



## TEACHER GUIDE

• Assessment Rubric .....	4
• How Is Our Resource Organized? .....	5
• Bloom's Taxonomy for Reading Comprehension .....	6
• Vocabulary .....	6



## STUDENT HANDOUTS

- Reading Comprehension

1. What Is Motion? .....	
2. How to Recognize Motion .....	
3. Velocity and Speed .....	
4. Acceleration .....	
5. How to Graph Motion .....	
6. Vibrating Motion .....	7
7. Wave Motion .....	

• Hands-on Activities .....	12
• Crossword .....	16
• Word Search .....	17
• Comprehension Quiz .....	18



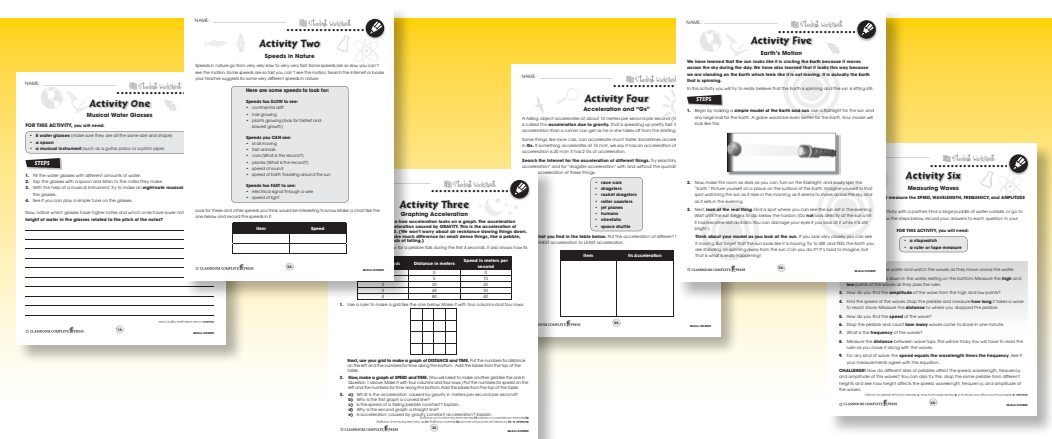
<b>EASY MARKING™ ANSWER KEY</b> .....	20
---------------------------------------	----

<b>MINI POSTERS</b> .....	22
---------------------------	----

**FREE!** 6 Bonus Activities!

**3 EASY STEPS** to receive your 6 Bonus Activities!

- Go to our website:  
[www.classroomcompletepress.com/bonus](http://www.classroomcompletepress.com/bonus)
- Click on item CC4509 – Motion
- Enter pass code CC4509D





## Vibrating Motion

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

- a) Vibrating motion is up and down or back and forth.

**True**      **False**

- b) Sound can travel through solids.

**True**      **False**

- c) Sounds are made by things that vibrate.

**True**      **False**

- d) Pitch is the same as loudness.

**True**      **False**

- e) Sound travels faster than cars.

**True**      **False**

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

- a) Which of these moves with a vibrating motion?

- A a spinning top  
 B a falling pebble  
 C a flowing stream  
 D a plucked guitar string

- b) What is frequency?

- A how far something vibrates  
 B how long something vibrates  
 C how often something vibrates  
 D how loudly something vibrates

- c) Which does not carry sound?

- A iron  
 B water  
 C nitrogen gas  
 D empty space



## Vibrating Motion

The pictures show three things that move with a vibrating motion, arranged from most pleasant to most unpleasant. When something vibrates it moves back and forth or up and down.



Harp



Bee



Woodpecker



Jackhammer

We can see the jackhammer and woodpecker's head moving back and forth. The motion of the harp strings and bee's wings are so fast we just see a blur.

The speed of the vibration is called the **frequency**. Frequency tells how often (how frequently) the thing vibrates. It is usually given in vibrations per second. When the vibration has a low frequency of just a few vibrations per second, we can hear each separate vibration. We hear each whack of the woodpecker's bill. When the frequency is high, we hear a steady hum or a musical note.

Musical instruments make sounds by vibrating at frequencies between about 25 and 4,000 vibrations per second. Our ears are able to hear sounds between about 20 and 20,000 vibrations per second.

In music the word **pitch** is usually used instead of frequency. High-pitched notes have

**Dogs can hear "silent" dog whistles that make a sound with a frequency of 22,000 vibrations per second. Why can't people hear these whistles?**



high frequencies, and low-pitched notes have low frequencies. Every sound comes from something that is vibrating. In different kinds of musical instruments, different things vibrate to make the notes. For guitars, violins, pianos, and harps, it is the strings. For brass horns, it is the metal. For drums it is the drum head.



## Vibrating Motion

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

- a) High-pitched notes have high frequencies.

**True**      **False**

- b) Frequency is measured in seconds per vibration.

**True**      **False**

- c) Earthquakes send out waves.

**True**      **False**

- d) Most of the sound of a drum comes from the vibration of the drumsticks.

**True**      **False**

- e) Most people can hear sounds with frequencies between 20 and 40 vibrations per second.

**True**      **False**

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

- a) What is an eardrum?

- A an ear protector of drummers  
 B the smallest drum in a drum set  
 C an earring with a built-in hearing aid  
 D the part of our ear that senses sound

- b) About how fast does sound travel in air?

- A 3 miles per hour  
 B 20 miles per hour  
 C 770 miles per hour  
 D 20,000 miles per hour

- c) What are seismic waves?

- A heat waves  
 B waves on the ocean  
 C waves sent out by earthquakes  
 D sound waves too high-pitched to hear

## Vibrating Motion

Answer the questions in complete sentences.

3. Tell how we hear a sound. Begin with how the sound starts and end with a message about the sound reaching the brain.

\_\_\_\_\_

4. Choose **two** musical instruments and tell how each sends out musical sounds.

\_\_\_\_\_

5. How are **sound waves** and **seismic waves** similar to each other? How are they different from each other?

\_\_\_\_\_

### Extension & Application

6. The **musical scale is divided into octaves**. When two musical notes are one octave apart, the higher note has exactly twice the frequency of the lower note. People can hear notes between about 20 and 20,000 vibrations per second.

How many octaves are in the range of human hearing? \_\_\_\_\_

Explain or show how you got your answer in the space below



# Circular Motion

This activity is best done with TWO people. You and your partner will need something to sit or stand on that will spin. A swivel office chair works well. A large "lazy Susan" platter will also work. You will also need a bicycle wheel. You will need the whole wheel and axle system, not just a tire. (Your teacher may be able to help you find these things.)

This activity has two parts.

## Part A

1. Hold the bicycle wheel by the axle with two hands. Have the other person spin the wheel as fast as he or she can.
2. When the wheel is spinning, try to change its ANGLE by moving one hand up while keeping the other where it is.
3. Tell what happened. Something in motion changed direction, so it must have been acted on by a force. What **changed direction**? What was the **force**?

---



---



---

## Part B

1. Sit in the office chair and hold your arms straight out. Have someone spin you as fast as they can by pushing on one of your arms.
2. Now, pull your arms in tight against your body. What happened?
3. While you are still spinning, put your arms out again. What happened?
4. For Steps 2 and 3, what was the **change in motion**? What **force** was involved?

---



---



---



# Word Search

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

- |              |          |           |
|--------------|----------|-----------|
| ACCELERATION | MASS     | SEISMIC   |
| AMPLITUDE    | MATTER   | SLOPE     |
| CONSTANT     | MEDIUM   | SPEED     |
| DECELERATION | MOTION   | VELOCITY  |
| FREQUENCY    | PITCH    | VIBRATE   |
| FRICTION     | POSITION | VIBRATION |
| GRAPH        | ROTATION | WAVE      |
| GRAVITY      | TIME     | SIZE      |
| FORCE        |          |           |

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



# Comprehension Quiz

## Part C

Here are some short answer questions. The first three are about the same spaceship.

1. You have been captured by aliens who have locked you in a windowless room on their spaceship. The spaceship is in outer space far from Earth or anything else. As you sit in the room, which of these questions could you answer? Write "could tell" or "could not tell" after each question. 5
  - a) Is the ship moving at a constant speed? \_\_\_\_\_
  - b) Is the ship accelerating? \_\_\_\_\_
  - c) Is the ship rotating? \_\_\_\_\_
  - d) Is the ship changing direction? \_\_\_\_\_
  - e) Is the ship standing still? \_\_\_\_\_
2. You discover a window in the wall of the spaceship. You pull open the curtains and look out. All you see are very distant stars. Could you learn anything new about the ship's motion that you didn't know before? Explain why or why not. 2  
\_\_\_\_\_
3. Help is on the way! You see the space shuttle coming to rescue you. Its engines are going full blast. Can you hear the space shuttle's engines as it approaches? Explain why or why not. 2  
\_\_\_\_\_
4. Things change their motion because they are being acted on by a force. 2
  - a) How does the **size of the force** affect how much the motion changes? \_\_\_\_\_
  - b) How does the **mass of the thing** affect how much the motion changes? \_\_\_\_\_
5. Name **two** things that appear to move across the sky but do not. What motion of Earth makes it look like these things move across the sky? 3  
\_\_\_\_\_  
\_\_\_\_\_

# Acceleration of Machines and Animals

Type	Distance	Speed	Time	Acceleration Gs
F16 Jet				9 G
Top Fuel Dragster	1/4 mile	1320 mph	4.4 Sec	3.3 G
Formula 1 Race Car		60 mph	2.7 Sec	2.7 G
Roller Coaster		120 mph	3 Sec	4 G
Cheetah		50 mph	4.38 Sec	0.8 G
Human	40 yds	27 mph		0.4 G

