

Free Body Diagram Maker

Classroom worksheet · Interactive simulation: <https://lkforge.com/tools/physics/free-body-diagram/>

Name: _____ Date: _____

Learning objectives

- Identify all forces acting on an object.
- Represent forces as vectors in a free body diagram.
- Use the diagram to find the net force.

Variables to change

- Scenario (surface, incline, hanging, etc.)
- Applied forces
- Friction

Procedure

1. Choose a scenario and add each force acting on the object as a labeled arrow.
2. Check that every arrow corresponds to a real interaction (gravity, normal, friction, tension, applied).
3. Combine the arrows to estimate the net force and predict the motion.

Observations

For each scenario, list the forces and their directions, then state the net force.

Questions

1. What belongs in a free body diagram?
2. Name the common forces to check for.

3. What does the normal force always do?
4. If the object is in equilibrium, what is true of the force vectors?
5. How do you get acceleration from a free body diagram?

Answer key (instructors)

- **1.** Only the forces acting ON the object, drawn as vectors from the object; not forces it exerts on others.
- **2.** Weight (gravity), normal force, friction, tension, applied force, and any spring or drag force.
- **3.** Acts perpendicular to the contact surface, pushing the object away from it.
- **4.** They sum to zero — the net force is zero.
- **5.** Find the net force and apply Newton's second law, $a = F_{\text{net}}/m$.

A free body diagram isolates one object and draws every force acting on it as a vector. Summing those vectors gives the net force, and Newton's second law ($a = F_{\text{net}}/m$) turns it into the motion — the starting point for nearly every mechanics problem.