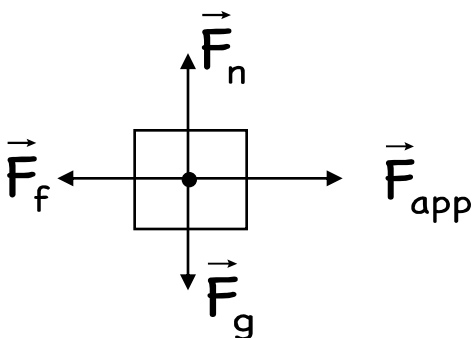


Name: _____ Date: _____ Period: _____

General Science Free-Body Diagrams

Features of free-body diagrams

- Free-body diagrams are vector diagrams used to show the magnitude and direction of forces acting on an object in a given situation.
- The size of the arrow in a free-body diagram represents the magnitude of the force. The arrow's direction shows the direction that the force acts.
- Each force arrow is labeled to indicate the type of force.
- A box represents the object that the forces are acting upon. Force arrows are drawn from the center of the box outward in the direction in which each force acts.



Typical Forces to Account for in Mechanics Problems

- F_{app} : Applied force. This is a force applied to an object, usually by a person or an engine.
- F_g : Force due to gravity; also known as weight. All objects on Earth experience this force, which is directed to the Earth's center. On most free-body diagrams, this force is directed downwards. Sometimes the symbol W is used in place of F_g .
- F_n : Normal force. This is the support force exerted on an object in contact with another stable object, like a floor or tabletop. This force is drawn perpendicular to the surfaces in contact. Sometimes the symbol n is used in place of F_n .
- F_f : Friction force. This force is exerted by a surface on an object and opposes the motion of the object. Sometimes the symbol f is used in place of F_f .
- F_{air} : Air resistance. This force is exerted by the air on moving objects and opposes the motion of the object.
- F_t : Tension. Tension is a force transmitted through supports such as strings or wires. It is directed along the strings. Sometimes the symbol T is used in place of F_t .

Free Body Diagrams and Force Equilibrium

1. A pencil rests on a desk.
2. You push a book across your table from right to left at constant velocity.
3. A girl sits motionless on a tree swing which has two ropes connected to a tree branch.
4. A skydiver coast down to the ground with constant velocity.

Free Body Diagrams and Acceleration

1. A block is pushed from right to left and it is increasing in speed.
2. A rock is dropped from the top of a ladder and no air resistance acts on it.
3. A hockey puck slowly slides to rest as it moves right to left.