

Unit 4: Newton's Laws - FBDs

Force	Description

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



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



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.

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.

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.

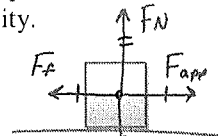
11. A car is coasting to the right and slowing down. Diagram the forces acting upon the car.

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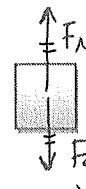
Force	Description
F_g	Force of gravity
F_{app}	Applied force \rightarrow any push
F_f	Force of friction \rightarrow generally against motion
F_N	Normal force \rightarrow supporting force
T	Tension \rightarrow force along a rope
F_E	Elastic force \rightarrow springs etc.
F_{air}	Air resistance

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

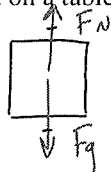
$a = 0$
 $F_{net} = 0$



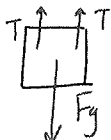
Ex 2: A hockey player glides on frictionless ice at a constant velocity.



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



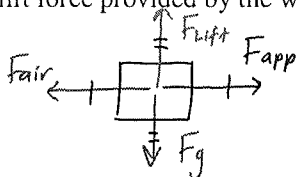
2. A girl is suspended motionless from a bar which hangs from the ceiling by two ropes.



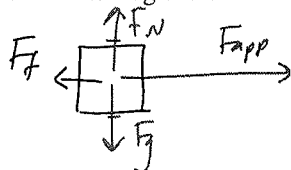
3. An egg is free-falling from a nest in a tree. Neglect air resistance. \leftarrow only F_g



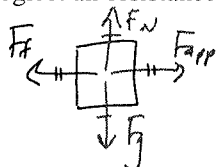
4. A plane flies at a constant velocity (Note: there will be an applied force generated by the engines as well as a lift force provided by the wings).



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.



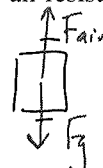
6. A rightward force is applied to a book in order to move it across a desk at constant velocity. Consider frictional forces. Neglect air resistance.



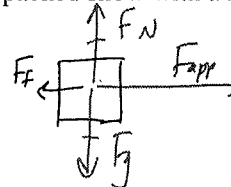
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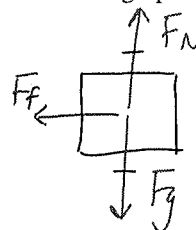
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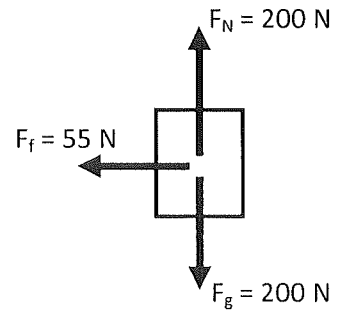
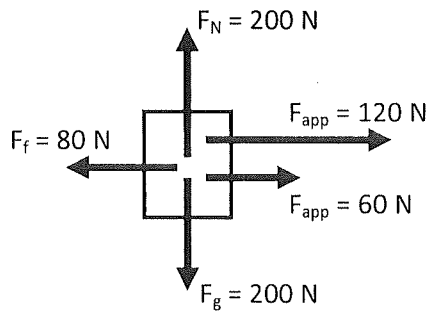
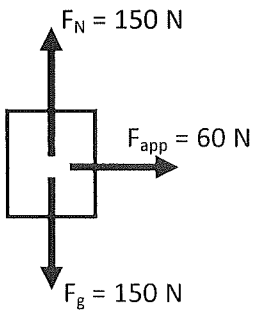
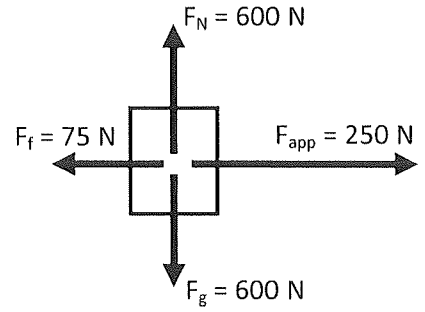
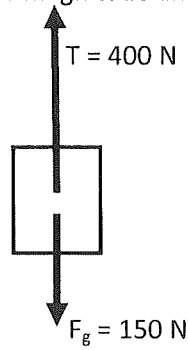
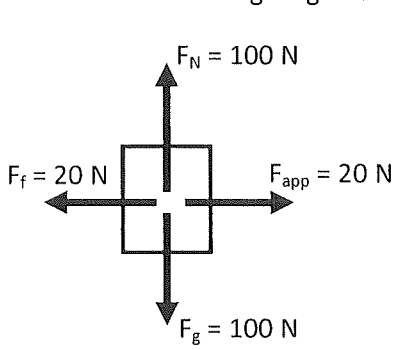


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Worksheet 4.1
Newton's 2nd Law

1) For each of the following diagrams determine the magnitude and direction of the net force.



2) Use the information given for each diagram to fill in all missing blanks.

