SPH3U0 **Introduction to Forces and Free-Body Diagrams** Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Read Section 4.1 pages 97-103 in PhysicsSource 11 and complete the following notesheet.*

**Fundamental Forces**

1. A force can be a \_\_\_\_\_\_\_\_\_ or a \_\_\_\_\_\_\_\_\_\_\_\_\_ on an object. It may have different \_\_\_\_\_\_\_\_\_\_\_\_\_ or can be in different \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Force is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ quantity.

1. There are \_\_\_\_\_\_\_\_\_\_\_\_\_\_ fundamental forces. Complete the chart below to summarize the properties of the four fundamental forces:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Force** | **Relative Strength** | **Range**  **(Short or Long?)**  **(Range Value?)** | **Function** | **Attract or Repel?** |
| **Strong Force** |  |  |  |  |
| **Electromagnetic** |  |  |  |  |
| **Weak** |  |  |  |  |
| **Gravity** |  |  |  |  |

1. Gravity is very important for controlling the motions of large objects such as \_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Why is the gravitational attraction between everyday objects not noticeable?

**Symbol and Unit for Force**

1. The symbol for force is : \_\_\_\_\_\_\_\_\_\_ The SI unit for force is : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The unit of force is named after: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

One Newton is equal to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

This is the force that is required to move a \_\_\_\_\_\_\_\_\_ object with an acceleration of \_\_\_\_\_\_\_\_\_\_.

One Newton is also the approximate amount of force you need to apply to hold an \_\_\_\_\_\_\_\_ in your hand!

**Representing Forces using Free-body diagrams:**

1. What is a free-body diagram?
2. Refer to Diagram 4.4 on page 99 and diagrams 4.6 and 4.7 on page 100 to complete the following free-body diagrams.

***Draw free-body diagrams for***:

A bucket held stationary in the Earth’s gravitational field.

1. b) A book at rest on a level table.

c) A book resting on a slanted table. d) A box which is stationary as a woman pushes on the box, trying to set it in motion.

**Examples of Forces**

1. Complete the chart for the following common forces:

|  |  |  |
| --- | --- | --- |
| **Force** | **Symbol** | **Description** |
| Normal Force |  |  |
| Friction |  |  |
| Applied force |  |  |
| Tension Force (see page 102) |  |  |

1. What is the net force,