

Name: Key  
Energy study guide

Period: \_\_\_\_\_  
Date: \_\_\_\_\_

### WARNING

This guide is not the only thing you should use to study. It does not provide you with everything you need. You should also rely on your textbook, homework, and classroom notes. Use everything you can for the best results.

#### Topic 1: Energy - Textbook pg. 146 - 147

1. True/False: A rock that sits high up on a cliff and does not move still has energy.
2. List 1 source of energy and 1 way in which you use energy in your everyday life.  
a. Source of E: SUN      b. Use of E: move
3. Which is a better definition for energy?  
(a) The ability to do work and to cause change      b. Doing work and causing change
4. Is energy always observable? If not, then give an example of an object with hidden energy.  
No, anything that is not moving (Example: Potential Energy)
5. What characteristic is energy being used to change in each of the following examples? chemical Energy  
- D Moving a desk a distance of 5m      a. Temperature  
- B Crushing a piece of paper      b. Shape  
- A Boiling water for pasta      c. Speed  
- C Slamming down the gas pedal on a car      d. Position
6. If you run into a wall at home, you may put a large dent in it. What has to happen to your energy in order for the wall to do this (think about the transfer of energy)?  
Energy goes from you into the wall
7. Powerful objects like canons and powerful forces of nature like tornadoes are considered powerful because:  
a. They contain less energy and transfer it slower  
b. They contain more energy and transfer it slower  
c. They contain less energy and transfer it faster  
(d) They contain more energy and transfer it faster
8. Two speakers are hooked up to an iPod. Speaker A puts out 60dB of sound, while speaker B puts out 120dB of sound. Which speaker is more powerful: Speaker A or Speaker B

#### Topic 2: Kinetic energy - Textbook pg. 147 - 148

9. Kinetic energy is energy due to motion. It depends on the mass and on the velocity of an object.
10. If an objects mass increases, then its KE will increase. If an objects velocity increases, then its KE will increase.
11. You are driving your car at 24m/s, when you approach a red light. You start easing on your brakes to slow down. During this time, what happens (increase, decrease, stays the same) to the car's:  
Mass: stays the same      Velocity: decrease      KE: decrease
12. Two football players are running straight at you at the same velocity of 5m/s. Player A has a mass of 45Kg, while player B has a mass of 114Kg.  
- Which player has the most KE AND how do you know?  
Player B, most mass  
- Which player would be the easiest to tackle?  
Player A
13. What is the mathematical formula for calculating KE?

$$.5 (Mass) \cdot (velocity)^2$$

14. A comet with a mass of 10,000Kg is traveling at an initial velocity of 500m/s.

- How much KE does it have?

$$KE = .5(10,000)(500)^2 = 1,250,000,000 \text{ J}$$

- Imagine that the comet keeps the same mass (10,000Kg) but slows down to a velocity of 250m/s. Calculate its new KE.

$$KE = .5(10,000)(250)^2 = 312,500,000 \text{ J}$$

- Imagine that the comet keeps the original velocity (500m/s) but breaks apart to a mass of 5,000Kg. Calculate its new KE.

$$KE = .5(5,000)(500)^2 = 625,000,000 \text{ J}$$

- Which factor had the greatest affect on the comets KE: Mass or Velocity?

### Topic 3: Potential energy - Textbook pg. 149 - 150

15. Potential energy is energy that is stored for later use. It is energy due to position or shape.

16. The form of PE that depends on how stretched or compressed an object becomes is called elastic potential energy.

17. The form of PE that depends on the weight of an object and its height above zero is called gravitational potential energy.

18. Give an example of something with EPE and something with GPE.

a. EPE: Rubber band

b. GPE: Crane

19. As a 756N mountain climber goes up a mountain, what happens (increase, decrease, stays the same) to her: Weight Mass: same Height Velocity: increases GPE: KE: Increase

20. You are lying on the ground with two bowling balls suspended above you, both at a height of 5m. Bowling ball A has a weight of 66N, while bowling ball B has a weight of 36N.

- Which ball has more PE AND why?

A, more weight

- Which ball would hurt the least if dropped onto your stomach?

B

21. What is the mathematical formula for calculating GPE? Weight  $\times$  Height

22. A comet with a weight of 9,800N enters Earth's atmosphere. After free-falling for sometime, the comet is at a height of 12,000m above the ground.

- How much GPE does it have?

$$W \times H = 117,600,000 \text{ J}$$

- Imagine that the comet keeps the same weight (9,800N) but falls to a height of 5,000m. Calculate its new GPE.

$$W \times H = 49,000,000 \text{ J}$$

- Imagine that the comet keeps the original height (12,000m) but breaks apart to a weight of 6,000N. Calculate its new GPE.

$$W \times H = 72,000,000 \text{ J}$$

- What will the comet's GPE be after its hits the ground? 0 J

### Topic 4: Forms of energy - Textbook pg. 151 - 155

23. Mechanical energy is associated with the Kinetic (motion) and the potential (position) of an object.

24. True/False Objects cannot have GPE and KE at the same time.

25. What is the formula for ME?

$$ME = PE + KE$$

26. A bird is flying with a GPE of 6,000J and a KE of 150J.

- How much ME does it have?

$$ME = 6,150J = 6,000J + 150J$$

- What will happen to its ME if it descends to a lower height?

Stays the same = 6,150J

27. Match the following forms of energy with their definitions:

- |   |                    |
|---|--------------------|
| - <u>C</u> Heat due to vibrations of atoms                    | a. Chemical        |
| - <u>E</u> Current of energy due to positive/negative charges | b. Electromagnetic |
| - <u>A</u> Stored energy in bonds between atoms               | c. Thermal         |
| - <u>D</u> Energy released when atoms split or join           | d. Nuclear         |
| - <u>B</u> Energy that travels in waves like X-rays           | e. Electrical      |

### Topic 5: Energy transformation - Textbook pg. 158 - 161

29. Describe the energy transformations that happen when you strike a match. List them in order.

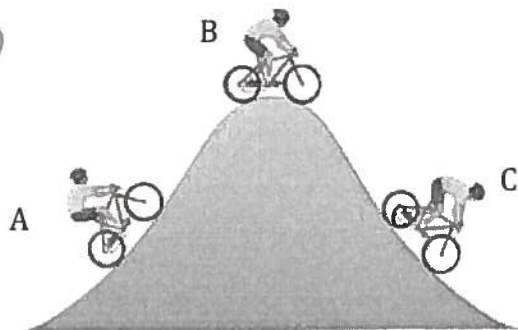
Striking a match transforms mechanical energy to chemical energy in the particles. Chemical energy transformed to thermal and electromagnetic (light) energy.

28. An eagle flies from its perch in a tree to the ground to capture and eat its prey. Describe its energy transformations.

On the perch the eagle has gravitational potential energy which transforms to kinetic energy. When the eagle eats the prey it is mechanical energy. The food from the prey transforms into chemical energy.

30. Use the diagram to analyze how GPE and KE transform between one another.

Increase = I, Decrease = D, and Constant = C



- As the person goes from point A to B:  
GPE I KE D ME C

- As the person goes from point B to C:  
GPE D KE I ME C

- As the person goes from point A to B:  
Velocity D

### Topic 6: Conservation of energy - Textbook pg. 162 - 163

31. The law of conservation of energy states that energy can neither be created nor destroyed. Energy can only transfer between objects or transform into different forms.

32. The amount of energy started with is always \_\_\_\_\_ the energy ended with.

- a. Equal to      b. Greater than      c. Less than

33. True/False: Friction causes a system to lose energy to its surroundings. \* As heat = Thermal Energy

33. If the pendulum is released from position A and there is no friction, then what is the greatest height it can reach on the other side?

