

**Gravity, Gears, and Review**

**Gravity**

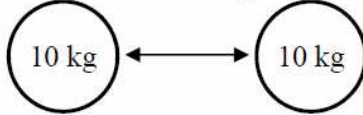
Gravity is a force that pulls any two masses towards each other. Nothing can stop gravity.

Gravity increases with mass.

*Less mass: less gravity*



*More mass: more gravity*

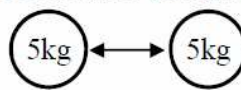


*Heavier things have more gravitational force (weight) because they have more mass.*



Gravity decreases with distance.

*Less distance: more gravity*



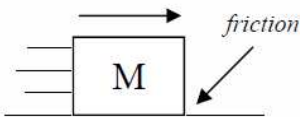
*More distance: less gravity*



*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.**



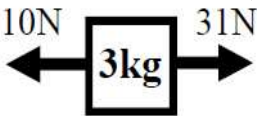
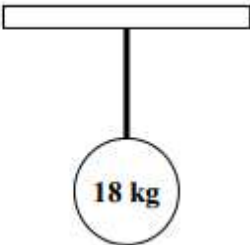

Air friction (air resistance) occurs when objects move thru air. Air friction increases with speed.



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

All sections marked with a ⚡ are considered essential concepts and must be completed to receive full credit on WS.

<p>What is gravity? ⚡</p> <p>Does gravity increase or decrease?        ___ If you increase the mass of one of the objects?        ___ If you decrease the distance between the two objects?        ___ If you decrease one of the masses?        ___ 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 <math>F_{Applied}</math>; <math>T</math>; <math>F_W</math>; <math>F_N</math>.</p> <p>A. ___ <math>F_1</math>— the two men pulling WITH A ROPE.</p> <p>B. ___ <math>F_2</math>— the force pushing up by the floor.</p> <p>C. ___ <math>F_3</math>— the force pulling down on the mass.</p> <p>D. ___ <math>F_4</math>— 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: <math>\Sigma F_y = ma_y</math>?</p> <p>J. Which forces would be used in this equation: <math>\Sigma F_x = ma_x</math>?</p> <div style="text-align: center;"> </div>

<p>Balanced or unbalanced forces?</p> <p>___ 10 N left and 5 N right?      ___ If <math>a = 0</math>?</p> <p>___ An object accelerating?      ___ If <math>\Delta v = 0</math>?</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:</p> <p>A 50 kg object or a 10 kg object?</p> <p>A 30 kg object on the earth or in space?</p> <p>A 20 kg object going 50 m/s, or a 30 kg object at rest.</p>
<p>Balanced or unbalanced forces?</p> <p>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 <math>12 \text{ m/s}^2</math> 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?</p> <p>___ If you increase an object's mass.</p> <p>___ 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.</p> <p>A. Is the object's initial velocity + or -?</p> <p>B. Is the object's acceleration + or -?</p> <p>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.</p> <p>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 <math>\Sigma F = ma</math> and calculate the force exerted by the rope.</p>
<div style="text-align: center;">  </div> <p>Which has more inertia?</p> <p>A) A 10 m/s car or a 20 m/s car?</p> <p>B) A heavy rock or a light rock?</p> <p>C) An astronaut on the earth or in space?</p> <p>Balanced or unbalanced forces?</p> <p>A) ___ When an object is changing motion?</p> <p>B) ___ When an elevator starts to move up?</p> <p>C) ___ When an elevator is between floors?</p> <p>D) ___ When a car is using cruise control?</p> <p>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></p> <p>A car has three ways to accelerate. What are they?</p> <p>Which of Newton's Laws applies?</p> <p>A) ___ A racing car needs to accelerate faster, so they make the car lighter.</p> <p>B) ___ You push your knuckles into a table and your knuckles start to hurt.</p> <p>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?</p> <p>B. Which way does Suzie move relative to the ground?</p> <p>C. Which of Newton's Laws does this show?</p> <p>What is Newton's 1st Law?</p> <p>What is Newton's 2nd Law?</p> <p>What is Newton's 3rd Law?</p> <p>Which of Newton's Laws applies?</p> <p>A. ___ To walk forward, your foot has to push backwards.</p> <p>B. ___ Your car will accelerate faster if you don't have extra weight in the trunk.</p> <p>C. ___ Without a seat belt, you would be launched forward if your car stops suddenly.</p> <div style="text-align: right;">  </div>