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| Force | Description |
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Unit 4: Newton’s Laws **- FBDs**

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

2. A girl sleeps in a hammock which is attached to 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.

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.

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.

1. A 1100 kg car accelerates from rest to 60.0 km/h over a distance of 45 m. Find the net force acting on the car.

Worksheet 4.2: Newton’s Second Law Worksheet #2

1. A 1400 kg car is traveling at 24 m/s when the driver takes his foot off of the gas. The car eventually rolls to a stop after 225 m. Find the force of friction acting on the car.
2. A 950 kg car travels at a constant speed of 35 m/s. If 350 N of friction act on the car, what is the applied force provided by the engine?
3. Ernie pushes Bert on a toboggan across some frictionless snow. Bert and the toboggan have a total mass of 85 kg and they are accelerating at 3.0 m/s2.  
   a. Find Ernie’s applied force (FErnie)

b. If Ernie and Bert hit a bare patch of concrete that exerts a force of friction on the sled of 180 N, what will their acceleration be in this time?

1. A student raises their 15 kg backpack from the floor at a constant velocity of 5.0 m/s. How much force must the student apply?
2. A physics teacher attaches a 4.0 kg brick to a light string (boy do you need a new hobby!) and pulls straight up on it. The brick accelerates upwards at 3.2 m/s2. How much force did the teacher apply to the brick?
3. A 75kg skydiver falls at terminal velocity (220 km/h) before pulling the chute. If she slows to 25 km/h in 3.8 s, determine the average force of air friction that acts on her during her deceleration.
4. A 45 kg chimpanzee on a skateboard accelerates from rest to 13.0 m/s over a distance of 8.0 m. A force of friction of 65 N acts on the board. What force must the chimp apply?
5. A 1350 kg crash test car strikes a cement wall at 24.0 m/s and bounces **back** at 8.0 m/s.   
   a. If it is in contact with the wall for 0.90 s, what force did the wall exert on the car?

b. If the same car had no crumple zones then it would only be in contact with the wall for 0.080 s. What force would the wall exert in this case?

1) 3400 N 2) 1800N 3) 350 N 4) a. 260 N b. 0.94 m/s2 5) 150 N 6) 52 N 7) 1800N 8) 540 N 9)a. 4.8x104 N b. 5.4x105 N

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