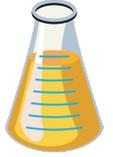




## Collecting, analysing and evaluating Data



**Question 1:** *Define the following in detail:* (12)

1. skills \_\_\_\_\_

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2. variable \_\_\_\_\_

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3. fixed or controlled variables \_\_\_\_\_

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6. inferences \_\_\_\_\_

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7. predictions \_\_\_\_\_

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8. hypothesis \_\_\_\_\_

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**Question 2:** *Answer the following questions:*

1. Compare a dependent variable to an independent variable. (3)

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2. Analyse the use of fair testing in scientific investigations. (3)

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**Question 3:** *List the 6 steps used to carry out practical investigations:* (6)

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**Question 4:** *Refer to each scenario and answer the questions which follow:*

4.1

For the Science Expo, Timothy investigated the influence of the colour of a house's roof on the temperature inside. The roofs of three small houses of exactly the same size, were painted either black, white or red. Everyday, from Monday to Sunday, the temperatures inside the houses were measured at exactly 12:00. The temperatures (measured in degrees Celsius) were recorded in a table.

a) Would you consider this to be a fair test? Give reasons for your answer. (3)

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b) Identify the fixed variables in this investigation. (2)

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c) Identify the independent variables in this investigation. (1)

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d) Identify the dependent variable in this investigation. (1)

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e) Write a hypothesis for this investigation. (2)

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4.2

Plant a few large seeds, such as pumpkin seeds. Plant the same number of small seeds, such as tomatoes, using soil of the same quality. Water the seeds equally, and place them where they get equal sunlight so that the only difference between the two is the size of the seeds. Document the number of large and small seeds that germinate.

a) Identify the fixed variables in this experiment. (2)

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b) Identify the dependent variables in this experiment. (1)

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c) Identify the independent variables in this experiment. (1)

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4.3

An investigation was done, using a group of 25 Grade 8 pupils, to determine the most liked soft drink of Grade 8 pupils. They were given a choice of Fanta, Coke and Sprite Zero and their preferences were recorded in a table.

a) What are the independent variables in this investigation? (1)

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b) What is the dependent variable in this investigation? (1)

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b) Would you consider this to be a good experiment? Give reasons for your answer.

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(3)

4.4

The influence of increased temperature on the rate of dissolving was tested by doing the following experiment: 15 grams of refined sugar was added, 5 g at a time, to 250 ml of cold water and stirred. The amount of sugar that completely dissolved in the water was then measured. The experiment was repeated with 250 ml of water that has been heated to 60 C. All the results were tabulated.

a) Define the fixed variables. (2)

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b) Define the independent variables. (1)

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c) Define the dependent variables. (1)

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d) In your opinion, which variables can cause the results to be inaccurate? (2)

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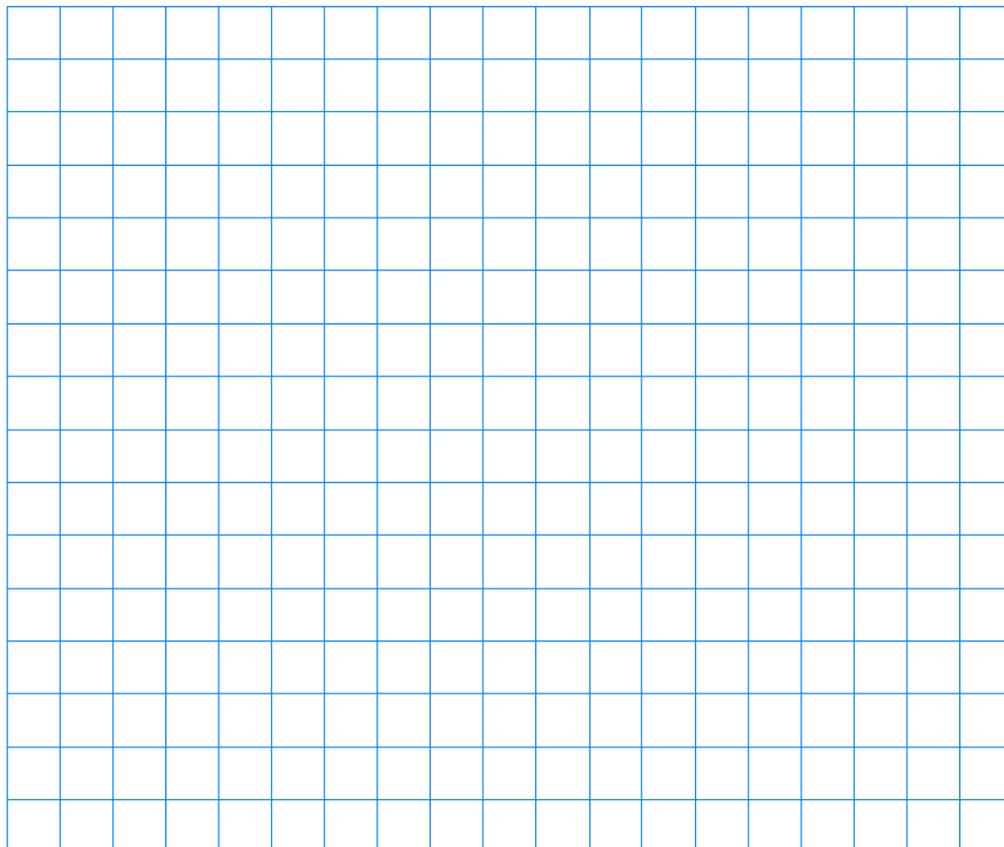
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**Question 5:** *Read through the following experiment and answer the questions that follow:*

In an experiment, a group of learners wanted to observe the temperature change of water as they applied a source of heat. They used a Bunsen burner and measured the temperature every 30 seconds and recorded the data in the table below:

TIME (seconds)	TEMPERATURE (°C)
0 (start of the experiment)	20
30	27
60	36
90	50
120	64
150	72
180	85
210	100

5.1 Plot a line graph using the data given in the table above. (10)



5.2 Use the graph to determine the temperature of water after 75 seconds. (2)

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**Question 6:** *Read through the following experiment and answer the questions that follow:*

Whilst on camp, Grade 8 learners did an experiment to find out what bait was most successful when catching fish. They recorded their results in the table below:

TYPE OF BAIT	NUMBER OF FISH CAUGHT
Earthworms	6
Prawns	0
Bread	3
Anchovies	9

6.1 Provide a suitable heading for the table. (1)

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6.2 Give two controlled variables for the experiment. (2)

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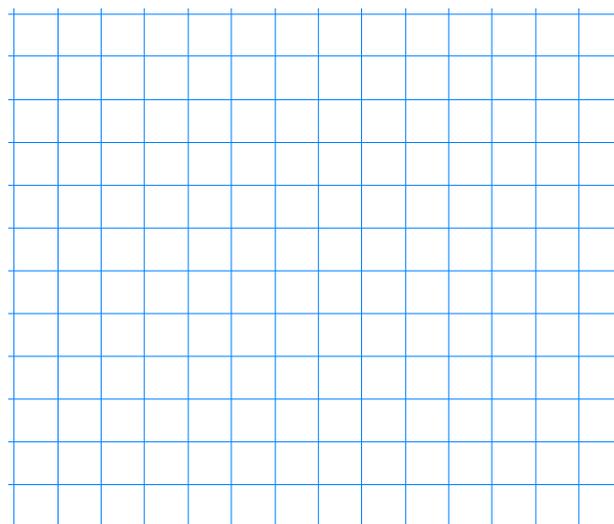
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6.3 Suggest a hypothesis for the experiment. (1)

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6.4 Use the information in the table above to draw a bar graph of the results: (9)



**Question 7:** *Read through the following experiment and answer the questions that follow:*

Matheo did a Science expo project where he investigated the growth of mould in processed Cheddar cheese compared to non-processed Cheddar cheese. The experiment took place over 6 weeks. Matheo used a grid to measure the area covered in mould in  $\text{cm}^3$ . He did the measurement at 16H00 every Sunday for the 6 week period. The results are shown in the table below:

WEEK	MOULD IN PROCESSED CHEESE ( $\text{cm}^3$ )	MOULD IN NON-PROCESSED CHEESE ( $\text{cm}^3$ )
1	0	0
2	0	0
3	0	1
4	0	2.5
5	0.5	3
6	0.5	4.5

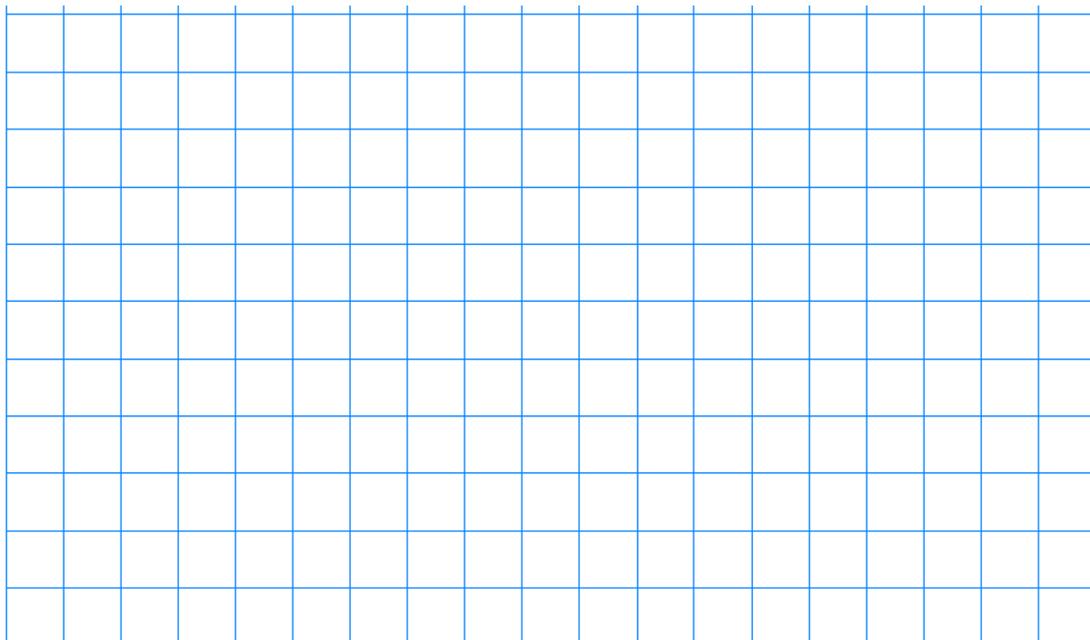
7.1 Write an aim for this investigation. (1)

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7.2 Use the information in the table above to draw a double line graph: (10)  
 (Tip: Use a key to show which graph represents which cheese!)



7.3 Give a possible hypothesis for this experiment. (1)

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7.4 Give 2 variables which should be controlled in this experiment. (2)

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7.5 State the dependent variable. (1)

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7.6 State the independent variable. (1)

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7.7 Write a conclusion for this experiment. (1)

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**MEMO:**

**Question 1:** *Define the following in detail:* (12)

1. Skills Skills are special techniques or particular abilities that enables people to do something well. Knowledge is used to complete these tasks. Scientists must have the skills to find information, to plan and carry out an experiment, to take measurements, to classify things, to interpret information, to make inferences and to make predictions.
2. Variable A variable is anything that exist in differing amounts or types and influences the outcome or results of the investigation or experiment.
3. Fixed or controlled variables Fixed variables are variables that remain constant or the same during the experiment or investigation.
6. Inferences When making inferences, you analyse the information given and make a decision based on the facts before you. It is the same as making an educated guess.
7. Predictions Using the information gathered, trends will be recognised and predictions can be made of possible future outcomes.
8. Hypothesis A hypothesis is a combination of an inference and a prediction, where the scientist will predict the outcome of an investigation or experiment, using prior knowledge.

**Question 2:** *Answer the following questions:*

1. Compare a dependent variable to an independent variable. (3)

An independent variable is a variable that is controlled by the scientist. A dependent variable is the outcome of the changes made to the independent variable. A dependent variable therefore "depends" on the changes made to independent variables.

**Independent variable = What I change**

**Dependent variable = What I observe (will usually include a measurement)**

**Controlled or Fixed variable = What I keep the same**

2. Analyse the use of fair testing in scientific investigations. (3)

Fair testing refers to an experiment or investigation that is conducted in an environment where one variable (independent variable) can be controlled by the scientist, fixed variables are kept the same and the results or dependent variables can be trusted to be true.

Good experiments are experiments where fair testing is done and where the values of variables are measurable. Experiments involving variables such as likes and dislikes of specific brands (involving feelings) usually result in inaccurate results and are not considered to be good experiments.

**Question 3:** *List the 6 steps used to carry out practical investigations:* (6)

1. Observe the world and ask questions
2. Write a hypothesis
3. Plan your investigation
4. Conduct your investigation and record your findings
5. Analyse your results and draw conclusions
6. Evaluate your investigation

**Question 4:** Refer to each scenario and answer the questions which follow:

1.

a) Would you consider this to be a fair test? Give reasons for your answer. (3)

Yes, there is an independent variable, fixed variables which are controlled and a dependent variable that is measurable, which makes this a fair test.

b) Identify the fixed variables in this investigation. (2)

Measurement is done every day for seven days at exactly the same time of the day for all three houses. The size of the houses is the same.

c) Identify the independent variables in this investigation. (1)

The independent variables are different colours used to paint the roofs, therefore the black roof, white roof and red roof.

d) Identify the dependent variable in this investigation. (1)

The difference in temperature inside each house, measured in degrees Celsius.

e) Write a hypothesis for this investigation. (2)

Example: I think that the temperature will be higher inside the house if the roof is painted a dark colour.

2.

a) Identify the fixed variables in this experiment. (2)

The number of seeds planted, the soil, the water and the sunlight.

b) Identify the dependent variable in this experiment. (1)

The number of large and small seeds that will germinate.

c) Identify the independent variables in this experiment. (1)

The size of the seeds planted.

3.

a) What are the independent variables in this investigation? (1)

The Fanta, Coke and Sprite Zero that was given to the 25 Grade 7 pupils.

b) What is the dependent variable in this investigation? (1)

The number of Grade 7 pupils that chose Fanta, Coke or Sprite Zero respectively.

b) Would you consider this to be a good experiment? Give reasons for your answer.

Example: I would not consider this to be a conclusive experiment to decide on the preference of Grade 7's in general, for the following reasons:

1. Only 25 pupils participated, which is not enough to make a conclusion.

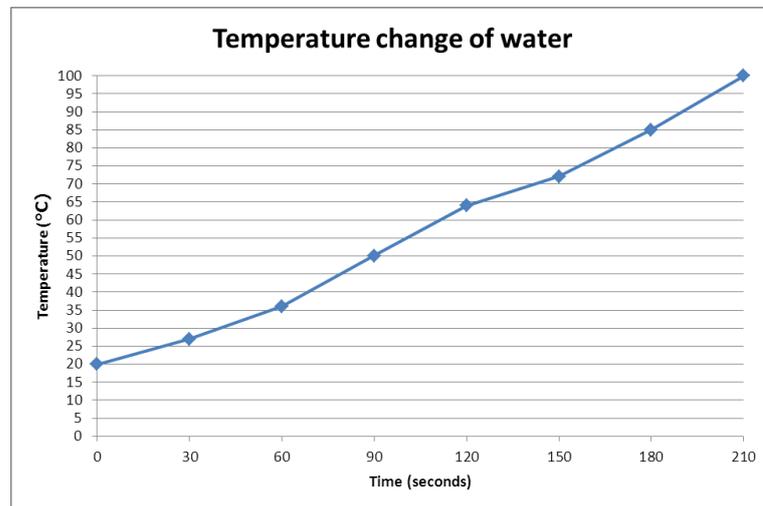
2. The fact that someone likes or dislikes a drink is not measurable.

3. The choice may be made as a result of other feelings, not related to the taste of the drink, e.g. someone who wants to lose weight will choose the Sprite Zero. (3)

- 4.a) Define the fixed variables. (2)  
 15 grams of refined sugar, added 5 g at a time, 250 ml of water, stirring
- b) Define the independent variables. (1)  
 The temperature of the water, measured in degrees Celsius.
- c) Define the dependent variables. (1)  
 The amount of sugar that will dissolve completely in either cold or hot water, measured in grams.
- d) In your opinion, which variables can cause the results to be inaccurate? (2)  
 These results can be influenced by the type of sugar that is used, as not all sugars dissolve at the same rate. The stirring of the water can have an influence, as it contributes to the dissolving rate. If you do not stir at exactly the same speed and exactly as long as with the cold water, the results can be inaccurate.

**Question 5:** Read through the following experiment and answer the questions that follow:

- 5.1 Plot a line graph using the data given in the table above. (10)



CRITERIA				
Appropriate heading	0	1	2	
Appropriate scale for Y-axis	0	1		
Appropriate scale for X-axis	0	1		
Correct and labeled Y-axis	0	1		
Correct and labeled X-axis	0	1		
Points joined with a ruler	0	1		
Correctly plotted points *	0	1	2	3

- \* All 8 points plotted correctly = 3 marks
- 4-7 points plotted correctly = 2 marks
- 1-3 points plotted correctly = 1 mark
- No points plotted correctly = 0 mark

5.2 Use the graph to determine the temperature of water after 75 seconds. (2)

40 – 45 °C

**Question 6:** Read through the following experiment and answer the questions that follow:

6.1 Provide a suitable heading for the table. (1)

Investigation of bait used to catch fish. (Any suitable heading)

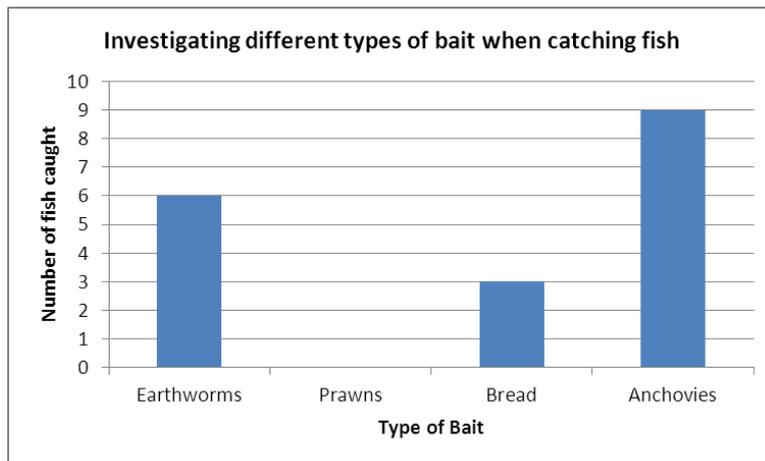
6.2 Give two controlled variables for the experiment. (2)

Same method of fishing used; fishing in same area; same fishing equipment used (any 2)

6.3 Suggest a hypothesis for the experiment. (1)

Example: I think that the use of worms as bait will be most successful as that is what fish usually feed on.

6.4 Use the information in the table above to draw a bar graph of the results: (9)



CRITERIA				
Appropriate heading	0	1		
Appropriate scale for Y-axis	0	1		
Appropriate scale for X-axis	0	1		
Correct and labeled Y-axis	0	1		
Correct and labeled X-axis	0	1		
Bars drawn neatly and correctly	0	1		
Correctly plotted points *	0	1	2	3

- \* All bars plotted correctly = 3 marks
- 1 bar plotted incorrectly = 2 marks
- 2 bars plotted incorrectly = 1 mark
- No bars plotted correctly = 0 mark

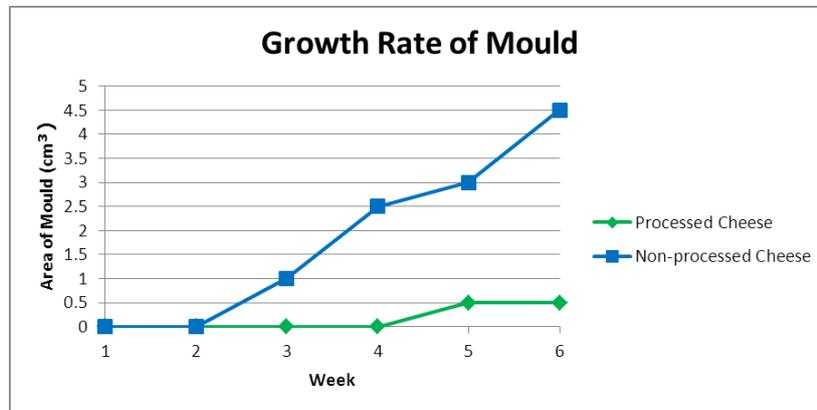
**Question 7:** Read through the following experiment and answer the questions that follow:

7.1 Write an aim for this investigation. (1)

To compare the growth rate of mould in processed and non-processed cheese.

7.2 Use the information in the table above to draw a double line graph: (10)

(Tip: Use a key to show which graph represents which cheese!)



CRITERIA				
Appropriate heading	0	1	2	
Appropriate scale for Y-axis	0	1		
Appropriate scale for X-axis	0	1		
Correct and labeled Y-axis	0	1		
Correct and labeled X-axis	0	1		
Points joined with a ruler	0	1		
Correctly plotted points *	0	1	2	3

7.3 Give a possible hypothesis for this experiment. (1)

Example: I think that the processed cheese will take longer to grow mould as it has been "treated" by man to last longer.

7.4 Give 2 variables which should be controlled in this experiment. (2)

Recordings taking at the same time and day each week; same volume of cheese used in the experiment; same conditions (temperature/moisture etc)

7.5 State the dependent variable. (1)

Measurement of the mould growth is done at the same time, on the same day each week.

7.6 State the independent variable. (1)

The different cheeses used: processed and non-processed.

7.7 Write a conclusion for this experiment. (1)

The method of processing cheese prevents it from growing mould as quickly as non-processed cheese therefore the shelf-life of processed cheese is longer than non-processed cheese.