**BIO 9: Hypothesis/Variable – Unit 1 Practice #2 Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Block:\_\_\_\_\_\_\_\_\_**

**Directions: Complete the following for each question: independent variable, dependent variable, controls, control group, experimental group, and hypothesis. In your hypothesis, you must underline the Independent Variable ONCE and underline the Dependent Variable TWICE. You must also CIRCLE the words IF, THEN, and BECAUSE. You must write out your answers to the questions on a piece of notebook paper and staple it to this sheet.**

**VARIABLES**

**Independent Variable**: What YOU CHANGE/CONTROL (UNITS)

**Dependent Variable**: What you MEASURE/result of IV (UNITS)

**Controls**: What stays the same between all experimental groups

**Control Group:** The group that receives only the control variables, nothing is added/changed with this group

**Experimental Group:** (Can have more than one) The group receiving the IV

**HYPOTHESIS FORMAT**

**IF** …(what will be changed/compared – I.V.)

**THEN**… (what will happen, the results of your measurement, your observation – D.V.)

**BECAUSE**… (why this will happen – based on your background knowledge, experiences, inferences, etc.)

**Example:** A social psychologist thinks that people are more likely to conform to a large crowd than to just a single person.  To test this hypothesis, the social psychologist had either one person or five persons stand in a busy area of the mall and look up.  The psychologist stood nearby and counted the number of people passing by who also looked up.

Independent variable: Size of group (5 people or 1 person)

Dependent variable: Conformity measured by the number of people who also look up

Controls: People looking up

Control Group: Single person

Experimental group: Group of 5 people

Hypothesis: If one person stands alone and looks up and a group of five people stand together and look up, then more people will look up when they pass the group of five because people are more likely to conform to a larger crowd in order to fit in, rather than with one person.

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1. Students that get more sleep have better grades.
2. The heartbeat of a goldfish is different in various water temperatures.
3. The cooler the temperature in a lake, the more oxygen the water holds. Daniel notices that he catches more fish in a lake that is cooler than 55 degrees.
4. Kasey thinks that she can bike further when she drinks more than a liter of water before her bike ride.
5. Ethan likes to work with his friend Joe in science class labs. However, he notices that he tends to get lower grades when he does work with Joe, because he and Joe like to talk about basketball and not science. He’s decided to investigate if his science lab grades are higher when he works with Joe or if they’re higher when he works with someone else.
6. Ms. Knetter has noticed that there is a wide range of grades that students get on tests, even though they are all in the same class. She wonders whether students, who study for 20 minutes every night, get higher scores on tests then students who study just the night before.
7. There is some evidence to suggest that certain herbs can have an effect on human memory. A researcher plans to use a standardized memory test to evaluate the effect of the herbs.
8. A researcher is evaluating the effectiveness of a new physical education program for elementary school children. The program is designed to reduce competition.
9. Managers have known that giving constructive criticism to a group of employees will affect their job performance. Further studies found that when the constructive criticism is positive, the employees’ job performance increased.
10. Salt in soil may affect plant growth.
11. Plant growth may be affected by the color of the light.
12. Bacterial growth may be affected by temperature.
13. Temperature may cause leaves to change color.
14. How does the type of shoe I wear (high-heels, tennis shoes, flip flops) affect how high I can jump, versus no shoes?
15. How does the amount of water you give to a plant each day (no water, 1 spoonful, 1 cup) affect how tall the plant will grow after 3 weeks?
16. Does heating a cup of water allow it to dissolve more sugar?
17. Does T.V. time seem to affect the reading scores of fourth graders?
18. Hypothesis Bob predicted that giving detentions for missing homework would lower the amount of homework missed in his class. He recorded the number of missed homework for 30 days, and then the school agreed to assign detentions for each missed homework assignment.
19. To test a new voice feature in a cockpit design a flight simulator was used.  The simulator was programmed to give visual readings of flight information, or to give visual and auditory (voice) readings of flight information.  All test pilots were put through a simulated emergency landing procedure, but were randomly assigned to the visual, or visual and auditory conditions.  Flight experts rated each pilot’s performance in the simulator on a scale of 1 (very poor) to 10 (excellent).
20. Dr. Smith wants to examine whether a new drug increases the maze running performance of older rats. Just like aging humans, older rats show signs of poorer memory for new things. Dr. Smith teaches two groups of older rats to find a piece of tasty rat chow in the maze. One group of rats is given the new drug while they are learning the maze. The second group is not given the drug.

Answer Key:

1. Students that get more sleep have better grades.

|  |  |
| --- | --- |
| **IV** | Amount of sleep (hours) |
| **DV** | Grade (A-F) |
| **Controls** | Students, All students get sleep, Take same test for grade |
| **Control Group** | Students that get # hours of sleep |
| **Experimental Group** | Students that get more than # hours of sleep |
| **Hypothesis** | If (IV), then (DV) because |

1. The heartbeat of a goldfish is different in various water temperatures.

|  |  |
| --- | --- |
| **IV** | Water temperature (degrees) |
| **DV** | Heartbeat (BPM) |
| **Controls** | Goldfish, same container, same amount of water |
| **Control Group** | Pick one baseline temperature (ex. Room temperature) |
| **Experimental Group** | Goldfish at temperatures other than the control |
| **Hypothesis** | If (IV), then (DV) because |

1. The cooler the temperature in a lake, the more oxygen the water holds. Daniel notices that he catches more fish in a lake that is cooler than 55 degrees.

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| --- | --- |
| **IV** | Temperature of lake (degrees) |
| **DV** | Amount of fish caught (number) |
| **Controls** | Same lake, same type of fish |
| **Control Group** | Lake at 55 degrees |
| **Experimental Group** | Temperatures lower than 55 degrees |
| **Hypothesis** | If (IV), then (DV) because |

1. Kasey thinks that she can bike further when she drinks more than a liter of water before her bike ride.

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| --- | --- |
| **IV** | Amount of water consumed (L) |
| **DV** | Length of bike ride (min) |
| **Controls** | Same test subject, same bike |
| **Control Group** | Not drinking more than a liter before biking |
| **Experimental Group** | Drinking a liter of water before biking |
| **Hypothesis** | If (IV), then (DV) because |

1. Ethan always works with his friend Joe in science class. However, he notices that he tends to get lower grades when he does work with Joe, because he and Joe like to talk about basketball and not science. He’s decided to investigate if his science lab grades are higher when he works with Joe or if they’re higher when he works with someone else.

|  |  |
| --- | --- |
| **IV** | Working with Joe (yes/no) |
| **DV** | Science Grade (scale) |
| **Controls** | Same class, same test student |
| **Control Group** | Working with Joe |
| **Experimental Group** | Working with someone else |
| **Hypothesis** | If (IV), then (DV) because |

1. Ms. Knetter has noticed that there is a wide range of grades that students get on tests, even though they are all in the same class. She wonders whether students, who study for 20 minutes every night, get higher scores on tests then students who study just the night before.

|  |  |
| --- | --- |
| **IV** | Study time (min) |
| **DV** | Grade on test (scale) |
| **Controls** | Same test, same class |
| **Control Group** | Students who didn’t study 20 min per night |
| **Experimental Group** | Students who study 20 min per night |
| **Hypothesis** | If (IV), then (DV) because |

1. There is some evidence to suggest that certain herbs can have an effect on human memory. A researcher plans to use a standardized memory test to evaluate the effect of the herbs.

|  |  |
| --- | --- |
| **IV** | Herb (yes/no) |
| **DV** | Standardized Memory Test (score) |
| **Controls** | Same memory test |
| **Control Group** | Without Herb |
| **Experimental Group** | With Herb |
| **Hypothesis** | If (IV), then (DV) because |

1. A researcher is evaluating the effectiveness of a new physical education program for elementary school children. The program is designed to reduce competition.

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| --- | --- |
| **IV** | Phy Ed Program (new/old) |
| **DV** | Amount of competition |
| **Controls** | Same Phy Ed grade/subject/sports |
| **Control Group** | Old Phy Ed program |
| **Experimental Group** | New Phy Ed program |
| **Hypothesis** | If (IV), then (DV) because |

1. Managers have known that giving constructive criticism to a group of employees will affect their job performance. Further studies found that when the constructive criticism is given, the employees’ job performance increased.

|  |  |
| --- | --- |
| **IV** | Constructive criticism |
| **DV** | Job performance (scale) |
| **Controls** | Same manager, same place of employment |
| **Control Group** | No constructive criticism |
| **Experimental Group** | Constructive criticism |
| **Hypothesis** | If (IV), then (DV) because |

1. Salt in soil may affect plant growth.

|  |  |
| --- | --- |
| **IV** | Salt in soil |
| **DV** | Height of plant (cm) |
| **Controls** | Same dirt, same type of plant |
| **Control Group** | No salt |
| **Experimental Group** | Salt added |
| **Hypothesis** | If (IV), then (DV) because |

1. Plant growth may be affected by the color of the light.

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| --- | --- |
| **IV** | Color of light |
| **DV** | Plant growth (cm) |
| **Controls** | White light, same soil, watering, and type of plant |
| **Control Group** | White light |
| **Experimental Group** | Different colored light |
| **Hypothesis** | If (IV), then (DV) because |

1. Bacterial growth may be affected by temperature.

|  |  |
| --- | --- |
| **IV** | Temperature (degrees) |
| **DV** | Growth of bacteria |
| **Controls** | Same culture dish and type of bacteria |
| **Control Group** | Room temp. or other baseline temp. |
| **Experimental Group** | Temp. other than the control group |
| **Hypothesis** | If (IV), then (DV) because |

1. Temperature may cause leaves to change color.

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| --- | --- |
| **IV** | Temperature |
| **DV** | Color change in leaves |
| **Controls** | Same type of leaves |
| **Control Group** | Room temp. or other baseline |
| **Experimental Group** | Temp. other than control temp. |
| **Hypothesis** | If (IV), then (DV) because |

1. How does the type of shoe I wear (high-heels, tennis shoes, flip flops) affect how high I can jump, versus no shoes?

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| --- | --- |
| **IV** | Type of shoe |
| **DV** | Height of jump (cm) |
| **Controls** | Same test subject, same type of jumping |
| **Control Group** | No shoes |
| **Experimental Group** | Each type of shoe |
| **Hypothesis** | If (IV), then (DV) because |

1. How does the amount of water you give to a plant each day (no water, 1 spoonful, 1 cup) affect how tall the plant will grow after 3 weeks?

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| --- | --- |
| **IV** | Amount of water |
| **DV** | Height of plant (cm) |
| **Controls** | Same water source, dirt type, location of plant, type of plant |
| **Control Group** | No water |
| **Experimental Group** | Water in different amounts |
| **Hypothesis** | If (IV), then (DV) because |

1. Does heating a cup of water allow it to dissolve more sugar?

|  |  |
| --- | --- |
| **IV** | Temp of water |
| **DV** | How much sugar it can dissolve |
| **Controls** | Same sugar, water source, cup size, water amount |
| **Control Group** | Room temp water |
| **Experimental Group** | Water at higher temperatures |
| **Hypothesis** | If (IV), then (DV) because |

1. Does T.V. time seem to affect the reading scores of fourth graders?

|  |  |
| --- | --- |
| **IV** | Amount of T.V. watched (hours) |
| **DV** | Reading score (scale) |
| **Controls** | Same reading test, same teacher/class |
| **Control Group** | No T.V. |
| **Experimental Group** | Watched T.V. |
| **Hypothesis** | If (IV), then (DV) because |

1. Hypothesis Bob predicted that giving detentions for missing homework would lower the amount of homework missed in his class. He recorded the number of missed homework for 30 days, and then the school agreed to assign detentions for each missed homework assignment.

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| --- | --- |
| **IV** | Giving detentions |
| **DV** | Number of missed homework assignments |
| **Controls** | Same teacher, assignment, school, etc. |
| **Control Group** | No detentions given |
| **Experimental Group** | Detentions given |
| **Hypothesis** | If (IV), then (DV) because |

1. To test a new voice feature in a cockpit design a flight simulator was used.  The simulator was programmed to give visual readings of flight information, or to give visual and auditory (voice) readings of flight information.  All test pilots were put through a simulated emergency landing procedure, but were randomly assigned to the visual, or visual and auditory conditions.  Flight experts rated each pilot’s performance in the simulator on a scale of 1 (very poor) to 10 (excellent).

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| --- | --- |
| **IV** | Auditory (voice) readings are present or not (yes/no) |
| **DV** | Rating of pilots’ performance (1-10) |
| **Controls** | Visual readings, test pilots |
| **Control Group** | Pilots with visual reading only |
| **Experimental Group** | Pilots with visual and auditory readings |
| **Hypothesis** | If (IV), then (DV) because |

1. Dr. Smith wants to examine whether a new drug increases the maze running performance of older rats. Just like aging humans, older rats show signs of poorer memory for new things. Dr. Smith teaches two groups of older rats to find a piece of tasty rat chow in the maze. One group of rats is given the new drug while they are learning the maze. The second group is not given the drug.

|  |  |
| --- | --- |
| **IV** | Drug given |
| **DV** | Number that found food or not |
| **Controls** | Same maze and food |
| **Control Group** | No drug |
| **Experimental Group** | Drug given |
| **Hypothesis** | If (IV), then (DV) because |