Name (First AND Last): _____ Date: _____

Recognizing and Interpreting Free-Body Diagrams

Adapted from Minds on Physics Activity #50:
Recognizing and Interpreting Free-Body Diagrams

Goals:

- ✓ To learn what a free-body diagram is.
- ✓ To learn the properties of a correct free-body diagram.
- ✓ To learn how to distinguish between correct and incorrect free-body diagrams.

Free-Body Diagrams:

- ✓ A free-body diagram shows all the forces acting on a single, isolated body.
- ✓ Only forces should be entered on a free-body diagram.
- ✓ The body must be isolated (a free body.)
- ✓ Indicating all of the forces acting on a single body makes it possible to discuss and determine the behavior of that body without referring to any of the objects exerting the forces.
- ✓ When drawing a free-body diagram, we draw a point to represent the body. Sometimes we draw a square around the point to represent the body.
- ✓ The point (and possible square) should be drawn away from any other illustrations or diagrams.
- ✓ On your free-body diagram, show each force on the object as an arrow. The direction of the arrow should be the same as the direction of the force. Whenever possible, the length of the arrow should be roughly proportional to the size of the force.
- ✓ All arrows representing forces begin at the point.
- ✓ Each force in the diagram should be clearly labeled.

Forces we will label on FBDs:

Gravity	F_g
Normal	F_N
Tension	F_T

Spring	F_s
Air Resistance	F_{ar}
Friction	F_f

Part A: Interpreting Free-Body Diagrams

A number of physical situations are described below, together with an illustration of each situation and a valid, but unlabeled free-body diagram. For each force drawn on the free-body diagram, label the force and the source.

Forces to choose from:

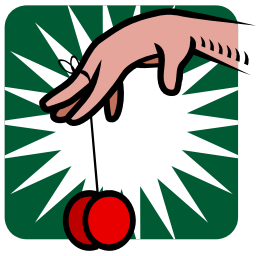
Gravity	F_g
Normal	F_N
Tension	F_T

Spring	F_s
Air Resistance	F_{ar}
Friction	F_f

1. 

A snowflake falls to the ground.

	Force	Source
1		
2		

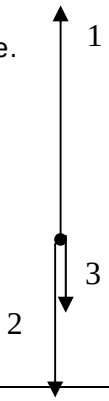
2. 

The yo-yo is going downward, away from your hand. Ignore air resistance. (Consider forces only on the round part of the yo-yo, not the string.

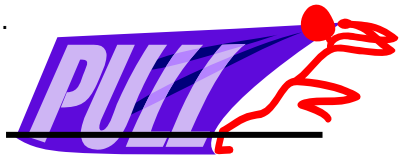
	Force	Source
1		
2		

3. 

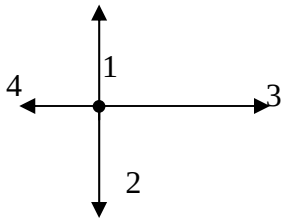
You are standing on the scale.
The scale is on the floor.
What are the forces on the SCALE?



	Force	Source
1		
2		
3		

4. 

The little man pulls the box along the floor.
What are the forces on the box?

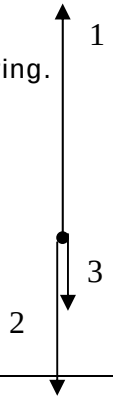


Ignore Air Resistance.

	Force	Source
1		
2		
3		
4		

5. 

The toy is being pushed up and out of the box by the spring. Include air resistance.



	Force	Source
1		
2		
3		