**PART ONE**

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| **Question** | **Marks** |
| **Explain how to write a good hypothesis** | |
| One mark for each of the following:   * “If-then” statement * Relationship between independent and dependent variable defined * States that this is good because it makes the hypothesis testable | **/3** |
| **Example hypothesis for this experiment** | |
| * Similar to - “If the subjects exercise length increases, then their body temperature will increase” | **/1** |
| **Explain how to tell the difference between the independent and dependent variable** | |
| One mark for each of the following   * Dependent variable is measured by the experimenters * Independent variable is manipulated/changed by the experimenters | **/2** |
| **State the dependent and independent variables for this experiment** | |
| One mark each for:   * Dependent variable is body temperature * Independent variable is time spent exercising | **/2** |
| **Describe what a controlled variable is** | |
| * Similar to – “controlled variables are variables that must not change during an experiment” | **/1** |
| **Explain why controlled variables must stay the same** | |
| One mark each for:   * To make experiment a fair test * Because if they change, then experimenters will not know what caused their results | **/2** |
| **State two example controlled variables for this experiment** | |
| Any two of:   * Type of exercise * Exercise intensity * External temperature * Etc - Any appropriate controlled variable | **/2** |
| **Describe how to write a great methods section** | |
| One mark each for:   * Numbered, logical steps/organised * Specific details for quantities/actions so that someone else could replicate | **/2** |
| **Sample method** | |
| One mark each for:   * Easy -to-follow order * Specific details * Appropriate process to investigate exercise time and body temperature * Repeat trials stated * Appropriate language | **/5** |
| **Explain how to increase reliability** | |
| One mark each for:   * Increase sample size/have a large sample size, or * Have at least 3 repeat trials and calculate an average * MUST SAY: this makes the data more reliable because it is more likely an accurate representation of the relationship between the two variables | **/2** |
| **Explain the difference between validity and reliability** | |
| One mark each for:   * Reliability: if an experiment is conducted multiple times, it will achieve the same results * Validity: the experiment actually investigates what it set out to investigate in the aim | **/2** |
| **State which kind of graph would be used for this data** | |
| * Line graph | **/1** |
| **Explain why this type of graph is needed** | |
| One mark each for:   * Time and temperature are both continuous data * Continuous data is represented on a line graph | **/2** |
| **State an appropriate title for this graph** | |
| * Similar to - “ the relationship between time spent exercising and subject body temperature” | **/1** |
| **Reference List/Bibliography of some kind** | **/1** |
| **TOTAL** | **/29** |

**PART TWO**

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| **Question** | **Marks** |
| 1. **State the aim of this research** | |
| * “To determine the effect of SkinnyBar diet supplements on the weight loss of people” | **/1** |
| 1. **State the Independent variable and dependent variable** | |
| * Independent: the SkinnyBar diet supplements * Dependent: the bodyweight of rats in grams | **/2** |
| 1. **Reread the controlled variables. State two other variables that would have to be controlled for this experiment, and explain why they must be controlled.** | |
| Two marks for any two of: the amount of exercise, the diet of the rats, the number of SkinnyBars, starting mass, time weighed etc  One mark for: because rat weight can also be influenced by … | **/3** |
| 1. **Reread the hypothesis. Explain why this is not a very good hypothesis.** | |
| * Because it is not specific/testable, as it says ‘some weight’ * Or, it is not a valid hypothesis because it says ‘in humans’ but it is actually in rats | **/1** |
| 1. **Create a new hypothesis for this experiment that is more appropriate** | |
| * Similar to “If rats are feed one SkinnyBar per day, then their body mass/weight will decrease more than normal” | **/1** |
| 1. **State two ways to improve the reliability of this experiment.** | |
| Any two of:   * Larger sample size of rats * Repeat trials * Add a control group * Longer period of time for experiment * Calculate % change in body mass | **/2** |
| 1. **Observe the graph in the report. In the space below, analyse the quality of the graph included in this experiment.** | |
| Any four of:   * Bar graph is not correct, should be a line graph * It is continuous data, not discrete data * Only 10 days on graph not 14 * ‘Skinny Bar’ and ‘Skinny Pill’ – name changes * The title does not mention both variables * The x and y axes do not have units * Axes should have days and grams included * Reader does not know if it is an average for all rats or just one | **/4** |
| 1. **On the grid, draw an appropriate table for this data**. | |
| One mark each for:   * Correct type of graph * Appropriate title * Drawn neatly * Logical scale * Labelled axes with units | **/5** |
| 1. **Read through the conclusion of the experiment. Describe whether the researchers made the right conclusions from their data.** | |
| One mark any 3 of for:   * Researchers say humans will lose weight, but they never tested humans * There is no control group to compare the results to; results could have happened naturally * Researchers say a lot of weight was lost, but it was only 4 grams in the end * MUST SAY: therefore, the researchers did not draw the right conclusions from their data/similar statement | **/3** |
| 1. **In the space below, discuss whether this article is a reliable source of information.** | |
| Any four of:   * Comment on date: it is recent, so probably reliable * Comment on authors: both doctors from a university, so probably reliable * Comment on publication site: respectable science source, so probably reliable * Comment on actual science: the research methodology is not valid or scientifically reliable * Comment on disclaimer: researcher was funded by the company; bias * MUST SAY: therefore not a reliable source of info | **/4** |
| 1. **In the space below, discuss whether this magazine article is a reliable source of science information.** | |
| Any three of:   * MUST SAY: Not a reliable source of scientific information * Comment on publication – not a respectable scientific publication * Comment on other articles in the magazine – obviously a gossip magazine * Comment on the actual scientific article it is referring to – not a reliable piece of research * Comment on data: there was no actual data included in the magazine article * Comment on author: not a qualified researcher, is a journalist | **/3** |
| 1. **Describe why the language used in the magazine article would not be appropriate for in a lab report** | |
| * It is emotive language/positioning the reader to feel a certain way * Science reports need to be written free of emotion/bias/personalisation/opinions | **/2** |
| **TOTAL** | **/30** |

**Grade Descriptors:**

A:

* Formulates a testable hypothesis that states the relationship between dependent and independent variables.
* Plans an investigation to collect appropriate data.
* Identifies controlled variables with specific detail.
* Organises data logically and presents it in a range of forms, including appropriate graphs and tables to show patterns and relationships.
* Analyses experimental data to describe trends and explains these using relevant scientific concepts.
* Uses evidence to make and justify conclusions that relate to the hypothesis.
* Explains any inconsistencies in data and suggests ways to improve the design of an investigation.

B:

* Formulates a testable hypothesis that states the relationship between dependent and independent variables.
* Plans an investigation to collect appropriate data.
* Identifies some controlled variables without detail.
* Presents data in a range of forms, including appropriate graphs, tables and charts to show patterns and relationships.
* Describes and briefly explains trends using relevant scientific concepts.
* Uses evidence to make conclusions that relate to the hypothesis.
* Recognises inconsistencies in data and makes general suggestions to improve the design of an investigation.

C:

* With guidance, formulates a hypothesis that includes dependent and independent variables, within a context that has been provided.
* Plans an investigation to collect appropriate data.
* Inconsistently identifies some controlled variables.
* Presents data using basic tables and graphs.
* Describes trends in data and draws simple conclusions that may not be linked back to the hypothesis.
* Describes difficulties experienced in conducting the investigation and suggests general improvements.