



## TEACHER GUIDE

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## STUDENT HANDOUTS

- Reading Comprehension

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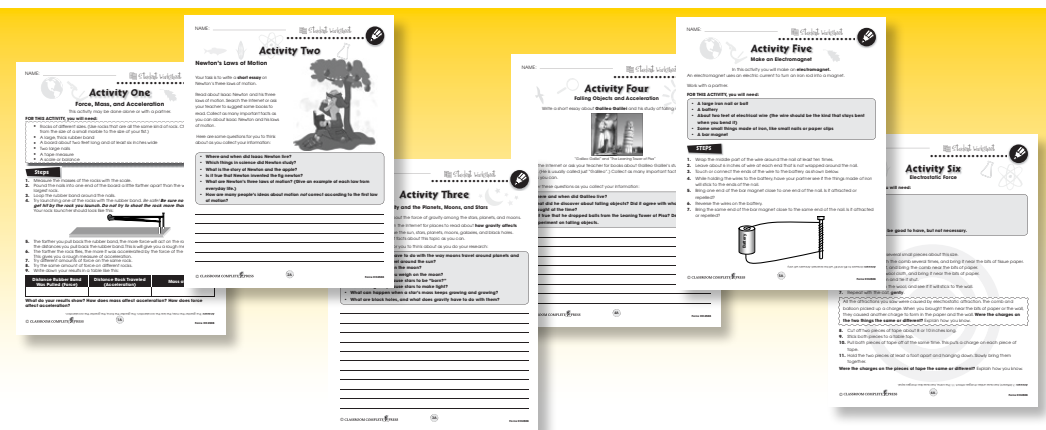
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## FREE! 6 Bonus Activities!

### 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





# Gravity

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

- a) On Earth, gravity always pulls in the direction we call "down."  
**True**      **False**
- b) Gravity pulls, but it never pushes.  
**True**      **False**
- c) Only planets have gravity.  
**True**      **False**
- d) Only solid things are pulled by gravity.  
**True**      **False**
- e) Gravity is the only force that can act without touching.  
**True**      **False**

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

- a) **What force causes falling things to speed up?**  
 A gravity  
 B friction  
 C air resistance  
 D magnetic force
- b) **Which of these things would happen if the force of gravity were somehow turned off?**  
 A The Earth would stop spinning.  
 B The Earth would crash into the sun.  
 C The moon and Earth would drift apart.  
 D Everything on Earth would become much heavier.
- c) **All of these forces can act at a distance, except \_\_\_\_\_.**  
 A gravity  
 B friction  
 C magnetic force  
 D electrostatic force



# Gravity

**W**e said earlier that there are mysterious forces that can push or pull things without touching them. This is called force at a distance. The force at a distance you feel most often is the force of gravity.



The force of gravity is an attraction between any two things made of matter. Every bit of matter in the world is attracted to every other bit of matter. You may remember that gravity only pulls; it never pushes.

Maybe you are wondering why you don't see everything being pulled together. Most things don't stick to you, and you can't feel yourself pulled toward other people. The reason is that gravity is a very weak force. We don't notice gravity unless something has a lot of mass.

The Earth is something with a lot of mass. Earth's gravity pulls everything toward it. It pulls on you so hard that you can only jump a few feet above the Earth before gravity pulls you back. When we use the word "down," we mean "the direction that gravity pulls."

The more mass two things have, the stronger will be the force of gravity pulling them together. The farther apart two things are, the weaker will be the force of gravity pulling them together.



# Gravity

1. Write each word beside its meaning.

grams	gravity	mass	pounds	weight
-------	---------	------	--------	--------

- \_\_\_\_\_ a) the force with which Earth's gravity pulls on something
- \_\_\_\_\_ b) a way to measure mass
- \_\_\_\_\_ c) a way to measure weight
- \_\_\_\_\_ d) the force of attraction between two masses
- \_\_\_\_\_ e) the amount of "stuff" in something

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

- a) **What causes ocean tides to rise and fall?**  
 A the pull of the moon's gravity  
 B sloshing caused by Earth's spin  
 C changes in the mass of salt water  
 D changes in the strength of Earth's gravity
- b) **What gives us weight?**  
 A the pull of Earth's gravity  
 B the motion of Earth around the sun  
 C the magnetic force at Earth's poles  
 D friction between our feet and Earth's surface
- c) **What tells how strong the force of gravity will be between two things?**  
 A the things' masses and the things' weights  
 B the things' weights and the mass of the Earth  
 C the mass of the Earth and the distance between the things  
 D the distance between the things and the things' masses

# Gravity

Answer the questions in complete sentences.

3. What is weight? In what units is weight measured?

\_\_\_\_\_

4. What is mass? In what units is mass measured?

\_\_\_\_\_

## Extension & Application

5. The force of gravity on the moon is a lot less than the force of gravity on Earth. The moon only pulls with  $\frac{1}{6}$  the force of Earth's gravity.

a) Use the word **mass** to explain why the moon's gravity is less than Earth's gravity.

\_\_\_\_\_

b) If a person weighs **120 pounds** on Earth, how much would they weigh if they went to the moon?

\_\_\_\_\_

c) If you can throw a ball **30 feet** into the air on Earth, how high could you throw it on the moon?

\_\_\_\_\_

d) If a person has a **mass** of 55 kilograms on Earth, what would be their mass on the moon?

\_\_\_\_\_





## Activity Two

### The Force of Air Resistance

Learn about the force of air resistance. When things fall they are acted on by two forces: **gravity** and **air resistance**. The force of gravity is the same on all objects. This means that, if there were no air, everything would fall the same way. That is, everything would fall with the same acceleration. It's hard to believe, but a feather and a rock would hit the ground at the same time if there were no air! This has been proved by dropping things in a container that has had the air pumped out of it.

You will need to do this activity with a partner.

**FOR THIS ACTIVITY, you will need:**

- A stopwatch
- Several of the following things:

a feather                      a coin                      a sheet of paper  
a balloon                      a block of wood                      a lead weight, like a fishing weight  
a dried pea or bean

**STEPS:**

1. One person drops each object from a height. Drop all objects from the same height.
2. The other person uses the stop watch to measure how long it takes the object to fall.
3. Try different sizes of the same thing. For example, cut the paper into smaller pieces to see if size changes the time to fall.

**Remember:** The *longer* it takes something to fall the *greater* is the air resistance.

**QUESTIONS:**

1. How does mass affect air resistance?  
\_\_\_\_\_
2. How does the amount of surface affect air resistance?  
\_\_\_\_\_
3. You may have seen helium balloons. They don't fall at all, but rise into the air.
  - a) Does this mean helium balloons have no mass? \_\_\_\_\_
  - b) Do they have negative mass? \_\_\_\_\_
  - c) Do they have negative air resistance? \_\_\_\_\_

Reading about the "buoyant force" will help you answer these questions.



## 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	P	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	V	A	R	G	I	R	Q	R	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

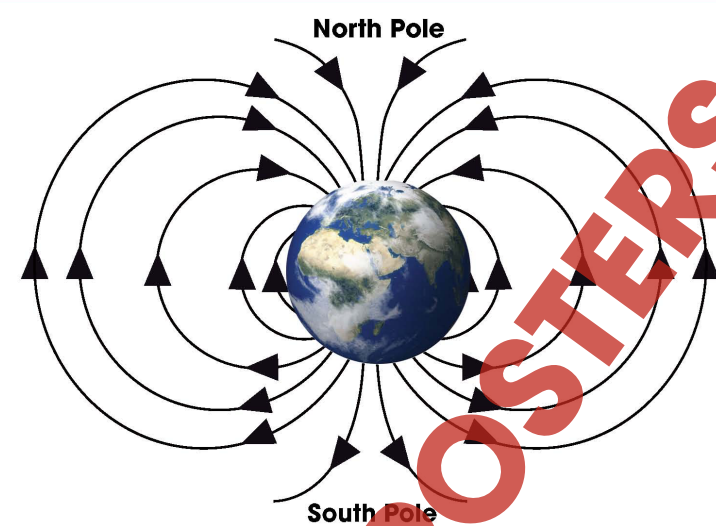
### Part C

Answer the questions in complete sentences.

1. Name **two** forces acting on a falling object. Tell the **direction** in which each force acts. 3  
\_\_\_\_\_  
\_\_\_\_\_
2. When an arrow is used to show a force, what **two** things does the arrow show about the force? 3  
\_\_\_\_\_  
\_\_\_\_\_
3. Tell what a **contact** force is. Give two examples of contact forces. 3  
\_\_\_\_\_  
\_\_\_\_\_
4. Give an example of something that is acted on by **balanced** forces. Name the forces that are in balance. 3  
\_\_\_\_\_  
\_\_\_\_\_
5. Name the **two poles** of a magnet. When do two poles attract each other? When do two poles repel each other? 3  
\_\_\_\_\_  
\_\_\_\_\_

SUBTOTAL: /15

## Earth's Magnetic Field



These are the magnetic lines of force of Earth's magnetic field.



Earth's magnetic field causes the aurora borealis, also called the northern lights.

NAME: \_\_\_\_\_

After You Read 



# Gravity

Answer the questions in complete sentences.

3. What is weight? In what units is weight measured?

\_\_\_\_\_

\_\_\_\_\_

4. What is mass? In what units is mass measured?

\_\_\_\_\_

\_\_\_\_\_

## Extension & Application

5. The force of gravity on the moon is a lot less than the force of gravity on Earth. The moon only pulls with **1/6** the force of Earth's gravity.

a) Use the word **mass** to explain why the moon's gravity is less than Earth's gravity.

\_\_\_\_\_

b) If a person weighs **120 pounds** on Earth, how much would they weigh if they went to the moon?

\_\_\_\_\_

c) If you can throw a ball **30 feet** into the air on Earth, how high could you throw it on the moon?

\_\_\_\_\_

d) If a person has a **mass** of 55 kilograms on Earth, what would be their mass on the moon?

\_\_\_\_\_

**3.**  
The force of Earth's gravity pulling on something. Measured in pounds or newtons.

**4.**  
The amount of stuff/matter in something. Measured in grams or kilograms.

**5.**  
a) The moon has less mass than Earth

b) 20 pounds  
( $120 \div 6 = 20$  OR  $120 \times \frac{1}{6} = 20$ )

c) 180 feet  
( $30 \times 6 = 180$ )

d) 55 kg (mass of an object stays the same regardless of the forces acting on it)

Answers will vary

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Answers will vary.

**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.

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**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.)

13

**7.**

Magnet has more force

15

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

16



EASY MARKING ANSWER KEY

