CONCEPT: TYPES OF FORCES

- Most problems will have multiple kinds or *types* of forces pushing/pulling on an object.
  - Always draw forces as a _____ arrow from the object's center.

MOST COMMON FORCES

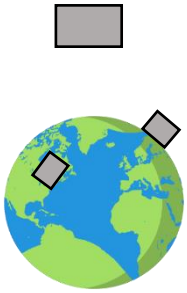
Applied: Something directly (____) pushes OR pulls

- In direction of push/pull

Tension: Rope/string is pulled (____)

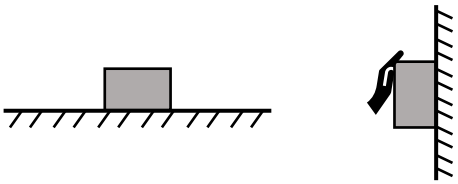
- In direction of pull

Weight: Gravitational pull by Earth (____)



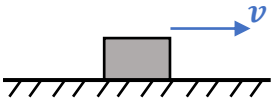
- Always assume a weight force, unless explicitly told there is none
- Always acts towards Earth's center

Normal: Reaction to a surface push, (____) whenever 2 surfaces in contact



- Always perpendicular (___) to surface

Friction: Rubbing of 2 rough surfaces in contact (____)



- ***Usually*** opposite of direction of motion

PROBLEM: A tire swing hangs from a tree branch by a rope. Identify all the forces acting on the tire.

A) Weight and normal force
B) Weight and applied force
C) Weight and tension
D) Weight, tension, and normal force

PROBLEM: You push a couch across a carpeted (rough) living room floor. Identify all the forces acting on the couch.

A) Weight, normal, friction
B) Weight, applied, friction
C) Weight, applied, normal, tension
D) Weight, applied, normal, friction

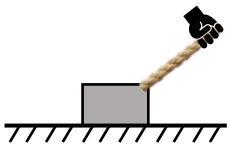
CONCEPT: FREE-BODY DIAGRAMS

● A Free-Body Diagram (FBD) shows only **FORCES** acting **ON** a ***SINGLE*** object, which is drawn as a _____.

- Draw ***all*** Forces as arrows from the object's center, in this order*:*

1) Weight (always, unless otherwise stated)
2) Applied Force, & Tension (if stated/shown)
3) Normal (if 2 surfaces in contact)
4) Friction (if surfaces are "rough")

DIAGRAM **FREE-BODY DIAGRAM**



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EXAMPLE**:** Draw a Free-Body Diagrams and calculate the acceleration for the following situations**:**

a) You push your 2kg physics textbook to the right with a force of 20N across a flat table**.** The force of kinetic friction is 8N**.**

b) Using a rope, you pull a box upwards with a force of 90N**.** The box's weight is 50N, and its mass is 5kg**.**

PROBLEM**:** Draw a Free-Body Diagram for the following situation**:** You push a block against a rough vertical wall, pushing upward at a 45° angle**.** The book slides upwards**.**

FORCES
1) Draw FBD**: W,F_A,T,N,f**