Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Study Guide – Motion and Forces Test**

**I. Motion**

1. A location to which you compare another location is called a **reference point**.
2. Define motion. -**The change is position over time**
3. Define speed. **How quickly or slowly an object changes position**
4. The formula for speed is **S= D/T** and is commonly expressed with the units **mph or m/s**.
5. Calculate the speed of a runner who covers 400 m in 50 sec.

**S=D/T S=400m/50 sec S=8 m/s**

1. Define acceleration. **The change in velocity over time**
2. What are the three types of acceleration, and give an example for each.

**Positive acceleration- speeding up**

**Zero Acceleration- constant speed**

**Negative Acceleration- slowing down**

**II. Forces and Newton’s Laws**

1. A force is a **push** or a **pull**.
2. State Newton’s First Law of Motion.

**An object at rest will remain at rest, and an object in motion will remain in motion unless acted on by an unbalanced force.**

1. Define inertia. **the resistance of an object to change its speed or direction of motion**
2. State Newton’s Second Law of Motion.

**The acceleration of an object depends on the mass of an object and the size of the force applied to it.**

1. The formula for force is **F= M\*A** and uses the unit **Newton (N)**.
2. If the same amount of force is applied to two different masses such as an empty grocery cart and a full one, what difference would you expect in their motion?

**The empty grocery cart would take less of a force to accelerate the same rate as the fukk cart, likewise, the empty cart would accelerate faster with the same force applied as the full cart.**

1. Calculate the force needed to accelerate a 10 kg box at a rate of 0.5 m/s/s.

**F=M\*A F=10kg\*0.5 m/s/s F=5 N**

1. State Newton’s Third Law of Motion.

**For every action, there is an equal and opposite reaction. Forces occur in action/ reaction pairs.**

**III. Gravity**

1. What is gravity? **the force that brings objects with mass together**

Which of the following is true about gravity?

a. it accelerates more massive objects faster

b. it accelerates less massive objects faster

c. **it accelerates all objects at the same rate regardless of their mass**

d. it cannot be determined by just knowing the objects’ masses

2. The strength of gravitational force between objects depends on their mass and **distance**

**IV. Simple Machines**

1. What is a simple machine? Compound machine?

**Simple machine- makes work easier by magnifying the force applied, all machines are based on the 6 simple machines.**

**Compound machine- a machine made up of more than one simple machine**

1. Define the 6 types of simple machines and give an examples of each.

* **Inclined Plane-a sloping surface, makes work easier by supporting part of the weight of an object while it is being moved from one level to another.**
* **Lever- a solid bar that rotates, or turns, around a fixed point. It can multiply or change the direction of an input force.**
* **Pulley-a wheel with a grooved rim and a rope or cable that rides in the groove, as you pull on the ripe, the wheel turns. Makes work easier by changing the direction of force.**
* **Screw-an inclined plane wrapped around a cylinder or cone to form a spiral. It is used to raise and lower weights as well as to fasten objects.**
* **Wedge- has a thick end and a thin end, used to cut, split, or pierce objects, or to hold objects together.**
* **Wheel & Axle- a wheel attached to shaft, or axle. A smaller force needs to be applied to get a greater force from the axle.**

3. Machines make work easier by changing either **size or direction** of the force applied.

**V. Mechanical Energy**

1. Define kinetic energy- **energy of an object in motion**
2. Define potential energy- energy of an object associated with its position
3. When does a roller coaster have the least amount of kinetic energy?

**at the top of the roller coaster, it has the most potential energy at that point**

4. Finish this equation: **Mechanical energy (ME) = potential energy(PE) + kinetic energy (KE)**