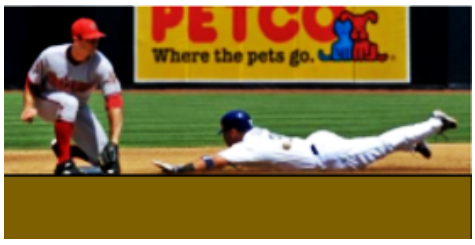
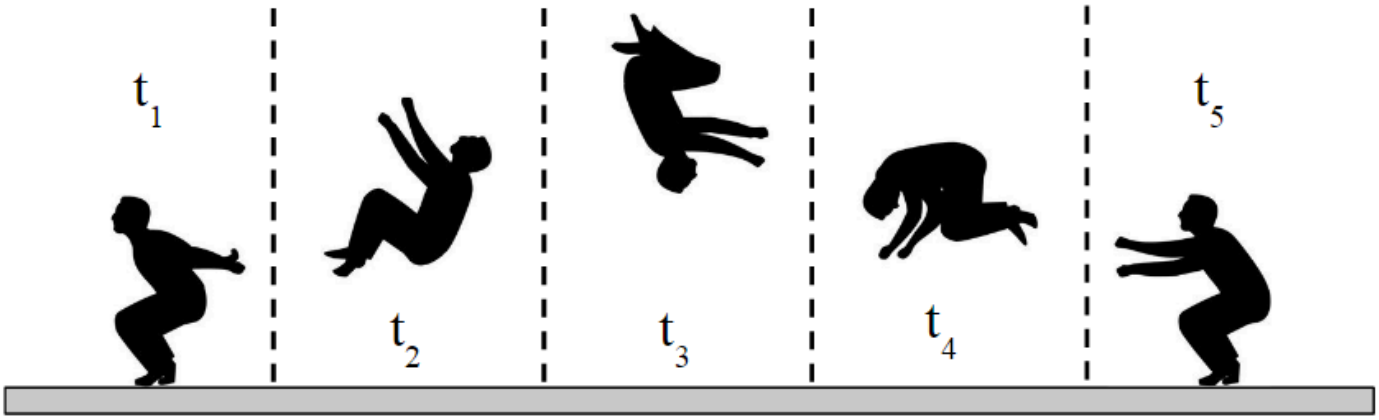
PHY Unit 04 Worksheet 1 (*Intro to Force Diagrams*) Name_____

Directions: Draw a force diagram for the specified object in each of the following situations. On the physical diagram, draw a dotted line around the object or objects underlined in the description of each situation. Draw each of the forces acting on the object, making the length of each arrow represent the size of the force. Each force should be labeled using the system described in the handout on force diagrams or as 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 "feeler" of the force and the "dealer" of the force. Define your subscripts by indicating what letter you are using to represent the feeler and each of the dealers. Draw forces in pencil. Write the net force equations which indicate the net force on your system in both the horizontal and vertical dimensions. In the blank to the right of the physical diagram, represent the object as a particle by drawing a dot in the middle of the blank.

1. Draw a force diagram for the <u>climber</u> hanging motionless from a rope. 	<u>Net Force Equations</u>: (+ / - / or **zero**!) ΣF_x = _____ ΣF_y = _____ <u>Subscript Definitions</u>:	Force Diagram:
2. Draw a force diagram for a <u>hockey player</u>, sliding to the right at a constant velocity, across *frictionless* ice. 	<u>Net Force Equations</u>: (+ / - / or **zero**!) ΣF_x = _____ ΣF_y = _____ <u>Subscript Definitions</u>:	Force Diagram:
3. Draw a force diagram for a baseball player as he slows while sliding into a base. 	<u>Net Force Equations</u>: (+ / - / or **zero**!) ΣF_x = _____ ΣF_y = _____ <u>Subscript Definitions</u>:	Force Diagram:

Questions #4 - #6 refer to a person who pushes against the ground to jump straight up and perform a backflip.



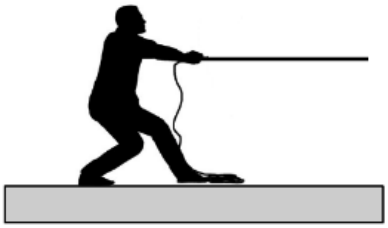
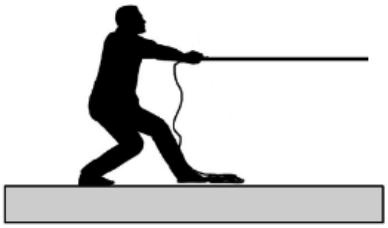
4. Draw a force diagram for a <u>person</u> at t_1 who is increasing speed and moving up while pushing against the ground.	<u>Net Force Equations</u>: (+ / - / or **zero**!) ΣF_x = _____ ΣF_y = _____ <u>Subscript Definitions</u>:	Force Diagram:

5. Draw a force diagram for the <u>person</u> at t_2 who is decreasing speed while still moving up.	<u>Net Force Equations</u>: (+ / - / or **zero**!) ΣF_x = _____ ΣF_y = _____ <u>Subscript Definitions</u>:	Force Diagram:

6. Draw a force diagram for a <u>person</u> at t_5 who is moving down and decreasing speed while landing on the ground.	<u>Net Force Equations</u>: (+ / - / or **zero**!) ΣF_x = _____ ΣF_y = _____ <u>Subscript Definitions</u>:	Force Diagram:

Questions #7 - #10 refer to a skydiver who jumps out of a hovering helicopter, falls toward the ground below, opens a parachute to slow down, and then slowly descends toward the ground.

7. Draw a force diagram for the <u>skydiver</u> immediately after leaving the helicopter. *Assume air resistance is negligible.* 	<u>Net Force Equations</u>: (+ / - / or **zero**!) ΣF_x = _____ ΣF_y = _____ <u>Subscript Definitions</u>:	Force Diagram:
8. Draw a force diagram for the <u>skydiver</u> after they have fallen for a long time and air resistance is so significant that he falls at a constant velocity ("terminal velocity"). 	<u>Net Force Equations</u>: (+ / - / or **zero**!) ΣF_x = _____ ΣF_y = _____ <u>Subscript Definitions</u>:	Force Diagram:
9. Draw a force diagram for the <u>skydiver + parachute</u> system shortly after the parachute was deployed and his speed rapidly decreased while continuing to move down. 	<u>Net Force Equations</u>: (+ / - / or **zero**!) ΣF_x = _____ ΣF_y = _____ <u>Subscript Definitions</u>:	Force Diagram:
10. Draw a force diagram for the <u>skydiver + parachute</u> system a long time after the parachute was deployed and he is descending at a slow constant velocity. 	<u>Net Force Equations</u>: (+ / - / or **zero**!) ΣF_x = _____ ΣF_y = _____ <u>Subscript Definitions</u>:	Force Diagram:

11. Draw a force diagram for a <u>person</u> at rest during a game of tug of war. 	<u>Net Force Equations</u>: (+ / - / or **zero**!) ΣF_x = _____ ΣF_y = _____ <u>Subscript Definitions</u>:	Force Diagram:
12. Draw a force diagram for a <u>person</u> during a game of tug of war if they are sliding to the right at an *increasing* speed. 	<u>Net Force Equations</u>: (+ / - / or **zero**!) ΣF_x = _____ ΣF_y = _____ <u>Subscript Definitions</u>:	Force Diagram:
13. Draw a force diagram for the person stretching while leaning against the wall at rest. 	<u>Net Force Equations</u>: (+ / - / or **zero**!) ΣF_x = _____ ΣF_y = _____ <u>Subscript Definitions</u>:	Force Diagram:
14. Draw a force diagram for a <u>rock climber</u> at rest in a large vertical crack called a “chimney”. 	<u>Net Force Equations</u>: (+ / - / or **zero**!) ΣF_x = _____ ΣF_y = _____ <u>Subscript Definitions</u>:	Force Diagram: