1. Consider a box (B) riding in the back of a flatbed truck (T).

a. If the truck accelerates gently, the box moves with the truck without slipping. Draw an extended free-body diagram of the box as it accelerates, to the right, without slipping (i.e. draw the forces at their points of application, not at a dot at the center of the box).

b. If the truck's acceleration is too large, the box will begin to slip. Draw a FBD for the box while still touching the truck, but while the truck is slipping out from under the box. Explain how you might be able to predict the acceleration OF THE BOX in this situation. What would you need to know?

2. Suppose you successfully press a book (B) against a wall (W) with your hand (H).

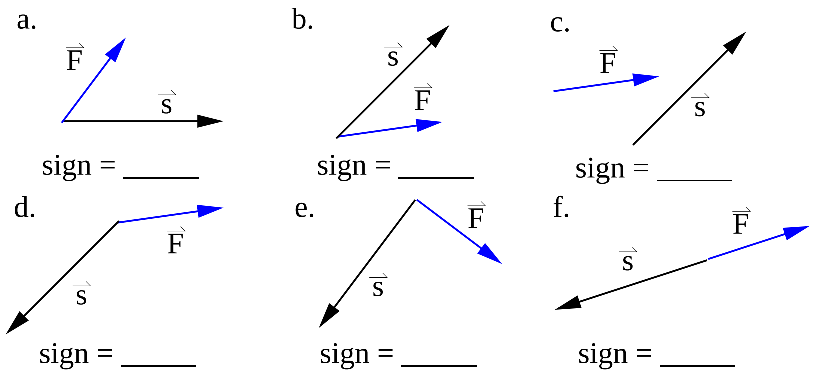
a. Identify all of the forces acting on the book and draw a clear extended FBD.

b. Suppose that you now decrease size of your pushing force, but not enough for the book to slip. What happens to each of the two normal force components and to each of the two frictional force components in your FBD; do they increase in magnitude, decrease, or not change? Explain, using Newton's 1st or 3rd Law where appropriate.

c. For the situation in (b), what happens to the maximum force of static friction on each side of the book? Explain.

d. Now suppose the side of the book on which you are pushing is very slick so that the ony frictional force is between the wall and the book. If μ_s between wall and book is known, as well as the book's mass m_B, then at least how hard must you push to keep the book at rest? Is this likely to be more or less than the weight of the book?

3. Force $\vec{F}$ is one of the forces acting on an object during a displacement $\vec{\Delta r} = \vec{s}$. Give the sign of the work done by $\vec{F}$ during the displacement $\vec{s}$. Zero is a possibility.



4. For each situation below, draw an extended FBD showing all forces acting on the object. Alongside your FBD, draw and label the displacement vector $\vec{\Delta r}$, then make a table showing the sign (+,−, or 0) of (i) the work done by each force in your FBD, (ii) the net work, and (iii) the object's change in kinetic energy.

a. A crate (C) riding on the floor (F) of an ascending elevator comes to rest as the elevator reaches the top of its journey.

b. A man pushes a cabinet (C) with his hands (H) across a rough level floor (F) at a constant speed.