

Gravity, Gears, and Review

Gravity

Gravity is a force that pulls any two masses towards each other. Nothing can stop gravity.

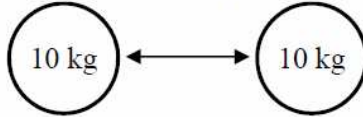
Gravity increases with mass.

Less mass: less gravity



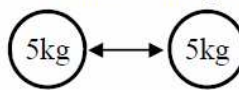
Heavier things have more gravitational force (weight) because they have more mass.

More mass: more gravity

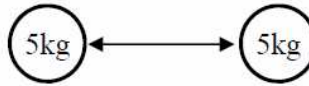


Gravity decreases with distance.

Less distance: more gravity



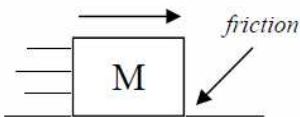
More distance: less gravity



As a spaceship gets closer to a planet, the gravity between the planet and the ship gets stronger.

Friction

Friction is a force that opposes moving objects and occurs any time objects touch. Friction causes heat and takes energy away from moving objects and machines.



The object and the table heat up as the two object rub against each other.

Rough surfaces have more friction than smooth surface.

An object must be touching something to have friction.



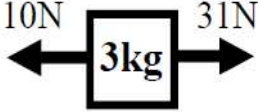
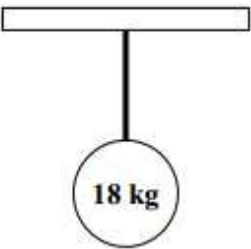

Air friction (air resistance) occurs when objects move thru air. Air friction increases with speed.



Friction can be helpful. A car use the friction of its tires to turn corners.

<p>What is gravity?</p> <p>Does gravity increase or decrease?</p> <p>___ If you increase the mass of one of the objects?</p> <p>___ If you decrease the distance between the two objects?</p> <p>___ If you decrease one of the masses?</p> <p>___ If the objects are farther apart?</p>	<p>Give an example of good friction.</p> <p>Give an example of bad friction.</p>
<p>If an object is not touching a table is there friction between them?</p> <p>What is another name for air friction?</p> <p>Friction always causes what?</p>	<div style="text-align: center;"> </div> <p>A. What is the normal force acting on the object?</p> <p>B. How do static and kinetic friction compare?</p> <p>C. Will this object start to move?</p> <p>D. Why?</p> <p>E. Calculate its acceleration.</p>
<p>For each pair of the objects, which has more inertia?</p> <p>A. A freight train or a car?</p> <p>B. A ping pong ball or a baseball?</p> <p>C. A fast bowling ball or a slow bowling ball?</p>	

<p>Two very small people are pulling a box. Identify the four shown forces as $F_{Applied}$; T; F_w; F_N.</p> <p>A. ___ F_1— the two men pulling WITH A ROPE.</p> <p>B. ___ F_2— the force pushing up by the floor.</p> <p>C. ___ F_3— the force pulling down on the mass.</p> <p>D. ___ F_4— the force trying to stop the mass from moving.</p> <p>E. ___ Which force is in the negative x-direction?</p> <p>F. ___ Which force is in the positive y-direction?</p> <p>G. ___ Which force is in the positive x-direction?</p> <p>H. ___ Which force is in the negative y-direction?</p> <p>I. Which forces would be used in this equation: $\Sigma F_y = ma_y$?</p> <p>J. Which forces would be used in this equation: $\Sigma F_x = ma_x$?</p>	
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<p>Balanced or unbalanced forces?</p> <p>___ 10 N left and 5 N right? ___ If $a = 0$?</p> <p>___ An object accelerating? ___ If $\Delta v = 0$?</p> <p>___ An object at constant speed? ___ When an object turns a corner?</p> <p>___ An object at rest?</p>	<p>Which has more inertia: A 50 kg object or a 10 kg object? A 30 kg object on the earth or in space? A 20 kg object going 50 m/s, or a 30 kg object at rest.</p>
<p>Balanced or unbalanced forces? Calculate the net force and acceleration of the object.</p> <div style="text-align: center;">  </div>	<p>What is the difference between mass and weight?</p> <p>Which changes in space?</p> <p>Mass or Weight: ___ 20 N; ___ 30 kg?</p>
<p>Which falls faster: heavy or light objects? Why?</p>	<p>A 4 kg object accelerates 12 m/s^2 to the left, find the force on it.</p> <p>A 30 N net force pulls to the right on a 5 kg object. Find its acceleration.</p>
<p>Will it accelerate faster or slower? ___ If you increase an object's mass. ___ If you increase the force on the object.</p>	<p>Calculate the weight of a 12 kg object.</p>
<p>A 2 kg object is thrown into the air going 5 m/s. A. Is the object's initial velocity + or -? B. Is the object's acceleration + or -? C. What is the force pulling down on the object (give a number).</p> <p><i>Notice that an object can be moving the opposite way of the acceleration.</i></p>	<p>A 18 kg object is suspended by a rope.</p> <p>A. Draw and label all of the forces acting on the object. B. What is the weight of the object?</p> <p>C. Since it is hanging at rest, what is the acceleration of the object?</p> <p>D. Put all of the above into $\Sigma F = ma$ and calculate the force exerted by the rope.</p>
<div style="text-align: center;">  </div> <p>Which has more inertia? A) A 10 m/s car or a 20 m/s car? B) A heavy rock or a light rock? C) An astronaut on the earth or in space?</p> <p>Balanced or unbalanced forces? A) ___ When an object is changing motion? B) ___ When an elevator starts to move up? C) ___ When an elevator is between floors? D) ___ When a car is using cruise control? E) ___ When a car is coming to a stop?</p> <p>An unbalanced or net force causes an object to change _____ or _____. <i>(Use this for the next question.)</i> A car has three ways to accelerate. What are they?</p> <p>Which of Newton's Laws applies? A) ___ A racing car needs to accelerate faster, so they make the car lighter. B) ___ You push your knuckles into a table and your knuckles start to hurt. C) ___ For a sky diver to fall thru the air at a constant speed, the force of gravity and the force of air friction must be equal.</p>	<p>If there is friction on the table, draw and label all of the forces acting on the two masses at the left.</p> <p>Suzie the slouch is sitting on the school bus. When the bus accelerates forward,</p> <p>A. Which way does Suzie move relative to the bus? B. Which way does Suzie move relative to the ground? C. Which of Newton's Laws does this show?</p> <p>Does the force of gravity increase or decrease? A. ___ If you increase the distance between the objects? B. ___ If you decrease one of the masses?</p> <p>If you need more help with the following, look at the table on the back of "Forces 5". A. If you double the distance, by how much does the gravity change? B. If you triple one of the masses, by how much does the gravity change? C. If you cut the distance to 1/3, by how much does the gravity change?</p> <p>What is Newton's First Law? What is Newton's Second Law? What is Newton's Third Law?</p> <p>Which of Newton's Laws applies? A. ___ To walk forward your foot has to push backwards. B. ___ Your car will accelerate faster if you don't have extra weight in the trunk. C. ___ Without a seat belt, you would be launched forward if your car stops suddenly.</p> <div style="text-align: right;">  </div>