



## LESSON PLAN

**Subject:** 6<sup>th</sup> Grade Science

**Lesson:** Brass Casting: Sea of Electrons

**Standard Addressed:** Understand the structure, classifications, and physical properties of matter. (NC.6.P.2)

**Objectives:**

- Identify the effects of heat on the motion of atoms and a compound of molecules through a description of what happens to particles during a change of phase.
- Identify the physical properties of pure substances that are independent of the amount of matter present including density, boiling point, melting point, and solubility.

**Materials Needed:**

- Device for showing *Brass Casting: Sea of Electrons* video
- “Brass Casting” activity

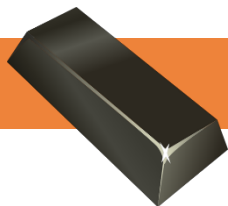
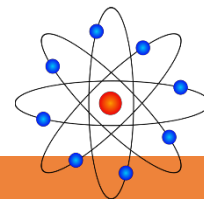
**Outline:**

- Prior to this lesson students should understand that elements are made up of atoms and that atoms of one element are alike but are different from atoms of other elements.
- Show the 7:17 minute video, <https://youtu.be/iZ9c3v9f8fg>.
- Discuss the activity prompt.
- Students finish the activity independently or with a partner. (For a more challenging activity, cover the riddle and blanks before making copies. Ask the riddle at the completion of activity to see if students can decipher the answer.)

**Take It Further:** Students compare the densities of a dime and a penny using the water displacement method. Modify the instructions in this link that compares the densities of iron and aluminum: [https://www.youtube.com/watch?v=h7owl6gC\\_wk](https://www.youtube.com/watch?v=h7owl6gC_wk).

**Cross-Curriculum Connection:** Choose two elements from the Periodic Table and write a love song about their chemical interaction.





## BRASS CASTING: Sea of Electrons

**Grade 6 Science**

Name: \_\_\_\_\_

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

### ACTIVITY 1

All matter is made of elements. Metalworkers in Salem had to know the physical and chemical properties of a variety of elements. How much do you know about matter?

*Circle your responses to the questions and statements below. When you are finished, write the letter of the answers you selected on the corresponding spaces to solve this riddle:*

**What do you call an iron/carbon alloy that never gets embarrassed?**

1	2	3	4	5	6	7	8	9	
					10	11	12	13	14

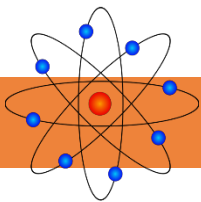
1. Based on the information in the video, circle the correct statement.
  - S. There are *more metals* than non-metals in the periodic table.
  - T. There are more *non-metals* than metals in the periodic table.
  
2. In what stage of matter do particles move the slowest?
 

F. Plasma	H. Solid
G. Liquid	I. Gas
  
3. Solids have:
 

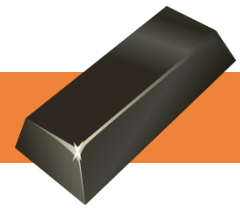
A. Definite shape and definite volume	C. Definite shape, but not definite volume
B. No definite shape; no definite volume	D. Definite volume, but not definite shape
  
4. A change in matter from solid to liquid is called:
 

J. Condensation	L. Evaporation
K. Freezing	M. Melting
  
5. The atoms in liquids move:
 

D. Faster than atoms in gases	F. Faster than atoms in plasma
E. More slowly than atoms in gases	G. More slowly than atoms in solids



## BRASS CASTING: Sea of Electrons



**Grade 6 Science**

Student Name: \_\_\_\_\_ Date: \_\_\_\_\_

6. Change in the state of matter from a liquid to a gas is called:

K. Condensation

M. Melting

L. Evaporation

N. Freezing

7. Gases have:

E. Lower density than solids

G. The same density as liquids

F. Greater density than solids

H. The same density as solids

8. Humans have discovered:

R. More than 1,000 elements

S. More than 100 elements

9. The smallest unit of matter is called:

Q. An element

S. An atom

R. A molecule

T. A metal

10. An example of a physical property is:

P. Flammability

R. Acidity

Q. Reactivity

S. Boiling Point

11. Which list of properties can be used to identify a substance?

T. Density, Boiling Point, and Solubility

U. Density, Melting point, and Saturation

12. Atoms of the same element:

E. Have the same masses

G. Have different volumes

F. Have the same temperature

H. Have different solubilities

13. Thermal energy is in which phase of matter?

B. Solids

D. Gases

C. Liquids

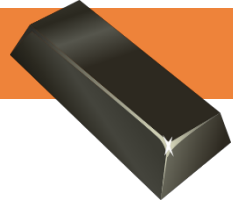
E. All phases of matter

14. What happens to molecules when the temperature is increased?

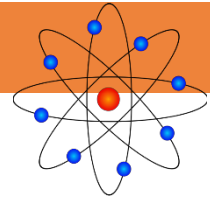
K. The molecules get closer together.

L. The molecules move faster.





# BRASS CASTING: Sea of Electrons



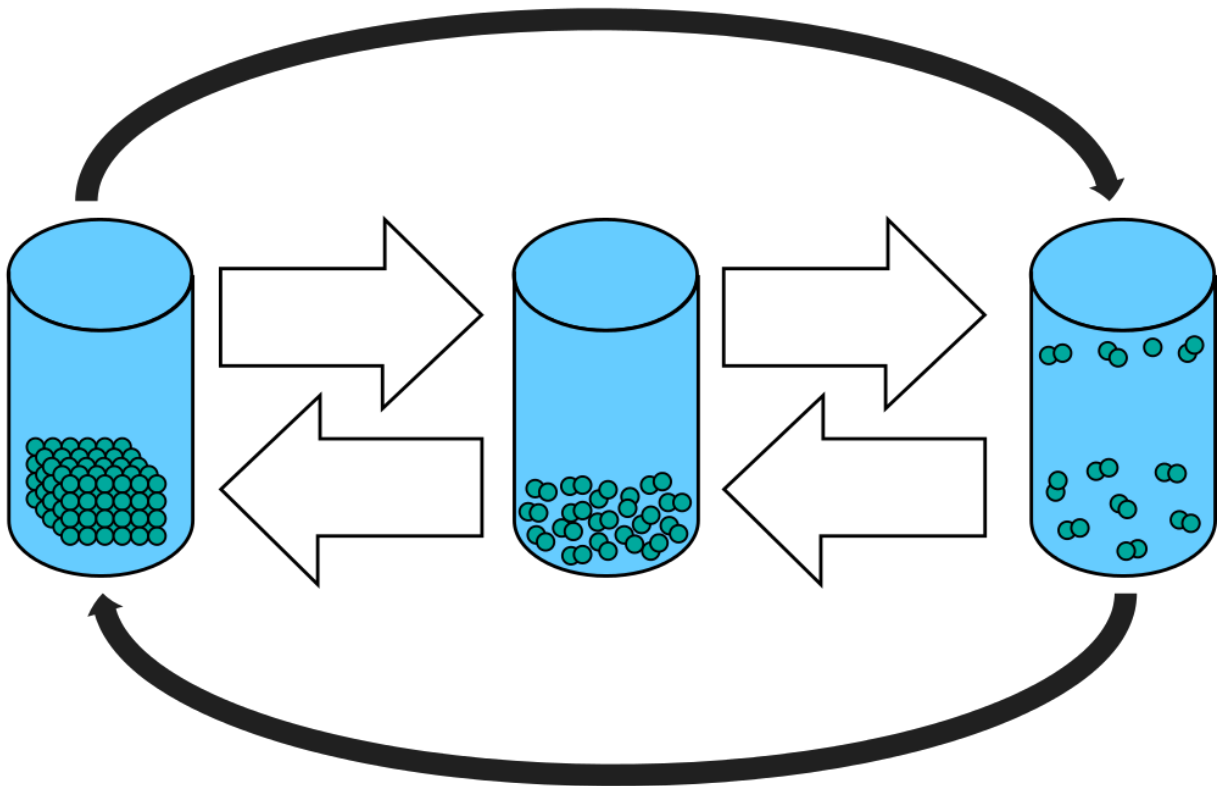
Grade 6 Science

Student Name: \_\_\_\_\_ Date: \_\_\_\_\_

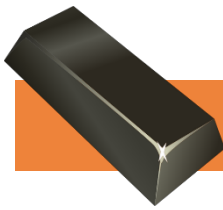
## ACTIVITY 2

Matter can exist in different phases. Write the words describing the phase changes inside the arrows.

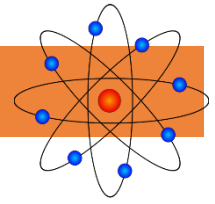
Energy is being added.



Energy is being removed.



# BRASS CASTING: Sea of Electrons



Grade 6 Science

ANSWER KEY

## ACTIVITY 1

All matter is made of elements. Metalworkers in Salem had to know the physical and chemical properties of a variety of elements. How much do you know about matter?

Circle your responses to the questions and statements below. When you are finished, write the letter of the answers you selected on the corresponding spaces to solve this riddle:

What do you call an iron/carbon alloy that never gets embarrassed?

<u>  S  </u>	<u>  H  </u>	<u>  A  </u>	<u>  M  </u>	<u>  E  </u>	<u>  L  </u>	<u>  E  </u>	<u>  S  </u>	<u>  S  </u>
1	2	3	4	5	6	7	8	9
	<u>  S  </u>	<u>  T  </u>	<u>  E  </u>	<u>  E  </u>	<u>  L  </u>			
	10	11	12	13	14			

1. Based on the information in the video, circle the correct statement.

- S. There are *more metals* than non-metals in the periodic table.
- T. There are more *non-metals* than metals in the periodic table.

2. In what stage of matter do particles move the slowest?

- F. Plasma
- H. Solid
- G. Liquid
- I. Gas

3. Solids have:

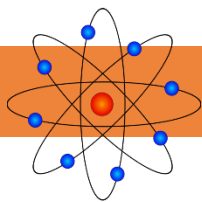
- A. Definite shape and definite volume
- B. No definite shape; no definite volume
- C. Definite shape, but not definite volume
- D. Definite volume, but not definite shape

4. A change in matter from solid to liquid is called:

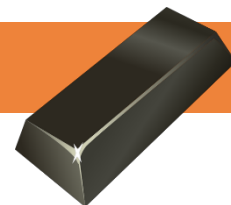
- J. Condensation
- K. Freezing
- M. Melting
- L. Evaporation

5. The atoms in liquids move:

- E. More slowly than atoms in gases
- D. Faster than atoms in gases
- F. Faster than atoms in plasma
- G. More slowly than atoms in solids



## BRASS CASTING: Sea of Electrons

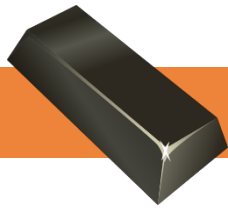


### Grade 6 Science

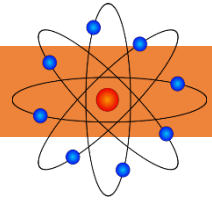
#### ANSWER KEY

6. Change in the state of matter from a liquid to a gas is called:
- K. Condensation
  - L. Evaporation
  - M. Melting
  - N. Freezing
7. Gases have:
- E. Lower density than solids
  - F. Greater density than solids
  - G. The same density as liquids
  - H. The same density as solids
8. Humans have discovered:
- R. More than 1,000 elements
  - S. More than 100 elements
9. The smallest unit of matter is called:
- Q. An element
  - R. A molecule
  - S. An atom
  - T. A metal
10. An example of a physical property is:
- P. Flammability
  - Q. Reactivity
  - R. Acidity
  - S. Boiling Point
11. Which list of properties can be used to identify a substance?
- T. Density, Boiling Point, and Solubility
  - U. Density, Melting point, and Saturation
12. Atoms of the same element:
- E. Have the same masses
  - F. Have the same temperature
  - G. Have different volumes
  - H. Have different solubilities
13. Thermal energy is in which phase of matter?
- B. Solids
  - C. Liquids
  - D. Gases
  - E. All phases of matter
14. What happens to molecules when the temperature is increased?
- K. The molecules get closer together.
  - L. The molecules move faster.





# BRASS CASTING: Sea of Electrons



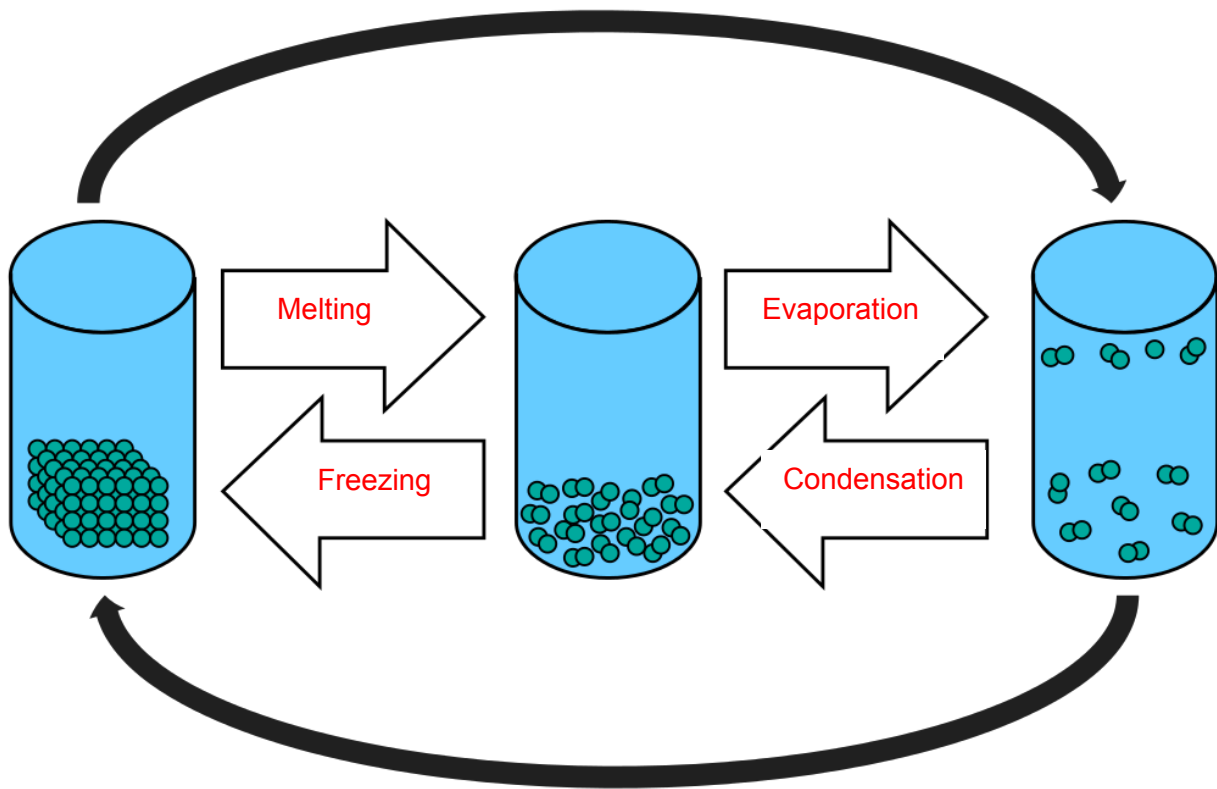
Grade 6 Science

## ANSWER KEY

### ACTIVITY 2

Matter can exist in different phases. Write the words describing the phase changes inside the arrows.

Energy is being added.



Energy is being removed.

