

Released Form

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

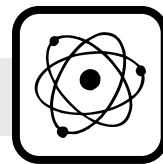
Spring 2013  
North Carolina  
Measures of Student Learning:  
NC's Common Exams  
**Physical Science**



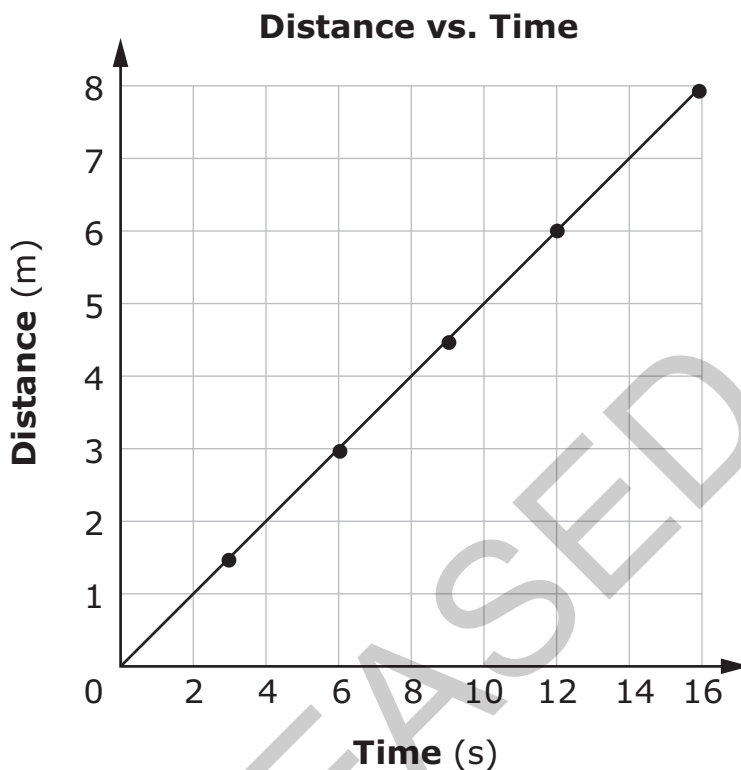
# Student Booklet



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

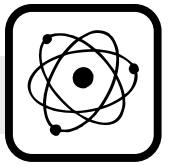


- 1 The graph below represents the motion of a cart.



How does the speed of the cart compare when  $t = 6$  s and  $t = 12$  s?

- A The speed of the cart at 6 s is greater than when time equals 12 s.
- B The speed of the cart at 6 s is less than when time equals 12 s.
- C The speed of the cart is 0.5 m/s at 6 s and 12 s.
- D The speed of the cart is 2 m/s at 6 s and 12 s.



2 The chart below represents the change in velocity for four different trains.

**Change in Velocity for Four Different Trains**

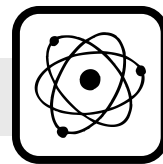
Train	Initial Velocity	Final Velocity
W	60	91
X	39	68
Y	42	70
Z	65	94

If it took 5.38 s to reach the final velocity, which train had the greatest acceleration?

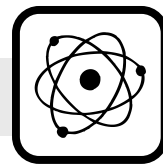
- A W
- B X
- C Y
- D Z

3 Why does a flat piece of notebook paper take longer to reach the ground than an identical piece of notebook paper crumpled into a ball?

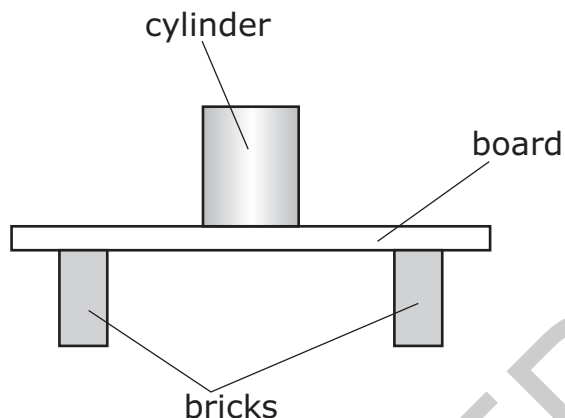
- A The flat piece of paper has more mass.
- B The crumpled piece of paper has more mass.
- C The frictional force of air has more effect on the falling flat piece of paper.
- D The frictional force of air has more effect on the falling crumpled piece of paper.



- 4 Why does the weight of an object change with increasing elevation on Earth?
- A The mass of the object decreases with higher elevation.
  - B The force of gravity acting on the object increases with higher elevation.
  - C The force of gravity acting on the object decreases with higher elevation.
  - D The mass of the object increases with higher elevation.
- 5 Which type of friction occurs when an eraser is rubbed across a sheet of paper?
- A static
  - B sliding
  - C rolling
  - D fluid
- 6 Two students pull on the opposite ends of a rope, but neither student is able to move the other. Which statement **best** explains why neither student is moved?
- A They each pull on the rope with the same amount of force, so the net force is zero.
  - B They each exert the same amount of friction against the ground, so the net friction is zero.
  - C Their forces are not balanced, but gravity keeps them from moving.
  - D The two students have the same mass.

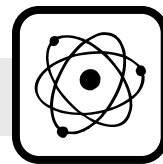


- 7 The diagram below shows a board on top of two bricks with a cylinder on top of the board.



The board exerts an upward force of 50 N. Which **best** explains this situation?

- A The board has a weight of 50 N.
  - B The cylinder has a weight of 50 N.
  - C The combined weight of the two bricks is 50 N.
  - D The combined weight of the bricks, board, and cylinder is 50 N.
- 8 Which is an example of a mixture?
- A iron filings
  - B copper wire
  - C bronze pipe
  - D titanium plate



- 9 An element located at Group 18 and Period 4 would be classified as which type of substance?
- A a halogen
  - B a metalloid
  - C a lanthanoid
  - D a nonmetal

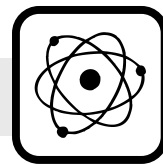
- 10 The chart below shows the density of five gases.

**Density of Gases**

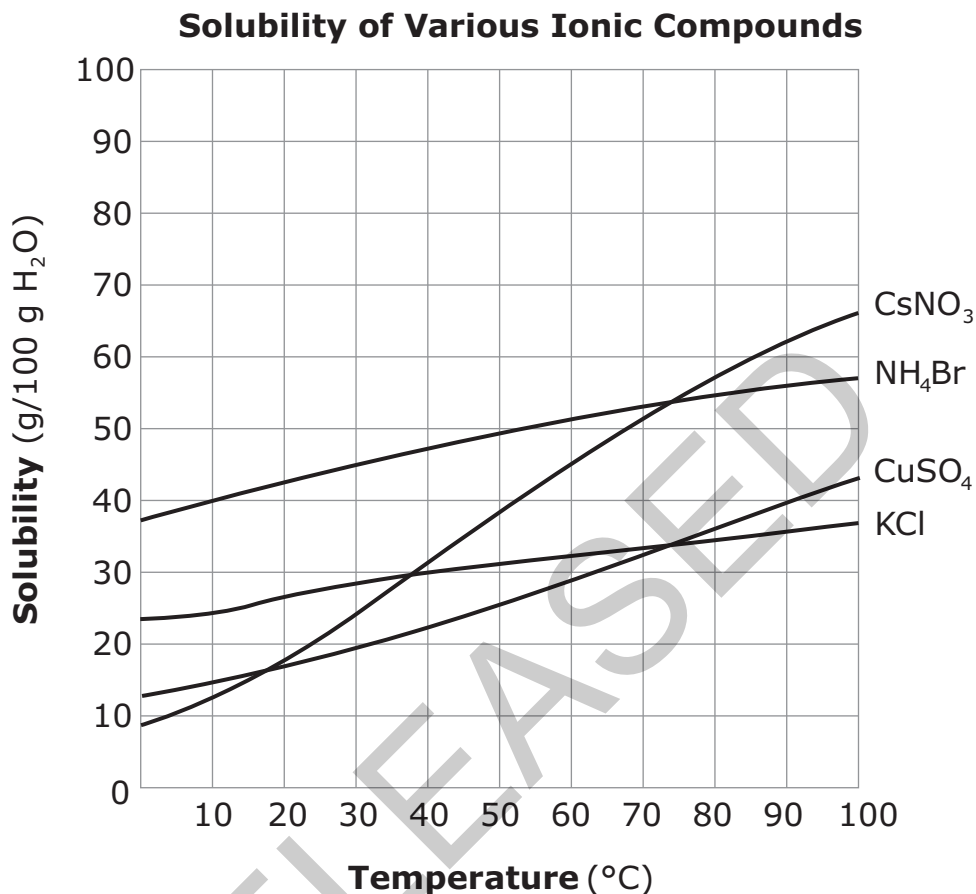
Gas	Density (g/L)
helium	0.178
neon	0.900
argon	1.78
krypton	3.71
xenon	5.85

A gas has a volume of 4.52 L. If its mass is 8.05 g, what is the identity of the gas?

- A helium
- B neon
- C argon
- D krypton

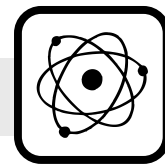


11 This graph shows the solubility curves for various ionic compounds.

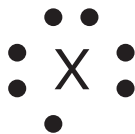


At which temperature does KCl have the same solubility as CuSO<sub>4</sub>?

- A 18°C
- B 38°C
- C 73°C
- D 100°C

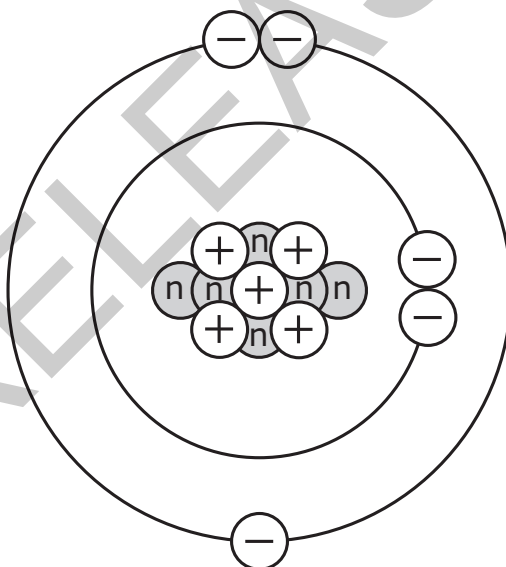


12 This is an electron dot diagram:



Which element is represented?

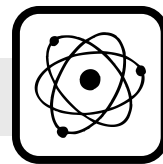
- A boron (B)
  - B phosphorus (P)
  - C sulfur (S)
  - D bromine (Br)
- 13 This diagram represents a neutral atom of boron-11.



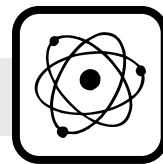
How many protons and neutrons does boron-11 have?

- A 11 protons, 11 neutrons
- B 11 protons, 0 neutrons
- C 6 protons, 5 neutrons
- D 5 protons, 6 neutrons

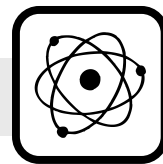




- 14 Which two elements have the same number of valence electrons?
- A C and O
  - B Na and Mg
  - C Cl and F
  - D Ga and Ge
- 15 Which of these elements is the **most** chemically reactive?
- A zinc (Zn)
  - B iron (Fe)
  - C potassium (K)
  - D germanium (Ge)
- 16 Some coins are alloys of zinc (Zn) and copper (Cu). Which type of bond forms these coins?
- A covalent
  - B hydrogen
  - C ionic
  - D metallic



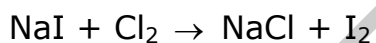
- 17 How can two different nonmetals form a compound?
- A by sharing protons
  - B by sharing electrons
  - C by transferring protons
  - D by transferring electrons
- 18 Which is the chemical formula for magnesium hydroxide?
- A  $\text{Mg}(\text{OH})_2$
  - B  $\text{MgOH}$
  - C  $\text{MgOH}_2$
  - D  $\text{Mg}_2\text{OH}$
- 19 Which is the correct name for the compound  $\text{NaNO}_3$ ?
- A sodium nitrate
  - B sodium nitrous acid
  - C sodium nitrogen oxide
  - D sodium nitrogen trioxide



20 Which is a correctly balanced chemical equation?

- A  $\text{CuCl}_2 + 2\text{Al} \rightarrow 2\text{AlCl}_3 + \text{Cu}$
- B  $2\text{CuCl}_2 + \text{Al} \rightarrow \text{AlCl}_3 + 2\text{Cu}$
- C  $2\text{CuCl}_2 + 3\text{Al} \rightarrow 3\text{AlCl}_3 + 2\text{Cu}$
- D  $3\text{CuCl}_2 + 2\text{Al} \rightarrow 2\text{AlCl}_3 + 3\text{Cu}$

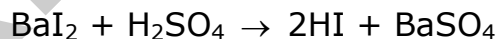
21 This equation represents an unbalanced chemical reaction:



When the equation is balanced, which coefficient should be placed before NaCl?

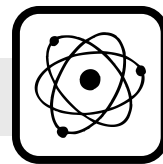
- A 2
- B 3
- C 4
- D 5

22 This equation represents a balanced chemical reaction:



Which type of chemical reaction is represented?

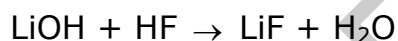
- A double replacement
- B single replacement
- C decomposition
- D synthesis



23 A scientist uses litmus paper to measure the pH of several different solutions. Which solution turns the litmus paper red?

- A NaOH
- B NaCl
- C HCl
- D NH<sub>3</sub>

24 This equation represents a balanced neutralization chemical equation:

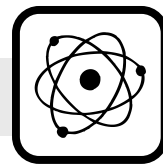


A solution of which compound has a pH greater than 7?

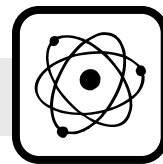
- A H<sub>2</sub>O, because it is neutral.
- B HF, because it is an acid.
- C LiF, because it is a salt.
- D LiOH, because it is a base.

25 Which group is in order of increasing ability to penetrate an object?

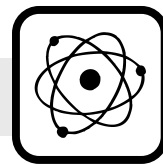
- A alpha, proton, beta
- B alpha, beta, gamma
- C beta, proton, alpha
- D gamma, beta, alpha



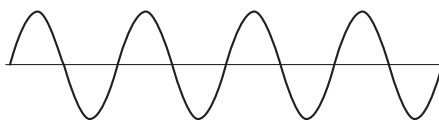
- 26 A 100-gram sample of radium-226 has a half-life of 1,600 years. How long will it take before there are only 12.5 grams of the radioactive radium-226 remaining?
- A 1,600 years
  - B 3,200 years
  - C 4,800 years
  - D 6,400 years
- 27 Why does a student's hand feel cold when holding an ice cube?
- A Heat flows from the ice cube to the hand.
  - B Heat flows from the hand to the ice cube.
  - C Cold flows from the hand to the ice cube.
  - D Cold flows from the ice cube to the hand.
- 28 What happens to the molecules in a pot of water as it is heated?
- A They move faster.
  - B They move slower.
  - C They lose thermal energy.
  - D They gain potential energy.



- 29 Two boxes, X and Y, are on a shelf 10 meters above the floor. Box X has a mass of 4 kg, and Box Y has a mass of 8 kg. Which statement **best** represents the relationship between boxes X and Y?
- A Box X and Box Y have no potential energy.
  - B Box X has less potential energy than Box Y.
  - C Box X has more potential energy than Box Y.
  - D Box X and Box Y both have 784 J of potential energy.
- 30 Which describes the kinetic energy of a ball in free fall?
- A The kinetic energy remains the same while the velocity increases.
  - B The kinetic energy decreases because the velocity increases.
  - C The kinetic energy increases because the velocity increases.
  - D The kinetic energy remains the same while the velocity decreases.
- 31 How do radio waves and visible light waves differ?
- A Radio waves have a shorter wavelength than visible light waves.
  - B Radio waves move faster than visible light waves.
  - C Radio waves have a lower frequency than visible light waves.
  - D Radio waves have more energy than visible light waves.

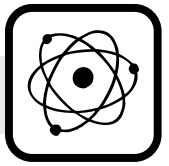


- 32 The diagram below represents a wave pattern.

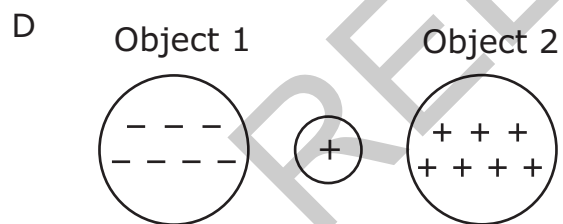
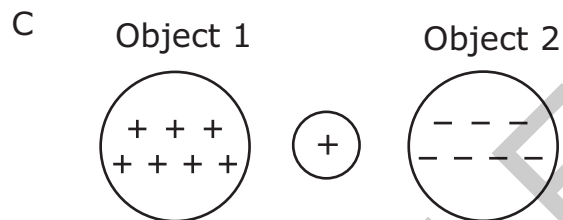
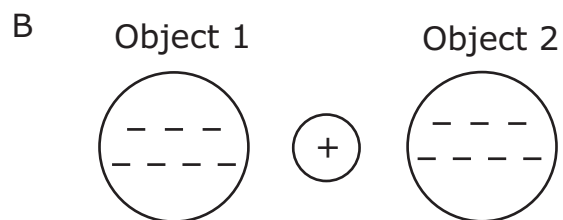
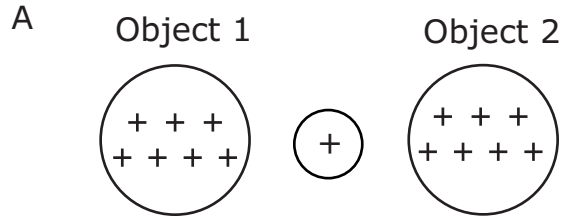


Which type of wave is represented?

- A longitudinal wave
  - B transverse wave
  - C sound wave
  - D primary wave
- 33 Object X and Object Y are rubbed together. Object X acquires a negative charge. What does Object Y experience?
- A a gain of protons
  - B a loss of protons
  - C a gain of electrons
  - D a loss of electrons



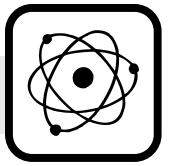
34 A positively charged ball is placed an equal distance between two charged objects (1 and 2). In which case will the positively charged ball move toward Object 2?



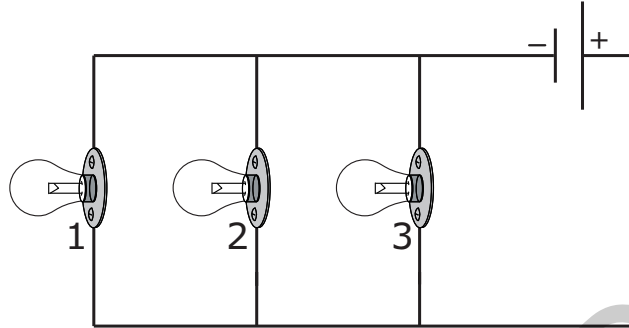
35 Which is a true statement about a series circuit?

- A All the current flows through every part of the circuit.
- B Every part of the circuit is positively charged.
- C The current through the circuit can take several paths.
- D Every part of the circuit is negatively charged.



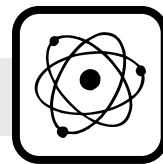


- 36 This diagram represents a circuit with three 20-ohm light bulbs. The battery is 10 volts.



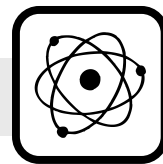
If light bulb 3 burns out in the circuit, what will happen to light bulb 1 and light bulb 2?

- A Light bulb 1 and light bulb 2 will work.
  - B Light bulb 1 and light bulb 2 will not work.
  - C Light bulb 1 will work, but light bulb 2 will not work.
  - D Light bulb 1 will not work, but light bulb 2 will work.
- 37 A student wants to build a simple circuit. Which material would be used to design a circuit with the least amount of resistance?
- A long wires with a thin diameter
  - B long wires with a large diameter
  - C short wires with a thin diameter
  - D short wires with a large diameter



- 38 Two magnets are stuck end to end by a magnetic force. Which statement **best** describes these magnets?
- A The north poles of the magnets are attracted to each other.
  - B The south poles of the magnets are attracted to each other.
  - C The south pole of one magnet is repelled by the north pole of the other magnet.
  - D The north pole of one magnet is attracted to the south pole of the other magnet.
- 39 Which action will have the **least** effect on the strength of an electromagnet?
- A changing the amount of current
  - B changing the current's direction
  - C changing the number of wire loops
  - D changing the size of the metal core
- 40 In cars with electric door locks, electromagnets allow the doors to be locked and unlocked at the push of a button. Why is an electromagnet used for this kind of door lock?
- A Using electromagnets conserves electricity.
  - B Using electromagnets prevents static electric shock.
  - C Electromagnets can easily be turned off.
  - D Electromagnets can attract metals or nonmetals.

**This is the end of the multiple-choice portion of the test.**

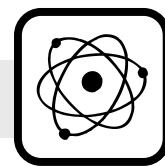


The questions you read next will require you to answer in writing.

1. Write your answers on separate paper.
2. Be sure to write your name on each page.

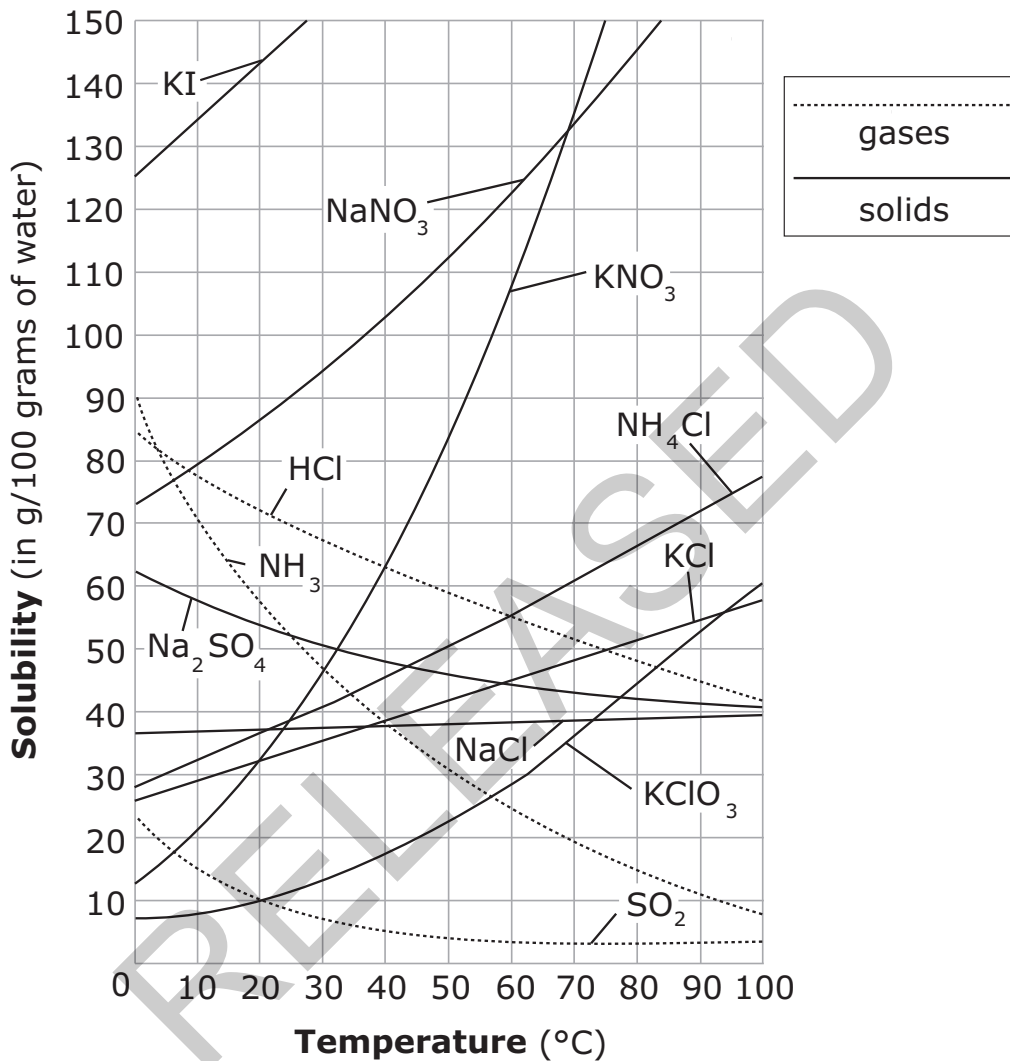
- 1 A student rides her bicycle to school, which is 6 km north of her home. After school, she rides to the grocery store that is 2 km north of the school.
- What is the total distance she travels from home to the grocery store?
  - For the student, her displacement from home to the grocery store is the same as her distance. How is this possible?
  - What could the student do to make her displacement different from her distance traveled?

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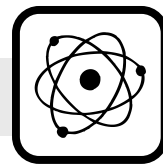


2 The graph represents the solubility curve for several substances in 100 g of water.

**Solubility Curve for Various Compounds**

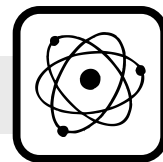


- Using the graph, determine which substance would be considered least soluble at 10°C. Explain your answer.



- 3 SONAR (Sound Navigation and Ranging) is often used to locate a ship below the surface of the ocean.
- What wave behavior is demonstrated by the use of SONAR?
  - Describe how SONAR can locate a ship below the surface of the ocean.

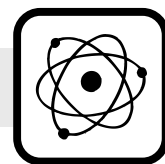
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**This is the end of the Physical Science test.**

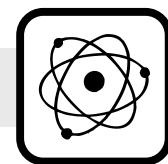
- 1. Look back over your answers.**
- 2. Put all of your papers inside your test book and close the test book.**
- 3. Place your calculator on top of the test book.**
- 4. Stay quietly in your seat until your teacher tells you that testing is finished.**

RELEASED



**Physical Science  
RELEASED Form  
Spring 2013  
Answer Key**

<b>Item number</b>	<b>Type</b>	<b>Key</b>	<b>Unifying Concept</b>
1	MC	C	Forces and Motion
2	MC	A	Forces and Motion
3	MC	C	Forces and Motion
4	MC	C	Forces and Motion
5	MC	B	Forces and Motion
6	MC	A	Forces and Motion
7	MC	B	Forces and Motion
8	MC	C	Matter: Properties and Change
9	MC	D	Matter: Properties and Change
10	MC	C	Matter: Properties and Change
11	MC	C	Matter: Properties and Change
12	MC	D	Matter: Properties and Change
13	MC	D	Matter: Properties and Change
14	MC	C	Matter: Properties and Change
15	MC	C	Matter: Properties and Change
16	MC	D	Matter: Properties and Change
17	MC	B	Matter: Properties and Change
18	MC	A	Matter: Properties and Change
19	MC	A	Matter: Properties and Change
20	MC	D	Matter: Properties and Change
21	MC	A	Matter: Properties and Change
22	MC	A	Matter: Properties and Change
23	MC	C	Matter: Properties and Change



Item number	Type	Key	Unifying Concept
24	MC	D	Matter: Properties and Change
25	MC	B	Matter: Properties and Change
26	MC	C	Matter: Properties and Change
27	MC	B	Energy: Conservation and Transfer
28	MC	A	Energy: Conservation and Transfer
29	MC	B	Energy: Conservation and Transfer
30	MC	C	Energy: Conservation and Transfer
31	MC	C	Energy: Conservation and Transfer
32	MC	B	Energy: Conservation and Transfer
33	MC	D	Energy: Conservation and Transfer
34	MC	C	Energy: Conservation and Transfer
35	MC	A	Energy: Conservation and Transfer
36	MC	A	Energy: Conservation and Transfer
37	MC	D	Energy: Conservation and Transfer
38	MC	D	Energy: Conservation and Transfer
39	MC	B	Energy: Conservation and Transfer
40	MC	C	Energy: Conservation and Transfer
41	CR	Rubric	Forces and Motion
42	CR	Rubric	Matter: Properties and Change
43	CR	Rubric	Energy: Conservation and Transfer

**Item Types:**

MC = multiple choice

CR = constructed response