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Form 301

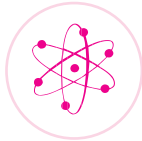
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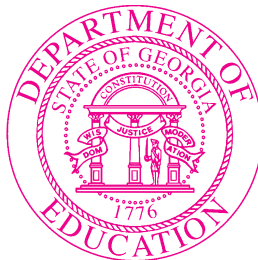


Course



Tests

Physical Science
Released Test Booklet
Spring 2004



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Kathy Cox, State Superintendent of Schools
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EOCT

Physical Science Reference Sheet

$$\text{Acceleration} = \frac{\text{final velocity} - \text{initial velocity}}{\text{time}} \quad (a = \frac{v_f - v_i}{t})$$

$$\text{Density} = \frac{\text{mass}}{\text{volume}} \quad (D = \frac{m}{V})$$

$$\text{Power} = \frac{\text{work}}{\text{time}} \quad (P = \frac{W}{t})$$

$$\text{Mechanical advantage} = \frac{\text{effort distance}}{\text{resistance distance}} \quad (MA = \frac{d_e}{d_r})$$

$$\text{Kelvin} = \text{°Celsius} + 273 \quad (K = \text{°C} + 273)$$

$$\text{Weight} = \text{mass} \times \text{acceleration of gravity} \quad (w = mg)$$

$$\text{Volume of a rectangular solid} = \text{length} \times \text{width} \times \text{height} \quad (V = lwh) \quad F_{\text{gravity}} = \frac{km_1m_2}{d^2}$$

$$\text{Speed} = \frac{\text{distance}}{\text{time}} \quad (v = \frac{d}{t})$$

$$\text{Force} = \text{mass} \times \text{acceleration} \quad (F = ma)$$

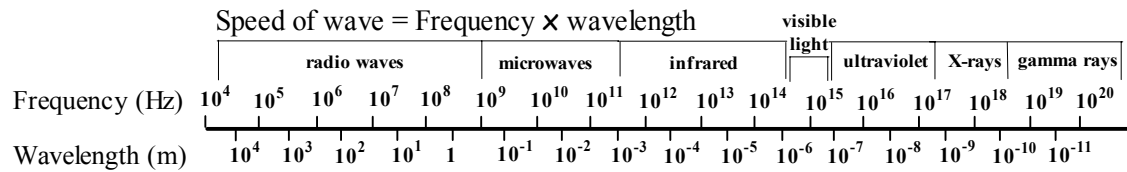
$$\text{Work} = \text{force} \times \text{distance} \quad (W = Fd)$$

$$\text{Efficiency} = \frac{\text{work out}}{\text{work in}} \quad (e = \frac{w_o}{w_i})$$

$$\text{Voltage} = \text{current} \times \text{resistance} \quad (V = IR)$$

$$\text{Acceleration of gravity} = g \approx 10 \frac{\text{m}}{\text{sec}^2}$$

Electromagnetic Spectrum



Periodic Table																	
1	2											13	14	15	16	17	18
IA	IIA											IIIA	IVA	VA	VIA	VIIA	VIII A
1 H 1.0	2 He 4.0											5 B 10.8	6 C 12.0	7 N 14.0	8 O 16.0	9 F 19.0	10 Ne 20.2
3 Li 6.9	4 Be 9.0											13 Al 27.0	14 Si 28.1	15 P 31.0	16 S 32.1	17 Cl 35.5	18 Ar 40.0
11 Na 23.0	12 Mg 24.3	III B 3	IV B 4	V B 5	V I B 6	V II B 7	V III B 8 9 10			IB 11	II B 12	13 Al 27.0	14 Si 28.1	15 P 31.0	16 S 32.1	17 Cl 35.5	18 Ar 40.0
19 K 39.1	20 Ca 40.1	21 Sc 45.0	22 Ti 48.0	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.7	29 Cu 63.5	30 Zn 65.4	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.9	36 Kr 83.8
37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc 98.0	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3
55 Cs 132.9	56 Ba 137.3	57-71	72 Hf 178.5	73 Ta 181.0	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po 209.0	85 At 210.0	86 Rn 222.0
87 Fr 223.0	88 Ra 226.0	89-103	104 Rf 261	105 Db 262	106 Sg 263	107 Bh 262	108 Hs 265	109 Mt 266									

57 La 138.9	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm 145.0	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0
89 Ac 227.0	90 Th 232.0	91 Pa 231.0	92 U 238.0	93 Np 237.0	94 Pu 244.0	95 Am 243.0	96 Cm 247.0	97 Bk 247.0	98 Cf 251.0	99 Es 252.0	100 Fm 257.0	101 Md 258.0	102 No 259.0	103 Lr 262.0

1 Which process is represented by the following description: “sugar is added to water and a sweet liquid results after stirring”?

- A melting
- B dissolving
- C evaporation
- D oxidation

2 The figure below shows how the word “ambulance” is painted on the front of some vehicles so that it reads correctly in the rearview mirror that is attached to the windshield of a car driving in front of the ambulance.

AMBULANCE

The word is painted this way because the mirror

- A turns the word upside down
- B reverses the left and the right sides of objects
- C rotates the objects by 90 degrees
- D makes the objects appear farther away

3 The weight of a person on Earth is 6 times his or her weight on the Moon. What type of force is responsible for a person’s weight?

- A inertial
- B electromagnetic
- C gravitational
- D mechanical

4 A large number of iron nails were kept in containers in a humid room. Some of the containers were open, and some were airtight. Sixty percent of the nails kept in open containers developed rust. Which of the following would be MOST important to know in order to draw a conclusion about whether the humidity might have contributed to the rusting?

- A the percentage of nails weakened by the rusting
- B the precise number of nails kept in airtight containers
- C the percentage of nails in airtight containers that also developed rust
- D the precise number of nails kept in the open containers

5 ITEM INTENTIONALLY LEFT BLANK

6 Which of the following is an example of a situation in which exothermic chemical reactions occur?

- A Ice cubes melt into water.
- B Boiling pots of water turn to steam.
- C Fireworks explode during a holiday.
- D Pieces of KCl dissolve in water.

7 Why did Dimitri Mendeleev use atomic masses instead of atomic numbers to organize his first periodic table in 1869?

- A Scientists did not know about atomic number in 1869.
- B Atomic mass works better than atomic number.
- C The elements will not be in the proper order if atomic number is used.
- D Atomic number cannot be measured.

8 Mr. Jacobs gives four groups of students an ice cube that they are to keep from melting as best as they can. An ice cube melts the LEAST over a period of one hour when it is

- A tightly wrapped in aluminum foil
- B in a tin can
- C in a glass jar
- D in a glass jar and the jar is completely covered in aluminum foil

9 Pauline needs to measure the sliding friction of a brick. How should she go about doing this?

- A attach the brick to a string and then to a spring scale and read the force needed to quickly lift the brick off the ground
- B drag the brick by a string attached to a spring scale so that it gradually speeds up
- C drag the brick by a string attached to a spring scale along the surface of a table at a constant speed and read the force
- D hang the brick from a string attached to a spring scale and read the force

10 By what process does a lens focus light?

- A reflection
- B refraction
- C congregation
- D dispersion

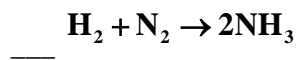
11 Which procedure is unsafe when heating a liquid in a test tube?

- A heating slowly
- B adding the liquid to the test tube before turning on the flame
- C using a low-energy flame
- D looking down the test tube to check for boiling

12 Soft drinks consist of a mixture of water, sugar, and flavoring, with carbon dioxide gas bubbled through it. Which of these ingredients would be considered the solvent?

- A water
- B sugar
- C flavoring
- D carbon dioxide

13 What number should precede H₂ in the chemical equation below in order for the equation to be balanced?



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

14 As you move from left to right across a row of elements in the periodic table, what happens to the number of neutrons in a typical atom?

- A It stays the same.
- B It increases.
- C It decreases.
- D It decreases until you reach the middle and then it increases.

15 Which of the following could be used to convert light energy to electrical energy?

- A a windmill
- B a chemical storage battery
- C a solar cell
- D rotating coils in a magnetic field

16 A helicopter is moving past some clouds at a velocity of 5 km/hr north relative to the clouds. The clouds are moving past the ground at a velocity of 3.5 km/hr north. How fast is the helicopter going past the ground?

- A 2.5 km/hr
- B 3.5 km/hr
- C 5 km/hr
- D 8.5 km/hr

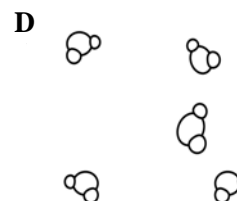
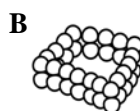
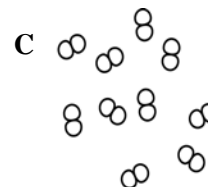
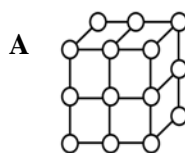
17 In a restaurant kitchen, lamps are used to keep food warm. Which type of electromagnetic radiation do the lamps emit that is primarily responsible for keeping the food warm?

- A gamma
- B infrared
- C ultraviolet
- D visible

18 The International System of Units (SI) is a standardized system of measurement used to express fundamental quantities in metric units. Which of the following metric units are used to measure the fundamental quantities of length, mass, and time, respectively, in the SI system?

- A liter, gram, second
- B foot, pound, second
- C meter, kilogram, second
- D meter, ounce, second

19 Which of the following is the BEST representation of molecules of water vapor?



20 Carbon atoms can link themselves together into long chains and rings to form a vast number of highly complicated molecules. Which of the following statements BEST explains why carbon atoms behave this way?

- A They easily form ionic bonds with each other.
- B They easily form covalent bonds with each other.
- C They easily combine with atoms of oxygen.
- D They easily become highly charged ions.

21 FIELD TEST ITEM

22 FIELD TEST ITEM

23 FIELD TEST ITEM

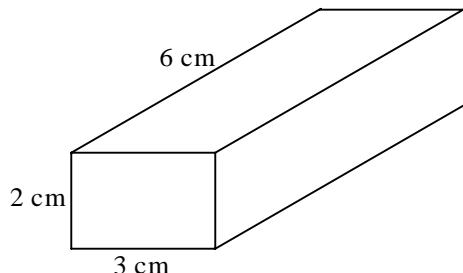
24 Which of the following situations violates the law of conservation of energy?

- A A ball dropped from the top of a building increases in speed until it hits the ground.
- B A block sliding freely on level ice increases in speed until it hits a wall.
- C A child playing on a swing moves fastest at the bottom of the swing's path.
- D The height a ball bounces decreases with each bounce.

25 Dale and Wallace are investigating static friction using a block and ramp. Their procedure is to raise the ramp in five-degree increments while adding five-gram masses to the block each time until it begins to slide down the ramp. Which statement accurately describes this experimental procedure?

- A This is a good experimental procedure.
- B This is a flawed experimental procedure because they should be measuring weight in newtons, not mass in grams.
- C This is a poor experimental procedure because they are changing too many variables.
- D This is a flawed experimental procedure because the masses may slide off the block.

- 26 A block of aluminum will be used to determine the density of aluminum. If the block measures $2\text{ cm} \times 3\text{ cm} \times 6\text{ cm}$, what is its volume?



- A 11 cm
 B 12 cm^3
 C 36 cm
 D 36 cm^3
- 27 Aluminum oxide, Al_2O_3 , is produced by combining Al^{3+} and O^{2-} particles. What type of compound has been formed?
- A covalent
 B ionic
 C metallic
 D molecular
- 28 Which of the following pairs are isotopes of the same element?
- A atom *J* (27 protons, 32 neutrons) and atom *L* (27 protons, 33 neutrons)
 B atom *Q* (56 protons, 81 neutrons) and atom *R* (57 protons, 81 neutrons)
 C atom *V* (8 protons, 8 neutrons) and atom *W* (7 protons, 8 neutrons)
 D atom *S* (17 protons, 18 neutrons) and atom *T* (18 protons, 17 neutrons)

- 29 An inclined plane is used to move a heavy box from the ground into the bed of a truck.



If 100 N of force is required to move the load up the ramp, how much work is done? Disregard any force of friction.

- A 100 J
 B 300 J
 C 400 J
 D 500 J
- 30 Four pairs of objects have the masses shown below. If the objects in each pair are the same distance apart, the gravitational force between the objects in which pair is greatest?
- A 1 kilogram and 1 kilogram
 B 1 kilogram and 2 kilograms
 C 2 kilograms and 1 kilogram
 D 2 kilograms and 2 kilograms
- 31 A toaster is plugged into a wall outlet that has a voltage of 110 volts. If the toaster's resistance is 10 ohms, what current runs through the toaster?
- A 10 amperes
 B 11 amperes
 C 100 amperes
 D 1100 amperes

- 32 Use the table below to answer the following question.

Flame Color for Different Salts

Salt	Flame Color
Sodium chloride	yellow
Potassium chloride	violet
Copper chloride	blue
Calcium chloride	red

Tomal performed a flame test by burning a small amount of an unknown substance in the flame of a Bunsen burner. The flame turned blue. It is MOST likely that the unknown substance contained

- A calcium
 - B potassium
 - C sodium
 - D copper
- 33 Which of the following is a chemical property of iodine?
- A violet as a gas
 - B silver-black as a solid
 - C reacts with starch to give a dark blue color
 - D a solid at room temperature
- 34 An ionic bond typically forms between certain types of elements. Which pair of elements will form an ionic compound?
- A Na and Cu
 - B K and Cl
 - C Ne and O
 - D Li and Mg
- 35 The number of protons in a neutral atom is equal to the number of
- A electrons
 - B neutrons
 - C ions
 - D isotopes

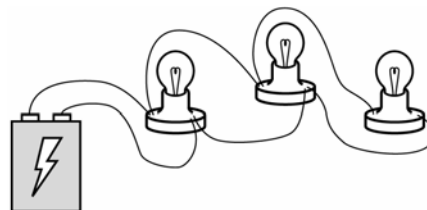
- 36 Albert stirs a mug of hot chocolate with a metal spoon. What type of heat transfer is responsible for the spoon getting hot?

- A conduction
- B convection
- C thermoelectric
- D radiation

- 37 In order to determine the speed of an object, what measurements must be made?

- A distance and direction
- B distance and mass
- C time, distance, and volume
- D distance and time

- 38 A student connects three identical light bulbs in parallel to a dry cell as shown below. What happens when the student removes one of the light bulbs from its socket?



- A All the light bulbs go out.
- B The other light bulbs remain on and will be equally bright.
- C The other light bulbs remain on, one less bright and the other the same brightness as before.
- D The other light bulbs remain on, one brighter and the other less bright than before.

- 39** The height, length, and width of the block shown below are all different.



Using this block, a student wants to test a hypothesis that frictional forces are independent of the area of contact between the block and the surface it slides on. Which method is BEST to collect the data needed?

- A pulling the block across the same surface 10 times, adding a weight on top of the block each time
 - B pulling the block across 10 different surfaces with the largest side in contact with them
 - C pulling the block across the same surface with a different side in contact each time
 - D pulling the block across three different surfaces with a different side in contact with each surface
- 40** The melting of wax is a physical change, yet the burning of wax is a chemical change. What is the essential difference between the physical change and chemical change of wax in a burning candle?
- A The burning of wax forms new compounds, while the melting of wax does not.
 - B A higher temperature is needed to burn wax than to melt wax.
 - C Melted wax can be separated into other substances, while solid wax cannot.
 - D Melted wax is a different phase of matter than solid wax.

41 FIELD TEST ITEM

42 FIELD TEST ITEM

43 FIELD TEST ITEM

44 FIELD TEST ITEM

45 FIELD TEST ITEM

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SECTION II

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- 46 A lab group of five students each used the same meter stick to measure the length of an aluminum rod. They made their measurements over a 5-minute time interval. Their results are shown in the table below.

Student Number	1	2	3	4	5
Measured Length of Rod (centimeters)	36.5	37.5	37.5	37.5	38.5

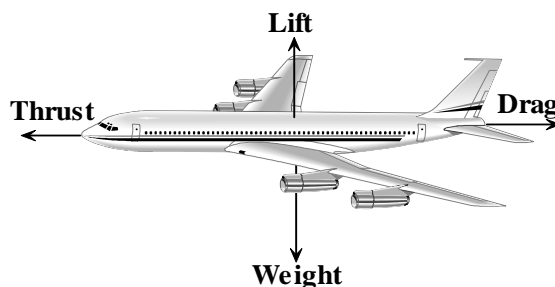
On the basis of these results only, which of these conclusions is MOST valid?

- A The length of the rod changes with temperature.
 - B The markings on the meter stick are inaccurately placed.
 - C The reported length of the rod is 37.5 cm because that is the average of the measurements.
 - D The actual length of the rod is 37.5 cm because that measurement appears three times.
- 47 An aluminum bar was found to have a mass of 27 g. Using water displacement, the volume was measured to be 10 mL. What is the density of the aluminum?
- A 270 g/mL
 - B 270 g
 - C 2.7 g/mL
 - D 2.7 g
- 48 What is the correct formula for the compound formed when lithium and oxygen combine?
- A LiO
 - B Li₂O
 - C LiO₂
 - D Li₂O₂

- 49 Radioactive isotopes are commonly used as

- A cooling agents
- B agricultural pesticides
- C nutritional supplements
- D tracers in biochemical reactions

- 50 An airplane in level flight is acted on by four basic forces. *Drag* is air resistance, *lift* is the upward force provided by the wings, *thrust* is the force provided by the airplane's engines, and *weight* is the downward force of gravity acting on the airplane.



In level flight at constant speed, which pair of forces must be equal?

- A lift and drag
 - B drag and weight
 - C lift and weight
 - D thrust and lift
- 51 A piece of blue paper appears blue because the paper
- A reflects all colors of light except blue
 - B refracts all colors of light except blue
 - C absorbs all colors of light except blue
 - D is transparent to all colors of light except blue

52 Which one of these energy sources is a nonrenewable source?

- A solar
- B water
- C wind
- D natural gas

53 Which of the following is MOST likely to contain information on a new scientific discovery?

- A a textbook
- B a current scientific magazine
- C an encyclopedia
- D a reference book of scientific data

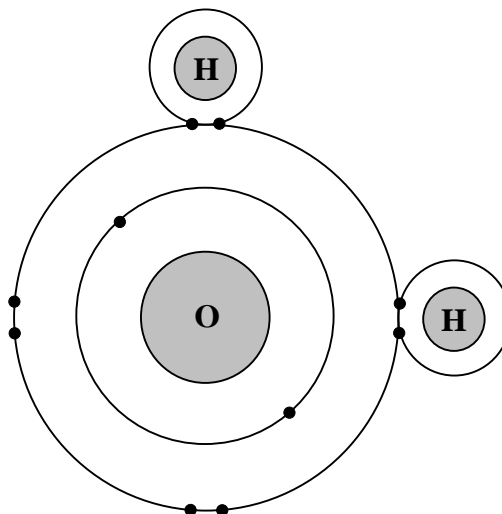
54 In normal air, which of the following substances is MOST common?

- A nitrogen
- B oxygen
- C carbon dioxide
- D carbon monoxide

55 Which equation below is correctly balanced?

- A $2\text{Na} + \text{O}_2 \rightarrow 2\text{Na}_2\text{O}$
- B $\text{Sn} + 2\text{KOH} \rightarrow \text{K}_2\text{SnO}_2 + 2\text{H}_2$
- C $\text{AsCl}_3 + 3\text{H}_2\text{O} \rightarrow 3\text{HCl} + \text{As}(\text{OH})_3$
- D $\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}$

56 Examine the drawing of a water molecule.



This drawing shows

- A 1 atom and 10 electrons
- B 3 atoms and 10 electrons
- C 1 molecule and 10 atoms
- D 3 molecules and 10 atoms

57 The stored energy in a battery can BEST be described as

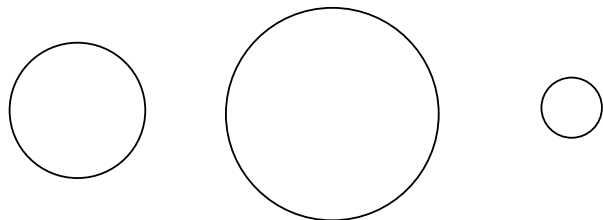
- A thermal
- B chemical
- C nuclear
- D kinetic

58 In the absence of air resistance, which of these objects will fall at the fastest rate when dropped?

mass = 25 kg

mass = 10 kg

mass = 75 kg



- A the ball with a mass of 75 kg
- B the ball with a mass of 25 kg
- C the ball with a mass of 10 kg
- D They all fall at the same rate.

59 To operate an electric train set, a transformer must reduce 120 volt house current to 6 volts. What is the ratio between turns on the primary (120 volt) side and the secondary (6 volt) side?

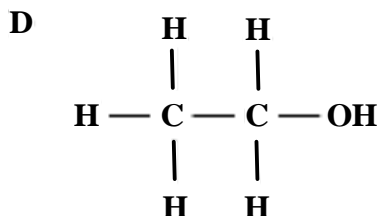
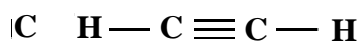
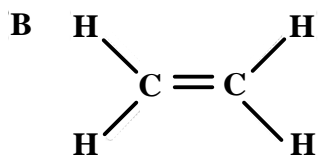
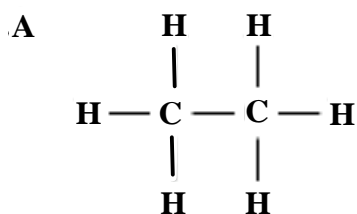
- A 10:1
- B 20:1
- C 1:10
- D 1:20

60 FIELD TEST ITEM

61 Mike wants to determine the weights of some small stones. He places each of them on a scale that measures the mass of each stone. Mike's final results should be reported in which metric unit?

- A grams/cm³
- B kilograms
- C liters
- D newtons

62 Which of the following structures represents a saturated hydrocarbon?



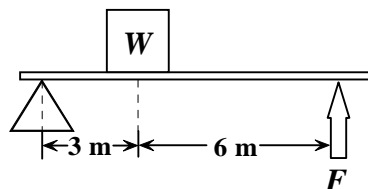
63 Which pair of elements is MOST similar?

- A Ca and F
- B Na and Cl
- C Ne and Ar
- D Li and H

64 In an atom, which force holds the protons and neutrons together in the nucleus?

- A gravity
- B electromagnetic force
- C strong force
- D weak force

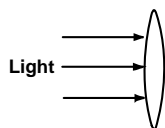
65 A box of weight W is lifted by a force F using a lever as shown below.



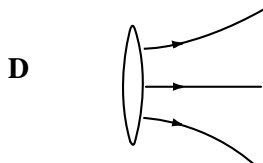
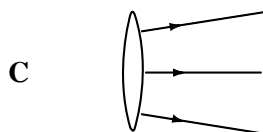
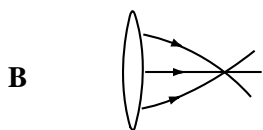
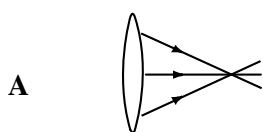
What is the mechanical advantage of the lever?

- A $\frac{1}{2}$
- B 2
- C 3
- D 6

- 66 Use the diagram of a lens to answer the question.



Parallel rays of light pass through the lens shown above. Which of the following diagrams BEST shows the path of the rays emerging from the right side of the lens?



- 67 Janelle is starting a research project on transistors. She goes to a Web site that has links organized by topic. In which of the following topics should Janelle begin her search?

- A astronomy
- B biology
- C earth science
- D physics

- 68 Which of the following contains the MOST atoms?

- A K_2MnO_7
- B $Al_2(SO_4)_3$
- C $C_4H_4F_4Cl_2$
- D $Hg_2(NO_3)_2$

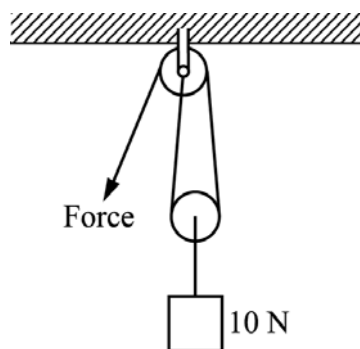
- 69 The compound formed from the elements calcium and chlorine is known as

- A chlorine calcide
- B calcite
- C calcium chloride
- D calcium chlorate

- 70 Which of the following are transferred or shared when two atoms react chemically?

- A protons
- B neutrons
- C electrons
- D photons

- 71 Use the diagram to answer the question.



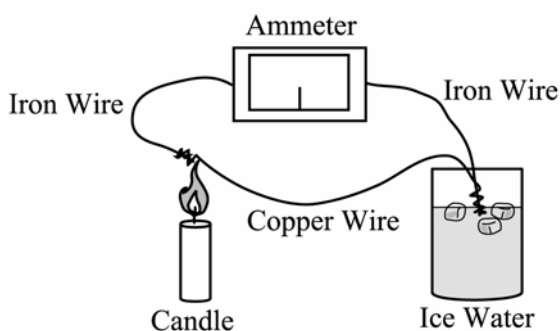
What force must be applied to the rope in the pulley shown in the diagram above to lift the 10-N block?

- A 5 N
- B 10 N
- C 15 N
- D 20 N

72 Pat measures a small rubber ball and then makes three other balls of the same diameter from lead, foam, and wood. Which ball has the greatest inertia?

- A the rubber ball
- B the lead ball
- C the foam ball
- D the wood ball

73 Bonnie sets up a thermocouple, as shown in the diagram below. The iron and copper wires are wrapped together in two places that are at different temperatures, and a current flows in the circuit.



As the temperature difference between the ends of the wires increases, the current in the circuit

- A also increases
- B remains the same
- C decreases, but not to zero
- D totally stops flowing

74 Which of the following laboratory practices is frequently followed but is NOT necessary for safety?

- A label containers of reagents
- B wear safety glasses or goggles
- C review where the safety equipment is located
- D rinse all glassware with distilled water before use

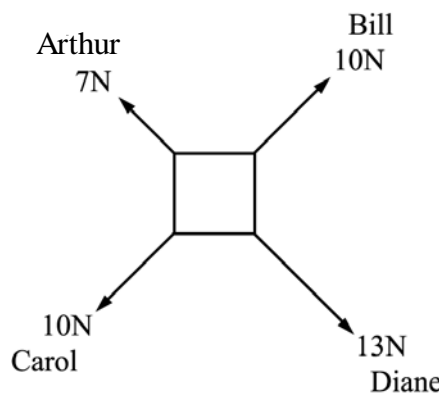
75 In the periodic table, the rows are called

- A periods
- B groups
- C classes
- D families

76 Shaina uses a shovel to dig a hole to plant a tree. A shovel is an example of a compound machine because it is made up of what two simple machines?

- A wheel and axle and lever
- B lever and wedge
- C screw and wedge
- D inclined plane and wedge

77 Four people are pulling on a box with the forces shown below. If there are no other forces on the box, in what direction will it move?



- A directly toward Diane
- B directly toward Bill
- C toward the bottom of the page
- D toward the right side of the page

78 A sound wave is produced and begins to travel from left to right through four different media. The speed of the wave varies as it travels. The media are solid, liquid, gas, and a vacuum, but not necessarily in that order.

1	2	3	4
344 m/sec	5000 m/sec	1450 m/sec	No transmission

Which speed **MOST** likely represents a gas?

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

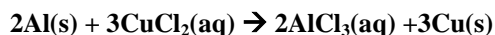
79 On Monday, the custodian places an air freshener in the gym. It is a shiny, pink disk. Over the next several days, the disk gradually shrinks. Which of the following statements is a valid inference?

- A The disk is undergoing a chemical change.
- B The disk is undergoing a physical change.
- C The disk is undergoing both chemical and physical changes.
- D The disk is undergoing neither physical nor chemical changes.

80 When comparing a sample of sodium stored in oil, a stoppered flask of chlorine gas, a container of table salt, and a beaker of salt water, which of the following is true?

- A Three of the samples consist of covalently-bonded atoms.
- B The elements require much stricter safety techniques than the compound or solution.
- C Elemental solid sodium and chlorine in its gas form are both quite stable.
- D Sodium and chlorine would combine violently to form covalently-bonded table salt.

81 Look at the following equation.



This is an example of what type of reaction?

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

82 Which group in the periodic table forms ions that have a valence of 1+?

- A 1
- B 2
- C 16
- D 17

83 A car was sitting in sunlight all day long. The heat that is now contained in the car was transferred to the car primarily by which of the following processes?

- A convection
- B conduction
- C radiation
- D electrical energy transfer

