Name: _____ Period: _____ Date: _____

Designing an Experiment Assignment – Teacher Edition

I. Multiple Choice

Each sentence below describes a step in a scientific investigation. Match each sentence with a step of the scientific method listed below. Write the **letter** of the correct answer on the blank.

A. Identifying a problem
B. Formulating a hypothesis
C. Testing the hypothesis with an experiment
D. Collecting data and results

_____ 1. Stephen predicted that seeds would start to grow faster if an electric current traveled through the soil in which they were planted.

_____ 2. Jonathan's data showed that household cockroaches moved away from raw cucumber slices.

_____ 3. Rene grew bacteria from the mouth on special plates in the laboratory. She placed drops of different mouthwashes on bacteria on each plate.

_____ 4. Kathy used a survey to determine how many of her classmates were left-handed and how many were right-handed.

_____ 5. Jose saw bats catching insects after dark. He asked, "How do bats find the insects in the dark?"

_____ 6. Alice soaked six different kinds of seeds in water for 24 hours. Then she planted the seeds in soil at a depth of I cm. She used the same amount of water, light, and heat for each kind of seed.

_____ 7. Kevin said, "If I grow five seedlings in red light, I think the plants will grow faster than the five plants grown in white light."

_____ 8. Justin wondered if dyes could be taken out of plant leaves, flowers, and stems.

_____ 9. Angela's experiment shows that earthworms move away from light.

_____ 10. Bob read about growing plants in water. He wanted to know how plants could grow without soil.

Copyright © iTeachly.com

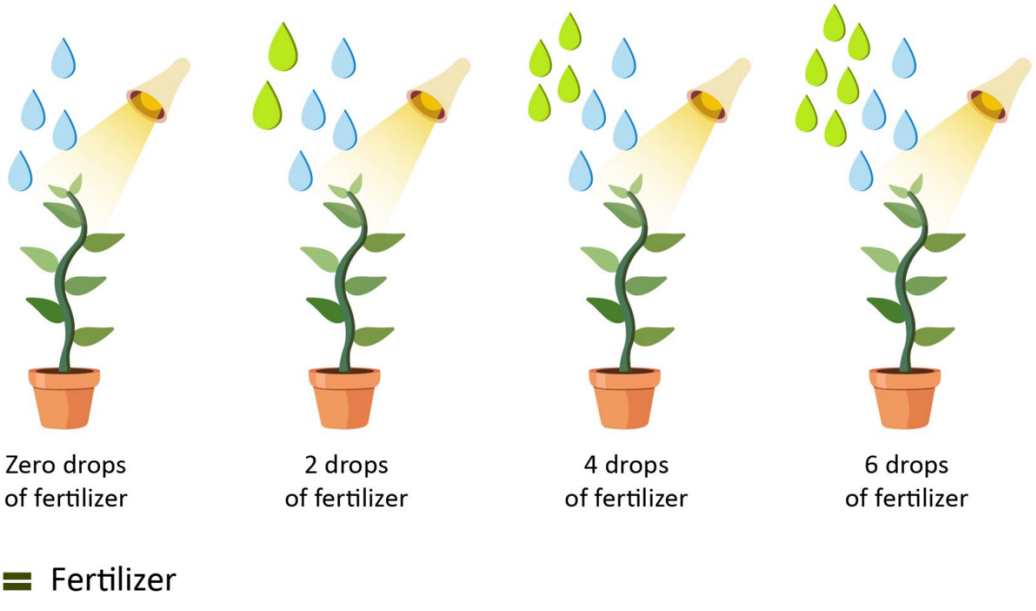
iTeachly

Name: _____ Period: _____ Date: _____

Designing an Experiment Assignment – Teacher Edition

II. Identification

Analyze the given diagram of an experimental set up. Then, identify the three main variables in this experiment.



Independent Variable	Dependent Variable	Controlled Variables
(1)	(2)	(3)
		(4)
		(5)

Which is the control group in the experiment?

_____

Which is the experimental group?

_____

Copyright © iTeachly.com

iTeachly

Name: _____ Period: _____ Date: _____

Designing an Experiment Assignment – Teacher Edition

III. Planning an Investigation

Apply what you have learned about the scientific method by writing down a plan of investigation based on the given problem below.

How does the temperature of water affect the rate of spreading of food coloring?

1. What hypothesis can you formulate based on the given problem? **Use the If and then format in formulating your hypothesis.**

_____

_____

_____

Below is the list of equipment that you have access to in doing this investigation:

Equipment List

- ✓ beaker (250 mL)
- ✓ cold water source
- ✓ hot water source
- ✓ food coloring
- ✓ pipette
- ✓ stopwatch

2. Based on the list of material, can you tell which variable are you changing in this experiment? What kind of variable is this?

_____

_____

_____

Copyright © iTeachly.com

iTeachly

Name: _____ Period: _____ Date: _____

Designing an Experiment Assignment – Teacher Edition

3. Which variable will result from the change you made in this experiment? What kind of variable is this?

_____

_____

_____

4. How will you measure the dependent variable in this experiment?

_____

_____

_____

5. Which factors should you kept **constant** as you test your hypothesis? How will you control each variable?

_____

_____

_____

_____

_____

_____

_____

_____

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

_____

_____

_____

_____

_____

_____

_____

Copyright © iTeachly.com

iTeachly

Name: _____ Period: _____ Date: _____

Designing an Experiment Assignment – Teacher Edition

_____

_____

_____

_____

_____

_____

_____

7. Explain the importance of carrying out a trial of the experiment.

_____

_____

_____

_____

_____

8. On the space below, draw a diagram or a flowchart to show how you will set up and run your experiment.

Copyright © iTeachly.com

iTeachly

Name: _____ Period: _____ Date: _____

Designing an Experiment Assignment – Teacher Edition

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.

_____

_____

_____

_____

_____

Copyright © iTeachly.com

iTeachly

Name: _____ Period: _____ Date: _____

Designing an Experiment Assignment – Teacher Edition

I. Multiple Choice

Each sentence below describes a step in a scientific investigation. Match each sentence with a step of the scientific method listed below. Write the **letter** of the correct answer on the blank.

A. Identifying a problem
B. Formulating a hypothesis
C. Testing the hypothesis with an experiment
D. Collecting data and results

B 1. Stephen predicted that seeds would start to grow faster if an electric current traveled through the soil in which they were planted.

D 2. Jonathan's data showed that household cockroaches moved away from raw cucumber slices.

C 3. Rene grew bacteria from the mouth on special plates in the laboratory. She placed drops of different mouthwashes on bacteria on each plate.

C 4. Kathy used a survey to determine how many of her classmates were left-handed and how many were right-handed.

A 5. Jose saw bats catching insects after dark. He asked, "How do bats find the insects in the dark?"

C 6. Alice soaked six different kinds of seeds in water for 24 hours. Then she planted the seeds in soil at a depth of I cm. She used the same amount of water, light, and heat for each kind of seed.

B 7. Kevin said, "If I grow five seedlings in red light, I think the plants will grow faster than the five plants grown in white light."

A 8. Justin wondered if dyes could be taken out of plant leaves, flowers, and stems.

D 9. Angela's experiment shows that earthworms move away from light.

A 10. Bob read about growing plants in water. He wanted to know how plants could grow without soil.

Copyright © iTeachly.com

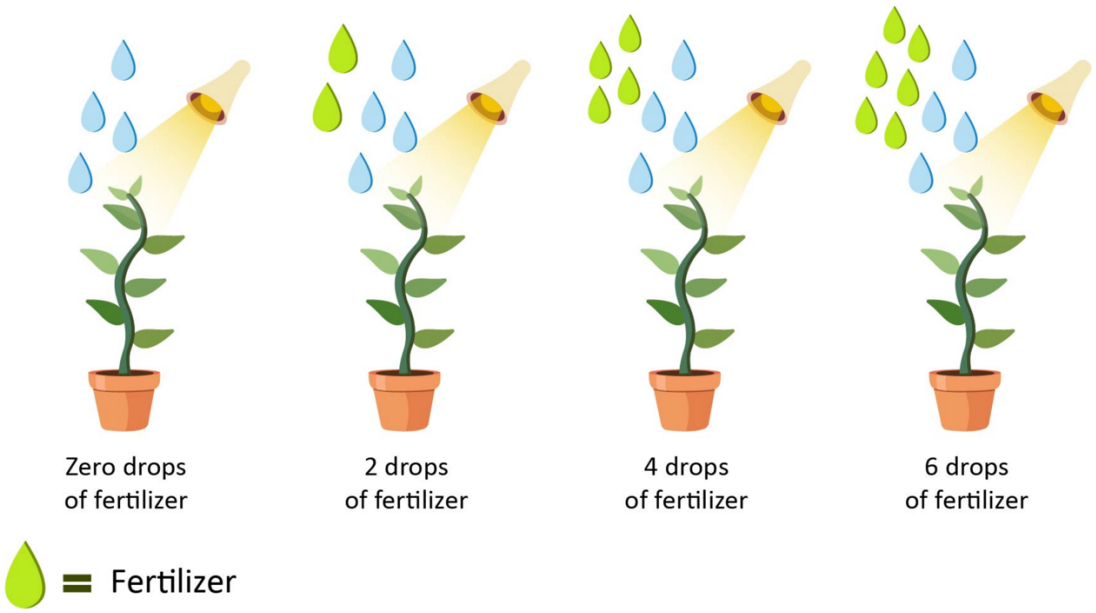
iTeachly

Name: _____ Period: _____ Date: _____

Designing an Experiment Assignment – Teacher Edition

II. Identification

Analyze the given diagram of an experimental set up. Then, identify the three main variables in this experiment.



Independent Variable	Dependent Variable	Controlled Variables
(1) amount of fertilizer	(2) height / growth of plant	(3) amount of water
		(4) amount of sunlight
		(5) kind of plant

Which is the control group in the experiment?

The control group is the plant that did not receive any amount of fertilizer.

Which is the experimental group?

The experimental group consists of the plants that receive varying amounts of fertilizers.

Copyright © iTeachly.com

Name: _____ Period: _____ Date: _____

Designing an Experiment Assignment – Teacher Edition

III. Planning an Investigation

Apply what you have learned about the scientific method by writing down a plan of investigation based on the given problem below.

How does the temperature of water affect the rate of spreading of food coloring?

1. What hypothesis can you formulate based on the given problem? **Use the If and then format in formulating your hypothesis.**

   If the temperature of water is higher/hotter, the rate of spreading of food coloring is faster.

   If the temperature of water is lower/cooler, the rate of spreading of food coloring is slower.

Below is the list of equipment that you have access to in doing this investigation:

Equipment List

- ✓ beaker (250 mL)
- ✓ cold water source
- ✓ hot water source
- ✓ food coloring
- ✓ pipette
- ✓ stopwatch

2. Based on the list of material, can you tell which variable are you changing in this experiment? What kind of variable is this?

   The variable that will be changed in this experiment is the temperature of water. This is known as the independent variable.

Copyright © iTeachly.com

iTeachly

Name: _____ Period: _____ Date: _____

Designing an Experiment Assignment – Teacher Edition

3. Which variable will result from the change you made in this experiment? What kind of variable is this?

   The variable that will result from the change made in this experiment is the rate of spreading of food coloring in water. This is known as the dependent variable.

4. How will you measure the dependent variable in this experiment?

   The rate of spreading of food coloring can be measured using a stopwatch.

5. Which factors should you kept **constant** as you test your hypothesis? How will you control each variable?

   Some factors that must be kept constant in this experiment are the amount of food coloring, amount of water, and the time the food coloring drops in each beaker with water. By using appropriate equipment such as pipette and beaker, the amount of water and food coloring may be controlled. To control the time that the food coloring drops in each beaker with water, the food coloring must be dropped at the same time.

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

   a. Get two beakers. Measure 250 mL of hot water and cold water in each beaker.
   b. Label beakers as hot water and cold water.
   c. Using a pipette, put 3 drops of food coloring in each beaker. Make sure to drop the food coloring in each beaker of water at the same time.
   d. Start the timer once the drops of food coloring reached the water. Record the time it takes for the food coloring to completely spread out in water.
   e. Repeat this trial thrice to get an accurate results.

7. Explain the importance 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.

Copyright © iTeachly.com

iTeachly

Name: _____ Period: _____ Date: _____

Designing an Experiment Assignment – Teacher Edition

8. On the space below, draw a diagram or a flowchart to show how you will set up and run your experiment.

   Answers here may vary

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

Temperature of Water	**Rate of Spreading of Food Coloring**			
	Trial 1	Trial 2	Trial 3	Average
Cold				
Hot				

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

    Do several trials of the experiment. Make sure to have only one independent variable and control the rest of the factors that may affect the experiment.

Copyright © iTeachly.com

iTeachly