Name: _____ Period: _____ Date: _____

Planning an Investigation Assignment - Teacher Edition

I. Fill in the Gaps

Use the words in the word bank to complete the sentences.

Word Bank:					
Variable	controlled variables	independent	dependent	testable	fair

1. A _____ is anything that affects a scientific investigation.
2. The _____ variable is deliberately changed and has a testable _____ of values.
3. The _____ variable that is the information that is collected or observed in the experiment.
4. The _____ are all other factors which must be kept the same to ensure that the investigation is _____ and unbiased.

II. Planning an Investigation

This task requires you to write a plan which investigates:

How changing the temperature of the water affects the length of time it takes for an antacid tablet to dissolve.

The equipment that you will have access to is in the equipment list below:

Equipment list:

- Beaker (250ml)
- Cold water source
- Hot water source
- Stopwatch
- Antacid tablets
- Thermometer

1. Write a hypothesis which describes how changing the temperature will affect how the antacid tablets will dissolve.

_____

_____

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2. Identify the variable which you are changing in this investigation. This is the independent variable.

   _____

3. Describe briefly how you could change the independent variable and provide a range of values that you will test.

   _____

   _____

   _____

   Range of values: _____

4. Identify the dependent variable and how you will measure it.

   _____

   _____

   _____

5. List any other variables that will affect this investigation and describe how you could control them.

   _____

   _____

   _____

6. Write a step-by-step method which describes how to carry out this investigation.

   _____

   _____

   _____

   _____

   _____

   _____

   _____

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7. What is the benefit of carrying out a trial of the experiment?

   _____

   _____

   _____

8. Draw a diagram (or a series of diagrams) which shows how you will set up and run your experiment in the space below.

9. Design a results table which you could use to record your results.

10. Describe how you could make sure that your investigation is reliable.

    _____

    _____

    _____

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Name: _____ Period: _____ Date: _____

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ANSWERS

I. Fill in the Gaps

Use the words in the word bank to complete the sentences.

Word Bank:					
Variable	controlled variables	independent	dependent	testable	fair

1. A **variable** is anything that affects a scientific investigation.
2. The **independent** variable is deliberately changed and has a testable **range** of values.
3. The **dependent** variable that is the information that is collected or observed in the experiment.
4. The **controlled variables** are all other factors which must be kept the same to ensure that the investigation is **fair** and unbiased.

II. Planning an Investigation

This task requires you to write a plan which investigates:

How changing the temperature of the water affects the length of time it takes for an antacid tablet to dissolve.

The equipment that you will have access to is in the equipment list below:

Equipment list:

- Beaker (250ml)
- Cold water source
- Hot water source
- Ice cubes
- Stopwatch
- Antacid tablets
- Thermometer

1. Write a hypothesis which describes how changing the temperature will affect how the antacid tablets will dissolve.

   As the temperature of the water increases, the length of time it takes for an antacid tablet to dissolve decreases. OR The antacid will take less time to dissolve in hotter water.

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2. Identify the variable which you are changing in this investigation. This is the independent variable.

   Water temperature

3. Describe briefly how you could change the independent variable and provide a range of values that you will test.

   Combine hot and cold water to get different temperatures of water.

   Range of values: **Any sensible range of 3-5 values e.g., 10°C, 20°C, 30°C, 40°C, 50°C**

4. Identify the dependent variable and how you will measure it.

   The time taken for the antacid tablet to dissolve in water.

   Time the reaction from when the tablet enters the water until fizzing has stopped/the tablet disappears.

5. List any other variables that will affect this investigation and describe how you could control them.
   - **At least three other variables controlled.**
   - **Same start/end point – start stopwatch as soon as tablet enters the water and stop it as soon as it has completely dissolved/ fizzing stops.**
   - **Size/shape of the tablet – use the same brand/check tablets for chips damage etc.**
   - **Amount/volume of water used - always fill the beaker to the same level**
   - **Stirring – once tablet is added leave the reaction undisturbed – no stirring/swirling etc.**
   - **Clean and dry beaker between tests.**
6. Write a step-by-step method which describes how to carry out this investigation.
   i. **Combine ice and cold water in a beaker to reach 150mL volume. Measure temperature and adjust the amount of ice/water to achieve 10°C temperature. Check temperature with a thermometer. Ensure that the overall volume in the beaker remains at 150mL.**
   ii. **Add one antacid tablet and immediately start the stopwatch. Wait until the tablet completely dissolves and then stop the stopwatch. Record the result in the table.**
   iii. **Rinse out the beaker and dry it.**

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iv. **Repeat experiment for 10°C temperature twice more to obtain three results in total.**

v. **Adjust the temperature to each of the other temperatures (20 - 50°C by combining hot and cold water together. Ensure that the total water level remains at 150mL. Repeat the experiment three times for each temperature and record results.**

7. What is the benefit of carrying out a trial of the experiment?

Repeated trials allow you to identify any problems in the experiment and find a solution for them. They also allow you to check that the testable range for the independent variable will show a trend or pattern.

8. Draw a diagram (or a series of diagrams) which shows how you will set up and run your experiment in the space below.

9. Design a results table which you could use to record your results.

Temperature (°C)	**Time taken to dissolve (s)**			
	Test 1	*Test 2*	*Test 3*	*Average*
10				
20				
30				
40				
50				

10. Describe how you could make sure that your investigation is reliable.

Repeat each value for the independent variable three times and obtain average results.

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