



UNIT 6 – NEWTON'S LAWS

IPOD Questions

IT'S *THE* PROBLEM OF *THE* DAY

PROMPT # 31

Draw a free body diagram for the following scenarios:

- 1) A field hockey ball **SLOWS DOWN** due to friction.
- 2) After a long day at school, a student lies **MOTIONLESS** on the couch watching TV.
- 3) A child pulls on a wagon so that it **SPEEDS UP** from rest. Assume friction is present.
- 4) A baseball travels **THROUGH THE AIR** on its way out of the ballpark. Assume no air resistance (friction).



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PROMPT # 32

- A rightward force of 60 N is applied to a crate of books with mass of 45 kg so that it moves with a constant velocity. Friction is present.
 - Draw the free body diagram.
 - Calculate the book's weight.
 - What is the normal force?
 - What is the frictional force?
 - What is the net force?



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PROMPT # 33

A 50 kg crate is being pushed on a horizontal floor at constant velocity. The coefficient of friction between crate and floor is 0.1.

- a) What type of friction exists while the crate is moving?
- b) Determine the value of the applied force necessary to keep the crate moving at a constant velocity.



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PROMPT # 34

- During a game of golf, a player takes a tee shot at the 14th green, which causes the ball to go from rest to 29 m/s (about 65 mi/hr) in 0.75 s. The ball has a mass of 0.11 kg. Assuming that the acceleration is constant, find the average net force exerted on the ball by the golf club.
- For a warm up drill, the soccer coach asks the players to dribble the 1.5-kg ball at constant velocity. The players must apply an 5 N force to the ball. Assume friction is present between the ball and the grass. What is the acceleration of the ball?



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PROMPT # 35

- A car is towing a boat on a trailer. The driver starts from rest and accelerates to a velocity of +11 m/s in a time of 28 s. The combined mass of the boat and trailer is 420 kg. What is the average net force?
- A tow rope is used to pull a 1000-kg car, giving it an acceleration of 2.5 m/s². If the frictional force is 750 N, what force does the rope exert?
Honors: *the applied force exists on an angle of 30 degrees off horizontal.*



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PROMPT # 36

○ Answer the following questions:

- T or F – If an object is at rest, then there must be no forces acting upon the object.
- T or F – It would take an unbalanced force to keep an object in motion at a constant velocity.
- T or F – A balance of forces is demonstrated by an object, which is slowing to a stop.
- T or F – An upward moving object must be experiencing an unbalanced upward force.



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Extra 1

- An applied force of 50 N accelerates a 13.0-kg baby stroller at 2.5 m/s^2 along a park trail.
 - How large is the frictional force?
 - What is the coefficient of friction?
 - ~~If the final velocity of the stroller is a constant 6.0 m/s , what is the stroller's momentum?~~



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Extra 2

- A rightward force is applied to a book that weighs 250 N so that it moves with a constant velocity. A frictional force of 100 N is present.
 - Draw the free body diagram.
 - Calculate the book's mass.
 - What is the normal force?
 - What is the applied force?
 - What is the net force?
 - What is the value of the acceleration?



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Extra 3

- A 68-kg person is descending in an elevator at a constant velocity of 4.0 m/s. At some time, “t,” the elevator starts to slow to a stop at a rate of 2.0 m/s/s. Answer the following questions for (a) the period of constant velocity and (b) the period of acceleration:
 - What is the value of the net force acting on the person in the elevator?
 - What does the person feel like (lighter, normal or heavier)? Draw a free body diagrams with all forces labeled.



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Extra 4

- Ryder applies a downward force 15° below horizontal to his 0.682 kg cart so that he can walk at a constant velocity. If the cart experiences a frictional force of 5 N , what is the value of his applied force on the cart?

