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**Background Research**

**Directions:** answer the following questions in complete sentences using the links on schoology.

1.) What are Newton's 3 laws of motion?

Newton’s First Law of Motion: Newton’s first law of motion is often called the Law of Inertia. It states,”An object at rest stays at rest, and an object in motion stays in motion at a constant speed unless acted upon by an unbalanced force.”

Newton’s Second Law of Motion: Newton’s second law of motion states that the acceleration of an object is dependent on two variables: the net force acting upon the object and the mass of the object.

Newton’s Third Law of Motion: Newton’s third law of motion states that for every action, there is an equal and opposite reaction.

2. ) What is the scientific process?

The scientific method is a step of techniques used to test, learn about, and investigate certain things.

1.) Ask a question

2.) Do background research

3.) Construct your hypothesis

4.) First define your variables and then test your hypothesis with an experiment.

5.) Analyze your data and form a conclusion.

6.) Communicate your results.

3.) What are variables? What is a dependent and independent variable?

A variable is an element that is changing in an experiment. It represents something that is not known. An independent variable is an element that remains unchanged during an experiment; it is the element you are testing. The result of the dependent variable depends on the independent variable.

4.) If you were to drop an egg from a high elevation, what do you PREDICT would happen?

If the egg is unprotected, then I predict the egg would break open when it is dropped from a high elevation. Depending on what protects the egg, it may not break.

5.) What is gravity? What is the speed of gravity; how fast would an unprotected egg fall?

Gravity is an unseen force that pulls everything towards the center of the Earth. Gravity acts on all objects with an equal amount of force, regardless of mass or weight. An unprotected egg would fall at the same speed as all other objects.

6.) Will the egg ever reach the speed of gravity(aka free fall)? Why or why not?

An object begins to free fall when it is under the sole influence of gravity. In the egg drop experiment, the egg probably won’t ever start to free fall because the wind will influence its course, either by a little or a lot.

7.) What is air resistance, and what are the 2 most common factors that have an affect on air resistance?

Air resistance is the frictional force that air applies on an object in motion. As an object moves, air resistance slows it down. The faster an object is moving, the more resistance it faces. The two most common factors that have an affect on air resistance are the density of the air and the speed the object is travelling at.

8.) Why do more massive objects fall faster than less massive objects?

More massive objects fall faster than less massive objects only if there is more air resistance present.

9.) What is momentum? How is it changed?

Momentum refers to the quantity of motion an object has. It is dependent on the mass of an object and the velocity it is travelling at. Because of this, momentum is referred to with the phrase “mass in motion”.

10.) What is an impulse?

An impulse is change in momentum.

11.) There are 3 collisions in a crash, what are they and explain what happens.

Collision 1: The Exterior of the Vehicle Strikes Something--->The force of the initial impact depends on the speed of the vehicle, how heavy it was, and how fast it stopped. Damage to the the object of impact and the inhabitant(s) of the vehicle depends on the force of the initial impact.

Collision 2: Objects Inside the Vehicle Move Towards the Point of Impact---> Everything inside the vehicle, including the people, move towards the point of impact. The force with which they are moved depends on the force of the initial impact. Unless, they have their seatbelts on, or some other form of resistance, the objects and people will be very damaged.

Collision 3: Organs/Material Inside the Person’s Body Are Damaged---> Solid organs like the spleen and the liver fracture and bleed. Hollow organs like the stomach rupture. Vessels like the aorta tear. Lungs rupture or become punctured.

12.) Name at least 5 safety features of a car.

12. Answer) Five safety features of a car are: seat belts, air bags, auto emergency brakes, traction control, and active braking systems.