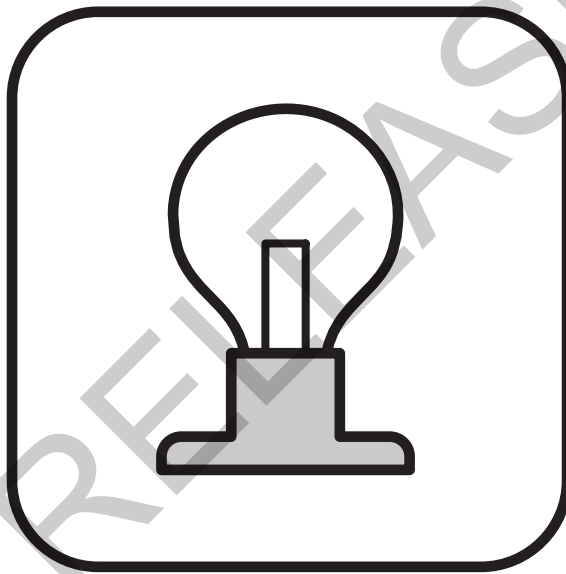


Released Items

Student Name: _____

Physical Science



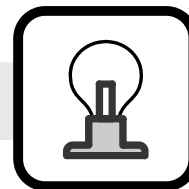
2016–2017



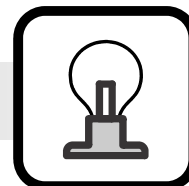
Public Schools of North Carolina
State Board of Education
Department of Public Instruction
Raleigh, North Carolina 27699-6314

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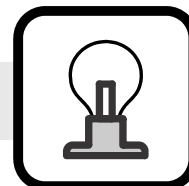
NC Final Exam



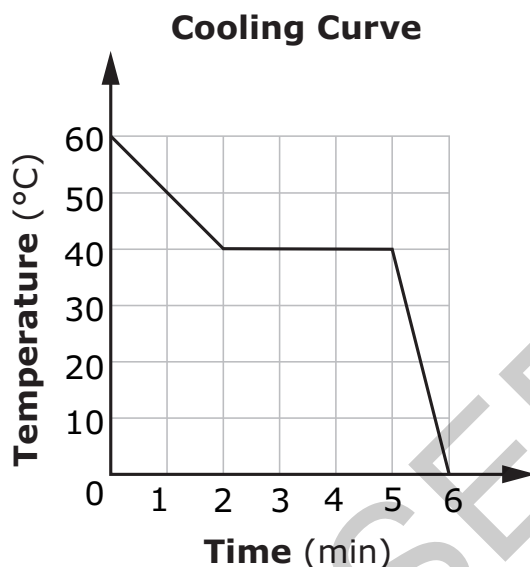
- 1 Which substance is **most likely** classified as a colloid?
- A soft drink
 - B oxygen gas
 - C water
 - D fog
- 2 Atoms of which two elements will form an ionic bond?
- A Mg and Cl
 - B N and O
 - C Fe and Co
 - D Rb and Al
- 3 Which compound will **most likely** be formed when lithium (Li) and nitrogen (N) are chemically combined?
- A LiN
 - B Li₃N
 - C LiN₃
 - D Li₃N₃



- 4 Which compound results from covalent bonding?
- A NH_4Cl
 - B K_2SO_4
 - C NaCl
 - D $\text{C}_6\text{H}_{12}\text{O}_6$
- 5 Why are beta particles able to penetrate objects better than alpha particles are?
- A because beta particles are larger than alpha particles
 - B because beta particles are smaller than alpha particles
 - C because beta particles are negatively charged, while alpha particles are neutral
 - D because beta particles travel in a straight line, while alpha particles travel in waves

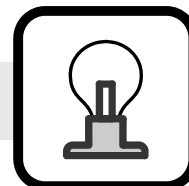


- 6 This graph represents the cooling curve for a pure substance in a liquid state at $t = 0$ min.

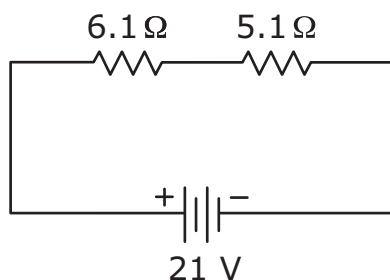


Why does temperature remain constant from when $t = 2$ min to when $t = 5$ min?

- A because the substance absorbs heat energy as it changes from a liquid to a solid
- B because heat energy is released from the substance as it changes from a liquid to a solid
- C because heat energy is released from the substance as it changes from a liquid to a gas
- D because the substance absorbs heat energy as it changes from a liquid to a gas

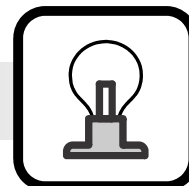


- 7 This diagram represents a closed series circuit.

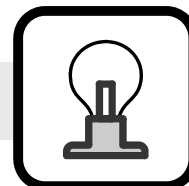


What would happen if the voltage were doubled?

- A The current would quadruple.
- B The current would double.
- C The current would remain constant.
- D The current would be reduced by half.
- 8 How would decreasing the diameter of the wires in a circuit influence the resistance and flow of electrons in the circuit?
- A It would decrease the resistance, causing fewer electrons to flow through the circuit.
- B It would increase the resistance, causing fewer electrons to flow through the circuit.
- C It would decrease the resistance by allowing more electrons to flow through the circuit.
- D It would increase the resistance by allowing more electrons to flow through the circuit.

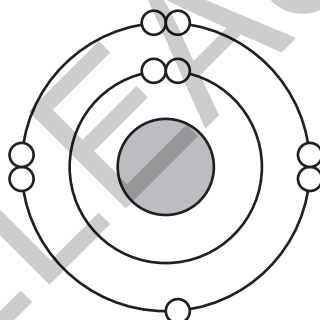


- 9 How could the strength of an electromagnet be increased?
- A by reducing the length of the core of the electromagnet
 - B by using rubber material as the core for the electromagnet
 - C by decreasing the amount of current in the electromagnet
 - D by increasing the number of coils in the wires of the electromagnet
- 10 How does a step-down transformer alter the amount of voltage from a power line to a building?
- A It increases output voltage by increasing the number of wire turns in the secondary coil.
 - B It decreases output voltage by decreasing the number of turns in the secondary coil.
 - C It increases output voltage by decreasing the number of wire turns in the secondary coil.
 - D It decreases output voltage by increasing the number of turns in the secondary coil.
- 11 Student X pushes a 10-N box with a force of 2 N. At the same time, Student Y pushes the same box with a force of 6 N, but in the opposite direction. Which would **most likely** occur? (Ignore friction.)
- A The resultant force on the box would be 8 N.
 - B The resultant force on the box would be 18 N.
 - C The box will move toward Student X.
 - D The box will move toward Student Y.



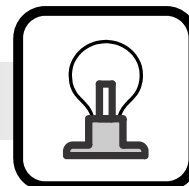
- 12 A ball at rest is dropped and hits the ground in 1.5 s with a final speed of 15 m/s. How would the acceleration and final speed of the ball be affected if it were dropped from a greater height on Earth? (Ignore friction.)
- A Its final speed would remain the same because its rate of acceleration would remain the same.
 - B Its final speed would increase because its rate of acceleration would remain the same.
 - C Its final speed would remain the same because its rate of acceleration would decrease.
 - D Its final speed would increase because its rate of acceleration would increase.

- 13 This diagram represents a neutral atom of fluorine-19.

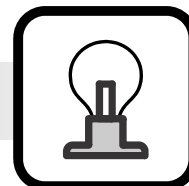


Which **best** describes the structure of fluorine-19?

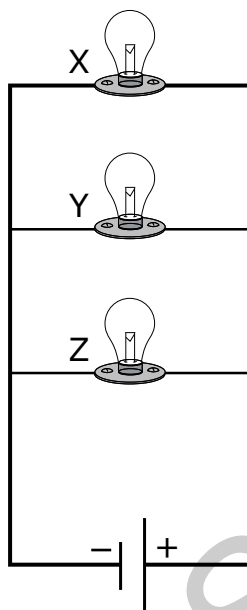
- A 2 electrons in the first energy level; 7 electrons in the second energy level
- B 2 electrons in the first energy level; 8 electrons in the second energy level
- C 9 protons and 9 neutrons in the nucleus
- D 10 protons and 9 neutrons in the nucleus



- 14 Which type of chemical bond accounts for the high electrical conductivity in a bar of pure silver (Ag)?
- A metallic
 - B ionic
 - C covalent
 - D hydrogen
- 15 Which equation represents a decomposition chemical reaction?
- A $2S + 3O_2 \rightarrow 2SO_3$
 - B $2NaCl \rightarrow 2Na + Cl_2$
 - C $2K + 2H_2O \rightarrow 2KOH + H_2$
 - D $Zn + 2HCl \rightarrow ZnCl_2 + H_2$
- 16 When is work done on an object?
- A when a force is applied to an object and the object remains stationary
 - B when a force is applied to an object and the object moves in the same direction as the force
 - C when the frictional force on an object is greater than a force applied to the object
 - D when two forces of equal magnitude are applied to the object in opposite directions

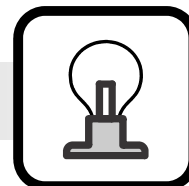


- 17 This diagram represents a closed circuit with three identical lightbulbs.



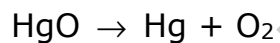
If bulb Y stops working in the circuit, what will happen to bulbs X and Z?

- A Bulb X and bulb Z will not glow.
 - B Bulb X will glow, but bulb Z will not glow.
 - C Bulb X and bulb Z will glow.
 - D Bulb X will not glow, but bulb Z will glow.
- 18 Two objects are traveling on the same track. For 10 s, Object X has an average acceleration of 3.0 m/s/s. If Object Y has an initial velocity of 0 m/s and a final velocity of 25 m/s after 10 s, how does its acceleration compare to Object X's?
- A The average acceleration of Object Y is greater than Object X by 247 m/s/s.
 - B The average acceleration of Object Y is greater than Object X by 32 m/s/s.
 - C The average acceleration of Object X is greater than Object Y by 2.6 m/s/s.
 - D The average acceleration of Object X is greater than Object Y by 0.5 m/s/s.



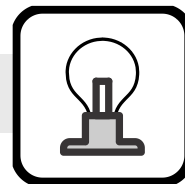
- 19 A desk exerts an upward force of 1.5 N to a book lying on it. What force does the book exert on the desk?
- A a downward force of 0.0 N
 - B a downward force of 1.5 N
 - C a downward force of 6.5 N
 - D a downward force of 15 N

- 20 This unbalanced equation represents a chemical reaction:



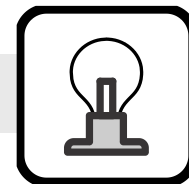
Which is the correctly balanced chemical equation for this reaction?

- A $\text{HgO} \rightarrow \text{Hg} + 2\text{O}_2$
- B $2\text{HgO} \rightarrow \text{Hg} + \text{O}_2$
- C $2\text{HgO} \rightarrow \text{Hg} + 2\text{O}_2$
- D $2\text{HgO} \rightarrow 2\text{Hg} + \text{O}_2$



Physical Science
 RELEASED Items¹
 2016–2017
 Answer Key

Question Number	Question Type ²	Correct Answer	Percent Correct ³	Objective
1	MC	D	30%	PSc.2.1.1
2	MC	A	49%	PSc.2.2.2
3	MC	B	50%	PSc.2.2.3
4	MC	D	23%	PSc.2.2.2
5	MC	B	35%	PSc.2.3.1
6	MC	B	48%	PSc.3.1.1
7	MC	B	64%	PSc.3.3.2
8	MC	B	34%	PSc.3.3.3
9	MC	D	61%	PSc.3.3.4
10	MC	B	30%	PSc.3.3.5
11	MC	C	58%	PSc.1.2.3
12	MC	B	16%	PSc.1.2.1
13	MC	A	76%	PSc.2.1.4
14	MC	A	55%	PSc.2.2.2
15	MC	B	62%	PSc.2.2.5

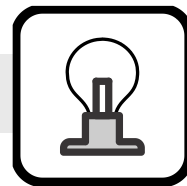


Question Number	Question Type ²	Correct Answer	Percent Correct ³	Objective
16	MC	B	70%	PSc.3.1.3
17	MC	C	52%	PSc.3.3.2
18	MC	D	45%	PSc.1.1.2
19	MC	B	74%	PSc.1.2.3
20	MC	D	57%	PSc.2.2.4

¹These released items were administered to students during a previous test administration. This sample set of released items may not reflect the breadth of the standards assessed and/or the range of item difficulty found on the NC Final Exam. Additional information about the NC Final Exam is available in the *Assessment Specification* for each exam located at <http://www.ncpublicschools.org/accountability/common-exams/specifications/>.

²This NC Final Exam contains only multiple-choice (MC) items.

³Percent correct is the percentage of students who answered the item correctly during a previous administration.



Clarifying Objectives Descriptions

Only clarifying objective descriptions addressed by the released items in this document are listed below. A complete list of North Carolina *Essential Standards* for Science may be reviewed at <http://www.ncpublicschools.org/curriculum/science/scos/support-tools/#standards>.

PSc.1.1.2 (Forces and Motion)

Compare speed, velocity, acceleration and momentum using investigations, graphing, scalar quantities and vector quantities.

PSc.1.2.1 (Forces and Motion)

Explain how gravitational force affects the weight of an object and the velocity of an object in freefall.

PSc.1.2.3 (Forces and Motion)

Explain forces using Newton's Three Laws of Motion.

PSc.2.1.1 (Matter: Properties and Change)

Classify matter as: homogeneous or heterogeneous; pure substance or mixture; element or compound; metals, nonmetals or metalloids; solution, colloid or suspension.

PSc.2.1.4 (Matter: Properties and Change)

Interpret data presented in Bohr model diagrams and dot diagrams for atoms and ions of elements 1 through 18.

PSc.2.2.2 (Matter: Properties and Change)

Infer the type of chemical bond that occurs, whether covalent, ionic or metallic, in a given substance.

PSc.2.2.3 (Matter: Properties and Change)

Predict chemical formulas and names for simple compounds based on knowledge of bond formation and naming conventions.

PSc.2.2.4 (Matter: Properties and Change)

Exemplify the law of conservation of mass by balancing chemical equations.

PSc.2.2.5 (Matter: Properties and Change)

Classify types of reactions such as synthesis, decomposition, single replacement or double replacement.

PSc.2.3.1 (Matter: Properties and Change)

Compare nuclear reactions including; alpha decay, beta decay and gamma decay; nuclear fusion and nuclear fission.

PSc.3.1.1 (Energy: Conservation and Transfer)

Explain thermal energy and its transfer.

PSc.3.1.3 (Energy: Conservation and Transfer)

Explain work in terms of the relationship among the applied force to an object, the resulting displacement of the object and the energy transferred to an object.



PSc.3.3.2 (Energy: Conservation and Transfer)

Explain simple series and parallel DC circuits in terms of Ohm's Law.

PSc.3.3.3 (Energy: Conservation and Transfer)

Explain how current is affected by changes in composition, length, temperature, and diameter of wire.

PSc.3.3.4 (Energy: Conservation and Transfer)

Explain magnetism in terms of domains, interactions of poles, and magnetic fields.

PSc.3.3.5 (Energy: Conservation and Transfer)

Explain the practical applications of magnetism.