**Identifying Variables**

* A scientific investigation has 3 kinds of variables:
  + **Independent variable** – what you **change** **on purpose** in the experiment.
  + **Dependent variable** – what you **measure** **or observe** in the experiment.
  + **Controlled variables** – all the things you **keep the** **same**.

In the following scenarios, identify the independent variable, the dependent variable, and controlled variables.

1. **How does the amount of soap affect the number of bubbles in the water?**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| A picture containing close  Description automatically generatedA picture containing text, glass  Description automatically generated | | A picture containing close  Description automatically generatedA picture containing text, glass  Description automatically generated | | A picture containing text, glass  Description automatically generated |
| 2 drops of soap | 4 drops of soap | | 6 drops of soap | |
| **Independent Variable** | | **Dependent Variable** | | **Controlled Variables** |
|  | |  | |  |

1. **How does the colour of a candy affect how quickly it dissolves in water?**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A picture containing food, sweet  Description automatically generated A picture containing glass, container  Description automatically generated | | A close-up of a candy bar  Description automatically generated with low confidence A picture containing glass, container  Description automatically generated | | A picture containing text  Description automatically generated A picture containing glass, container  Description automatically generated | |
| Pink candy | | Blue candy | | Green candy | |
| **Independent Variable** | **Dependent Variable** | | **Controlled Variables** | |
|  |  | |  | |

1. **How does the type of fertillizer affect how quickly a plant grows?**

|  |  |  |
| --- | --- | --- |
| A picture containing background pattern  Description automatically generated Diagram  Description automatically generatedA plant growing out of a cupcake  Description automatically generated with low confidence | A picture containing background pattern  Description automatically generatedDiagram  Description automatically generatedA picture containing clipart, plant  Description automatically generated | A picture containing background pattern  Description automatically generated A plant growing out of a cup  Description automatically generated with low confidence |
| fertillizer: Safco | fertillizer: Agrium | fertillizer: Miracle-Gro |
| **Independent Variable** | **Dependent Variable** | **Controlled Variables** |
|  |  |  |

1. **How does the type of food affect the weight of a dog?**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A picture containing clipart  Description automatically generated | |  | | A picture containing clipart  Description automatically generated | |
| Food: Iams | | Food: Purina | | Food: Natural Choice | |
| **Independent Variable** | **Dependent Variable** | | **Controlled Variables** | |
|  |  | |  | |

1. **How does the amount of sugar affect the taste of coffee?**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | |  | |  | |
| 1 teaspoon of sugar | | 2 teaspoons of sugar | | 3 teaspoons of sugar | |
| **Independent Variable** | **Dependent Variable** | | **Controlled Variables** | |
|  |  | |  | |

1. **How does the temperature of water affect how quickly an egg boils?**

|  |  |  |
| --- | --- | --- |
| A close-up of a stethoscope and a stethoscope  Description automatically generated with medium confidence | A close-up of a stethoscope and a stethoscope  Description automatically generated with medium confidence | A close-up of a stethoscope and a stethoscope  Description automatically generated with medium confidence |
| temperature of water = 75OC | temperature of water = 100OC | temperature of water = 150OC |
| **Independent Variable** | **Dependent Variable** | **Controlled Variables** |
|  |  |  |

1. **How does the angle a ball is thrown affect how far the ball will go?**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | |  | |
| angle of 100O | angle of 130O | | angle of 150O | |
| **Independent Variable** | | **Dependent Variable** | | **Controlled Variables** |
|  | |  | |  |

1. **How does the amount of water affect how many lemons grow on a tree?**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A picture containing text, container, glass  Description automatically generatedMap  Description automatically generated with medium confidence | A picture containing text, container, glass  Description automatically generatedA picture containing text, container, glass  Description automatically generatedMap  Description automatically generated with medium confidence | | A picture containing text, container, glass  Description automatically generatedA picture containing text, container, glass  Description automatically generatedA picture containing text, container, glass  Description automatically generatedMap  Description automatically generated with medium confidence | | |
| **Independent Variable** | | **Dependent Variable** | | **Controlled Variables** |
|  | |  | |  |

1. **How does the temperature in a classroom affect students’ concentration?**

|  |  |  |
| --- | --- | --- |
| A picture containing text, clipart  Description automatically generated | A picture containing text, linedrawing  Description automatically generated | A picture containing text  Description automatically generated |
| temperature = hot | temperature = average | temperature = cold |
| **Independent Variable** | **Dependent Variable** | **Controlled Variables** |
|  |  |  |

1. **How does the number of insects in an area affect how many bats there are?**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| A bat with wings  Description automatically generated with medium confidence | A picture containing mammal  Description automatically generated | | |  |
| no insects | a few insects | | | a lot of insects |
| **Independent Variable** | | **Dependent Variable** | **Controlled Variables** | |
|  | |  |  | |

1. **How does the amount of rain affect how many flowers grow?**

|  |  |  |
| --- | --- | --- |
| Flower in the Rain Clip Art - Flower in the Rain Image | Flower in the Rain Clip Art - Flower in the Rain Image | Flower in the Rain Clip Art - Flower in the Rain Image |
| no rain | some rain | a lot of rain |
| **Independent Variable** | **Dependent Variable** | **Controlled Variables** |
|  |  |  |

1. **How does the height you drop a ball from affect how high it will bounce?**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Shape, circle  Description automatically generated | | Shape, circle  Description automatically generated | | Shape, circle  Description automatically generated | |
| drop from 1 meter | | drop from 2 meters | | drop from 3 meters | |
| **Independent Variable** | **Dependent Variable** | | **Controlled Variables** | |
|  |  | |  | |

**Answers**

1. **How does the amount of soap affect the number of bubbles in the water?**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| A picture containing close  Description automatically generated | | A picture containing close  Description automatically generated | |  |
| 2 drops of soap | 4 drops of soap | | 6 drops of soap | |
| **Independent Variable** | | **Dependent Variable** | | **Controlled Variables** |
| # of drops of soap | | # of bubbles in the water | | same type of water  same quantity of water  same temperature  same type of soap  etc. |

1. **How does the colour of a candy affect how quickly it dissolves in water?**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A picture containing food, sweet  Description automatically generated A picture containing glass, container  Description automatically generated | | A close-up of a candy bar  Description automatically generated with low confidence A picture containing glass, container  Description automatically generated | | A picture containing glass, container  Description automatically generated | |
| Pink candy | | Blue candy | | Green candy | |
| **Independent Variable** | **Dependent Variable** | | **Controlled Variables** | |
| colour of the candy | time it takes to dissolve | | same type of water  same quantity of water  same temperature  same type of candy  etc. | |

1. **How does the type of fertillizer affect the height a plant grows?**

|  |  |  |
| --- | --- | --- |
| A picture containing background pattern  Description automatically generated A plant growing out of a cupcake  Description automatically generated with low confidence | A picture containing background pattern  Description automatically generatedDiagram  Description automatically generatedA picture containing clipart, plant  Description automatically generated | A picture containing background pattern  Description automatically generated Diagram  Description automatically generated |
| fertillizer: Safco | fertillizer: Agrium | fertillizer: Miracle-Gro |
| **Independent Variable** | **Dependent Variable** | **Controlled Variables** |
| type of fertilizer | height of the plant | same quantity of sun  same quantity of water  same quantity of fertilizer  same type of soil  etc. |

1. **How does the type of food affect the weight of a dog?**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A picture containing clipart  Description automatically generatedDiagram  Description automatically generated | | A picture containing clipart  Description automatically generatedDiagram  Description automatically generated | | A picture containing clipart  Description automatically generatedDiagram  Description automatically generated | |
| Food: Iams | | Food: Purina | | Food: Natural Choice | |
| **Independent Variable** | **Dependent Variable** | | **Controlled Variables** | |
| type of food | weight of the dog | | same dog  same quantity of food  eats at the same time  same type and quantity of exercise  etc. | |

1. **How does the amount of sugar affect the taste of coffee?**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A cup of coffee with a spoon  Description automatically generated with low confidence | | A cup of coffee with a spoon  Description automatically generated with low confidence | | A cup of coffee with a spoon  Description automatically generated with low confidence | |
| 1 teaspoon of sugar | | 2 teaspoons of sugar | | 3 teaspoons of sugar | |
| **Independent Variable** | **Dependent Variable** | | **Controlled Variables** | |
| quantity of sugar | taste of the coffee | | same type of coffee  same type of sugar  same quantity of coffee  etc. | |

1. **How does the temperature of water affect how quickly an egg boils?**

|  |  |  |
| --- | --- | --- |
| A close-up of a stethoscope and a stethoscope  Description automatically generated with medium confidence | A close-up of a stethoscope and a stethoscope  Description automatically generated with medium confidence | A close-up of a stethoscope and a stethoscope  Description automatically generated with medium confidence |
| temperature of water = 75OC | temperature of water = 100OC | temperature of water = 150OC |
| **Independent Variable** | **Dependent Variable** | **Controlled Variables** |
| temperature of water | time it takes for the egg to boil | same type of egg  same pot  same type of water  same quantity of water  etc. |

1. **How does the angle a ball is thrown affect how far the ball will go?**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | |  | |
| angle of 100O | angle of 130O | | angle of 150O | |
| **Independent Variable** | | **Dependent Variable** | | **Controlled Variables** |
| angle of the throw | | distance of the ball | | same thrower  same ball  same hand to throw with  etc. |

1. **How does the amount of water affect how many lemons grow on a tree?**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Map  Description automatically generated with medium confidence | Map  Description automatically generated with medium confidence | | Map  Description automatically generated with medium confidence | | |
| **Independent Variable** | | **Dependent Variable** | | **Controlled Variables** |
| quantity of water | | number of lemons that grow | | same quantity of sunlight  same type of tree  same soil  etc. |

1. **How does the temperature in a classroom affect students’ concentration?**

|  |  |  |
| --- | --- | --- |
| A picture containing text, clipart  Description automatically generated | A picture containing text, linedrawing  Description automatically generated | A picture containing text  Description automatically generated |
| temperature = hot | temperature = average | temperature = cold |
| **Independent Variable** | **Dependent Variable** | **Controlled Variables** |
| temperature of the room | concentration of students | same room  same students  same activity  etc. |

1. **How does the number of insects in an area affect how many bats there are?**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| A bat with wings  Description automatically generated with medium confidence | A picture containing mammal  Description automatically generated | | |  |
| no insects | a few insects | | | a lot of insects |
| **Independent Variable** | | **Dependent Variable** | **Controlled Variables** | |
| # of insects | | # of bats | same place  same type of insects  same time of day  etc. | |

1. **How does the amount of rain affect how many flowers grow?**

|  |  |  |
| --- | --- | --- |
| Flower in the Rain Clip Art - Flower in the Rain Image | Flower in the Rain Clip Art - Flower in the Rain Image | Flower in the Rain Clip Art - Flower in the Rain Image |
| no rain | some rain | a lot of rain |
| **Independent Variable** | **Dependent Variable** | **Controlled Variables** |
| quantity of rain | # of flowers | same type of flowers  same place  same soil  etc. |

1. **How does the height you drop a ball from affect how high it will bounce?**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Shape, circle  Description automatically generated | | Shape, circle  Description automatically generated | | Shape, circle  Description automatically generated | |
| drop from 1 meter | | drop from 2 meters | | drop from 3 meters | |
| **Independent Variable** | **Dependent Variable** | | **Controlled Variables** | |
| height of the drop | height of the bounce | | same ball  same amount of air in the ball  same surface  etc. | |