Forces Review

# Forces Intro

1. What is a Force? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = the force at which a massive object attracts another towards itself, directed downward
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = support force exerted on an object on any surface; always 90 degrees to the horizontal
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = The force that resists motion on a surface
4. Match the Units to the Measurements: meters, seconds, newtons, kilograms, m/s/s, m/s
   1. Velocity = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. Force = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. Mass = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   4. Acceleration = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   5. Distance = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   6. Time = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Free Body Diagrams

1. Draw the free body diagram for a glass of water resting on a table.
2. Draw the Free Body Diagram representing the following: A ball that was pushed with 10N and is rolling across a table (4 forces)
3. Draw the Free Body Diagram for a skydiver with their parachute open (2 forces)
4. Calculate the missing forces on the objects below:

470 N 360 N

25 N

25 N

537 N

240 N

Ff = \_\_\_\_\_\_

Fn = \_\_\_\_\_\_

Fnet = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Fnet = 174 N right

1. A basketball is passed with a force of 94 N right. Air resistance is 1 N left. The ball feels 27 N of gravity. Draw the Free body diagram and calculate the net force.

# Newton’s Laws

1. What is Newton’s First Law?
2. Define Inertia
3. Which has more inertia: a speedboat or a cruise-ship? How do you know?
4. Roll a ball along the floor and it stops. Why? Does it follow the first law? How?
5. What equation is Newton’s 2nd Law?
6. You throw a 3 kg rock with an acceleration of 13 m/s/s. What force did you apply to the rock?
7. A sumo wrestler steps on to a scale at weigh in. His mass is 198.8 kg. What is the force of gravity on him? What is the normal force pushing him back up?
8. A 25.0-N force is applied to a 5.0-kg object to accelerate it rightwards. The object encounters 15.0-N of friction. Determine the acceleration of the object. (Neglect air resistance.)
9. A 4.5-kg bucket suspended by a rope is accelerated upwards from an initial rest position. If the upward force on the bucket is a constant value of 80 Newtons, then determine the speed (in m/s) of the bucket after 2 seconds.
10. Write Newton’s Third Law: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
11. What **force** opposes gravity for an object sitting on the ground? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
12. What **force** opposes motion for an object sliding on the ground? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
13. What **force** opposes motion for an object falling through the air? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
14. Draw the Action-Reaction Pair for a foolish freshman punching their locker:

# Weight vs. Mass

1. Calculate the gravitational force of a 77 kg skydiver before they open their parachute in Earth’s atmosphere.
2. Ralphie weighs 760N on earth. What would Ralphie’s weight be on Jupiter? (Hint: Jupiter’s acceleration due to gravity is 24.5 m/s2 … Find Ralphie’s mass first…)