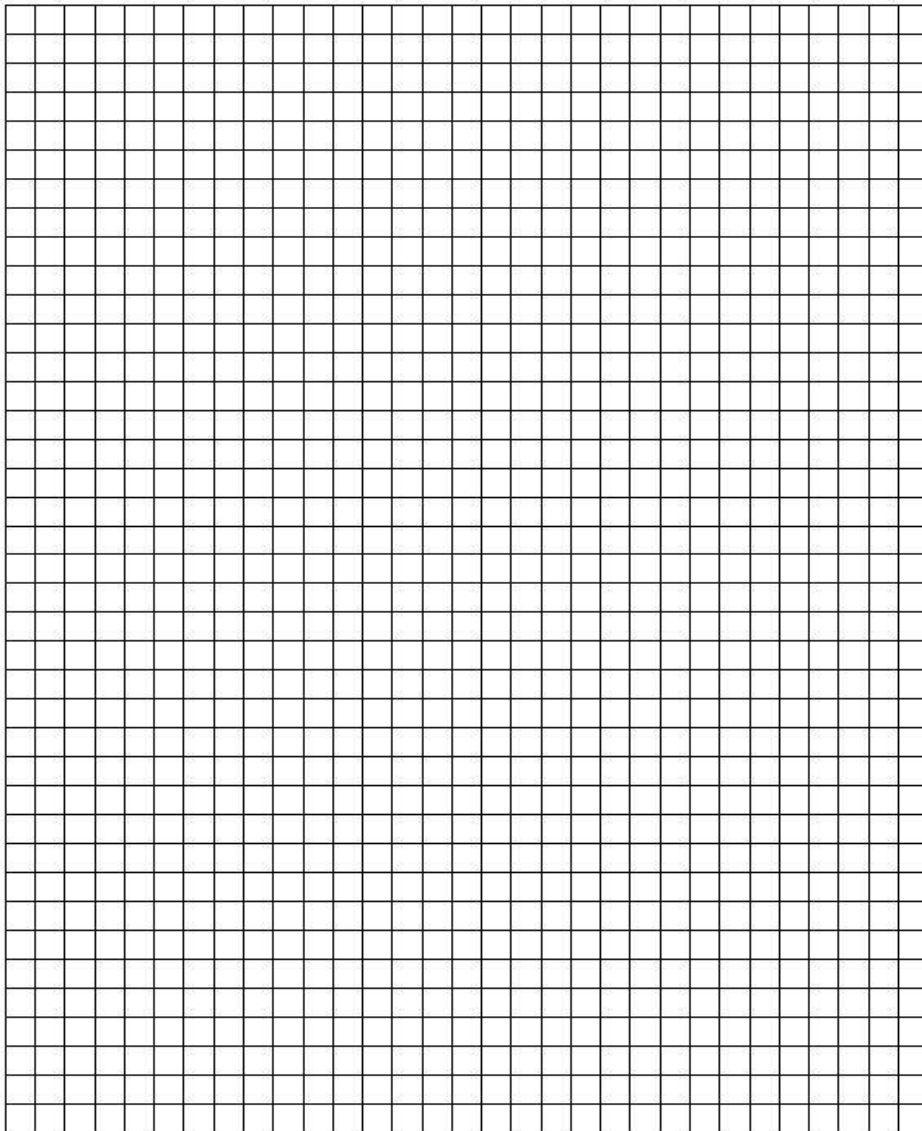**12. Graph**   **(5 marks)**

On the following Page draw a draft graph of your experimental results. Include the following checklist.

Checklist:
- A title
- The labels of independent variable on the x-axis and the dependent variable on the y-axis. Use an average of the dependent variable if this is what was calculated in the results section.
- Units in brackets after each label.
- A scale on each axis that goes up by the same amount each time.
- Bars/columns the same width and correct height based on data (if your results are discrete)
- A small x or cross if plotting points for a line graph (if your results are continuous)

A key to label each line, column, or bar

13. Discussion: (9 marks)

1. Outline the key findings of the experiment, as shown in the above results table, and any trends in the data. **Include quantitative data from the table** to make comparisons. (2 marks)

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2. What is experimental reliability? Discuss the **reliability** of the results collected in the above results table.

(2 marks)

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3. Using the given information (below) **identify** and **give a reason,** with example, if the experiment conducted by you is valid.   (2 marks)

To ensure the experiment is **valid** in a practical investigation, you must carry out a fair test by:

- testing only one variable at time
- all other variables are kept constant
- it tests the hypothesis/aim that you want to
- use appropriate data measuring techniques.

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4. How could you make the method followed to be more valid, or results collected to be more reliable or accurate? **Suggest ONE improvement** for the investigation conducted by you.
                                                                                                (1 mark)

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5. Write an appropriate **conclusion** for the experiment. It is a summary of the results and whether hypothesis was proven to be correct.
                                                                                                (2 marks)

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