1st Semester Final Exam Study Guide
Physical Science

Student _____

Class _____

Date _____

1. S8P1.a The smallest particle of matter that can be identified as an element is called

A. an atom.

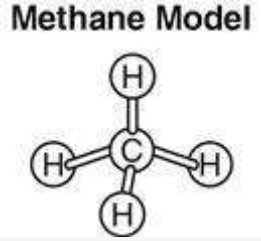
B. a proton.

C. an electron.

D. a molecule.

Explain why your answer makes sense.

2. S8P1.a The chemical formula for methane is CH_4 and a model of its structure is shown.



The model of methane represents a(n)

A. isotope.

B. ion.

C. atom.

D. molecule.

Explain why your answer makes sense.

3. S8P1.b Which is a compound?

A. Nitrogen (N_2)

B. Neon (Ne)

C. Ozone (O_3)

D. Ammonia (NH_3)

Explain why your answer makes sense.

4. S8P1.b Which statement best distinguishes between a compound and a mixture?

A. Only a mixture has more than one atom.

B. Only a mixture has more than one element.

C. Only a compound is a pure substance.

D. Only a compound has chemical properties.

Explain why your answer makes sense.

5. S8P1.b

A self-warming packet can be used to warm hands during cold weather. Powdered iron (Fe) reacts with oxygen (O_2) when the packet is exposed to air. With the addition of a salt catalyst, Fe_2O_3 (iron oxide) is quickly formed and heat is given off.

$$4Fe + 3O_2 \longrightarrow 2Fe_2O_3$$

Which term best describes iron oxide?

A. compound

B. element

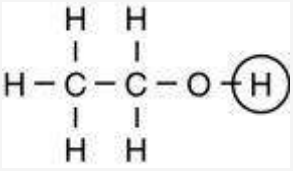
C. ion

D. mixture

Explain why your answer makes sense.

6. S8P1.b

The diagram for the structural formula of ethanol shows the elements and their arrangement.



What does the circled part of the diagram represent?

A. an atom

B. any ion

C. one molecule

D. an electron

Explain why your answer makes sense.

7. S8P1.b

What is the smallest unit of an element that retains the properties of that element?

A. electron

B. molecule

C. neutron

D. atom

Explain why your answer makes sense.

8. S8P1.c Anita heats a beaker containing water. As the temperature of the water increases, which change to the water molecules occurs?

A. The molecules move at afaster rate.

B. The molecules become more massive.

C. The molecules expand and become wider.

D. The molecules separate into atoms of hydrogen and oxygen.

Explain why your answer makes sense.

9. S8P1.c Which statement best describes particles of matter in the gaseous state?

A. They move together and are tightly packed.

B. They move independently and are tightly packed.

C. They move together and are relatively far apart.

D. They move independently and are relatively far apart.

Explain why your answer makes sense.

10. S8P1.d Julie listed some information about calcium chloride $(CaCl_2)$ in her notebook.

Calcium Chloride Data

- Color/texture – White/Granular
- Density – 2.15 g/cm^3
- Melting Point – 772°C
- Reaction with water – Releases energy

Which of her notes listed indicates a chemical property of calcium chloride $(CaCl_2)$?

A. It is white and granular.

B. The density is $2.15\ g/cm^3$.

C. The melting point is 772°C.

D. It releases energy when it reacts with water.

Explain why your answer makes sense.

11. S8P1.e Which is a physical change?

A. a piece of wood burning

B. a copper roof changing color

C. rust forming on an iron fence

D. a sheet of paper shredding

Explain why your answer makes sense.

12. S8P1.e Which of these does not illustrate substances reacting to form new substances?

A. $H_2O_{(l)} \rightarrow H_2O_{(g)}$

B. $2\,H_2 + O_2 \rightarrow 2\,H_2O$

C. $2\,Na + Cl_2 \rightarrow 2\,NaCl$

D. $6\,CO_2 + 6\,H_2O \rightarrow C_6H_{12}O_6 + 6O_2$

Explain why your answer makes sense.

13. S8P1.f

Elements in the Periodic Table of the Elements are organized into columns and rows.

Periodic Table of the Elements (partial section)

13 3A	14 4A	15 5A	16 6A	17 7A	18 8A
					2 He
5 B	6 C	7 N	8 O	9 F	10 Ne
13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr

Explain why your answer makes sense.

The columns are organized to show the

A. similarities of the reactivity in groups.

B. number of neutrons in a column.

C. sum of atomic weights per column.

D. amount of radioactivity in each group.

14. S8P1.f

The Periodic Table of the Elements organizes elements according to their properties. A section of the periodic table is shown.

Periodic Table of the Elements (Groups 1–6)

	1		3	4	5	6
1	1 H 1.008	2				
2	3 Li 6.941	4 Be 9.012				
3	11 Na 22.99	12 Mg 24.31				
4	19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.88	23 V 50.94	24 Cr 52.00
5	37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.94
6	55 Cs 132.9	56 Ba 137.3	57 La 138.9	72 Hf 178.5	73 Ta 180.9	74 W 183.8
7	87 Fr 223.0	88 Ra 226.0	89 Ac 227.0	104 Rf 261.1	105 Db 262.1	106 Sg 263.1

Explain why your answer makes sense.

Which set of elements below is the most similar in chemical behavior?

A. H, Be, Sc

B. Fr, Ra, Rf

C. Ti, V, Cr

D. Be, Ca, Ra

15. S8P1. g

A student observed a science demonstration. In the demonstration, two invisible gases, hydrogen and oxygen, were combined to form water. When the water appeared, the student concluded that matter had been created. Which statement best explains whether the student is correct or incorrect?

A. The student is correct because the law of conservation of energy applies only to physical changes.

B. The student is correct because the law of conservation of matter applies only to physical changes.

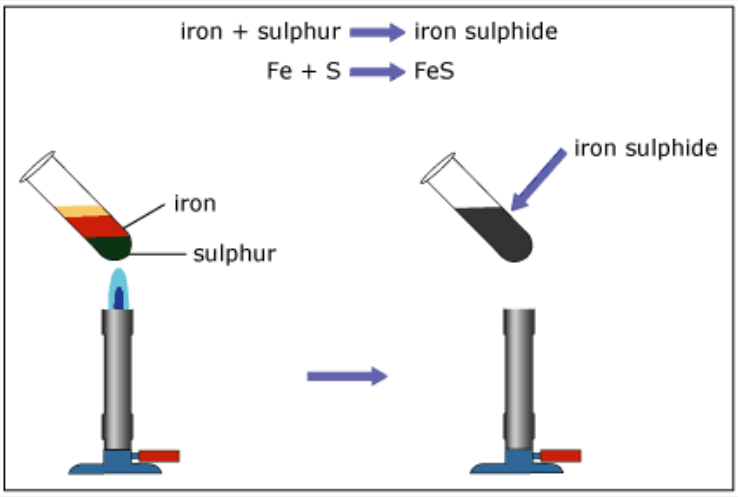
C. The student is incorrect because the law of conservation of energy applies to chemical reactions.

D. The student is incorrect because the law of conservation of matter applies to chemical reactions.

Explain why your answer makes sense.

16. S8P1. g

When iron and sulphur are heated, iron sulphide is produced. Fe + S → FeS



If 280 grams of iron was needed to produce 440 grams of iron sulphide, how many grams of sulphur was used?

A. 160 grams

B. 280 grams

C. 440 grams

D. 720 grams

Explain why your answer makes sense.

17. S8P1. g

A scientist studies the following chemical equation for the production of water.

$$2H_2 + O_2 \longrightarrow 2H_2O$$

What happens to the mass of the reactants during this chemical reaction?

A. mass of oxygen stays the same

B. mass of hydrogen doubles

C. mass of oxygen decreases

D. mass of hydrogen increases

Explain why your answer makes sense.

18. S8P1. g

A chemical reaction separates water into hydrogen gas and oxygen gas. Which of the following statements is true about the mass of the water and the combined mass of the two gases?

A. The mass of the water is greater than the combined mass of the two gases.

B. The combined mass of the two gases is much greater than the mass of the water.

C. The combined mass of the two gases is the same as the mass of the water.

D. The mass of the water is the same as double the combined mass of the two gases.

Explain why your answer makes sense.

19. S8P2.a Chemical energy from the fuel of a car is converted to another form of energy. Which statement best describes the energy changes in this process?

A. The kinetic energy of the car is less than the chemical energy of the fuel.

B. During this energy change, the total disorder of the universe decreases.

C. The kinetic energy of the car is equal to the chemical energy of the fuel.

D. During this energy change, the total disorder of the universe remains the same.

Explain why your answer makes sense.

20. S8P2.a According to the law of conservation of energy, energy cannot be created nor destroyed just _____ and _____.

A. Transforms and transfers

B. Absorbs and emits

C. Changes in color and shape

D. Converts and expires

Explain why your answer makes sense.

21. S8P2.a The human body produces motion by changing chemical energy into mechanical energy. Which of these best describes what happens to the energy?

A. The total amount of energy increases.

B. The total amount of energy is constant.

C. The energy is destroyed through motion.

D. The amount of chemical energy increases.

Explain why your answer makes sense.

22. S8P2.a Which of these statements best represents the law of conservation of energy?

A. Potential energy can be completely converted to kinetic energy.

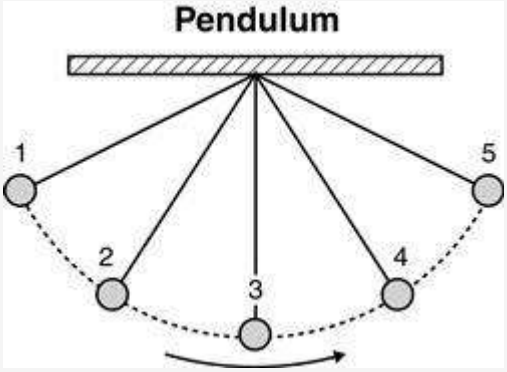
B. The total energy in a systemdecreases over time.

C. Energy is being created in the universe every day.

D. The energy created by machines can be lost.

Explain why your answer makes sense.

23. S8P2.b The pendulum shown moves from point 1 to point 5.



Which statement best describes the change in energy during motion of the pendulum?

A. The kinetic energy at point 3 increases as it moves to point 4.

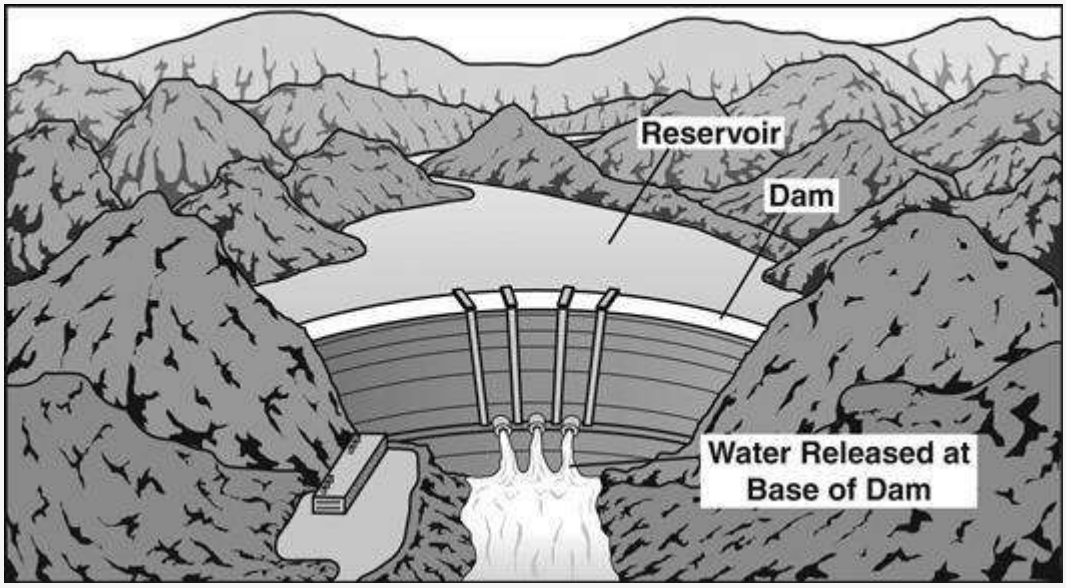
B. The potential energy at point 2 increases as it moves to point 4.

C. The kinetic energy at point 1 is equal to the potential energy at point 3.

D. The potential energy at point 1 is equal to the potential energy at point 3.

Explain why your answer makes sense.

24. S8P2.b Engineers are building a dam in a river valley. Once the dam is built, a reservoir will develop.



Which energy transformation are engineers most likely attempting to achieve?

A. to convert electrical energyinto potential energy

B. to convert potential energy into electrical energy

C. to convert electromagnetic energy into kinetic energy

D. to convert kinetic energy into gravitational energy

Explain why your answer makes sense.

25. S8P2.b Which of the following is the best example of potential energy?

A. a falling rock

B. a burning match

C. a liter of gasoline

D. a red-hot piece of iron

Explain why your answer makes sense.

26. S8P2.b A group of friends decided to go camping for the weekend. They gathered some tree branches and built a campfire. What type of energy of the tree branches did the friends use?

A. heat energy

B. kinetic energy

C. chemical energy

D. mechanical energy

Explain why your answer makes sense.

27. S8P2.b Which form of energy is in firewood?

A. light

B. sound

C. kinetic

D. potential

Explain why your answer makes sense.

28. S8P2.c Which of the following energy sources converts the potential energy of stored water into kinetic energy?

A. biofuels

B. solar energy

C. geothermal power

D. hydroelectricity

Explain why your answer makes sense.

29. S8P2.c Which of the following energy resources relies on energy from Earth's interior?

A. wind energy

B. geothermal energy

C. hydroelectric energy

D. biofuels

Explain why your answer makes sense.

30. S8P2.c One of the most effective agents of erosion is running water, as in the St. John's River. Running water carries particles that hit against rocks in the river, causing the rocks to become smooth and rounded. The change in rocks caused by running water is a result of which type of energy?

A. thermal

B. radiant

C. mechanical

D. gravitational

Explain why your answer makes sense.

31. In a gasoline-powered car, chemical energy from gasoline is transformed to make the car move. The motion of the car is what form of energy?

A. radiant energy

B. nuclear energy

C. electrical energy

D. mechanical energy

Explain why your answer makes sense.

32. S8P2.c Riding a bicycle produces several forms of energy. Which form of energy is produced in the greatest amount by pedaling a bicycle down the sidewalk?

A. chemical

B. radiant

C. kinetic

D. sound

Explain why your answer makes sense.

33. S8P2.d The best example of heat transfer by convection is when

A. sunlight warms soil.

B. a ceiling fan blows air.

C. flames heat up a pan.

D. heat rises in a chimney.

Explain why your answer makes sense.

34. S8P2.d A carpenter rubs sandpaper on a wooden bench to make the bench smoother. The sandpaper will get warm as it is rubbed on the bench. As a result of the friction between the sandpaper and the bench, thermal energy is converted to

A. chemical energy that isstored by the sandpaper.

B. radiant energy that is transferred to the bench.

C. potential energy that is stored by the wood.

D. heat energy that is transferred to the air.

Explain why your answer makes sense.

35. S8P2.d A metal container on the stove gets hot by

A. conduction of heat energy.

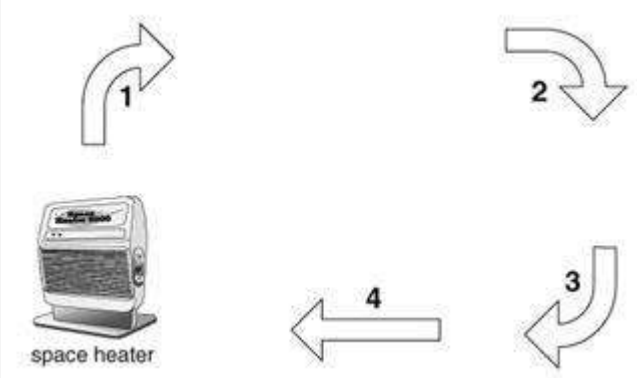
B. convection of heat energy.

C. radiation of heat energy.

D. refraction of heat energy.

Explain why your answer makes sense.

36. S8P2.d Use the diagram of a convection current to answer the question that follows.



Which arrow represents the hottest air in this convection current?

A. 1

B. 2

C. 3

D. 4

Explain why your answer makes sense.

37. S8P1. a

Which symbolizes a molecule?

A. He

B. Be

C. N_2

D. Na

Explain why your answer makes sense.

38. S8P1. a

Which of the following particles combine to form molecules?

A. protons

B. electrons

C. compounds

D. atoms

Explain why your answer makes sense.

39. S8P1 c.

During an experiment, a class heated a balloon that had an initial circumference of 25 cm. The circumference increased to 27 cm. Which is the best conclusion that can be drawn?

A. The molecules inside the balloon lost energy to the outside.

B. The molecules inside the balloon gained energy from the heat.

C. The energy of the molecules inside the balloon remained the same.

D. The molecules inside the balloon were escaping outside.

Explain why your answer makes sense.

40. S8P1 c.

As a sample of mercury changes state from liquid to solid, the atoms of the sample

A. move closer together and have less kinetic energy.

B. move closer together and have more kinetic energy.

C. move farther apart and have less kinetic energy.

D. move farther apart and have more kinetic energy.

Explain why your answer makes sense.

41. S8P1 d.

Some properties of calcium carbonate are listed below.

1. odorless
2. fine white powder
3. very slightly soluble in cold water
4. forms bubbles when mixed with an acid

Which property is a chemical property?

A. property 1

B. property 2

C. property 3

D. property 4

Explain why your answer makes sense.

42 . S8P1 d.

Which of the following is a chemical property of matter?

A. reactivity

B. luster

C. boiling point

D. density

Explain why your answer makes sense.

43. S8P1 d.

Which of these is a chemical property of a material?

A. density

B. flammability

C. color

D. brittleness

Explain why your answer makes sense.

44. S8P1 e

Which part of digestion is mainly a chemical change?

A. Teeth break food into small pieces.

B. Throat muscles push food toward the stomach.

C. Stomach acids dissolve food into nutrients.

D. Intestinal cells transport nutrients into the blood.

Explain why your answer makes sense.

45. S8P1 e

Each of the following statements describes either a physical or chemical process.

1. An iron nail rusts.
2. A glass window breaks.
3. A piece of wood burns.
4. An ice cube melts.

Which processes are physical processes?

A. 1 and 3

B. 1 and 4

C. 2 and 3

D. 2 and 4

Explain why your answer makes sense.

46. S8P1. f

2. The Periodic Table of the Elements organizes elements according to their properties. A section of the periodic table is shown.

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4	19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.88	23 V 50.94	24 Cr 52.00
5	37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.94
6	55 Cs 132.9	56 Ba 137.3	57 La 138.9	72 Hf 178.5	73 Ta 180.9	74 W 183.8
7	87 Fr 223.0	88 Ra 226.0	89 Ac 227.0	104 Rf 261.1	105 Db 262.1	106 Sg 263.1

Which set of elements below is the most similar in chemical behavior?

A. H, Be, Sc

B. Fr, Ra, Rf

C. Ti, V, Cr

D. Be, Ca, Ra

Explain why your answer makes sense.

47. S8P1 f

Fluorine is an element found in its pure form as a diatomic gas molecule, F_2. It is placed as follows on the periodic table.

O	F	Ne
S	Cl	Ar

Which element most likely forms the same kind of gas molecule?

A. neon

B. argon

C. sulfur

D. chlorine

Explain why your answer makes sense.