

Lesson Topic: Kinetic Energy**Objective:**

Students will be able to:

1. Define kinetic energy as the energy of motion.
2. Describe the relationship between mass and velocity in determining the amount of kinetic energy.
3. Identify examples of kinetic energy.
4. Recognize that KE can be calculated given mass and volume.

Time Required: 90 minutes**Materials Needed:**

- Beach ball
- Baseball
- Scale
- Teacher computer with internet access
- Projector/interactive whiteboard
- 1 computer/laptop/iPad per student with internet access
- Kinetic Energy is Moving: Word Splash handout (1 per student)

Teacher Preparation:

- Assign a Legends of Learning Instructional [Quick Play](#) playlist for the day(s) you will be teaching the lesson.
 - Instructional – Middle School – Kinetic Energy
- Assign a Legends of Learning Instructional [Quick Play](#) playlist for the day(s) you will be teaching the lesson.
 - Content Review – Middle School – Kinetic Energy
- Make copies of Kinetic Energy is Moving! handout (1 per student)

Engage (20 minutes):

1. Explain to students that today they will learn more about energy of motion.
 - a. Ask students if they know another name for motion energy. (kinetic energy)
2. Hold up the beach ball and ask for a volunteer to help demonstrate kinetic energy in a friendly game of catch.
 - a. Gently toss the beach ball to the student volunteer and ask the student to toss the ball back to you gently.
 - b. Explain to students that once the beach ball left you and the student's hand, it gained kinetic energy.
 - c. Write the equation **KE = 1/2 mv²** on the board.
 - d. Define the variable **m** as **mass**, the variable **v** as **velocity**, and **KE** as **kinetic energy**.
 - e. Ask students what they believe would happen to kinetic energy if there was an increase in either the mass or the velocity of the beach ball.
 - f. Show the baseball to the students. Ask students which object has greater kinetic energy. (baseball because of greater mass and potential for greater

velocity)

- i. Place the beach ball on the scale. Measure and record the mass of the beach ball on the board.
 - ii. Place the baseball on the scale. Measure and record the mass of the baseball on the board.
3. Write the equation $KE = \frac{1}{2} mv^2$ on the board, twice, side by side. Fill in the value for mass in both equations.
 - a. Ask students which object has the greater kinetic energy, if both have the same velocity. (baseball)
 - b. Ask students to determine the kinetic energy of the baseball if the velocity is zero. (kinetic energy is zero)
 4. Summarize for students that kinetic energy is the energy of motion, composed of two variables, mass, and velocity and can be mathematically calculated.

Explore (30 minutes):

1. Have your students sign into [Legends of Learning](#). Instruct students to complete the Instructional playlist.
2. As students complete the assigned games, students will complete the Kinetic Energy is Moving: Word Splash handout.
3. Circulate as students work through the playlist and complete the handout. Listen for evidence of understanding and use this opportunity to correct any misconceptions.

Explain (20 minutes):

1. Review answers to Kinetic Energy is Moving: Word Splash by writing the terms on the whiteboard or interactive whiteboard.
2. Ask for student volunteers to help connect the words and fill in phrases on the connecting lines.
 - a. Use this opportunity for formative assessment to gauge understanding and address any misconceptions.
3. Relate student knowledge to the beach ball toss and baseball comparison demonstration at the beginning of class.
 - a. What is shown by tossing the beach ball? (kinetic energy)
 - b. What is the kinetic energy before that ball is thrown, and why? (zero, because the kinetic energy is the energy of motion)
 - c. Why does the beach ball have less kinetic energy even though it is larger than the baseball? (the baseball has more mass)
 - d. How does increasing velocity change the kinetic energy of an object? (increases kinetic energy)

Elaborate (10 minutes):

1. Explain to students that kinetic energy exists in multiple forms, such as the sound waves that are heard when particles vibrate.
2. Show the [video](#) of sound vibrations moving sand on the speaker.
 - a. Ask students caused the particles to move? (kinetic energy as sound)
 - b. Ask students why the patterns changed as the sound waves increased in frequency? (increase in kinetic energy)

Evaluate (10 minutes):

1. Have your students [sign into Legends of Learning](#). Instruct students to complete the Content Review playlist.
2. [Analyze student results](#) to access topics that may require reteaching.

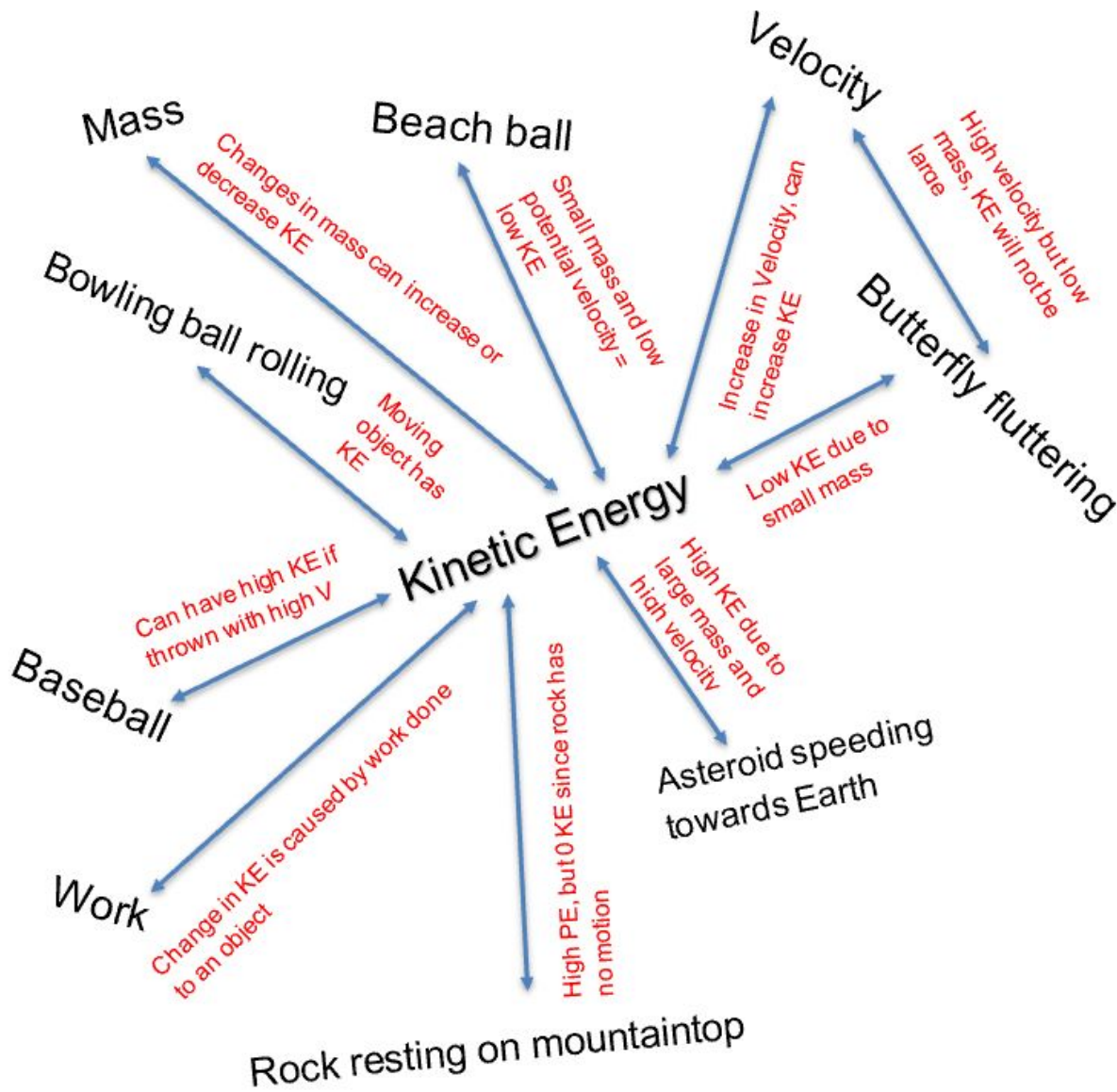
Additional Lesson Strategies:

- To use Legends for additional instruction, create a [custom playlist](#) with an [instructional game](#) and pre and post [assessment](#).
- To use Legends for a quick formative assessment, create a 5-question [assessment](#) in a [playlist](#).
- To use Legends for a student-directed experience, create a [targeted freeplay](#) playlist.
- Encourage students to play on their own at home in [Legends of Learning: Awakening](#) for a student-driven experience including avatars, battling, and quests all centered around topics they are covering in class.

Kinetic Energy is Moving: Word Splash

Name: _____ KEY _____

While playing the instructional games in Legends of Learning, draw lines connecting the related words and write a short phrase on top of the line that describes how they relate.



Kinetic Energy is Moving: Word Splash

Name: _____

While playing the instructional games in Legends of Learning, draw lines connecting the related words and write a short phrase on top of the line that describes how they relate.

Mass

Beach ball

Velocity

Bowling ball rolling

Butterfly fluttering

Kinetic Energy

Baseball

Asteroid speeding
towards Earth

Work

Rock resting on mountaintop