



# Teacher Friendly Physics

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## Free-Body Diagram Cut-and-Paste



This lab adapted from:

Original lab written by colleague, Carey Munoz. Lab was never published.

## Lab: Free-Body Diagram Cut-and-Paste Lab TEACHER NOTES

### Introduction:

Carey Munoz, the author of Teacher Friendly ICP (ICP=Integrated Chemistry Physics) had a similar activity that I "stole" this idea from. (Thanks Carey!) It's such a great way to have students "play" with free-body diagrams. I tell students to do their best and try it on their own first, then we come together as a class and discuss our results. Every time they are able to get the correct answers without any "lecture" from me! That's VERY teacher friendly!

### Notes on Setup:

Each student (or lab group) will need scissors and glue sticks to complete this activity.

There is no "dummy data" provided for this lab activity since making the lab up requires no teacher setup and most students have scissors and glue sticks at home.

Students now will understand "balanced" versus "unbalanced" forces in horizontal/vertical directions. They will also realize that unbalanced forces result in acceleration.

# Free Body Diagrams-Cut and Paste Physics 1

**CUT THIS PAGE OUT!**

## Instructions:

- Cut out both the word descriptions and the pictures (called "free body diagrams") below.
- Match the word description number with the number on the chart first.
- Next, match the pictures ("free body diagrams") with the correct word descriptions.
- Paste them on the answer sheet and complete the chart by filling in all columns.

<b>1</b> -Falling on the moon-no air drag	<b>2</b> -At rest on the table-no horizontal forces	<b>3</b> -Falling on Earth at terminal velocity	<b>4</b> -Falling on Earth, but terminal velocity not yet reached	<b>5</b> -A book is at rest on a tabletop
<b>6</b> -Rolling along a surface with applied force and friction at constant velocity	<b>7</b> -Rolling along a surface with applied force and friction with one greater than the other	<b>8</b> -True free fall-no force opposes the weight	<b>9</b> -A girl is suspended motionless from a bar which hangs from the ceiling by two ropes	<b>10</b> -A college student rests a backpack upon one shoulder
<b>11</b> -A car is coasting to the right and slowing down	<b>12</b> -A flying squirrel is gliding (no wing flaps) to the ground at constant velocity	<b>13</b> -A football is moving up towards its peak after having been kicked	<b>14</b> -A horizontal force is applied to an object in order to accelerate it	<b>15</b> -A force is applied to an object in order to move it at a constant velocity

**Free Body Diagrams-Cut and Paste**  
**Physics 1**

Name \_\_\_\_\_

**PASTE ANSWERS HERE AND FILL IN ENTIRE CHART!**

<b>Word Description</b>	<b>Free Body Diagram (Picture)</b>	<b>Are the forces all balanced? aka (Is the object in equilibrium?)</b>	<b>Is the object accelerating? If yes, in which direction?</b>
<b>1</b>			
<b>2</b>			
<b>3</b>			
<b>4</b>			
<b>5</b>			

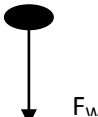
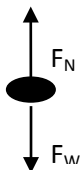
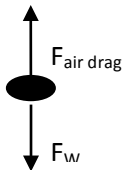
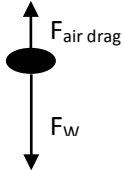
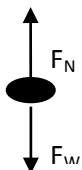
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6			
7			
8			
9			
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12			
13			
14			
15			

Free Body Diagrams-Cut and Paste  
Physics 1

**"ANSWER KEY"**

**PASTE ANSWERS HERE AND FILL IN ENTIRE CHART!**

Word Description	Free Body Diagram (Picture)	Are the forces all balanced? aka (Is the object in equilibrium?)	Is the object accelerating? If yes, in which direction?
<u>1</u> -Falling on the moon-no air drag		No	Yes-down
<u>2</u> -At rest on the table-no horizontal forces		Yes	No
<u>3</u> -Falling on Earth at terminal velocity		Yes	No
<u>4</u> -Falling on Earth, but terminal velocity not yet reached		No	Yes-down
<u>5</u> -A book is at rest on a tabletop		Yes	No

Word Description	Free Body Diagram (Picture)	Are the forces all balanced? aka (Is the object in equilibrium?)	Is the object accelerating? If yes, in which direction?
<u>6</u> -Rolling along a surface with applied force and friction at constant velocity		Yes	No
<u>7</u> -Rolling along a surface with applied force and friction with one greater than the other		No	Yes-right
<u>8</u> -True free fall-no force opposes the weight		No	Yes-down
<u>9</u> -A girl is suspended motionless from a bar which hangs from the ceiling by two ropes		Yes	No
<u>10</u> -A college student rests a backpack upon one shoulder		Yes	No



Word Description	Free Body Diagram (Picture)	Are the forces all balanced? aka (Is the object in equilibrium?)	Is the object accelerating? If yes, in which direction?
<b>11</b> -A car is coasting to the right and slowing down		No	Yes-left
<b>12</b> -A flying squirrel is gliding (no wing flaps) to the ground at constant velocity		Yes	No
<b>13</b> -A football is moving up towards its peak after having been kicked		No	Yes-down
<b>14</b> -A horizontal force is applied to an object in order to accelerate it		No	Yes-right
<b>15</b> -A force is applied to an object in order to move it at a constant velocity		Yes	No