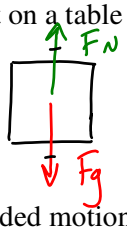
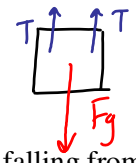
Unit 4: Newton's Laws - **FBDs**

Force	Description
F_g	Force of gravity
F_{app}	Applied force → any push
F_f	Force of friction → generally against motion
F_N	Normal force → supporting force
T	Tension → force along a rope
F_E	Elastic force → springs etc.
F_{air}	Air resistance

1. A book is at rest on a table top.

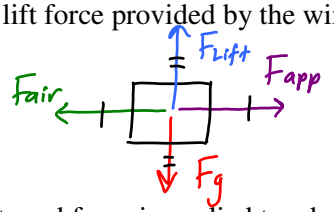


2. A girl is suspended motionless from a bar which hangs from the ceiling by two ropes.

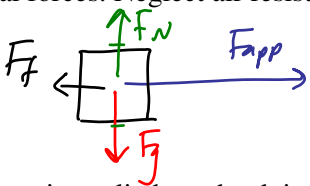


3. An egg is free-falling from a nest in a tree. Neglect air resistance. only F_g

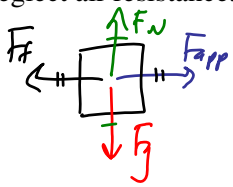
4. A plane flies at a constant velocity (**Note**: there will be an applied force generated by the engines as well as a lift force provided by the wings).



5. A rightward force is applied to a book in order to move it across a desk with a rightward acceleration. Consider frictional forces. Neglect air resistance.



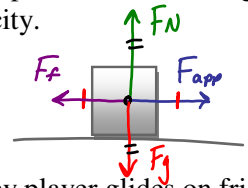
6. A rightward force is applied to a book in order to move it across a desk at constant velocity. Consider frictional forces. Neglect air resistance.



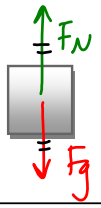
Ex 1: A box is pushed across a rough floor at a constant velocity.

$a = 0$

$F_{net} = 0$

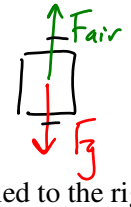


Ex 2: A hockey player glides on frictionless ice at a constant velocity.

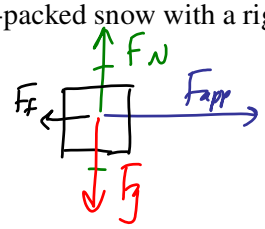


7. A college student rests a backpack upon his shoulder. The pack is suspended motionless by one strap from one shoulder.

8. A skydiver is descending with a constant velocity. Consider air resistance.



9. A force is applied to the right to drag a sled across loosely-packed snow with a rightward acceleration.



10. A football is moving upwards towards its peak after having been *booted* by the punter.

11. A car is coasting to the right and slowing down. Diagram the forces acting upon the car.