

Motion and Machines - Study Guide

Vocabulary Match Up

_____ force	A. A change in an object's position as compared to objects around it.
_____ frame of reference	B. An object's location, or place.
_____ friction	C. A measure of the distance an object travels in a certain amount of time.
_____ gravity	D. A <u>push</u> that moves an object away or a <u>pull</u> that moves an object nearer.
_____ balanced force	E. A force that slows or stops motion between two surfaces that are touching.
_____ motion	F. The force that pulls bodies or objects toward other bodies or objects.
_____ position	G. When two forces act in opposite direction and do NOT cause a change in motion.
_____ unbalanced force	H. When two unequal forces act on an object and cause a change in the motion of that object.
_____ speed	I. Surrounding objects used as a comparison when describing the motion of a particular object

1. A ball rolling along a floor slows and comes to a stop. What force stopped it? What force is keeping it on the floor?

2. Suppose you kicked a soccer ball as hard as you can. What would be the effect on the soccer ball? _____
3. How can you tell if an object is in motion? _____

4. Look at the table to the right.

Which train had the fastest speed? Explain your answer.

Train	Distance Traveled	Time
Zephyr	50 miles	1 hour
Bullet	100 miles	1 hour
Express	80 miles	1 hour

5. If you push a box full of books and an empty box across the sidewalk using the same force, which would move farther? Why? _____

You are playing soccer with your friends at recess. Before the game starts, the ball sits at the sideline and you are about to kick it into play.

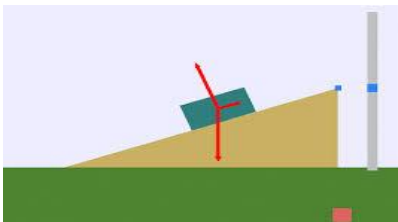
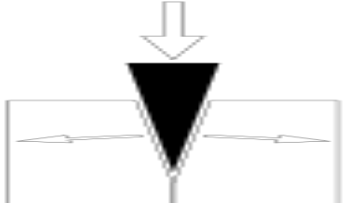
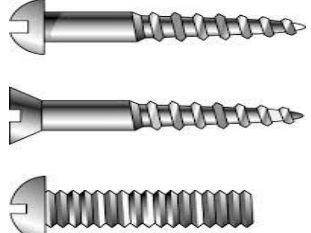

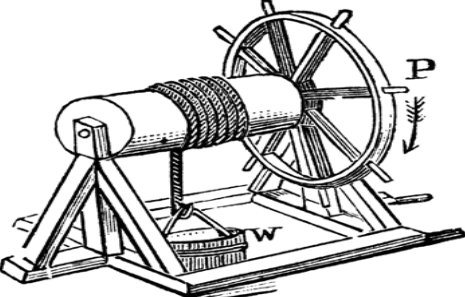

6. Explain if the forces acting on the ball are balanced or unbalanced. _____

7. As you kick the ball into play, do you use a push or a pull to cause a change in the ball's motion? Explain if the force you used was a balanced force or an unbalanced force and why. _____

8. How are gravity and friction alike? _____

9. How are gravity and friction different? _____

10. Name two ways to reduce friction. _____

Simple Machine	Illustration	Definition
inclined plane		<p>A simple machine that changes the</p> <hr/> <hr/> <hr/> <hr/>
_____		<p>A simple machine that changes a downward force to an outward force.</p> <hr/>
screw		<p>A simple machine that</p> <hr/> <hr/> <hr/> <hr/>
_____ and fulcrum		<p>This simple machine changes a downward force to an</p> <hr/> <hr/> <hr/>
wheels & axles		<p>This simple machine has two parts and changes the _____ of the force which is applied.</p>
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Vocabulary Match Up

___ D ___ force	A. A change in an object's position as compared to objects around it.
___ E ___ friction	B. An object's location, or place.
___ F ___ gravity	C. A measure of the distance an object travels in a certain amount of time.
___ G ___ balanced force	D. A <u>push</u> that moves an object away or a <u>pull</u> that moves an object nearer.
___ A ___ motion	E. A force that slows or stops motion between two surfaces that are touching.
___ B ___ position	F. The force that pulls bodies or objects toward other bodies or objects.
___ H ___ unbalanced force	G. When two forces act in opposite directions and do NOT cause a change in motion.
___ C ___ speed	H. When two unequal forces act on an object and cause a change in the speed, direction, or motion of that object.

1. A ball rolling along a floor slows and comes to a stop. What force stopped it? What force is keeping it on the floor? **Friction stopped the ball. Gravity keeps it on the floor.**
2. Suppose you kicked a soccer ball as hard as you can. What would be the effect on the soccer ball? **The soccer ball would move away from you.**
3. How can you tell if an object is in motion? **The object would have changed positions in comparison to other objects around it.**

Train	Distance Traveled	Time
Zephyr	50 miles	1 hour
Bullet	100 miles	1 hour
Express	80 miles	1 hour

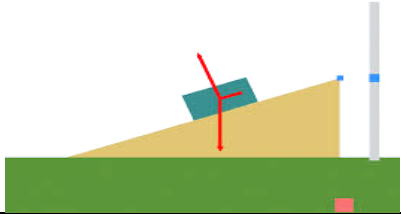
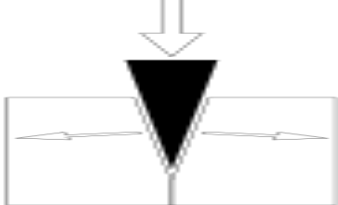

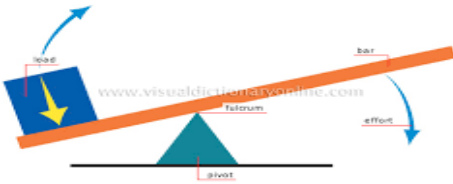
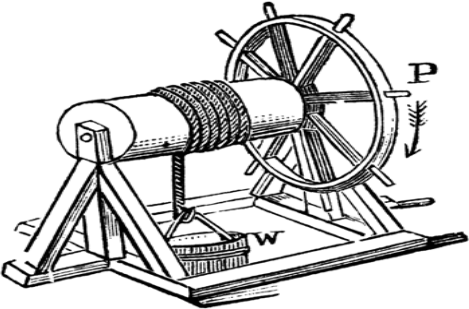
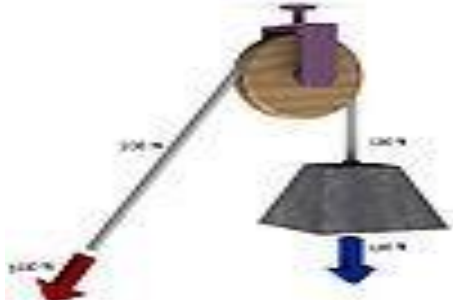
4. Look at data in the table above to answer the following question.
Which train had the fastest speed? Explain your answer.

The Bullet was the fastest train because it went the farthest distance in the same amount of time as all the other trains.

5. If you push a box full of books and an empty box across the sidewalk using the same force, which would move farther? Why?
The empty box would move farther because it has less mass and it requires less force to move the box.

You are playing soccer with your friends at recess. Before the game starts, the ball sits at the sideline and you are about to kick it into play.

6. Explain if the forces acting on the ball are balanced or unbalanced. The force acting on the ball as it sits on the sideline of the playground is a balanced force. When two opposite forces are acting on an object and are an equal in size, we say the forces are balanced. Balanced forces do NOT cause a change in motion.
7. As you kick the ball into play, do you use a push or a pull to cause a change in the ball's motion? Explain if the force you used was a balanced force or an unbalanced force and why. You will use a push to kick a ball. The force is unbalanced because when two forces are acting on an object and are not equal in size, we say the forces are unbalanced. The kick which is used on the ball is a larger, stronger force than the friction and gravity which are working on the ball to keep it still. Unbalanced forces cause a change in motion.
8. How are gravity and friction alike? Gravity and friction are both forces which act to stop objects from moving.
9. How are gravity and friction different? Gravity is the force which pulls objects together. Friction is the force which acts on the surfaces of touching objects to slow and stop their movement.
10. Name two ways to reduce friction. Friction may be reduced when:
- a slippery substance (ice, water, soap, oil) is added to surfaces which are touching
 - wheels or ball bearings are added to one or more of the objects
 - make the touching surfaces as smooth as possible

Simple Machine	Illustration	Definition
<p>inclined plane a simple machine with a smooth, slanted surface</p>		<p>A simple machine that increases the distance over which force is applied allowing a person to use less force to go up.</p>
<p><u>wedge</u> a simple machine made up of two inclined planes that meet to form a sharp edge</p>		<p>A simple machine that changes a downward force to an outward force.</p>
<p>screw a simple machine made up of an inclined plane wrapped around a column</p>		<p>A simple machine that changes a circular force to a downward force.</p>
<p><u>lever</u> and fulcrum a simple machine made up of a stiff bar that moves freely around a stiff point.</p>		<p>This simple machine changes a downward force to an to an upward force.</p>
<p>wheels & axles a simple machine made up of two cylinders that turn on the same axis</p>		<p>This simple machine has two parts and changes the increases the strength of the force that is applied.</p>
<p><u>pulley</u> a simple machine made up of a rope fitted around the rim of a fixed wheel</p>		<p>This simple machine changes a downward force to an to an upward force.</p>