**Part 3: Compare and contrast**

Newton’s Laws of Motion

|  |  |  |
| --- | --- | --- |
| Explanation of the law | Newton’s laws | Explanation of the law if it were not true |
|  | An object at rest remains at rest, an object in motion remains in motion with the same velocity unless acted upon by an unbalanced force |  |
|  | The acceleration of an object increases with increased force, decreases with increased mass, and is the same direction as the force |  |
|  | For every action there is an opposite and equal reaction. When one object exerts a force on another object, the second object exerts an equal and opposite force on the first object. |  |

**Top hat**: Find 4 Difference between Newton’s 3 laws of motion.

|  |  |  |
| --- | --- | --- |
| Newton’s 1st Law | Newton’s 2nd law | Newton’s 3rd law |
| **Differences between Newton’s 3 Laws of Motion** |  |  |
|  |  |  |
|  |  |  |
| **Similarities** of Newton’s laws of Motion |  |  |
|  |  |  |

**Writing extension: Compare and Contrast Summary**

**Directions:** Write a compare and contrast summary about Newton’s 3 laws of motion. Below are some helpful transitional words and phrases associated with comparing and contrasting.

Alike

Although

But

Compared with

Different from

Either…or

Have in common

However

In contrast to

Less than

More than

Neither…nor

Nonetheless

Not only…but also

On the other hand

Similar to

While

Yet

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**Part 1: Inductive Reasoning-**

**Step 1:** Analyze the terms below and explore the different ways you can group them. Write a descriptive label for each group of terms and make several predictions/hypothesis about what the reading passage.

Force

Push

Pull

Inertia

Momentum

Friction

Balanced

Unbalanced

Net force

Force

Gravity

magnetism

Tensional force

Air resistance

Spring force

Contact force

Normal force

Applied force

“G force”

Newton (N)

**Prediction/Hypothesis:**

**Refute organizer**

**Directions:**

1. Write your prediction/hypothesis in the prediction/hypothesis column.
2. Read the text- search and collect evidence that supports or refutes your predictions.
3. Cite evidence for your prediction in the left column and cite evidence against in the right column.

|  |  |  |
| --- | --- | --- |
| **Evidence for** | **Prediction/Hypothesis** | **Evidence against** |
|  |  |  |

**Step 3: Extension of Knowledge:** Choose one of the following options:

1. Using your organizer and the text, create a concept map using the terms from above to illustrate the relationships between the terms.
2. Use a tree map to classify the types of forces
3. Write an objective summary of the text

**Part 2: Reading for Meaning** Phet Simulation vs. Text book

|  |  |  |
| --- | --- | --- |
| Supporting Evidence from text of Newton’s laws | Statement | Supporting Data as evidence from Force simulation of Newton’s laws |
|  | If the sum of forces are equal (balanced) an object will not move |  |
|  | If the unbalanced force is greater on the right side then the object will move to the right |  |
|  | If the unbalanced force is greater on the left side then the object will move to the left. |  |
|  | If the mass of the object increases , then a larger applied force is needed to move the object at a faster speed |  |
|  | If the mass of the object decreases, then a smaller applied force is needed to move an object at a faster speed. |  |
|  | Every action has an equal, but opposite reaction |  |

VOCABULARY REVIEW

Part 4: Vocabulary CODE

|  |  |
| --- | --- |
| Term | Definition |
| Force | Push or pull |
| Applied/contact force | Force applied to an object by a person or another object. Forces that touch an object |
| Normal force | A support force exerted upon an object in contact with another object. The normal force is perpendicular to the object it is in contact with. Example: The normal force acting upon a lamp sitting on a table is the table exerting a normal force upon the lamp opposing gravity. |
| Tension force | Oppositional force created when forces act at opposition to each other. |
| Spring force | Force exerted by a compressed or stretched spring upon any object that is attached to it. |
| Vector | Quantity that has both size and direction. |
| Friction | Is the force exerted by a surface as an object moves across it or makes an effort to move across it. |
| Distant forces | Forces that work from a distant and do not touch the object |
| Gravity | Pull of one object towards the center of the earth. Gravity is known as the weight of the object because the force of gravity is directly proportional to the mass of an object. |
| Balanced forces | When all the forces acting upon an object and equal (net forces= 0). When forces are balanced, the object does not move. |
| Unbalanced forces | Causes motion/acceleration of an object |
| Net balance | Sum of all the forces acting on the object |
| Inertia | The resistance of an object has to change its state of motion. Inertia is directly proportional to the mass of the object |
| Momentum | "mass in motion." All objects have mass; so if an object is moving, then it has momentum - it has its mass in motion. |

Concept Circles:

Find the matching vocabulary term in the circle

Distant

Touch

Contact

Size

Direction force is applied

Direction

Write the type of force in the missing piece of the circle

Gravity

g

Electrical

Magnetic

Tension

Normal

Spring