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STUDENT HANDOUTS

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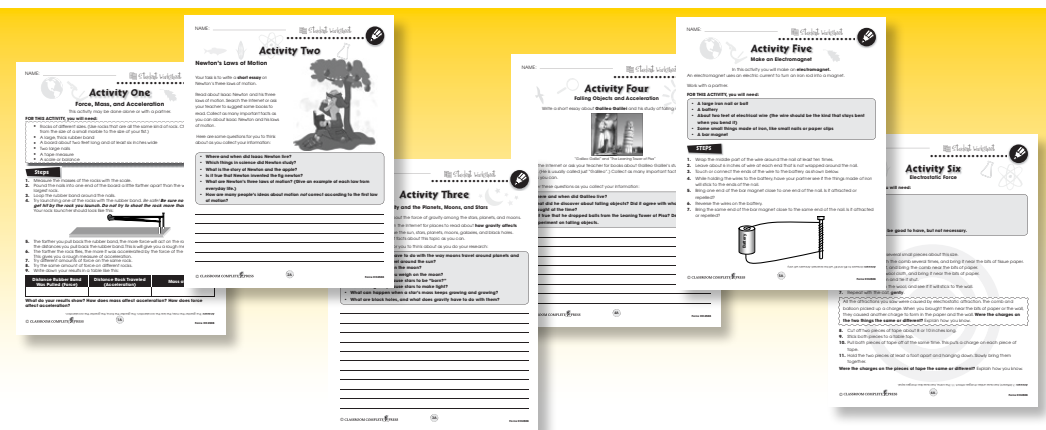
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6 Bonus Activities!

3 EASY STEPS to receive your 6 Bonus Activities!

- Go to our website:
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- Click on item CC4508 – Force
- Enter pass code CC4508D





Balanced and Unbalanced Forces

1. **Circle** the word True if the statement is true. **Circle** the word False if it is false.

- a) If you are sitting still right now, the net force acting on you is zero.
True False
- b) A car moving at a steady speed of 50 miles per hour has no forces acting on it.
True False
- c) When an arrow is used to show a force, the length of the arrow shows the amount of force.
True False
- d) Things fall to the ground because they are acted on by a force.
True False
- e) Net force is the same as the force of gravity.
True False

2. Put a check mark (✓) next to the answer that is most correct.

- a) When you use an arrow to show the force of gravity on something, which way should the arrow point?
 A up
 B down
 C in whatever direction the thing is moving
 D in the opposite direction that the thing is moving
- b) Two horses are pulling a wagon. Each horse pulls with a force of 500 pounds. What is the net force on the wagon?
 A zero
 B 500 pounds
 C 1,000 pounds
 D 2,000 pounds
- c) What is acceleration?
 A speeding up
 B slowing down
 C a steady speed
 D a very fast speed



Balanced and Unbalanced Forces

We have read that the forces acting on something can be combined into a net force. You may remember that sometimes the net force is zero. When the net force is zero, we say the forces are **balanced**.



At other times, the forces combine to give a net force that is not zero and acts in one direction or another. When the net force acts in some direction, we say the forces are **unbalanced**.

When the forces on something are balanced, the motion of the thing does not change. If it is sitting still, it will go on sitting still. If it is moving at some speed in some direction, it will continue to move at that speed in that direction.

When forces on something are unbalanced, the motion of the object will change. It might go faster, it might go slower, or it might go in a different direction. Speeding up is called **acceleration**. Slowing down is called **deceleration**.

The forces on a ball thrown into the air are unbalanced. The main part of the net force on the ball is the force of gravity pulling it back to earth. This net force causes all three kinds of change in motion. As the ball goes up, it decelerates until it reaches its highest point. At the high point, the ball changes direction. Finally, the ball accelerates as it falls back to the ground.



Balanced and Unbalanced Forces

1. Put a check mark (✓) next to the answer that is most correct.

- a) Which is the **best** way to say what an unbalanced force is?
 A a net force that is not zero
 B the force that acts against gravity
 C a force that moves things sideways
 D the largest force acting on something
- b) Which is true of a feather that is floating toward the ground at a steady speed?
 A The feather is decelerating.
 B The net force on the feather is zero.
 C Forces on the feather are unbalanced.
 D Gravity is the only force acting on the feather.
- c) If you force a balloon under water and then let go, the balloon will rise quickly to the surface. Which describes the force on the balloon just after it is let go?
 A The net force is zero.
 B The force is unbalanced.
 C The force arrows all point up.
 D The force of gravity does not act on the balloon.

2. Fill in each blank with a word from the list. Some words may be used more than once or not at all.

balanced	unbalanced	acceleration
deceleration	net	direction

When the forces are _____ a _____ the _____ b _____ force is zero. An unbalanced force can cause _____ c _____ or change of _____ d _____.

_____ e _____ Combining forces gives the _____ f _____ force.



Balanced and Unbalanced Forces

Answer the questions in complete sentences.

3. Give an example of a person or thing that is acted on by balanced forces. Name the forces.

4. Give an example of a person or thing that is acted on by unbalanced forces. Name the forces.

Extension & Application

5. Look at the picture on the next page. It shows the **path** of a person diving off a diving board, entering the water, and coming back up to the surface. **The dotted line shows the path she followed through the air and water.**

Six points on the path of the diver are marked with the letters A, B, C, D, E and F.

For each point tell these things:

- Is the force on the diver balanced or unbalanced?
- If the force is unbalanced, show the direction of the force with an arrow.
- Name the forces that make up the net force.
- If the motion is changing, is it accelerating, decelerating, or changing direction?

Write your answers in the chart on the next page. Point A has been done for you.



Activity Four

Magnetic Force

For this activity you will need a **magnet** and a **compass**. Any kind of magnet will do—a bar magnet, horseshoe magnet, or a refrigerator magnet. Anything made of iron or steel is attracted to a magnet. (Steel is made mostly of iron.) Find as many things as you can that are made of iron or steel.

This is what you do:

1. Hold the magnet against different objects. If the magnet sticks to the object it is made at least partly of iron. If you have a bicycle, see which parts of it are made of iron or steel.
2. Many parts of cars that used to be made of steel are now made of plastic. See which parts of a car are made of steel.
3. Some things that look like gold or silver are iron inside, covered with a thin coating of gold or silver. Try to find something that is iron coated with gold or silver.
4. Make a list of things that are iron or steel and a list of things that are some other material.
5. Find a tin can. Tin is not attracted to a magnet. Is a tin can all tin?
6. Look at the compass and see how the needle in it moves. The needle is a small magnet. It always points toward the North Pole of Earth because the Earth is a magnet.
7. Bring the magnet near the compass and see if the needle points in a different direction.

Which magnetic force is stronger, that of the Earth or that of your magnet?



Word Search Force

Find all of the words in the Word Search. Words are written horizontally, vertically, diagonally, and some are even written backwards.

acceleration	electrical	friction	mass	pole
air	charge	grams	matter	positive
attraction	electrostatic	gravity	negative	repel
balanced	exert	magnet	net	south
contact	force	magnetic	north	weight

B	S	O	U	T	H	G	I	E	W	C	D	F	G
H	S	J	K	L	M	M	N	L	P	Q	R	S	T
V	A	B	A	L	A	N	C	E	D	W	X	Z	B
E	M	T	C	A	T	N	O	C	C	E	D	F	G
V	A	H	J	K	T	L	M	T	C	N	P	R	Q
I	G	A	C	C	E	L	E	R	A	T	I	O	N
T	N	R	S	E	R	T	O	O	E	A	I	O	O
A	E	P	S	V	L	F	W	S	X	P	R	Z	I
G	T	O	B	M	C	E	D	T	C	T	E	F	T
E	G	S	H	J	A	K	C	A	H	L	X	L	C
N	O	I	T	C	A	R	T	T	A	N	E	M	I
P	Y	T	I	V	A	R	G	I	R	Q	R	R	R
S	T	I	V	W	X	N	Z	C	G	I	T	B	F
C	D	V	F	G	H	J	E	K	E	L	C	M	N
P	Q	E	L	O	P	C	I	T	E	N	G	A	M
R	B	S	C	T	D	V	F	W	G	X	H	Z	L



Comprehension Quiz

25

Part A

Circle the word **True** if the statement is true. Circle the word **False** if it is false.

7

1. A force is a push or a pull.
True **False**
2. Air resistance is a force that acts at a distance.
True **False**
3. Gravity repels, but it does not attract.
True **False**
4. Friction is a contact force.
True **False**
5. Combining the forces acting on an object gives the net force.
True **False**
6. The more mass a thing has, the more a force will change its motion.
True **False**
7. The north pole of a magnet will be attracted to the south pole of another magnet.
True **False**

Part B

Put a check mark (✓) next to the answer that is most correct.

3

1. Which of these is a force?
 A energy
 B friction
 C mass
 D work
2. Which is the force of attraction between the masses of any two objects?
 A gravity
 B friction
 C air resistance
 D magnetic force
3. Which is true of any object acted on by an unbalanced force?
 A It is not moving.
 B Its net force is zero.
 C Its motion is changing.
 D It is moving at a steady speed.

SUBTOTAL: /10

Galileo Galilei and The Leaning Tower of Pisa



It has been said Galileo discovered how objects fall by dropping balls of different masses from the Leaning Tower of Pisa. Actually he rolled balls down a ramp.



Balanced and Unbalanced Forces

Answer the questions in complete sentences.

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Extension & Application

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- Name the forces that make up the net force.
- If the motion is changing, is it accelerating, decelerating, or changing direction?

Write your answers in the chart on the next page. Point A has been done for you.



3.
Answers will vary.
Example: Car travelling at a steady speed. Force of the wheels pushing on the road, friction, air resistance.

4.
Answers will vary.
Example: A falling object, gravity, air resistance.

5.
B: unbalanced; ↓; gravity & air resistance; changing
C: unbalanced; ↓; gravity & air resistance; speeding
D: unbalanced; ↑; gravity, buoyancy & water resistance; slowing
E: unbalanced; ↑; gravity, buoyancy & water resistance; changing
F: unbalanced; ↑; gravity, buoyancy & water resistance; speeding

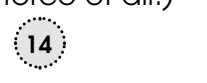


Answers will vary
13.
Answers will vary.

1.
Mass does not affect air resistance.

2.
Surface increases air resistance.

3.
a) No
b) No
c) No
(Helium balloons are acted on by the buoyant force of air.)



2.
The greater the speed of rising or sinking, the greater the net force. Closest to being balanced on the egg

5.
Yes, weight is different in the water. Buoyant force is weight in air minus weight in water.



7.
Magnet has more force



Across:
1. south

3. gravity
6. matter
7. electrostatic
10. acceleration

12. negative
13. magnet

14. weight
Down:
2. unbalanced
3. grams
4. attraction
5. deceleration

8. repel
9. mass
11. exert
12. net

