**Unit 4 - Worksheet 1**

**Force Diagram Practice**

For each of the following systems:

1. Draw the system schema for the object or objects included in the system.
2. In the box to the right of the physical diagram, draw a force diagram for the specified object in each of the following situations.
   1. Represent the object as a particle by drawing a dot in the middle of the blank.
   2. Draw each of the forces acting on the object, making the length of each vector represent the magnitude of the force.
   3. Label each force using the system discussed in class. Specifically each force should be labeled with a capital F, followed by a subscript which describes the type of force, followed by two subscripts which describe the “agent” of the force and the “object” of the force.
3. Specify sign conventions for the vertical and horizontal directions.
4. Define subscripts by indicating the type of force, the agent and the object.
5. Write the sum of forces equations which indicate the sum of the forces on your system in both the horizontal and vertical directions.

Use the following symbols for the various forces:

Fg Gravitational force

FN Normal force

FT Tension force

Ff Frictional force

Force

What the force is “on”

The “object” of the force

What the force is “by”

The “agent” of the force

Type of force

F

T

by A on O

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| 1. A bird sitting motionless on a perch. | Sign Conventions: | Force Diagram: |
| Sum of Forces Equation(s): |
| System Schema: |
| Subscript Definitions: |
| 1. Draw a force diagram for a hockey player, moving at a constant velocity, across frictionless ice. | Sign Conventions: | Force Diagram: |
| Sum of Forces Equation(s): |
| System Schema: |
| Subscript Definitions: |
| 1. Draw a force diagram for a baseball player who slows as he slides into the base. | Sign Conventions: | Force Diagram: |
| Sum of Forces Equation(s): |
| System Schema: |
| Subscript Definitions: |

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| 1. Draw a force diagram for the chandelier which is suspended from the ceiling by a chain. | Sign Conventions: | Force Diagram: |
| Sum of Forces Equation(s): |
| System Schema: |
| Subscript Definitions: |
| 1. Draw a force diagram for the bucket of water that is being raised from the well at a constant velocity. | Sign Conventions: | Force Diagram: |
| Sum of Forces Equation(s): |
| System Schema: |
| Subscript Definitions: |
| 1. Draw a force diagram for a skydiver who has just left the plane and is accelerating toward the ground. | Sign Conventions: | Force Diagram: |
| Sum of Forces Equation(s): |
| System Schema: |
| Subscript Definitions: |
| 1. Draw a force diagram for a skydiver who has opened the parachute and is descending at a constant velocity. | Sign Conventions: | Force Diagram: |
| Sum of Forces Equation(s): |
| System Schema: |
| Subscript Definitions: |
| 1. Draw a force diagram for the basketball in the middle of a free throw. | Sign Conventions: | Force Diagram: |
| Sum of Forces Equation(s): |
| System Schema: |
| Subscript Definitions: |
| 1. Draw a force diagram for a hurdler as she clears a hurdle. | Sign Conventions: | Force Diagram: |
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| System Schema: |
| Subscript Definitions: |
| 1. Draw a force diagram for an airplane flying at a constant velocity in level flight. | Sign Conventions: | Force Diagram: |
| Sum of Forces Equation(s): |
| System Schema: |
| Subscript Definitions: |
| 1. Draw a force diagram for the water skier moving at a constant velocity. | Sign Conventions: | Force Diagram: |
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| System Schema: |
| Subscript Definitions: |