Physics 40S **Free Body Diagrams**

A Free Body Diagram indicates:

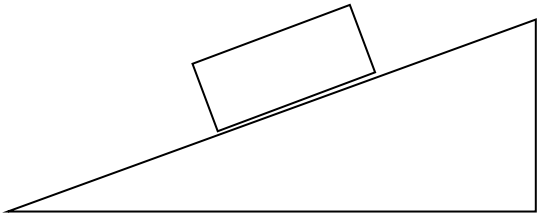
- What types of forces are acting on a body.
- The direction the forces are acting.
- The magnitude of the size of forces acting on the body.

Arrows are used to indicate the direction and magnitude of the forces in a Free Body Diagram. The arrows are drawn from the **center of gravity** of the body.

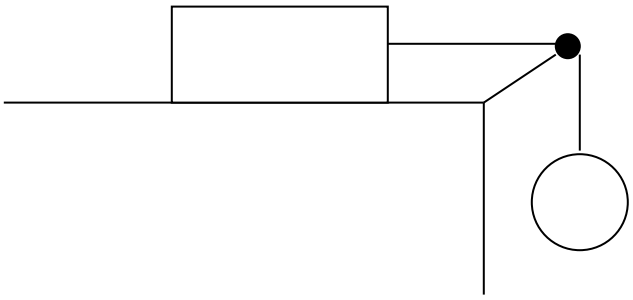
Example 1
Object on a flat surface being pulled to the right. (horizontal force)

Example 2
Object on a flat surface being pulled to the right. (force at an angle)

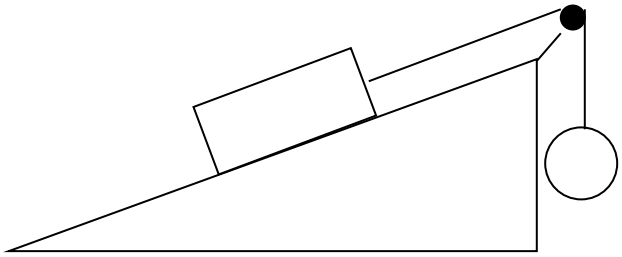
Example 3
Object on an inclined plane sliding downward



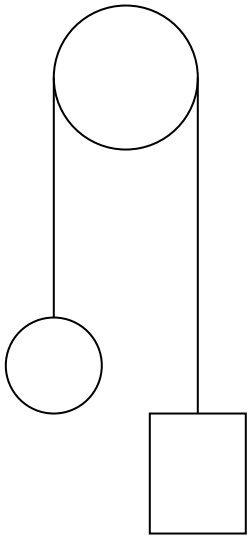
Example 4
Object on a flat surface with a second object attached by a rope, hanging over a pulley.



Example 5
Object on an inclined surface with a second object attached by a rope, hanging over a pulley.

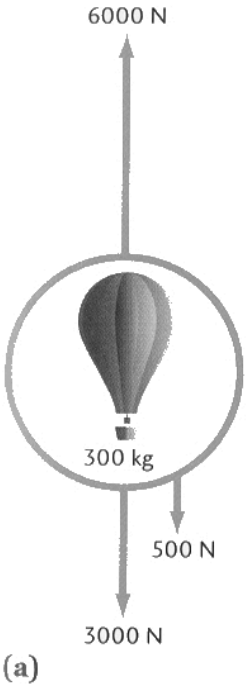


Example 6
Two overhanging masses connected over a pulley – **Atwood Machine**

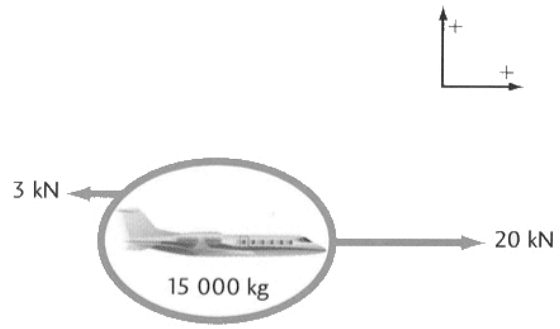


FBD Worksheet

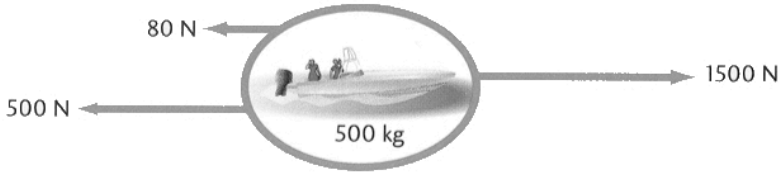
1. Find the acceleration in the following FBDs:



(a)

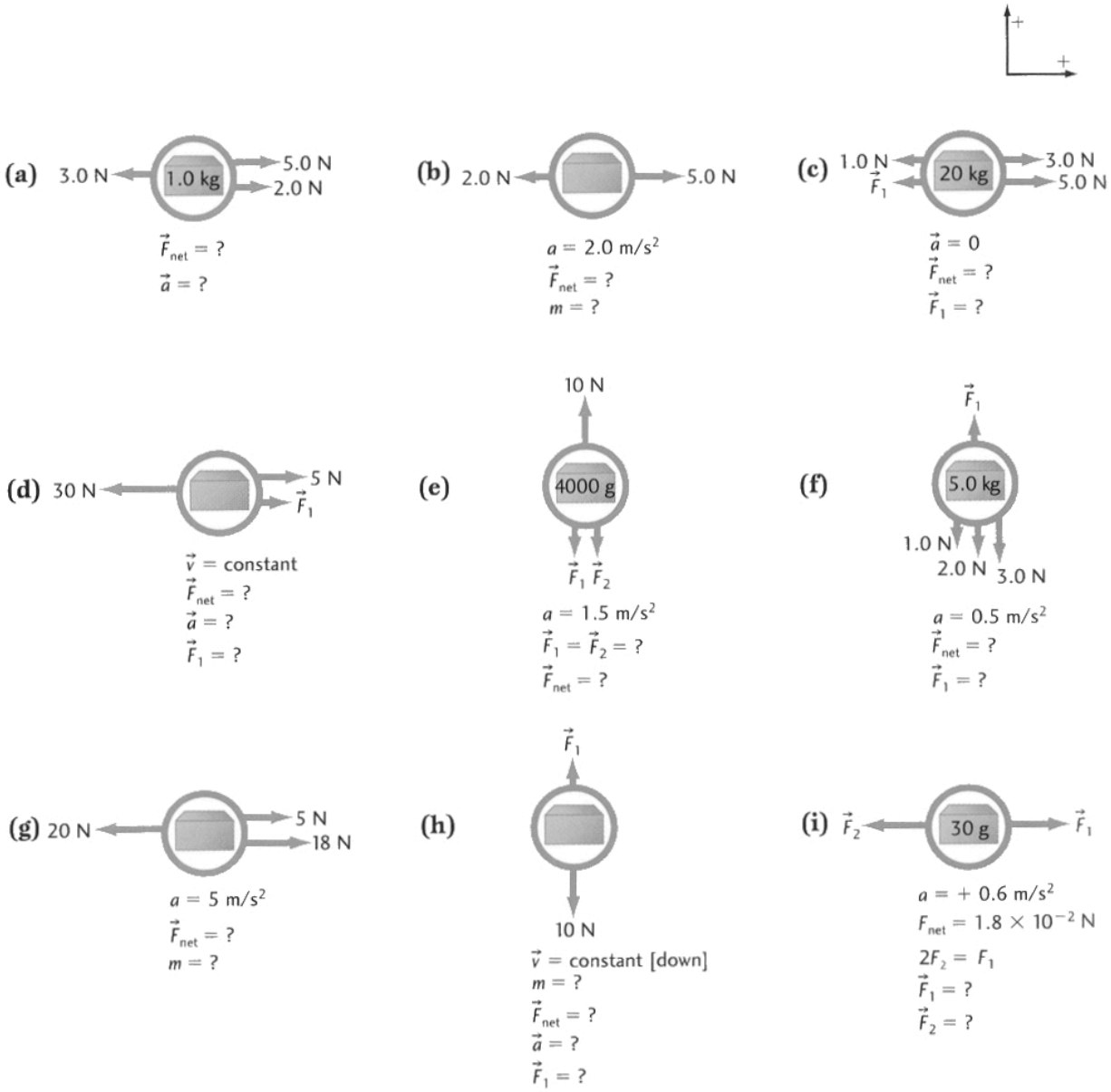


(b)

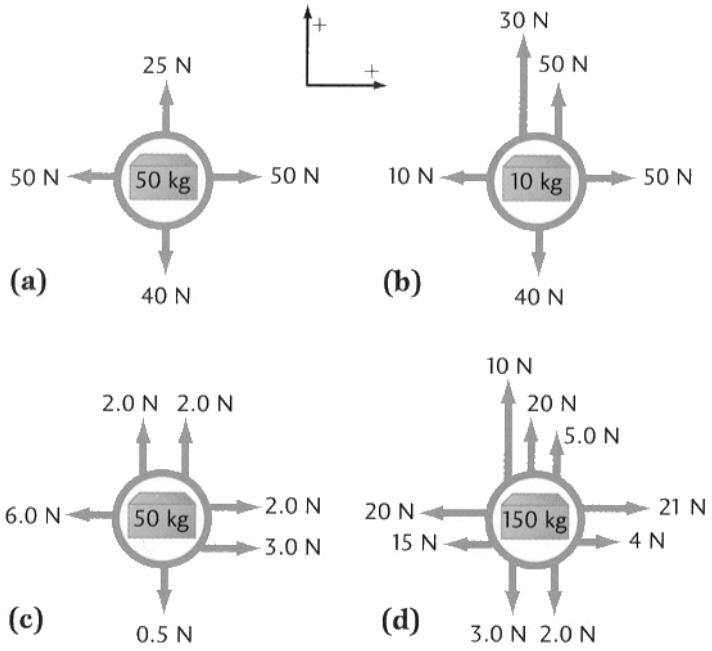


(c)

2. Fill in the missing quantities for the following:



3. For the following FBDs, create two separate net force statements, one for each direction.



4. Calculate the net force acting on the objects in Problem 3.