

Energy Matters- Student Response Sheet

School: _____ V JV1 JV2 JV3

Student Names: _____

(For each answer, fill in the blank or circle the correct response.)

Station 1

1. _____

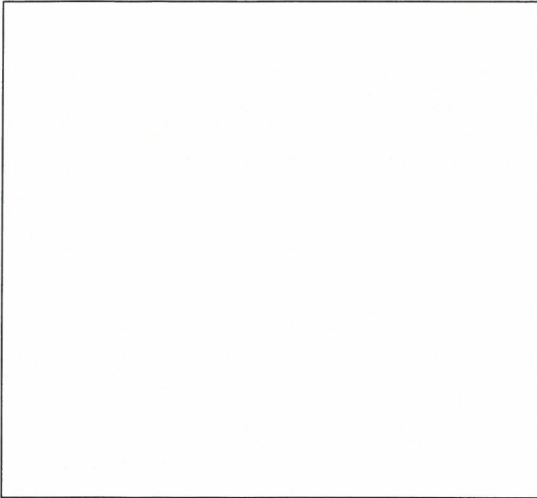
2. A B C D

3. A B C D

Station 2

4. A B C D

5. 6. & 7.



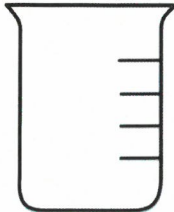
8. _____

9. _____

Station 3

10. A B C D

11. A B C D



12.

13. A B C D

14. A B C D

Station 4

15.

| Object | Good conductor? |
|----------------|-----------------|
| Lego | YES or NO |
| Penny | YES or NO |
| Washer | YES or NO |
| Glass | YES or NO |
| Popsicle Stick | YES or NO |

16. Insulator or conductor

17. Insulator or conductor

18. Insulator or conductor

Station 5

19.

| Physical Change | Chemical Change |
|-----------------|-----------------|
| | |

Station 6

- 20. A B C
- 21. A B C D
- 22. A B C D
- 23.

Station 8

- 30. A B C
- 31. A B C D
- 32. A B C D
- 33. A B C D
- 34. A B C D
- 35. HIGHER or LOWER



Station 9

- 36. _____
- 37. _____
- 38. _____
- 39. A B C D

Station 7

- 24. A B C D
- 25. A B C D
- 26. A B C D
- 27. A B C
- 28. A B C
- 29. A B C D

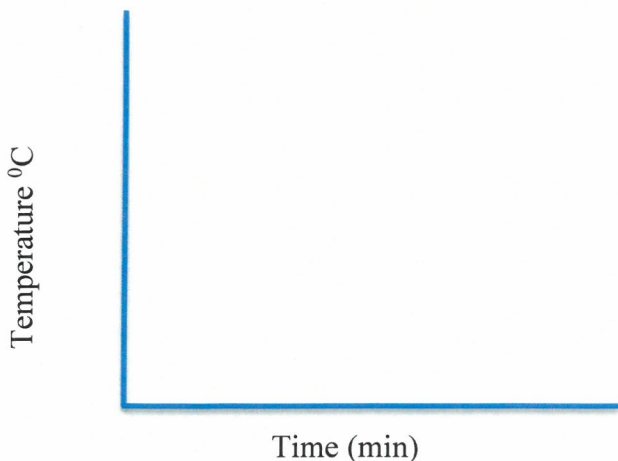
Station 10

- 40. Yes or No
- Explain:

- 41. A B C D
- 42. A B C D

Lab Activity

| | 0 min | 5 min | 10 min | Total difference in Temp | 4. Which Bear's Bowl? | 5. Draw Candy |
|----------------|-------|-------|--------|--------------------------|-----------------------|---------------|
| Plastic Bowl | | | | | | |
| Metal Bowl | | | | | | |
| Styrofoam Bowl | | | | | | |



- 2. _____
- 3. _____
- 6. _____
- 7. _____
- 8. YES or No
- Explain:

KEY

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1 pt for each line or blank

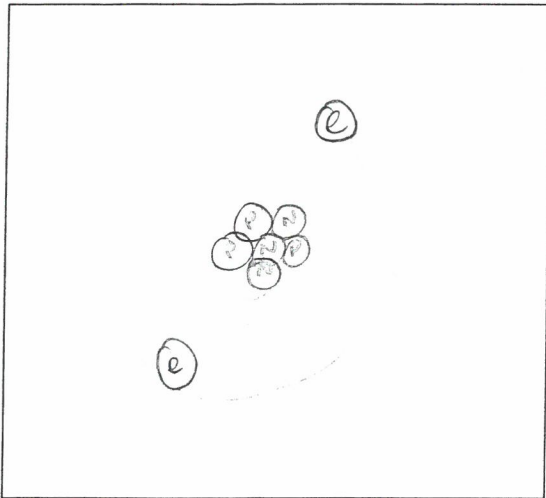
TB: Best on lab, then Station 5, 8, 1, 2

Station 1

1. Heat
light
2. A B C D
3. A B C D

Station 2

4. A B C D
5. 6. & 7.

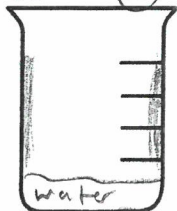


e⁻ can be either in ring or in the e⁻ cloud

8. Protons in the nucleus
9. Neutrons in the nucleus

Station 3

10. A B C D
11. A B C D



← condensation on walls of beaker

- 12.
13. A B C D
14. A B C D

Station 4

15.

| Object | Good conductor? |
|----------------|------------------|
| Lego | YES or <u>NO</u> |
| Penny | <u>YES</u> or NO |
| Washer | <u>YES</u> or NO |
| Glass | YES or <u>NO</u> |
| Popsicle Stick | YES or <u>NO</u> |

16. Insulator or conductor
17. Insulator or conductor
18. Insulator or conductor

Station 5

19.

| Physical Change | Chemical Change |
|-----------------|-----------------|
| C | A |
| F | B |
| H | D |
| | E |
| | G |

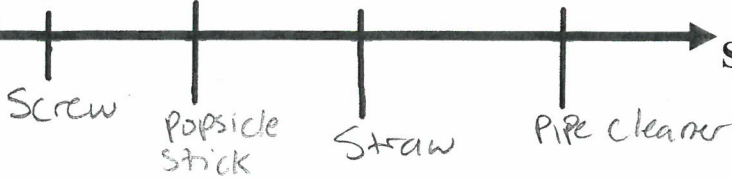
Station 6

- 20. A B C
- 21. A B C D
- 22. A B C D
- 23.

Station 8

- 30. A B C
- 31. A B C D
- 32. A B C D
- 33. A B C D
- 34. A B C D
- 35. HIGHER or LOWER

Least flexible ← → Most Flexible



Station 9

- 36. Rock (B)
- 37. Wood (C)
- 38. Colored liquid
- 39. A B C D

Station 7

- 24. A B C D
- 25. A B C D
- 26. A B C D
- 27. A B C D
- 28. A B C D
- 29. A B C D

Station 10

- 40. Yes or No

Explain:

The coat will insulate the snowman... keeping him cold, thus slowing down the melting.

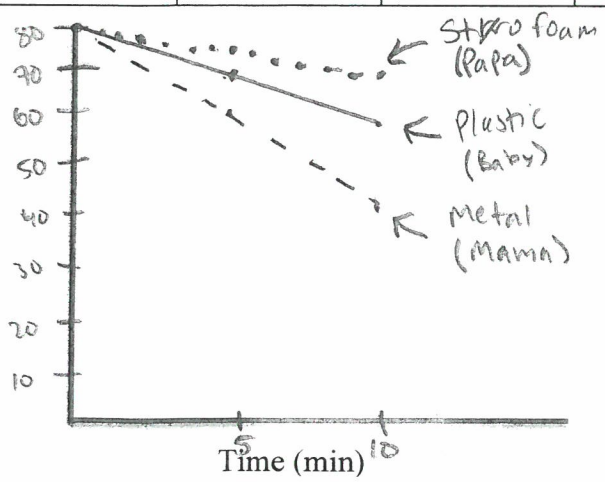
- 41. A B C D
- 42. A B C D

Follow these trends. Values not exact.

Lab Activity

| | 0 min | 5 min | 10 min | Total difference in Temp | 4. Which Bear's Bowl? | 5. Draw Candy |
|----------------|-------|-------|--------|--------------------------|-----------------------|---------------------|
| Plastic Bowl | 80°C | 70°C | 60°C | 20°C | Baby | Some red gone |
| Metal Bowl | 80°C | 60°C | 40°C | 40°C | Mama | Least red gone |
| Styrofoam Bowl | 80°C | 75°C | 70°C | 10°C | Papa | Almost All red gone |

These 3 should be just



- 2. B, Conductivity
- 3. Styrofoam bowl
- 6. The one in styrofoam bowl
- 7. A, Solubility
- 8. YES or No

These 3 must be correct

Explain:

The hotter liquid will dissolve more candy.

Station 1



1. Name 2 types of energy being produced by this campfire.
2. Which form of energy does the wood contain so that the fire will burn?
 - a. Chemical
 - b. Electrical
 - c. Mechanical
 - d. Solar
3. Someone used a match to light the fire by rubbing the end across a rough surface. Which form of energy is being used to light the match?
 - a. Chemical
 - b. Electrical
 - c. Mechanical
 - d. Solar



Station 2

4. Which of these is smallest in size?
 - a. Atom
 - b. Molecule
 - c. Proton
 - d. Compound

On your answer sheet, draw an atom with the following parts in their correct locations:

5. 3 green protons
6. 3 blue neutrons
7. 2 red electrons

8. Which of these parts of an atom has a positive charge?

9. Which of these parts has a neutral charge?

Station 3

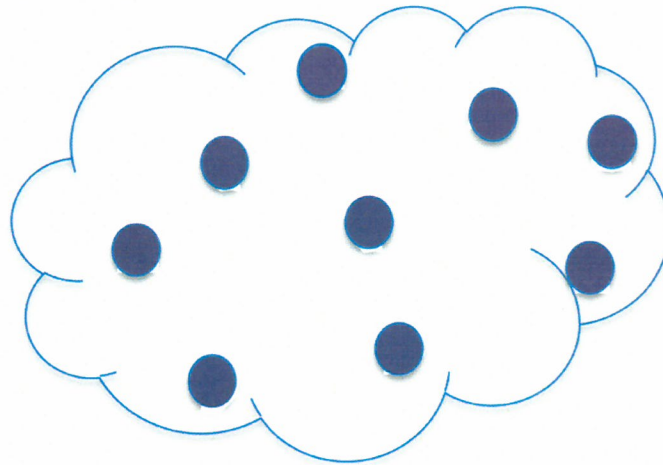
10. A definite shape and a definite volume are properties of which state of matter?

- a. Solid only
- b. Liquid only
- c. Solid & liquid
- d. Liquid & gas

11. Volume and mass are properties of:

- a. Light
- b. Matter
- c. Sound
- d. Energy

12. Here is a picture of water molecules in the air as a gas. Use the markers at this station to draw what these molecules would look like in a beaker if we cooled the air down to 0° Celsius.



13. When a gas changes to a liquid, it is called:

- a. Evaporation
- b. Condensation
- c. Melting
- d. Boiling

14. When a solid changes to a liquid, it is called:

- a. Evaporation
- b. Condensation
- c. Melting
- d. Boiling

Station 4

15. Use the items at this station to determine which of these objects is a good conductor of electricity. If the lightbulb turns on when both wires are touched to the object, it is a good conductor of electricity.

Based on your results, do you predict that the following objects would be good insulators or conductors of electricity?

16. Plastic Spoon



17. Quarter



18. Colored Pencil



Station 4 – page 2

Battery Pack here

Conductor or Insulator?

Lego

Penny

Washer

Glass

Popsicle
Stick




Test Here – if you touch the 2 wires to the object and the lightbulb turns on, you have completed the circuit!

Station 5


- 19. Sort the cards at this station into Physical and Chemical changes. Write their letters in the right box on your answer sheet. Be sure to mix the cards back up when you are done!**

Print, laminate, cut apart and include with station 5


A
Roasting a marshmallow




B
Shooting off fireworks




C
Breaking a pencil




D
Baking a cookie



E
Iron Rust




F
Color in your lemonade



Put back in w/original
Do NOT need to copy

G
Rotten Milk



H
Coloring snow with food coloring



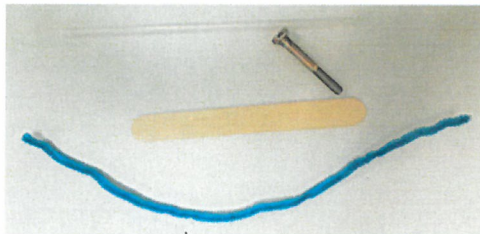
Station 6

20. An object is attracted to a magnet. When the magnet is moved away from the object, the magnetic force on the object will:
- Increase
 - Decrease
 - Stay the same
21. When 2 magnets are placed together like the diagram below, what will they do?
- Attract to each other
 - Repel each other
 - Nothing, magnets aren't attracted to each other, only to other objects
 - They will grow very hot



Source: <http://www.people.vcu.edu/~jatulasimha/IntroToNanomagnetismGeneralAudience.html>

22. The petri dish at this station has several different substances in it. You have a magnet wand, put it near the dish and watch what happens. Which of these substances is most likely the one in the dish attracted to the magnet?
- Iron
 - Aluminum
 - Salt
 - Rubber



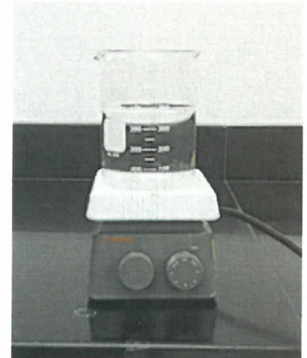
23. Rank these items from Most Flexible to Least Flexible on your answer sheet.

Station 7

24. Which energy transfer occurs when someone blows a whistle?
- Electrical to sound
 - Light to electrical
 - Heat to mechanical
 - Mechanical to sound
25. Which action allows electrical energy to change to another form of energy?
- Sleeping in a cold room
 - Turning on a light in a dark room
 - Cooking food on an open campfire
 - Playing a violin in a music group



26. This hot plate is heating the water in this beaker. What type of energy transfer occurs as the beaker of water is heated?
- Light to heat
 - Chemical to heat
 - Electrical to heat
 - Magnetic to heat
27. Heat is transferred from the hot plate to the beaker by:
- Conduction
 - Convection
 - Radiation



28. The water in the beaker is heated by:
- Conduction
 - Convection
 - Radiation
29. This dancing hippo needs the sun for energy. What type of energy transfer occurs to make her wiggle?
- Light to electrical
 - Chemical to mechanical
 - Electrical to mechanical
 - Light to mechanical



Station 8

30. If enough heat was REMOVED from this orange juice, it would change into _____.
- a. a solid
 - b. a gas
 - c. a liquid



31. The process described in #30 is called:
- a. Melting
 - b. Freezing
 - c. Boiling
 - d. Evaporating



32. Dry ice is frozen carbon dioxide with a very low boiling point. If left outside of a freezer, it changes from a solid directly to a gas. This is an example of which process?
- a. conduction
 - b. convection
 - c. sublimation
 - d. radiation

33. If the temperature of a balloon were to decrease suddenly, how would the balloon change?
- a. Its mass would increase
 - b. Its mass would decrease
 - c. Its volume would increase
 - d. Its volume would decrease



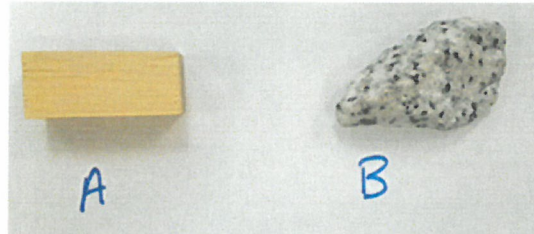
Source: <https://www.steamboat.com/things-to-do/events/hot-air-balloon-rodeo>

34. This picture shows a hot-air balloon. The pilot can make the balloon go higher or lower by changing the temperature of the gas inside the balloon. When the gas is heated, the balloon rises. Which of the following best describes why this happens?
- a. Heating the gas slows the particles down
 - b. Heating the gas decreases its density
 - c. Heating the gas decreases its pressure
 - d. Heating the gas increase its density

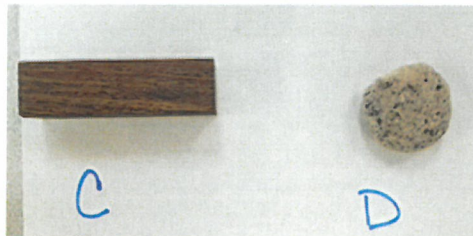
35. The freezing point will always be a HIGHER or LOWER temperature than the boiling point (with constant pressure).

Station 9

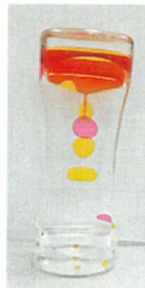
Use the tools at this station to determine the answer to the following questions.



36. Which is more dense – this piece of wood (a) or this rock (b)?



37. Which is more dense – this piece of wood (c) or this rock (d)?



38. Which is more dense – the colored liquid or the clear liquid?

39. If you want to make a liquid more dense, should you:

- Shake it up in a flask
- Heat it
- Cool it
- Put in in a sunny spot

Station 10

40. Dave, Allie & Abby built a snowman in their front yard on a snowy NC winter day. The weather warmed up quickly and they didn't want the snowman to melt. They argued about how to save him. Allie said that they should put a winter jacket on the snowman to keep him from melting. Abby & Dave said that this would make him melt faster. You are the insulator and conductor expert – what is the right answer – would a winter jacket slow down the snowman's melting on a warm day? Explain your answer.

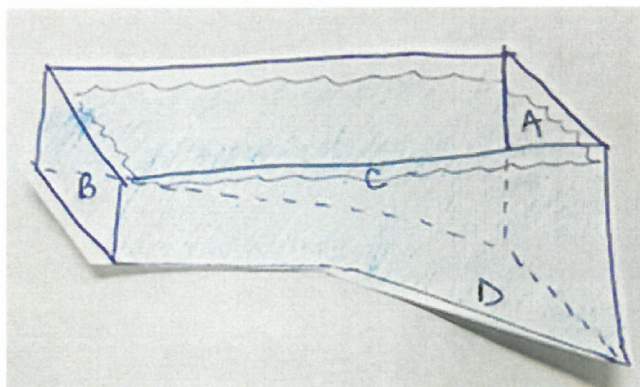


41. You are so excited – your grandma got a pool, just in time for the summer! She is wondering about how long it will take to heat up. Which of the following is the correct way to explain what happens to the water molecules as they absorb the Sun's energy?



- a. The molecules occupy less volume
- b. The molecules begin to move more slowly
- c. The molecules gain energy
- d. The molecules lose energy

42. She decides to install a pool heater so that you can enjoy it for most of the year. Below is a side diagram of the pool. Where should the hot water enter the pool to most efficiently heat the pool?



Lab Activity – page 1

Goggles on!

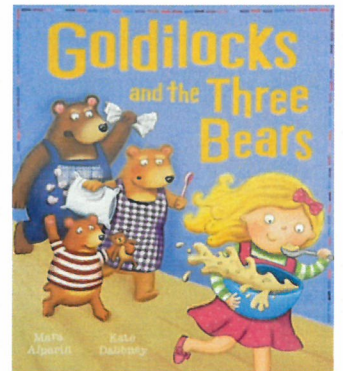


Supplies per group

- 1 Plastic cup
- 1 Styrofoam cup
- 1 Metal cup
- 1 thermometer
- 1 timer
- 1 tray for your supplies
- Plastic spoon
- 3 pieces of peppermint candy
- Paper towel

Goldilocks and the 3 bears.

We all know the story of Goldilocks and the 3 bears. Goldilocks breaks in to the poor bears' house and sits on their furniture, eats their breakfast and sleeps in their beds – how rude! But let's focus on the porridge she comes to in the kitchen. Papa's bowl is too hot, Mama's bowl is too cold, and Baby Bear's bowl is just right. If they all filled their bowls from the same pot at the same time and left them on the table, why are they different temperatures? It is your job to collect data on 3 types of bowls to see which belonged to each bear.



Set up your lab station to look like this:



Your event leader will bring you 3 hot bowls of “porridge.” When they fill your cups, immediately start your timer and put the thermometer in one cup. Record the starting temperature of each bowl of water in ⁰Celsius. Take and record the temperature again when the timer gets to 5 minutes and 10 minutes in the table on your answer sheet. Remember – this is hot water, do not touch it or the containers with your hands!

Lab Activity – page 2

1. After your first measurements, start plotting your data on the graph on the answer sheet. You can do this after each set of measurements, you do not need to wait until the end. Be sure to label each line. You should end up with 3 lines on the same graph.
2. What property of matter are you testing in this experiment?
 - a. Solubility
 - b. Conductivity
 - c. Magnetism
 - d. Strength
3. After gathering your data, analyze your results. Which bowl was the best insulator?
4. Looking back at the story, match up the bowl material to each bear.

When you are done with your first experiment, drop a peppermint candy in to each cup at the same time. Reset your timer to zero and start it as your partner drops a candy in each cup. Use the spoon to remove the candy after 3 minutes and put it on your paper towel.

5. Draw what the candy looks like from each bowl.
6. Which one has changed the most?
7. What property of matter are you testing in this experiment?
 - a. Solubility
 - b. Conductivity
 - c. Magnetism
 - d. Strength
8. Does your result make sense? Why or why not?

The event leader will bring a waste bucket to you for you to dump out the water. Throw away the candy and the paper towel and clean up your station for the next group.

DO NOT THROW AWAY THE CUPS OR SPOONS, THEY WILL BE REUSED.

