Alissa is the fastest runner in her class. She leaves everyone in the dust, and her dad loves to brag about how she even beats the boys! Alissa’s dad is describing the ________ at which she runs.

A. 〇 energy  
B. 〇 distance  
C. 〇 force  
D. 〇 speed

Levers are simple machines that help lift weight, like a seesaw at a park. The point that a lever turns around is called the ________

A. 〇 effort  
B. 〇 load  
C. 〇 fulcrum  
D. 〇 triangle
A large truck and a small car are hurtling down the road at the same speed. There is a red light up ahead. Which of the following statements is most accurate?

A. The truck needs more time to stop because it’s heavier and has more inertia.
B. The car needs more time to stop because it is lighter and has more inertia.
C. The car and truck can both stop immediately.
D. The truck cannot stop.

A heavy object that pulleys and levers are used to lift is also called a __________.

A. load
B. fulcrum
C. bar
D. weight
Lena rolled a ball down an inclined plane. Its speed increased each second. Which diagram best shows the position of the ball for each second it travels?

A.  
B.  
C.  
D.  

Where is the fulcrum on a pair of scissors?

A.  
B.  
C.  
D.  
Speed is the measure of how fast something is moving. An object’s speed can be calculated as Speed = \frac{\text{Distance}}{\text{Time}}. If a train travels 300 miles in 3 hours, what is its average speed?

A. 300 mph  
B. 30 mph  
C. 3 mph  
D. 100 mph

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Matt is too heavy for Becca to lift on the seesaw! The amount of force Becca needs to use to move Matt would decrease if ________

A. the fulcrum is removed from the lever  
B. the fulcrum is moved closer to Matt  
C. Matt’s mass increases  
D. the fulcrum is moved farther from Matt
Force, Motion, and Simple Machines

MOVING OBJECTS

Work only happens when something is being moved. Which formula is used to measure work?

A. Work = energy x force
B. Work = force x distance
C. Work = Distance
   Time
D. Work = force x time

SIMPLE MACHINES

How’d Jonah make that pile of leaves so quickly? He must have used a rake, which is a type of __________.

A. screw
B. pulley
C. lever
D. wedge
Maya is trying to pull a heavy desk across her bedroom, but it does not budge. Maya is _________.

A. doing work because she is pulling on the desk
B. not doing work because no object moves
C. doing work because she is trying
D. not doing work because she is not pushing

Your Special Agent Mission:
In order to escape the secret vault of Dr. Doodle, you must create a simple machine using a piece of rope and a grooved wheel. What simple machine will you create?

A. lever
B. screw
C. wedge
D. pulley
Olympic snowboarders put wax on their boards to help them glide more smoothly on the snow. Wax is a __________ and decreases friction.

A. powder  B. lubricant  C. mulch  D. gritty material

Tina wishes her dad would just get them a regular remote control. Instead, she has to use his crazy invention which uses a series of __________ to change the direction of force, as well as several other simple machines, just to turn the TV on!

A. wedges  B. screws  C. pulleys  D. wheels and axles
Keyana is pulling a toy car up a ramp. Which tool helps her figure out the amount of force needed to pull the car?

A. spring scale  B. balance
C. graduated cylinder  D. coil scale

You see pulleys everyday. Which of the following is an example of a pulley?

A.  B.  C.  D.
Bob is using force to pull his new walrus home from the pet shop. To measure the force Bob is using, you need to use the unit of measure that measures force, which is called the ____________.

A. □ newton  
B. □ kilogram
C. □ machine  
D. □ pint

Jay uses a clothesline for his latest invention. He can shoo flies away from his lunch while holding the door open for his mother. Which of the following is true about Jay’s use of the clothesline?

A. □ Jay does not have to do any work to shoo flies.
B. □ The clothesline is an example of pulleys which changes the direction of the force.
C. □ The clothesline is an example of an inclined plane that does not change the direction of the force.
D. □ Jay does work to move shoo flies but does not use any force.
Force, Motion, and Simple Machines

MOVING OBJECTS

Jamaire could not believe his eyes when he saw how much he weighed! Weight is ____________.

A. ____________ a measure of the force of gravity pulling on an object
B. ____________ the amount of matter in a given volume
C. ____________ the size of an object
D. ____________ how fast an object would sink in water

SIMPLE MACHINES

A movable pulley ________. It allows you to only have to pull half as hard to lift the load because each side of the rope supports half of the load’s weight.

A. ____________ remains still
B. ____________ does not require work
C. ____________ requires more effort
D. ____________ moves with the load
Force, Motion, and Simple Machines

MOVING OBJECTS

Gear yourself up for this one! Gears are toothed wheels that link together. They are able to do all of the following except:

A. create effort
B. carry turning
C. movement from one place to another
D. change the speed of movement

SIMPLE MACHINES

Mmmmmmm! These cookies are delicious thanks to you rolling them perfectly flat with the rolling pin! A rolling pin is what kind of simple machine?

A. pulley
B. lever
C. inclined plane
D. wheel and axle
"Red light, STOP! Green light, GO, GO, GO!" Increasing speed is an example of __________.

A. a load  B. acceleration  
C. pivoting  D. rotation

Sure, wheel and axle simple machines are useful but they are totally fun, too! Which of the following does not use a wheel-and-axle simple machine?

A.  
B.  
C.  
D.  
Mrs. Moo is driving north on Dairy Drive at a speed of 40 miles per hour. Because you know both the speed and direction of the car, you can describe the _____.

A. size of the car  B. force of gravity pulling on the car
C. velocity of the car  D. acceleration of the car

A doorknob is an example of a wheel-and-axle simple machine. Which diagram below accurately identifies a doorknob’s wheel and its axle?

A.  B.  C.  D.
**14. Force, Motion, and Simple Machines**

MOVING OBJECTS

Ouch! How hard a snowball hits its target depends on its mass and its acceleration. Which famous scientist figured out this relationship as force = mass x acceleration?

A. Sir Isaac Newton  
B. Thomas Edison  
C. Galileo  
D. Thomas Jefferson

**50. Force, Motion, and Simple Machines**

SIMPLE MACHINES

A wheel and axle is a simple machine that helps move an object, like the wheels on your bike! All of the following are true about wheel-and-axle simple machines except:

A. They lift or move loads.  
B. If effort is applied to the wheel, the axle will not turn.  
C. If effort is applied to the wheel, it turns the axle.  
D. If effort is applied to the axle, the wheel turns.
When you stopped that asteroid from hitting Earth, and pushed it back into space, you were using force. Force can change all of the following except:

A. the direction an object is moving  
B. the speed of an object  
C. the way an object is spinning  
D. the brightness of an object

Ricky needs to send his cousin’s birthday present today. The entrance has both steps and a long, gradual ramp. If he takes the stairs, he’ll be using ________.

A. more force over a longer distance  
B. more force over a shorter distance  
C. less force over a longer distance  
D. less force over a shorter distance
Claire uses her bucket to move wet sand to where she is building her sand castle. The force she uses to move the load of sand is called ______________.

A. ______ pulling
B. ______ gravity
C. ______ fulcrum
D. ______ effort

Inclined planes make hard work easier by decreasing the force needed to move an object up. An inclined plane would help you most with

A. ______ opening a box
B. ______ packing a box
C. ______ taping a box shut
D. ______ carrying a heavy box upstairs
It’s moving day! To help Karena pull a cart, Jonah opens the door, and Lisa lifts boxes. All of these tasks require energy, which is ________

A. a change in an object’s position  
B. the ability or power to do work  
C. a push or pull on an object  
D. the ability of an object to stay at rest

It’s tune-up time for Joan’s custom racing bike. She uses a ramp to bring her bike up into the garage. Which statement is not true about the inclined plane Joan is using?

A. It is used to move a load from one level to another.  
B. It has a sloped or slanted surface.  
C. It is the only simple machine that does not move.  
D. It turns and moves on a fulcrum.
When you ______________, you are changing the acceleration of a car.

A. ☐ turn the key and the engine of the car turns on
B. ☐ push the brake pedal and the speed of the car decreases
C. ☐ turn on the headlights and see the road more clearly
D. ☐ fill the tank with enough fuel for the car to run

This knight needs to choose between two inclined planes in order to storm this castle! All of the following are true except:

A. ☐ The less steep inclined plane needs less force to move an object up it.
B. ☐ The longer inclined plane is less steep.
C. ☐ The steeper inclined plane needs less force to move an object up it.
D. ☐ The shorter inclined plane is steeper.
FORCE MOTION and SIMPLE MACHINES

FORCES

Slow down! When you step on your scooter’s back brake, the wheel cover rubs on the wheel causing you to slow down. Your brake uses _________ to slow you to a safe speed.

A. gravity
B. friction
C. inertia
D. pulleys

SIMPLE MACHINES

These different tools have a lot in common! Each one contains which type of simple machine?

A. pulley
B. wedge
C. lever
D. rollers
Kayla likes her playground slide, but she LOVES the water slide because it’s so much faster. This is because the water on the water slide ________ friction.

A. increases  
B. amplifies  
C. transforms  
D. decreases

Mr. Barrick uses an axe to chop wood for his fireplace. Axes are _________.

A. pulleys, which change the direction of force  
B. inclined planes that never move  
C. wedges, which are often used to move heavy loads  
D. wedges, which are often used to split objects apart
FORCE MOTION & SIMPLE MACHINES

Grades 2+
at HOME

by Educational Insights

DOT QUIZ

Jenny pushes her car across the carpet while Sean pushes the same car across the red tile kitchen floor. Whose car will roll the farthest and why?

Jenny’s will roll farthest
A. because carpet has friction and tile doesn’t.
B. because tile has less friction than carpet.
C. because carpet has less friction than tile.
D. since carpet and tile have the same amount of friction.

SIMPLE MACHINES

All aboard! The front of a boat forms a wedge to

A. push the water apart
B. hold the anchor
C. lighten the boat’s mass
D. change the direction of the boat’s force
A. □ has no mass  
B. □ lightweight  
C. □ able to float in water  
D. □ able to sink easily in water

A screw is a simple machine that ____________

A. □ is an inclined plane wrapped around a post  
B. □ has two sides that are inclined planes  
C. □ is the only simple machine that does not move  
D. □ makes lifting heavy objects easier
Earl and his little sister dropped the following objects in a fish tank. Which one is buoyant and will float?

A. key  
B. paper clip  
C. ice cube  
D. spoon

The sharp edges that spiral around a screw are called threads. When you twist a screw into a block of wood, the angle of the threads _____________.

A. prevents the screw from moving  
B. changes the twisting motion into a straight-ahead motion  
C. means that the screw cannot go in straight  
D. allows the screw to pivot around a fulcrum
Hole in one! Jalan and Tyiah each hit a golf ball from the same spot. Tyiah’s golf ball rolled further than Jalan’s ball, passing through the windmill and into the hole! Which statement is most likely true?

A. Jalan and Tyiah applied the same amount of force to their golf balls.
B. Jalan applied more force to his golf ball than Tyiah applied to hers.
C. Tyiah applied more force to her golf ball than Jalan applied to his.
D. Tyiah has been playing golf longer than Jalan.

Sally is super smart so she used screws, not nails, to build her ramp! Nails are more likely to loosen than screws because __________.

A. nails are not simple machines but screws are
B. screws are always longer than nails
C. the smooth surface of a nail has more friction than a screw
D. the ridges, or threads, on a screw have more friction than a nail
Poor Olivial It didn’t matter whether she used the same amount of force to roll a lighter ball as she did to roll a heavier ball, they both ended up in the gutter. Which statement is true?

A. The heavier ball earned a strike for Olivia.
B. The heavier ball will roll into the gutter more quickly than the lighter ball.
C. The heavier ball rolled into the gutter more slowly than the lighter ball.
D. The heavier ball was easier to roll.

Dad’s flower bed must have mulch. How much—errr, how much mulch? A wheelbarrow full, so much that mulch over here! Which two simple machines make up a wheelbarrow?

A. a wheel and axle and a lever
B. a lever and an inclined plane
C. a pulley and a wheel and axle
D. a screw and an inclined plane
This book bag weighs a ton! It’s so heavy you can’t even lift it! Dragging it across the floor to your desk is easier than carrying it there because ________________.

A. it takes more force to lift against gravity than it does to pull against the force of friction
B. lifting a heavy object requires no force, only work
C. pulling a heavy load across the floor takes more effort than lifting it, you do not need to do any work to lift a heavy object against the force of gravity
D. ________________

You’ll need a magnet to hang that masterpiece! A magnet would most likely be attracted to a refrigerator door that ____________.

A. is sticky
B. has wires
C. contains iron
D. contains lead
It's the boys against the girls! The boys and the girls are pulling their hardest, but the rope hasn't budged an inch! That's because _____________.

A. the boys are pulling with more force than the girls
B. the girls and the boys are pulling with the same force
C. the girls are pulling with more force than the boys
D. the boys are pulling in the same direction as the girls

In science class, Nico sprinkles iron filings around a magnet and watches as they take the shape shown in the picture below. This shows the magnet's _____________.

A. charge
B. magnetic field
C. electricity
D. capacity
Sarah is riding her new bike around the park and comes across two huge hills of the same height. Which of the following statements is true?

**HILL "A"**
A. Sarah needs more force to climb Hill B since the path's slope is steeper.
B. Sarah won't need any force on Hill A because of inertia.
C. Sarah needs more force to climb Hill A since the path's slope is less steep.
D. Sarah will use the same amount of force for both hills.

Magnets on your fridge work all the time. But you wouldn’t use a(n) __________ to hang things there, because they only work when electricity runs through a coil of wire.

A. power magnet
B. compass
C. lodestone
D. electromagnet
Sit down and hang on! The zoo tram is off to the hippo exhibit. You don’t want to fall off when it starts up quickly due to ________.

A. inertia  
B. gravity 
C. Newton  
D. ice

Some rocks can’t help it; they just have magnetic personalities. A naturally magnetic rock is (a) ________.

A. lodestone  
B. granite 
C. compass 
D. diamond
Bryce was giving his little brother Eric a wild ride, when an angry look from his mother stopped him short! Due to inertia, Eric most likely ________.

A. remained perfectly still
B. kept moving forward, falling out of the front of the cart and into the tomatoes
C. began moving backwards, falling out of the back of the cart and into his brother
D. lost gravity but did not fall at all

A compass doesn’t always point you in the right direction. Because it’s attracted to Earth’s magnetic field, it actually only points in one direction, which is __________. I hope that’s the way you want to go.

A. east
B. west
C. north
D. south
Newton’s First Law of Motion states that an object at rest shall stay at rest, and an object in motion shall stay in motion, unless acted upon by an unbalanced force. Which means the piece of cake you left on the table

__unless your dog got to it!__

A. [ ] should still be there  
B. [ ] should fall to the floor  
C. [ ] will be on your chair  
D. [ ] will begin moving

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The biggest magnet on Earth is actually Earth’s giant magnetic field, which allows your compass to work. Which of the following in not true about the magnetic field?

A. [ ] The location of the magnetic poles stays about the same.  
B. [ ] Compasses point toward the magnetic north pole.  
C. [ ] The geographic north pole is in exactly the same location as the magnetic north pole.  
D. [ ] The earth’s core is made of iron, which creates this giant magnetic field.
Unfortunately William, who tossed his ball as high as he could, did not count on the force of __________, which pulls things toward the earth.

A. gravity
B. friction
C. tension
D. spring

Let’s get together! Which picture best shows how to place magnets so that they will attract each other?

A. S N S N
B. S S N S
C. N S N S
D. N S N
Force, Motion, and Simple Machines

FORCES

Oh, no! Maura’s two best snow globes of exactly the same size and shape have fallen off the shelf at exactly the same time! The princess snow globe weighs more than the horse one, so which of the following is going to happen?

A. The princess globe hits the floor first since gravity accelerates heavier objects quicker.
B. The horse globe hits the floor first since it weighs less than the princess globe.
C. They hit the floor at the same time since acceleration from gravity is the same despite different weights.
D. The princess globe hits the floor first since it has less friction than the horse globe.

Force, Motion, and Simple Machines

MAGNETISM

It’s no magician’s trick! When you place Magnet B above Magnet A, Magnet B appears to float. But why?

A. The like poles of the magnet attract each other.
B. The like poles of the magnets repel each other.
C. The magnets are not exactly the same size.
D. Magnet A does not attract any other magnets.
It’s a Snow Day, so grab your sled! Krystal went to Tonsla Park and flew down 50 meters in 11 seconds. Then, at Jefron Park, she went flying down a 50-meter hill in 19 seconds. Assuming the snow at both parks is the same, the Tonsla Park’s hill __________.

A. is slower than Jefron Park’s hill
B. has the same slope as Jefron Park’s hill
C. has a steeper slope than Jefron Park’s hill
D. is identical to Jefron Park’s hill

Regina’s teacher gave her a bar magnet with a north pole and a south pole. Regina broke that magnet into two pieces, so she now has two smaller magnets. Which of the following statements is true?

A. Regina has one magnet with two north poles, and one magnet with two south poles.
B. Both of Regina’s magnets have two north poles.
C. Each of Regina’s magnets has a north pole and a south pole.
D. Both of Regina’s magnets have two south poles.
You use simple machines every day. Did you turn a door knob today? Ride a skateboard? Use a knife? Simple machines help us by reducing the amount of _________ needed to do work.

A. speed
B. mass
C. kinetic energy
D. force

Unfortunately for the evil Dr. Magno, as your spaceship pulls free of his giant magnet, the force of attraction between your ship and the giant magnet __________, allowing your escape!

A. repels each other
B. does not change
C. increases
D. decreases
FORCE MOTION & SIMPLE MACHINES

Grades 2+
at HOME

DOT QUIZ

Rosie gets to help Mrs. Schechtman staple the school’s holiday play pamphlets together! A stapler is what kind of simple machine?

A. lever  B. pulley
C. screw  D. inclined plane

Oops! Lester knocked over the shelf! A magnet should be able to pick up all of the following except:

A. metal ruler  B. metal jar lid
C. paper envelopes  D. metal safety pins