

Fall Semester Regents Physics  
John Dewey High School  
Mr. Klimetz

Name \_\_\_\_\_  
Period \_\_\_\_\_  
Date \_\_\_\_\_

## Free-Body Diagrams

A free-body diagram is a useful dynamic analysis tool which permits system(s) of concurrent forces (force pairs) acting on an object to be graphically represented, their sums more simply calculated, and the response of the object to those force sums (net forces) more easily interpreted and understood. Based on the information provided in class and your reading of the textbook, produce a free-body diagram for each of the situations provided below. Each diagram should be labeled with arrows representative of each of the forces acting on the object of interest. Additionally, you should also predict the response of the object to the system(s) of concurrent forces based on an interpretation of your free-body diagram. That is, determine sort of motion, if any, the object experience in response to the forces applied to it. Provide mathematical data and calculations to support your interpretations.

1. A box with a mass of 40.0 kg is resting on a horizontal surface.
  
  
  
  
  
  
  
  
  
  
2. A box with a mass of 30.0 kg is placed on a frictionless horizontal surface. A pulling force of 15.0 N is applied to the right side of the box.
  
  
  
  
  
  
  
  
  
  
3. A box with a mass of 50.0 kg is placed on a frictionless plane inclined at 30 degrees from the horizontal.
  
  
  
  
  
  
  
  
  
  
4. A box with a mass of 20.0 kg is placed on a 30-degree inclined plane. The coefficient of starting friction between the box and the plane is 0.720.