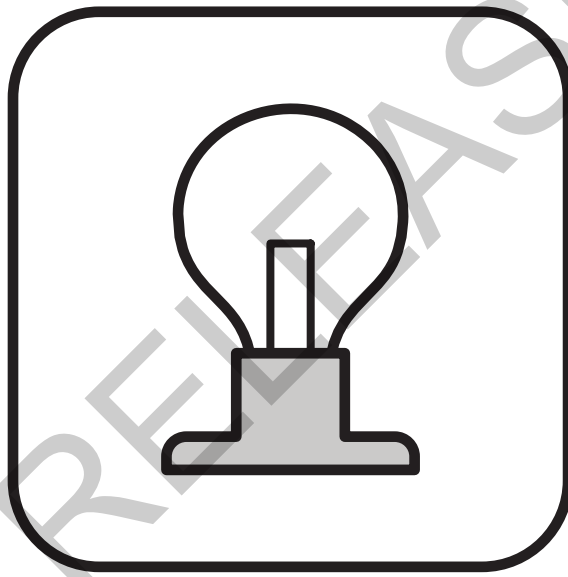


Released Items

Student Name: _____

Physical Science



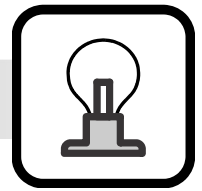
2018–2019



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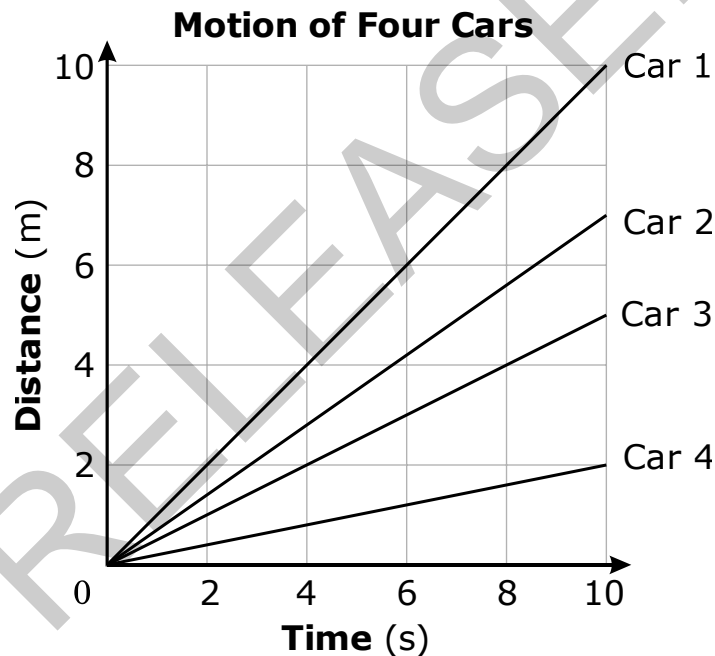
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NC Final Exam



- 1 A man jogs at a velocity of 2.5 m/s west for 1,200 s. He then walks at a velocity of 1.0 m/s east for 500 s and then stops to rest. What is the displacement of the man when he stops to rest?
- A 3,500 m west
 - B 3,000 m west
 - C 2,500 m west
 - D 700 m west

- 2 The graph below shows the motion of four cars.

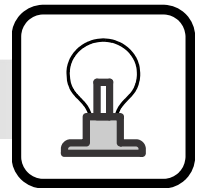


Based on the graph, which statement about all the cars is true?

- A They are moving at a constant speed.
- B They are changing their speed during travel.
- C They are slowing down.
- D They are stopped.

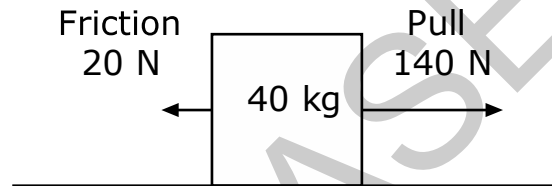


- 3 A rock on Earth has a mass of 750 kg and a weight of 7,350 N. If the rock is taken into outer space, how will its mass and weight be affected?
- A The weight and mass will remain the same because they are not altered by the effects of gravity.
 - B The weight will remain the same, but the mass will change because of the effects of gravity.
 - C The mass will be 76.5 kg, and the weight will increase because of the effects of gravity.
 - D The mass will be 750 kg, but the weight will decrease because of the effects of gravity.
- 4 As the wheels of a train move along the train tracks, what type of friction exists between the wheels and the tracks?
- A fluid friction
 - B rolling friction
 - C sliding friction
 - D static friction
- 5 A 1,500-kg truck has a net force of 4,200 N acting on it. What is the truck's acceleration?
- A 6,300,000 m/s/s
 - B 2,700 m/s/s
 - C 2.8 m/s/s
 - D 0.36 m/s/s



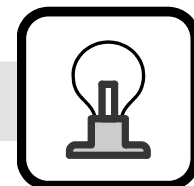
- 6 A child fills a bucket with salt water and sand. How are the contents of the bucket classified?
- A a solution
 - B a compound
 - C a homogeneous mixture
 - D a heterogeneous mixture

- 7 This diagram shows a 40-kg object being pulled in one direction while friction acts on it in the opposite direction.



What is the net force on the object?

- A 160 N
 - B 140 N
 - C 120 N
 - D 20 N
- 8 How are the processes of melting and freezing similar?
- A They are both processes that physically change a substance.
 - B They are both processes that chemically change a substance.
 - C They are both processes where heat is released by a substance.
 - D They are both processes where heat is absorbed by a substance.



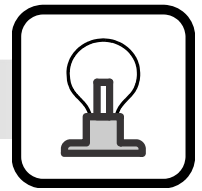
- 9 Which element is classified as a metal?
- A boron (B)
 - B antimony (Sb)
 - C phosphorus (P)
 - D cadmium (Cd)
- 10 Four different liquids will be separately poured into a single beaker. The liquids are ethanol, milk, oil, and water. The density for each liquid at room temperature is listed in the table below.

Density of Substances at Room Temperature

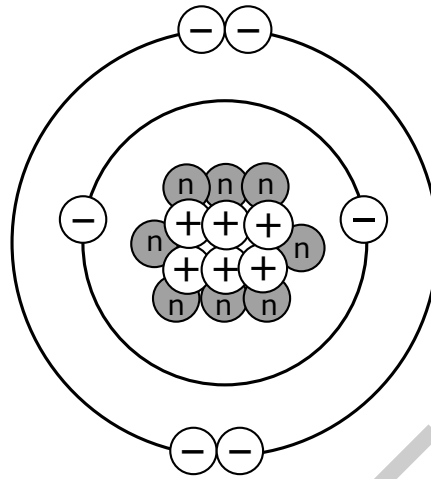
Liquid	Density (g/mL)
ethanol	0.789
milk	1.033
oil	0.918
water	1.000

How will the liquids be arranged from **bottom** to **top** in the beaker?

- A milk, water, oil, ethanol
- B milk, water, ethanol, oil
- C water, milk, oil, ethanol
- D water, oil, ethanol, milk

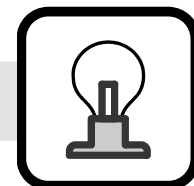


11 The diagram below is the Bohr model of an atom.

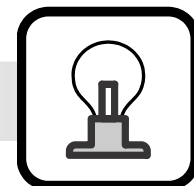


Which **best** describes this atom?

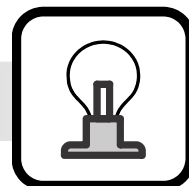
- A It has 6 electrons.
 - B It has a positive charge.
 - C It has 6 valence electrons.
 - D It has a full outermost energy level.
- 12 How does a piece of paper's ability to be folded in half compare to its ability to burn?
- A Its ability to be folded is a physical property, while its ability to burn is a chemical property.
 - B Its ability to be folded is a chemical property, while its ability to burn is a physical property.
 - C Both are physical properties of the piece of paper.
 - D Both are chemical properties of the piece of paper.



- 13 How many valence electrons are in a neutral atom of nitrogen (N)?
- A 2
 - B 3
 - C 5
 - D 15
- 14 Electrons are being shared between atoms in a certain compound. Which elements could **most likely** form this compound?
- A lithium (Li) and fluorine (F)
 - B aluminum (Al) and iodine (I)
 - C sulfur (S) and oxygen (O)
 - D iron (Fe) and chlorine (Cl)
- 15 What is the chemical formula for magnesium acetate?
- A $\text{Mg}_2(\text{C}_2\text{H}_3\text{O}_2)_2$
 - B $\text{Mg}(\text{C}_2\text{H}_3\text{O}_2)_2$
 - C $\text{Mg}_2\text{C}_4\text{H}_6\text{O}_4$
 - D $\text{MgC}_4\text{H}_6\text{O}_4$



- 16 Which represents a balanced chemical equation?
- A $\text{CO}_2 + 2\text{H}_2\text{O} \rightarrow 2\text{CH}_4 + 2\text{O}_2$
- B $\text{CH}_4 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
- C $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$
- D $\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{CH}_4 + \text{O}_2$
- 17 What type of chemical reaction occurs when beryllium (Be) combines with oxygen (O_2) to form beryllium oxide (BeO)?
- A double replacement
- B single replacement
- C decomposition
- D synthesis
- 18 Which equation represents a neutralization reaction?
- A acid + water \rightarrow salt + base
- B acid + base \rightarrow water + salt
- C acid + salt \rightarrow base + water
- D water + base \rightarrow salt + acid



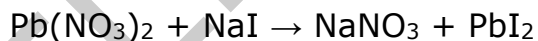
19 Which of these elements is the **most** chemically reactive?

- A beryllium (Be)
- B calcium (Ca)
- C strontium (Sr)
- D radium (Ra)

20 Which compound contains ionic bonds?

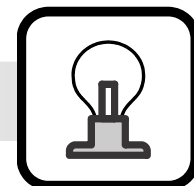
- A C₂H₆
- B PCl₅
- C Ca₃N₂
- D SF₂

21 This unbalanced equation represents a chemical reaction:



What is the coefficient for NaI once the equation is balanced?

- A 1
- B 2
- C 3
- D 4



22 What type of bond will form when an element from group 2 (IIA) bonds with an element from group 17 (VIIA)?

- A hydrogen bond
- B covalent bond
- C metallic bond
- D ionic bond

23 This chart shows the effects of several solutions on litmus paper.

Solutions and Their Effects on Litmus Paper

Solution	Effect on Blue Litmus	Effect on Red Litmus
1	None	Turns Blue
2	None	Turns Blue
3	None	None
4	Turns Red	None
5	None	Turns Blue
6	None	None
7	Turns Red	None
8	None	Turns Blue

Which information can be determined from the litmus paper tests?

- A Solutions 1 and 5 are both acids.
- B Solutions 2 and 8 are both neutral.
- C Solutions 3 and 6 are both bases.
- D Solutions 4 and 7 are both acids.



- 24 A 100-gram sample of cerium-143 has a half-life of 33 hours. How long will it take until there are only 6.25 grams of cerium-143 left?
- A 66 hours
 - B 99 hours
 - C 132 hours
 - D 165 hours

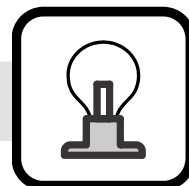
- 25 The chart below lists the specific heat capacity of four different metals of equal mass.

Specific Heat Capacity of Four Metals

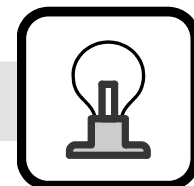
Metal	Specific Heat Capacity (J/g°C)
copper	0.385
gold	0.129
nickel	0.444
titanium	0.523

If the temperature of each metal were increased from 20°C to 25°C, which metal would require the **least** amount of heat to raise its temperature?

- A copper
- B gold
- C nickel
- D titanium



- 26 Thallium-208 has a half-life of 3 minutes. How long will it take 60.0 g of thallium-208 to decay so that 15.0 g of the thallium-208 remains?
- A 3 minutes
 - B 6 minutes
 - C 9 minutes
 - D 12 minutes
- 27 A 200-kg rock is at the top of a cliff. What happens to its energy as it begins to fall?
- A Its kinetic energy is transformed into potential energy.
 - B Its potential energy is transformed into kinetic energy.
 - C Its potential energy increases.
 - D Its kinetic energy decreases.

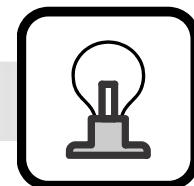


- 28 The chart below shows the force applied on four different objects and the distance each object moves.

Object	Force Applied (N)	Distance Moved (m)
W	10	30
X	20	20
Y	30	1
Z	40	0

On which object was the **least** amount of work done?

- A W
 - B X
 - C Y
 - D Z
- 29 It takes 6.0 seconds for a pulley system to lift a crate weighing 300. N to a height of 5.0 meters. How much power is required to lift the crate?
- A 360 W
 - B 250 W
 - C 10. W
 - D 0.1 W



- 30 If the velocity of a sound wave remains constant and its frequency increases, which characteristic of the wave will decrease?
- A amplitude
 - B wavelength
 - C energy
 - D speed
- 31 How does the energy of ultraviolet radiation compare to the energy of microwaves?
- A Ultraviolet radiation has less energy than microwaves, because ultraviolet radiation has a lower frequency.
 - B Ultraviolet radiation has more energy than microwaves, because ultraviolet radiation has a higher frequency.
 - C Microwaves have less energy than ultraviolet radiation, because microwaves have shorter wavelengths.
 - D Microwaves have more energy than ultraviolet radiation, because microwaves have longer wavelengths.
- 32 A certain wave has compressions and rarefactions. How should this wave be classified?
- A as a longitudinal wave
 - B as a surface wave
 - C as a transverse wave
 - D as an electromagnetic wave



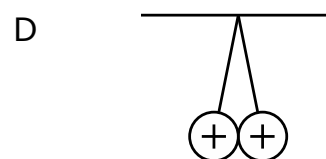
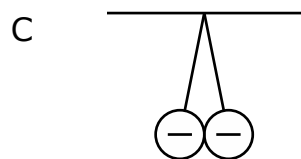
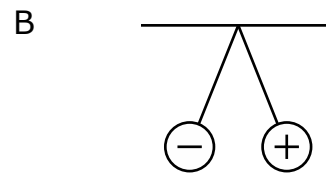
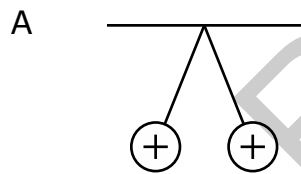
33 Which statement describes the wave interactions in sound navigation and ranging (SONAR)?

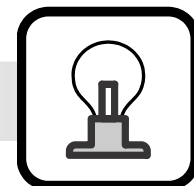
- A Sound is transmitted through the water and diffracted by hard surfaces.
- B Sound is transmitted through the water and reflected by hard surfaces.
- C Sound is diffracted through the water and transmitted by hard surfaces.
- D Sound is diffracted through the water and reflected by hard surfaces.

34 A wave has a frequency of 4.0 Hz. If it is traveling at a velocity of 20 m/s, what is the wavelength of the wave?

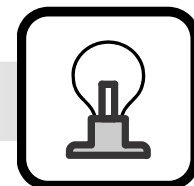
- A 80 m
- B 16 m
- C 5.0 m
- D 0.2 m

35 Which diagram correctly shows how electrically charged balls will act?



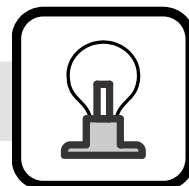


- 36 If a wave has a frequency of 0.4 Hz and a wavelength of 15 m, what is its velocity?
- A 0.2 m/s
 - B 6.0 m/s
 - C 38 m/s
 - D 60 m/s
- 37 A circuit has 2.25 amps of current and a resistance of 4.00 Ω . What is the voltage difference across the circuit?
- A 9.00 V
 - B 6.25 V
 - C 1.78 V
 - D 0.56 V
- 38 A copper wire is connected across a constant voltage source. Which change will cause an increase in the current flowing through the wire?
- A an increase in the length of the wire
 - B an increase in the resistance of the wire
 - C an increase in the diameter of the wire
 - D an increase in the insulation around the wire



- 39 Which will cause an electromagnetic solenoid to increase its strength?
- A replacing the wire with an insulator inside the solenoid
 - B increasing the temperature surrounding the solenoid
 - C increasing the number of wire coils in the solenoid
 - D removing the iron core from the solenoid
- 40 How could the output voltage of an electrical generator be increased?
- A by reducing the generator's rotational speed
 - B by reducing the mechanical work put into the generator
 - C by increasing the resistance of the coils in the generator
 - D by increasing the number of coils in the generator's electromagnet

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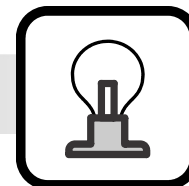


This is the end of the Physical Science Released Items.

Directions:

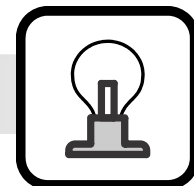
- 1. Look back over your answers for the test questions.**
- 2. Make sure all your answers are entered on the answer sheet. Only what is entered on your answer sheet will be scored.**
- 3. Put all of your papers inside your test book and close the test book.**
- 4. Place your calculator on top of the test book.**
- 5. Stay quietly in your seat until your teacher tells you that testing is finished.**
- 6. Remember, teachers are not allowed to discuss items from the test with you, and you are not allowed to discuss with others any of the test questions or information contained within the test.**

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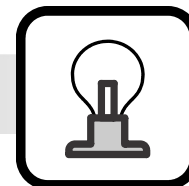


**Physical Science
RELEASED Items¹
2018–2019
Answer Key**

Question Number	Question Type	Correct Answer	Percent Correct ²	Objective
1	MC	C	39%	PSc.1.1.1
2	MC	A	62%	PSc.1.1.2
3	MC	D	61%	PSc.1.2.1
4	MC	B	77%	PSc.1.2.2
5	MC	C	56%	PSc.1.2.3
6	MC	D	45%	PSc.2.1.1
7	MC	C	49%	PSc.1.2.3
8	MC	A	76%	PSc.2.1.2
9	MC	D	55%	PSc.2.1.1
10	MC	A	72%	PSc.2.1.3
11	MC	A	46%	PSc.2.1.4
12	MC	A	81%	PSc.2.1.3
13	MC	C	46%	PSc.2.2.1
14	MC	C	39%	PSc.2.2.2
15	MC	B	53%	PSc.2.2.3
16	MC	C	44%	PSc.2.2.4



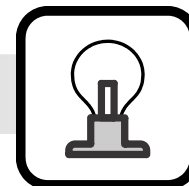
Question Number	Question Type	Correct Answer	Percent Correct ²	Objective
17	MC	D	42%	PSc.2.2.5
18	MC	B	39%	PSc.2.2.6
19	MC	D	55%	PSc.2.2.1
20	MC	C	47%	PSc.2.2.2
21	MC	B	56%	PSc.2.2.4
22	MC	D	48%	PSc.2.2.2
23	MC	D	46%	PSc.2.2.6
24	MC	C	43%	PSc.2.3.2
25	MC	B	57%	PSc.3.1.1
26	MC	B	46%	PSc.2.3.2
27	MC	B	63%	PSc.3.1.2
28	MC	D	56%	PSc.3.1.3
29	MC	B	51%	PSc.3.1.4
30	MC	B	43%	PSc.3.2.1
31	MC	B	43%	PSc.3.2.2
32	MC	A	29%	PSc.3.2.3
33	MC	B	51%	PSc.3.2.4
34	MC	C	54%	PSc.3.2.1



Question Number	Question Type	Correct Answer	Percent Correct ²	Objective
35	MC	A	54%	PSc.3.3.1
36	MC	B	66%	PSc.3.2.1
37	MC	A	57%	PSc.3.3.2
38	MC	C	32%	PSc.3.3.3
39	MC	C	61%	PSc.3.3.4
40	MC	D	50%	PSc.3.3.5

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/>.

²Percent 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.1.1.1 (Forces and Motion)

Explain motion in terms of frame of reference, distance, and displacement.

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.1.2.2 (Forces and Motion)

Classify frictional forces into one of four types: static, sliding, rolling, and fluid.

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.2.1.2 (Matter: Properties and Change)

Explain the phases of matter and the physical changes that matter undergoes.

PSc.2.1.3 (Matter: Properties and Change)

Compare physical and chemical properties of various types of matter.

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.2.2.1 (Matter: Properties and Change)

Infer valence electrons, oxidation number, and reactivity of an element based on its location in the Periodic Table.

PSc.2.2.2 (Matter: Properties and Change)

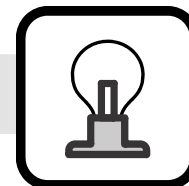
Infer the type of chemical bond that occurs, whether covalent, ionic or metallic, in a given substance.

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.2.2.6 (Matter: Properties and Change)

Summarize the characteristics and interactions of acids and bases.

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.2.3.2 (Matter: Properties and Change)

Exemplify the radioactive decay of unstable nuclei using the concept of half-life.

PSc.3.1.1 (Energy: Conservation and Transfer)

Explain thermal energy and its transfer.

PSc.3.1.2 (Energy: Conservation and Transfer)

Explain the law of conservation of energy in a mechanical system in terms of kinetic energy, potential energy and heat.

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.3.1.4 (Energy: Conservation and Transfer)

Explain the relationship among work, power and simple machines both qualitatively and quantitatively.

PSc.3.2.1 (Energy: Conservation and Transfer)

Explain the relationships among wave frequency, wave period, wave velocity and wavelength through calculation and investigation.

PSc.3.2.2 (Energy: Conservation and Transfer)

Compare waves (mechanical, electromagnetic, and surface) using their characteristics.

PSc.3.2.3 (Energy: Conservation and Transfer)

Classify waves as transverse or compressional (longitudinal).

PSc.3.2.4 (Energy: Conservation and Transfer)

Illustrate the wave interactions of reflection, refraction, diffraction, and interference.

PSc.3.3.1 (Energy: Conservation and Transfer)

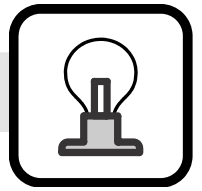
Summarize static and current electricity.

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.

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