**Science Inquiry 1 Nervous System – Brain Investigation Validation Test**

NAME \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Score\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_/38

**Section 1 The Practice of Human Biology [22 marks]**

1. State a hypothesis for this investigation.

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(2 marks)

1. What was the independent variable?

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(1 mark)

1. What was the dependent variable and what was the unit of measurement used?

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(2 marks)

Below is a table showing the results taken from a Year 12 student population who completed a series of tasks involving dealing cards accurately into piles. The second part of the table shows discrimination times.

**Results Table: Task time and discrimination time results for card playing activity for female and male student as task complexity increases**

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| |  |  |  | | --- | --- | --- | | Brain Investigation | Task time averages | Discrimination tasks |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | **Student name** | Task A | Task B | Task C | Task D | B-A | C-A | D-A | | Female [1] | 25 | 36 | 52 | 88 | 11 | 27 | 63 | | Female [2] | 29 | 41 | 54 | 83 | 12 | 25 | 54 | | Female [3] | 26 | 38 | 45 | 84 | 12 | 19 | 58 | | Female [4] | 26 | 34 | 42 | 86 | 8 | 16 | 60 | | Female [5] | 22 | 33 | 43 | 70 | 11 | 21 | 48 | | Female [6] | 25 | 38 | 48 | 73 | 13 | 33 | 58 | | Female [7] | 24 | 34 | 41 | 70 | 10 | 17 | 46 | | Female [8] | 21 | 33 | 40 | 74 | 12 | 19 | 53 | | Female [9] | 19 | 30 | 38 | 63 | 11 | 19 | 44 | | Female [10] | 19 | 30 | 39 | 62 | 11 | 20 | 43 | | Female [11] | 25 | 42 | 52 | 62 | 17 | 27 | 37 | | Female [12] | 30 | 41 | 49 | 96 | 11 | 19 | 66 | | Female [13] | 22 | 32 | 35 | 53 | 10 | 13 | 31 | | Female [14] | 21 | 32 | 45 | 83 | 11 | 24 | 62 | | Female [15] | 23 | 37 | 45 | 63 | 14 | 22 | 50 | | Female [16] | 19 | 35 | 44 | 61 | 16 | 25 | 42 | | Female [17] | 28 | 38 | 54 | 91 | 10 | 26 | 63 | | Female [18] | 17 | 30 | 42 | 70 | 13 | 25 | 53 | | ***Female averages*** | ***23*** | ***37*** | ***51*** | ***78*** | ***14*** | ***28*** | ***55*** | | Male [1] | 19 | 32 | 40 | 63 | 13 | 21 | 44 | | Male [2] | 22 | 33 | 44 | 72 | 11 | 22 | 50 | | ***Male averages*** | ***21*** | ***34*** | ***42*** | ***68*** | ***12*** | ***22*** | ***47*** | |

1. Construct a line graph that plots the average discrimination times for males and females for

tasks B, C, D on the graph paper.

(6 marks)

1. Looking at your graph
2. Identify which gender showed the shortest discrimination time for task D?

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(1 mark)

1. Identify which gender showed the shortest discrimination time for task B?

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(1 mark)

1. Suggest how researchers could increase the:

1. validity of this experiment

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(1 mark)

1. reliability of this experiment

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(1 mark)

1. Identify the main control for this investigation and outline why this was used as the control.

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(2 marks)

1. List three other controlled variables.

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(3 marks)

1. Identify the main trend in the data between discrimination time and tasks performed

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. (2 marks)

**Section 2 Processing the data [16 marks]**

1. Identify which main part of the brain initiates the movement of the sorting of the cards?

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(1 mark)

1. Identify which main part of the brain completes the movement of the sorting of the cards?

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(1 mark)

1. Using your knowledge of the nervous system, explain briefly why the discrimination time for task D was longer than the discriminatory time for task B.

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(2 marks)

1. Identify the type of matter involved in saltatory conduction.

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(1 mark)

1. Explain how this type of matter allows saltatory conduction to occur.

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(4 marks)

1. The motor neurons that innervate the muscles of the arms and fingers receive messages from the connector neurons in the spinal cord. This enables the fingers to clasp and turn over the card to the correct pile. After the neurotransmitter has bound to the receptors on the motor neuron, explain how the electrical impulse is transmitted to the hand to enable this to happen. (7 marks)

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(7 marks)