Notes for teachers:

This game involves knowledge of the subject as well as the roll of the die (for lucky but unknowledgeable students!)

You will need:

One six-sided die

The knowledge cards printed (double-sided) and cut into individual cards

A card holder is handy

This is my own invention: Dr. Vikki French, 2017

Enjoy!

**The Energy Game**

It’s about heat, temperature, energy and work

To play:

When it is your turn, choose an “Energy Game” card from the stack

Hand it to the person to your right

That person will read the card’s question for you to answer

If you get the answer right, keep the card

If you get the answer wrong, put the card in the dump and roll the die:

If you get: a 5 or 6 – you get 1 point

a 3 or 4 – 0 points

a 1 or 2 – you lose 1 point

At the end of the game:

Everyone calculates their points:

2 points for every card you answered correctly plus your dice points

The person with the most points wins

**My total points were: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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|  | What is energy?  a. Energy is the motion of the planets around the sun  **b. Energy is the ability to do work**  c. Energy is what causes the four seasons | |  | |  | | Select the statement that is FALSE:  a. Energy can give off light  b. Energy can produce heat  **c. Energy can be created and destroyed**  d. Energy causes movement | |  | |  | | True or False: Electricity  is a type of energy  **a. True**  b. False |  |
|  | Electricity is caused by the \_\_\_\_\_\_\_\_\_ of charged particles  **a. movement**  b. attraction  c. loss  d. explosion | |  | |  | | When a solid changes to a liquid it is called what?  (melting or fusion) | |  | |  | | When a liquid changes to a solid it is called what?  (freezing) |  |
|  | True or false? Liquids are easy to compress  (false) | |  | |  | | When a gas changes into a liquid it is called what?  (condensation) | |  | |  | | When a liquid changes into a gas it is called what?  (evaporation or boiling or vaporization) |  |
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|  | True or false? The particles of a gas are packed tightly together  (false) |  | |  | | Can states of matter change from one to another?  (Yes. For example, water – a liquid – can turn to ice, which is a solid. Heat it up and the ice becomes steam, which is a gas.) | |  | |  | | When solids reach their melting points they become what?  (liquids) | |  |
|  | What is it called when a gas changes directly into a solid?  (deposition) |  | |  | | True or false? Plasma is a state of matter  (true) | |  | |  | | When a gas reaches its condensation point it becomes a what?  (liquid) | |  |
|  | True or false? Solids do not take the shape of the container they are in  (true) |  | |  | | What is it called when a solid changes directly into a gas?  (sublimation) | |  | |  | | True or false? Gases are hard to compress.  (false) | |  |
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|  | True or false? Energy comes in different forms  (true) |  | |  | | Can energy be converted from one form to another?  (Yes) | |  | |  | | Can energy be created?  (No) | |  |
|  | Can energy be destroyed?  (No) |  | |  | | Kinetic energy is what objects have when they are in \_\_\_\_\_\_\_\_\_  (motion) | |  | |  | | Kinetic energy is symbolized by \_\_\_?  (ke) | |  |
|  | Friction converts kinetic energy to  (heat) |  | |  | | Potential energy is symbolized by \_\_\_?  (pe) | |  | |  | | Name one type of potential energy:  (gravitational, mechanical, or chemical) | |  |
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|  | Another term for atomic energy is \_\_\_\_\_\_\_  (mass energy) |  | |  | | What is the “tiny bubbles” stage of boiling called?  (nucleation) | |  | |  | | What is the step after “tiny bubbles” in getting something to boil?  (steam) | |  |
|  | What is the stage of boiling that happens after steam?  (bubble release) |  | |  | | True or false: temperature and heat are the same thing  (false) | |  | |  | | Name three scales for measuring temperature:  (Fahrenheit, Celsius and Kelvin) | |  |
|  | Heat is kinetic energy or potential energy?  (kinetic) |  | |  | | Temperature is kinetic energy or potential energy?  (potential) | |  | |  | | True or false: Heat is measured in degrees  (false – it’s measured in joules or calories) | |  |
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|  | The temperature at which molecules have lost all available kinetic energy is called \_\_\_\_\_\_\_  (absolute zero) |  | |  | | True or false: Heat moves from cold to warm  (false) | |  | |  | | How can you use heat to identify a substance?  (specific heat or thermal expansion) | |  |
|  | True or false: a high specific heat means a substance heats up quickly  (false) |  | |  | | True or false: high specific heat means a substance cools down slowly  (true) | |  | |  | | True or false: water has an unusually high specific heat  (true) | |  |
|  | Thermal expansion happens when \_\_\_\_?  (a substance warms up) |  | |  | | True or false: most substances expand when heated and contract when cooled  (true) | |  | |  | | What substance expands when it becomes a solid?  (water) | |  |
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|  | True or false: ice is less dense than water  (true) |  | |  | | True or false: ice has a larger volume than water  (true) | |  | |  | | Heat transfer within a solid is called \_\_\_\_  (conduction) | |  |
|  | Heat transfer within a gas or liquid is called \_\_\_  (convection) |  | |  | | True or false: the wind is an example of convection  (true) | |  | |  | | True or false: convection is the reason water boils  (true) | |  |
|  | Heat transfer through outer space is called \_\_\_\_?  (radiation) |  | |  | | True or false: the electromagnetic spectrum includes heat waves  (true – infrared waves are heat) | |  | |  | | Name four phases of matter  (solid, liquid, gas, plasma) | |  |
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|  | True or false: plasma is the phase of matter where a gas disintegrates to ions and electrons  (true) |  | |  | | True or false: changing phase uses energy only if the substance is getting warmer  (false) | |  | |  | | True or false: atmospheric pressure affects the boiling point of water  (true) | |  |
|  | True or false: Water boils at a lower temperature at a higher altitude  (true) |  | |  | | True or false: Cookware should be made from a substance with a low specific heat  (true) | |  | |  | | True or false: the high specific heat of water keeps our planet at a more even temperature  (true) | |  |
|  | Expansion joints are incorporated in roads, bridges and railroad tracks to prevent damage due to \_\_\_  (thermal expansion) |  | |  | | Damage to water pipes is common in Colorado in the winter due to \_\_\_\_  (thermal expansion) | |  | |  | | True or false: water is most dense at 4°C  (true) | |  |

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|  | True or false: Convection is the transfer of internal energy by molecular collision  (false) |  | |  | | True or false: Conduction is the transfer of energy by the motion of fluids  (false) | |  | |  | | A popular source of energy used by Americans to fuel our cars is \_\_\_\_  (petroleum) | |  |
|  | True or false: Potential energy can be converted to kinetic energy and vice versa  (true) |  | |  | | True or false: In science class, “work” is force done over a distance  (true) | |  | |  | | True or false: In science class, drinking a beer is work  (true) | |  |
|  | True or false: In science class, work requires movement  (true) |  | |  | | True or false: In science class, playing a game is work  (true) | |  | |  | | True or false: In science class, digging a hole is not work  (false) | |  |

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|  | True or false: Work and energy are both measured in joules  (true) |  | |  | | True or false: Calories are a measure of energy  (true) | |  | |  | | What is a bimetallic strip?  A. 2 wires twisted together  B. A strip of two types of metal bonded together, one on one side of the strip, one on  the other  C. A strip of cable wire | |  |
|  | When using the Celsius scale, what is the boiling point for water?  A. 50 degrees  B. 100 degrees  C. 0 degrees  D. 27 degrees  E. -100 degrees |  | |  | | When using the Celsius scale, what is the freezing point for water?  A. 50 degrees  B. 100 degrees  C. 0 degrees  D. 27 degrees  E. -100 degrees | |  | |  | | When using the Fahrenheit scale, what is the boiling point for water?  A. 32 degrees  B. 100 degrees  C. 0 degrees  D. 212 degrees  E. -100 degrees | |  |
|  | When using the Fahrenheit scale, what is the freezing point for water?  A. 32 degrees  B. 100 degrees  C. 0 degrees  D. 212 degrees  E. -100 degrees |  | |  | | Chemical energy is:  A. Energy from coal and wood  B. Energy from breathing  C. The heat you give off  D. Energy from hydro-electric dams | |  | |  | | Heat is the random movement of what?  **A: molecules**  B: cells  C: protons | |  |
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|  | What happens when you use a toaster?  A: you heat the bread  B: you heat the air around the bread  **C: A and B** |  | |  | | Heat is the transfer of \_\_\_\_\_\_\_\_\_\_\_\_\_ between substances of different temperatures.  **A: energy**  B: atoms  C: molecules  D: cells | |  | |  | | When something is heated, this changes.  A: conduction  **B: temperature**  C: energy | |  |
|  | This is a material that transfers heat energy easily.  **A: conductor**  B: radiation  C: insulator |  | |  | | Which of the following is responsible for bring heat to our planet?  A: convection  B: conduction  **C: radiation** | |  | |  | | Heat is taken in by what?  A: conduction  B: convection  C: radiation  **D: All of the above** | |  |
|  | When warm water rises in a lake and cold water descends, what is happening?  A: conduction  **B: convection**  C: radiation |  | |  | | Which of the following can be measured with a thermometer?  A: heat  B: radiation  **C: temperature**  D: all of the above | |  | |  | | Heat always moves from \_\_\_\_\_\_\_\_\_\_ objects to \_\_\_\_\_\_\_\_\_\_\_ objects.  A: cooler, warmer  **B: warmer, cooler**  C: bigger, smaller  D: smaller, bigger | |  |

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|  | Work is being done only when a force is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ an object  A: with  **B: moving**  C: next to | |  | |  | | Work is done when a force moves an object a certain \_\_\_\_\_\_\_\_\_\_\_\_\_\_  **A: distance**  B: way  C: energy  D: temperature |  |  | When a moving object has the energy of motion it has this type of energy  A: potential energy  B: high energy  **C: kinetic energy**  D: transfer energy |  |
|  | True or False? Stored energy with the future ability to do work is called potential energy.  **A: True**  B: False | |  | |  | | How can energy change?  A: temperature changes the type of energy  **B: energy can be transferred from one object to another**  C: electrical energy can change light energy |  |  | When kinetic energy is transferred from one marble to another, the second marble picks up what?  A: potential energy  B: electrical energy  **C: kinetic energy**  D: light energy |  |
|  | What happens when energy is transferred?  **A: it changes form**  B: it loses form  C: it gains energy | |  | |  | | Chemical energy is converted to electrical energy in a \_\_\_\_\_\_\_\_\_\_\_\_\_\_  A: light bulb  B: toaster  **C: battery** |  |  | What occurs when energy passes from one object to another?  **A: transformation**  B: potential energy  C: kinetic energy |  |

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|  | The Laws of Thermodynamics dictate the specifics for the movement of \_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_  A: planets, stars  **B: heat, work**  C: electrons, molecules |  | |  | | Which shows that energy disperses rather than staying concentrated?  A: A cold frying pan heats up faster on a hot burner  **B: A hot frying pan cools down when it is taken off the burner** | |  | |  | | Which of the following is NOT one of the laws of thermodynamics?  A: conservation of energy  B: energy disperses  C: Absolute Zero  **D: none of the above** | |  |
|  | True or False? The total energy output is equal to the amount of heat supplied (conservation of energy  **A: True**  B: False |  | |  | | True or False? When energy is exchanged, if no energy enters or leaves the system, the potential energy will always be less than that the initial amount.  **A: True**  B: False | |  | |  | | The Third Law of Thermodynamics refers to a state known as "absolute zero." This is the bottom point on the \_\_\_\_\_\_\_\_\_\_\_\_ temperature scale.  A: Celsius  **B: Kelvin**  C: Fahrenheit | |  |
|  | Which is NOT a form of kinetic energy?  A: electrical energy  B: light  C: mechanical energy  **D: temperature** |  | |  | | What is the unit for heat in the SI system?  A: calorie  B: BTU  C: joule | |  | |  | | What is heat?  A: average kinetic energy  B: thermal energy  C: absence of thermal energy  **D: thermal energy in transit** | |  |