

# The Periodic Table of Elements

<table border="1"> <tr> <td>H 1 hydrogen</td> </tr> </table>		H 1 hydrogen	symbol number of protons name																<table border="1"> <tr> <td>H 1 hydrogen</td> </tr> </table>		H 1 hydrogen	<table border="1"> <tr> <td>He 2 helium</td> </tr> </table>		He 2 helium
H 1 hydrogen																								
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He 2 helium																								
Li 3 lithium	Be 4 beryllium											B 5 boron	C 6 carbon	N 7 nitrogen	O 8 oxygen	F 9 fluorine	Ne 10 neon							
Na 11 sodium	Mg 12 magnesium											Al 13 aluminum	Si 14 silicon	P 15 phosphorous	S 16 sulphur	Cl 17 chlorine	Ar 18 argon							
K 19 potassium	Ca 20 calcium	Sc 21 scandium	Ti 22 titanium	V 24 vanadium	Cr 24 chromium	Mn 25 manganese	Fe 26 iron	Co 27 cobalt	Ni 28 nickel	Cu 29 copper	Zn 30 zinc	Ga 31 gallium	Ge 32 germanium	As 33 arsenic	Se 34 selenium	Br 35 bromine	Kr 36 krypton							
Rb 37 rubidium	Sr 38 strontium	Y 39 yttrium	Zr 40 zirconium	Nb 41 niobium	Mo 42 molybdenum	Tc 43 technetium	Ru 44 ruthenium	Rh 45 rhodium	Pd 46 palladium	Ag 47 silver	Cd 48 cadmium	In 49 indium	Sn 50 tin	Sb 51 antimony	Te 52 tellurium	I 53 iodine	Xe 54 xenon							
Cs 55 cesium	Ba 56 barium	Lu 71 lutetium	Hf 72 hafnium	Ta 73 tantalum	W 74 tungsten	Re 74 rhenium	Os 76 osmium	Ir 77 iridium	Pt 78 platinum	Au 79 gold	Hg 80 mercury	Tl 81 thallium	Pb 82 lead	Bi 83 bismuth	Po 84 polonium	At 85 astatine	Rn 86 radon							
Fr 87 francium	Ra 88 radium	Lr 103 lawrencium																						
Lanthanide Series		La 57 lanthanum	Ce 58 cerium	Pr 59 praseodymium	Nd 60 neodymium	Pm 61 promethium	Sm 62 samarium	Eu 63 europium	Gd 64 gadolinium	Tb 65 terbium	Dy 66 dysprosium	Ho 67 holmium	Er 68 erbium	Tm 69 thulium	Yb 70 ytterbium									
Actinide Series		Ac 89 actinium	Th 90 thorium	Pa 91 protactinium	U 92 uranium	Np 93 neptunium	Pu 94 plutonium	Am 95 americium	Cm 96 curium	Bk 97 berkelium	Cf 98 californium	Es 99 einsteinium	Fm 100 fermium	Md 101 mendelevium	No 102 nobelium									

1. Which represents sexual reproduction?

Number	Number of Parents	Variation
I	1	No
II	1	Yes
III	2	No
IV	2	Yes

- (A) I
- (B) II
- (C) III
- (D) IV

2. What makes a plant cell different from an animal cell?

- (A) cell membrane
- (B) cell wall
- (C) cytoplasm
- (D) nucleus

3. What term describes the dramatic change in appearance and habits at various stages in an organism's life cycle?

- (A) camouflage
- (B) evolution
- (C) metamorphosis
- (D) mimicry

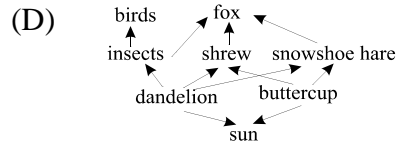
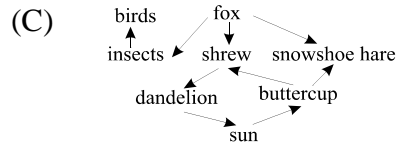
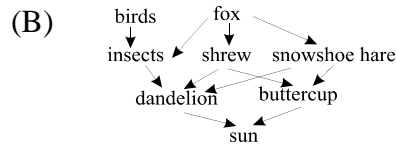
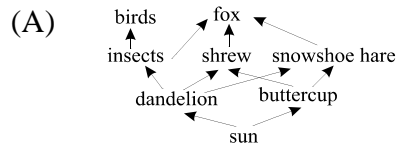
4. Which situation most clearly demonstrates the importance of reaction time?

- (A) over time, a drug disappears completely from the bloodstream
- (B) a sprinter taking off at the sound of the starter gun in a 100 m dash
- (C) a tree losing its leaves in the fall
- (D) birds flying south in the winter

5. Which habitat represents an area in the final stage of succession?

- (A) an alder patch
- (B) a blueberry field
- (C) a bog hole
- (D) a fir and spruce forest

6. Which food web shows the correct flow of energy in an ecosystem?



7. Which connections represent a food chain found in nature?

- (A) sun → consumer → producer
- (B) sun → producer → carnivore → herbivore
- (C) sun → producer → herbivore → carnivore
- (D) sun → producer → predator → prey

8. Which is a biotic factor?

- (A) earthworm
- (B) soil
- (C) sun
- (D) water

9. Why is Latin still used today to name living things?
- (A) It allows scientists who speak different languages to communicate about organisms.
  - (B) Latin was the commonly-used language at the time the system was developed.
  - (C) The developing scientist, Carl von Linné, was Latin.
  - (D) The first organism Linné tried to name was an organism common to Latin-speaking areas.
10. Which describes a relationship between two species in which both species benefit?
- (A) commensalism
  - (B) mutualism
  - (C) parasitism
  - (D) symbiosis
11. What would be a desirable trait that a breeder would artificially select in a racehorse?
- (A) coat colour
  - (B) keen sense of smell
  - (C) leg length
  - (D) sharp eyesight
12. Which method is **best** used to measure turbidity **directly**?
- (A) dissolved oxygen test
  - (B) filtration
  - (C) litmus test
  - (D) phosphate test

13. What are the names of the kingdoms described in the table?

Kingdom	Description
1	multicellular cells have nucleus and organelles do not move from place to place absorb nutrients from other organisms
2	unicellular no membrane boundary, nucleus, not organelles some move from place to place some make their own food some obtain nutrients from other organisms
3	multicellular cells have nucleus and organelles can move from place to place eat plants and/or animals
4	unicellular and multicellular cells have nucleus and organelles some move from place to place some make their own food and some eat microorganisms
5	multicellular cells have nucleus and organelles do not move from place to place make their own food

- (A) 1 = Animalia; 2 = Fungi; 3 = Monera; 4 = Plantae; 5 = Protista
- (B) 1 = Fungi; 2 = Monera; 3 = Animalia; 4 = Protista; 5 = Plantae
- (C) 1 = Monera; 2 = Protista; 3 = Plantae; 4 = Animalia; 5 = Fungi
- (D) 1 = Protista; 2 = Plantae; 3 = Fungi; 4 = Monera; 5 = Animalia

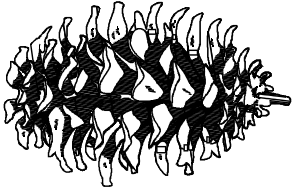
14. Using biological indicators to determine water quality, which sample of pond water appears to contain low levels of pollution?

Organisms	Pond I	Pond II	Pond III	Pond IV
beetles	5	0	0	0
leeches	5	20	20	18
midge larvae	0	30	40	20
stonefly larvae	10	2	0	0
worms	0	0	0	30

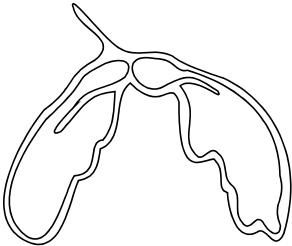
- (A) Pond I  
(B) Pond II  
(C) Pond III  
(D) Pond IV
15. Which chemical causes an increase in the algae population of a river?
- (A) carbon dioxide  
(B) nitrogen  
(C) oxygen  
(D) phosphate
16. What is a behavioural adaptation of an organism in the wild?
- (A) a fox sunning itself on a rock on a warm day  
(B) burrowing of a frog in the mud at the bottom of a pond  
(C) long legs of a moose allowing it to run faster  
(D) change in colour of a snowshoe hare from winter to summer
17. These statements are about the finches that Darwin studied on the Galapagos Islands. Which supports the Theory of Natural Selection?
- (A) All the beaks of the finches look the same because the islands are so close together.  
(B) Darwin deliberately selected different beak forms on the islands.  
(C) The forms of the finches' beaks changed as the finches adapted to each islands' food supplies.  
(D) The finches' eyesight changed depending on the food supply on each island.

18. Which seed is best suited for dispersal by herbivores?

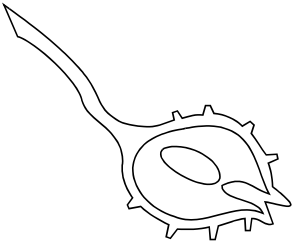
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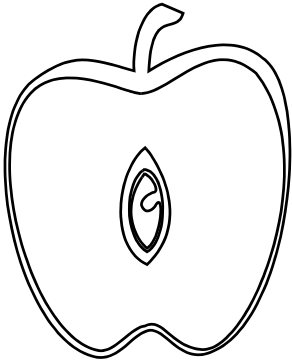
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(C)



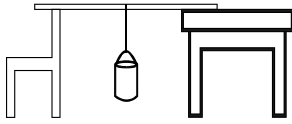
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19. Which is an example of a manufactured chemical?

- (A) Ammonia is made by mixing hydrogen and nitrogen at high pressure.
- (B) Carbon dioxide produced by the respiration of living organisms.
- (C) Methane gas created by the decaying of dead organisms.
- (D) Sulfur dioxide released from active volcanoes.

20. Which illustrates the effect of a tensile force?



- (A) The bucket swinging back and forth.
- (B) The chair toppling over.
- (C) The string stretching.
- (D) The top of the support bar bending.

21. What type of thermometer uses electricity to measure temperature?

- (A) bimetallic strip
- (B) gas
- (C) liquid
- (D) thermocouple

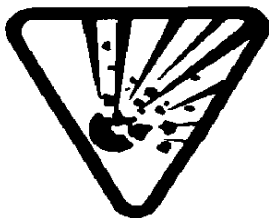
22. Which shape gives most support to manufactured structures?

- (A) circle
- (B) rectangle
- (C) square
- (D) triangle

23. What information must be contained on a consumer product label?

- (A) identity of product, texture of product
- (B) identity of product, quantity of product
- (C) name of manufacturer, type of packaging
- (D) quantity of product, size of container

24. What is the meaning of this symbol?



- (A) Caution: Explosive
- (B) Caution: Flammable
- (C) Warning: Explosive
- (D) Warning: Flammable

25. People of Twin City observed that there were fewer fish in the rivers around their city. According to the test results below, which environmental factor was causing the decrease in the fish population?

Factor	Normal Range	Level in Rivers
oxygen level	> 5 mg/L	1.0 mg/L
pH	5.2 - 7.9	6.2
phosphate level	<10.0 $\mu\text{g/L}$	0
temperature	10°C-28°C	12°C - 18 °C

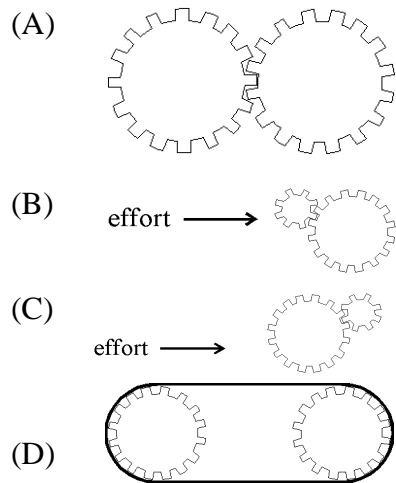
- (A) oxygen levels
- (B) pH
- (C) phosphate levels
- (D) temperature

26. Biologists found the pH level of a lake to be 4.7. What could be used to neutralize the lake without harming its aquatic life?

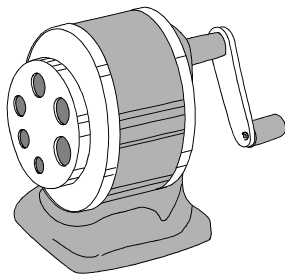
- (A) apple juice, pH = 3.0
- (B) bleach, pH = 11.1
- (C) limestone, pH = 8.2
- (D) vinegar, pH = 2.2

27. The force of gravity is greater on Jupiter than on Earth. What effect would this have on a person's weight and mass?
- (A) Both weight and mass would decrease.
  - (B) Both weight and mass would increase.
  - (C) Weight would increase and mass would stay the same.
  - (D) Weight would stay the same but mass would increase.
28. Which force is best illustrated by heat production, wearing of surfaces, and generation of static charge?
- (A) erosion
  - (B) friction
  - (C) gravity
  - (D) magnetism
29. Why is an arch or dome better able to support a vertical load than a simple beam?
- (A) This shape allows for no stress from the arch.
  - (B) This shape conducts the stress from the ground upward to the arch.
  - (C) This shape conducts the stress from the top of the arch downward into the ground.
  - (D) This shape has a long cross beam which removes stress from the arch.
30. Which is true of a ten speed bike?
- (A) In a low gear, for pedalling uphill, the front sprocket has fewer teeth than the rear sprocket.
  - (B) In a low gear, for pedalling uphill, the front sprocket has more teeth than the rear sprocket.
  - (C) In a high gear, for racing, the front sprocket has less teeth than the rear sprocket.
  - (D) In a high gear, for racing, the front sprocket has the same number of teeth as the rear.

31. In which diagram are the gears used to increase rotational speed?



32. For the mechanical device below, which two simple machines are working together?



- (A) inclined plane, pulley
- (B) pulley, lever
- (C) screw, pulley
- (D) wheel and axle, screw

33. Using the following formula, calculate the percent efficiency of a gasoline engine which produces only 30 kJ of useful output energy for every 100 kJ of input energy.

$$\text{percent efficiency} = \frac{\text{work output}}{\text{work input}} \times 100$$

- (A) 30%
- (B) 33%
- (C) 70%
- (D) 300%

34. What is the standard unit of work?

- (A) amp
- (B) joule
- (C) newton
- (D) watt

35. Which is an example of a simple machine?

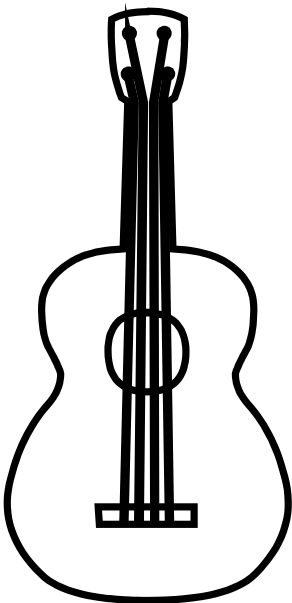
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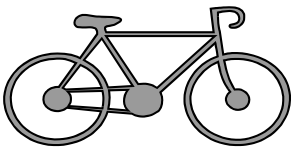
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(C)



(D)



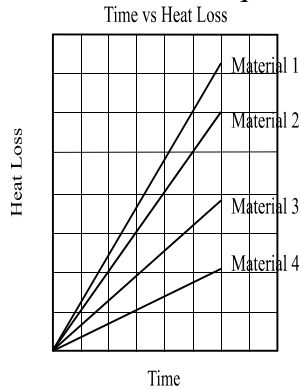
36. Which machine requires a push downwards in order to raise a load?

- (A) inclined plane
- (B) lever
- (C) pulley
- (D) wedge

37. Which action would be the proper application of heat convection?

- (A) Placing a heater for a tropical organism fish tank at the bottom of the tank rather than the top.
- (B) Putting hot air ducts, which pump out warm air, in the ceilings of rooms in the top level of a two storey house.
- (C) Using copper pots when you have very little time to cook supper.
- (D) Wearing light coloured clothing on the warmest days of summer.

38. According to the graph below, what material should be used to create an energy efficient basement if all materials are of equal thickness?



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

39. To create more resistance in a toaster, the element was replaced with a thinner wire. What would be the effect of increasing the resistance?

- (A) The current will speed up because electrons can move faster through the wire.
- (B) The current will stop flowing because electrons are unable to pass through the wire.
- (C) The wire will heat up because the electrons will lose energy as they move through the wire at a slower rate.
- (D) The wire will heat up because the electrons will gain energy as they move through the wire at a faster rate.

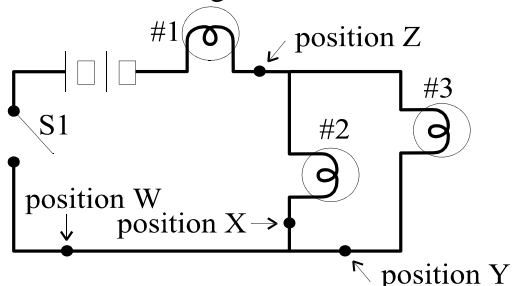
40. Which is the best example of an insulating material?

- (A) copper
- (B) air
- (C) ice
- (D) iron

41. Which type of heat transfer describes radiation?

- (A) transfer along a metal rod
- (B) circulating motion of particles
- (C) collision of particles
- (D) wave-like transfer

42. At what position should a switch be placed so that when switch S1 is closed, bulb #2 can be turned off without affecting bulb #1 or bulb #3?



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

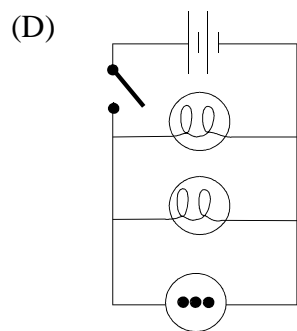
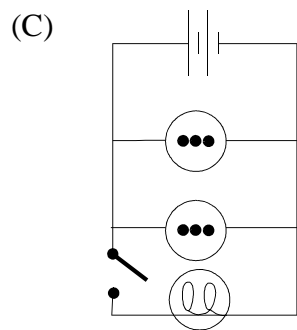
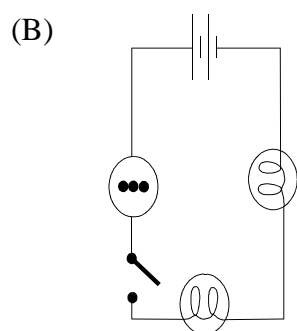
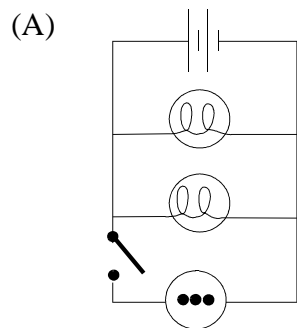
43. Given the RSI values below, which would provide the best insulation, if all materials are 1 cm thick?

RSI Values	
Material	RSI/cm
fibreglass	0.24
plywood	0.087
gypsum board	0.035
polystyrene (white)	0.29

- (A) two pieces of gypsum board with fibreglass between them
- (B) two pieces of gypsum board with polystyrene between them
- (C) two pieces of plywood with fibreglass between them
- (D) two pieces of plywood with polystyrene between them

44. What is the definition of an insulator?
- (A) A material composed mainly of copper.
  - (B) A material that allows heat to transfer easily.
  - (C) A material that allows heat transfer to occur more quickly.
  - (D) A material that prevents heat transfer.

45. Which circuit diagram represents two lamps and a motor in parallel to a battery of two cells, and a switch that controls the motor only?



46. Which measures weak electric currents?
- (A) ammeter
  - (B) galvanometer
  - (C) generator
  - (D) voltmeter
47. Which is true about bulbs connected in series?
- (A) If an extra bulb is added to the circuit, the brightness of all bulbs stays the same.
  - (B) If one bulb is removed from the circuit, the others will not light.
  - (C) If one bulb is removed from the circuit, the remaining bulbs stay lit.
  - (D) If an extra bulb is added to the circuit, the resistance decreases.
48. Which unit refers to the amount of energy supplied to electrons in an electric current?
- (A) ammeter
  - (B) amperes
  - (C) power
  - (D) voltage
49. What term describes electricity in which charged particles move along a path?
- (A) current electricity
  - (B) electromagnetism
  - (C) magnetism
  - (D) static electricity
50. When you rub a plastic ruler with wool, both materials become charged. Why is the ruler negatively charged and the wool positively charged?
- (A) The air contains many free-floating electrons which are attracted to the ruler.
  - (B) The electrons in the wool transfer to the ruler.
  - (C) The protons of the ruler change places with the electrons of the wool.
  - (D) The ruler loses protons when rubbed with the wool.

51. Using the information in the table below, which substance would make the best cooking pots for use without oven mitts?

Material	Thermal Conductivity at 20°C
W	35
X	300
Y	3000
Z	30000

- (A) W  
(B) X  
(C) Y  
(D) Z
52. Which describes a concentrated solution?
- (A) contains a small amount of solute and a large amount of solvent  
(B) contains more solvent than it should for a given temperature  
(C) decreases in buoyancy as the ratio of solute to solvent increases  
(D) increases in buoyancy as the ratio of solute to solvent increases
53. What is the correct conclusion from a litmus test?
- (A) Blue litmus paper staying blue indicates an acid.  
(B) Blue litmus paper turning pink indicates an acid.  
(C) Pink litmus paper staying pink indicates a base.  
(D) Pink litmus paper turning blue indicates an acid.
54. What is the result of the addition of pure water to an acid solution?
- (A) The solution becomes less acidic.  
(B) The solution becomes less basic.  
(C) The solution becomes very basic.  
(D) The solution becomes more concentrated.

55. Which example of a solution is correct?

Example	Solute	Solvent
1	milk	cornflakes
2	Purity syrup	water
3	water	salt
4	sand	water

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

56. In order to determine the threshold limit value of a chemical, a laboratory rat was injected with the substance. What is the threshold limit value of the chemical?

- (A) The concentration at which the chemical is undetectable.
- (B) The concentration at which the rat detects the chemical.
- (C) The concentration at which the rat experiences illness.
- (D) The concentration which is lethal.

57. Matter can be classified as pure or impure. Which substance would be considered pure?

- (A) air
- (B) cement
- (C) oxygen
- (D) salt water

58. What is the chronic toxicity level for Chemical X?

Symptoms From 10 min exposure to Chemical X		
Amount of Chemical X (ppm)	Short Term Symptoms	Long Term Symptoms
500	None	None
1000	Slight confusion, dizziness, headache	None
1500	Coughing, wheezing, vomiting, severe headache, blurred vision	Shortness of breath, damage to nervous system, poor eyesight
2000	Unconsciousness, possibly death	Death, immediately, or in 2-3 years.

- (A) 500
- (B) 1000
- (C) 1500
- (D) 2000

59. According to the particle theory of matter, which letter in the table below represents a liquid?

Substance	Definite Shape?	Definite Volume?	Particle Attraction
A	Yes	Yes	Strong
B	No	Yes	Moderate
C	No	No	Weak
D	Yes	Yes	Weak

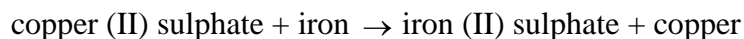
- (A) A
- (B) B
- (C) C
- (D) D

60. What is the name of the process of vaporizing and condensing vapours so that a solution can be separated?

- (A) distillation
- (B) evaporation
- (C) filtration
- (D) flotation

61. Which statement distinguishes a mechanical mixture from a solution?
- (A) A mechanical mixture is always composed of solids, while solutions are always liquid.
  - (B) A mechanical mixture is made up of two or more substances, while a solution is made up of only one substance.
  - (C) Mechanical mixtures are clear while the particles in a solution reflect light making the solution look cloudy.
  - (D) The particles of a mechanical mixture are clumped together, while the particles of a solution are completely intermingled.
62. What is the chemical symbol for potassium?
- (A) K
  - (B) P
  - (C) Pb
  - (D) Pt
63. Which is **NOT** a characteristic of a chemical change?
- (A) Bubbles are formed.
  - (B) Change is difficult to reverse.
  - (C) Change of state occurs.
  - (D) Heat is produced.
64. The equation  $\text{Zn} + 2\text{HCl} \rightarrow \text{H}_2 + \text{ZnCl}_2$ , which statement is correct?
- (A) Hydrochloric acid (HCl) is a compound because it contains two or more different atoms.
  - (B) Hydrogen ( $\text{H}_2$ ) is a compound because it contains two identical atoms of hydrogen.
  - (C) Zinc chloride ( $\text{ZnCl}_2$ ) is an element because it contains two or more different atoms.
  - (D) Zinc (Zn) is a compound because it is made up of only one type of atom.
65. Which statement illustrates a physical change?
- (A) Burning a match.
  - (B) Neutralization of an acid.
  - (C) Rusting of iron
  - (D) Salt dissolving in water.

66. What are the reactants in the following equation?



- (A) copper (II) sulphate and iron
- (B) copper (II) sulphate and iron (II) sulphate
- (C) iron and copper
- (D) iron (II) sulphate and copper

67. What is the chemical formula for carbon dioxide?

- (A) Cd
- (B) CO
- (C) CO<sub>2</sub>
- (D) CaO

68. Which defines an electron?

- (A) a negatively charged particle found in the nucleus of an atom
- (B) a negatively charged particle found in the shells (clouds) outside the nucleus of an atom
- (C) a neutral particle found in the nucleus of an atom
- (D) a positively charged particle found in the nucleus of an atom

69. Using the periodic table in the front of the test booklet, which series of elements belong in the same family?

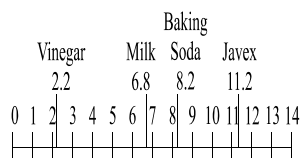
- (A) boron, aluminum, gallium, indium, thallium
- (B) boron, carbon, nitrogen, oxygen, fluorine, neon
- (C) lanthanum, cerium, praseodymium, neodymium, promethium
- (D) lithium, beryllium, sodium, magnesium

70. Magnesium and hydrochloric acid were combined in the lab and all products were collected. Upon testing one of the products, a glowing splint produced a popping sound. The other product was magnesium chloride. Which is the word equation for the reaction of magnesium and hydrochloric acid?

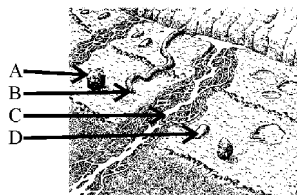
- (A) hydrochloric acid produces hydrogen plus magnesium chloride
- (B) magnesium plus hydrochloric acid produces hydrogen plus magnesium chloride
- (C) magnesium plus hydrochloric acid produces oxygen plus magnesium chloride
- (D) magnesium plus hydrochloric acid produces magnesium chloride

71. What is true about a zinc/carbon chemical cell?
- (A) Zinc and carbon are electrodes that both gain electrons.
  - (B) Zinc and carbon are electrodes with one gaining electrons and the other losing electrons.
  - (C) Zinc is an electrolyte and carbon is an electrode.
  - (D) Zinc and carbon are electrolytes.

72. What is the weakest acid of the substances below?



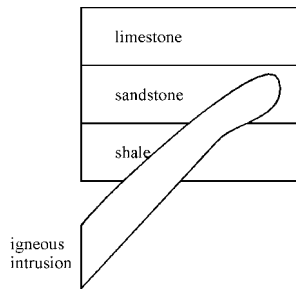
- (A) baking soda
  - (B) javex
  - (C) milk
  - (D) vinegar
73. Which is an esker?



- (A) A
- (B) B
- (C) C
- (D) D

74. Which is an example of chemical weathering?
- (A) Acid rain wears away limestone.
  - (B) The freezing and thawing of water in rock cracks breaks the rocks.
  - (C) Tree roots widen a crack in a boulder.
  - (D) Waves break beach rocks into pebbles.
75. Which factor **LEAST** affects the formation of glaciers?
- (A) accumulation of snow
  - (B) climate conditions
  - (C) slope of the land
  - (D) weight of the snow
76. A mineral surface is described as greasy. To which property of minerals does this example refer?
- (A) colour
  - (B) hardness
  - (C) lustre
  - (D) streak
77. What processes are directly involved in the formation of metamorphic rock?
- (A) accumulation of eroded materials
  - (B) accumulation of eroded materials and cooling of magma
  - (C) compacting and cooling of magma
  - (D) increasing heat and pressure below the surface of the earth
78. What is the name of the study of the materials of the Earth's crust?
- (A) biology
  - (B) botany
  - (C) ecology
  - (D) geology

79. Which section of rock in the diagram is the oldest?



- (A) igneous intrusion
- (B) limestone
- (C) sandstone
- (D) shale

80. Which type of rock is formed from the cooling of magma?

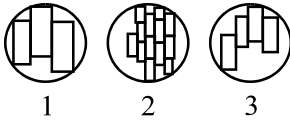
- (A) igneous
- (B) metamorphic
- (C) sandstone
- (D) sedimentary

81. According to the table, which lake would most likely have rocks containing fossils?

Lake	Lake Bottom	Number of Organisms	Number of Predators	Rock Type Formed
A	mud	many	few	sedimentary
B	mud	many	few	igneous
C	mud	few	many	sedimentary
D	mud	few	many	metamorphic

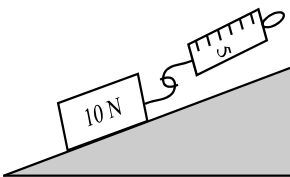
- (A) A
- (B) B
- (C) C
- (D) D

82. A student views onion cells through three different objectives of a compound microscope, as shown below. Which statement is true?



- (A) View 1 was observed through the medium power objective.  
(B) View 2 was observed through the high power objective.  
(C) View 2 was observed through the low power objective.  
(D) View 3 was observed through the low power objective.
83. A student tests for amounts of friction between a block and three different surfaces: paper, wood and carpet. The block is pulled across the three surfaces with a spring scale attached. What variables need to be controlled in this experiment?
- (A) rate at which the block is pulled and the surface the block is pulled across  
(B) size of the block and the amount of friction  
(C) size of the block, rate at which the block is pulled, and type of block  
(D) surface the block is pulled across, and size of the block
84. Which term describes the step in the scientific method that involves making an educated guess?
- (A) conclusion  
(B) hypothesis  
(C) observation  
(D) procedure
85. Using the diagram and formula below, calculate the mechanical advantage of the inclined plane.

$$\text{Mechanical Advantage} = \frac{\text{load}}{\text{effort}}$$



- (A) 0.5  
(B) 2  
(C) 15  
(D) 50

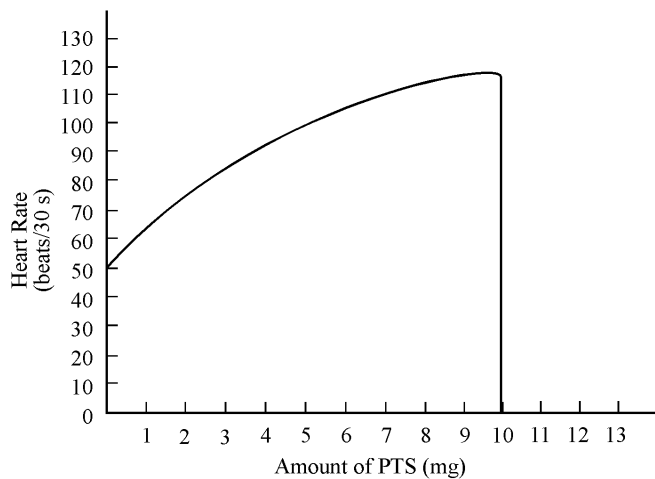
86. Which is true about an accurate sampling technique?
- (A) A sample size should never be larger than 1000 for fear of repeat sampling and distortion of data.
  - (B) The fewer samples taken, the less likely that there will be conflicting results, and the more accurate the data.
  - (C) The larger the sample size, the larger the number of samples, the more accurate and unbiased the data.
  - (D) To get the answer you are looking for is more important than your sampling technique.

87. A student wishes to identify an unknown mineral sample which has the following characteristics:
- It is white in colour.
  - When light strikes it, it appears glassy.
  - When it is scratched on a streak plate, the powdery mark is colourless.
  - When tested with a hardness kit, a mineral of hardness 3 left a scratch, but a mineral of hardness 2 did not.
- Use the chart below to identify the mineral.

Mineral	Colour	Lustre	Streak	Hardness
1	white	glassy	white	2 - 3
2	black	glassy/brilliant	colourless	2 - 3
3	white	metallic	dark grey	2.5 - 3
4	white	glassy	colourless	2 - 3

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

88. A rat was injected with varying amounts of a potentially toxic substance (PTS). The effect of this substance on its heart rate is shown in the graph. What happened to the rat after 10 mg of PTS was injected?



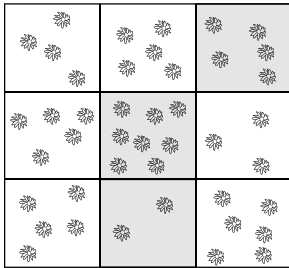
- (A) The rat developed heart disease.
- (B) The rat died.
- (C) The rat went to sleep.
- (D) The rat's heart rate was unaffected by PTS.

89. A student wants to find out how the germination rates of bean seeds in affected by temperature. What is the **BEST** procedure?

Method	Step 1	Step 2	Step 3	Step 4
A	Collect 16 bean seeds of the same size and four petri dishes	Place 4 bean seeds in each dish. Cover them with a damp paper towel.	Place the dishes at Dish 1 - 5° Dish 2 - 10° Dish 3 - 15° Dish 4 - 20°	Record the germination times for the seeds in each dish. Repeat steps 1 - 3.
B	Collect 4 bean seeds of the same size and four petri dishes	Place 1 bean seed in each dish. Cover them with a damp paper towel.	Place the dishes at Dish 1 - 5° Dish 2 - 10° Dish 3 - 15° Dish 4 - 20°	Record the germination times for the seeds in each dish.
C	Collect 4 bean seeds of the same size and four petri dishes	Place 1 bean seed in each dish. Cover them with a damp paper towel.	Place the dishes at Dish 1 - 5° Dish 2 - 10° Dish 3 - 15° Dish 4 - 20°	Record the germination times for the seeds in each dish. Repeat steps 1 - 3.
D	Collect 16 bean seeds of the same size and four petri dishes	Place 4 bean seeds in each dish. Cover two petri dishes with a damp paper towel and two with a dry one.	Place the dishes at Dish 1 - 5° Dish 2 - 10° Dish 3 - 15° Dish 4 - 20°	Record the germination times for the seeds in each dish.

- (A) A  
(B) B  
(C) C  
(D) D

90. The diagram shows an area on a lawn where there are many dandelion plants. Each dot indicates one plant. Based on the three highlighted areas, what is the estimated dandelion population on the lawn according to the quadrat sampling method?



- (A) 15  
 (B) 36  
 (C) 43  
 (D) 45
91. A student carried out an investigation to determine if the amount of sunlight per day affects the number of dandelion plants that will grow on the lawn. The results are in the table below:

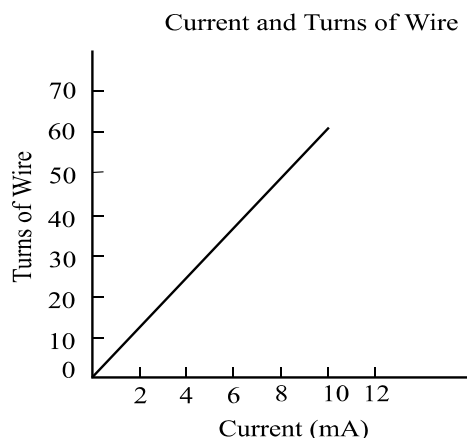
Number of Hours for Direct Sunlight per Day	Number of Dandelion Plants per quadrat
2	10
4	15
6	20
8	25

What would be the best estimate for the number of dandelions in a quadrat that receives 12 hours of sunlight per day?

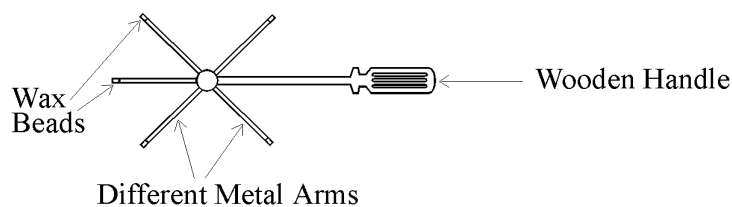
- (A) 30  
 (B) 35  
 (C) 40  
 (D) 45

92. A metal doorknob feels cold, but a wooden doorknob in the same room does not. Which statement is a reasonable inference?
- (A) It is colder outside the door with the metal knob.
  - (B) Metal conducts heat better than wood.
  - (C) The metal knob is at a lower temperature than the wooden one.
  - (D) Wood conducts heat better than metal.

93. A student investigated the amount of electricity generated from a coil of wire and a magnet. Based on the graph, which statement is a good interpretation of the data?

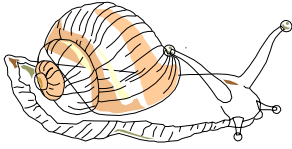


- (A) The greater the number of turns, the less current produced.
  - (B) The greater the number of turns, the more current needed.
  - (C) The greater the number of turns, the more current produced.
  - (D) The number of turns is equal to the current produced.
94. In the diagram below, why do the wax beads melt at different rates when the centre is heated?



- (A) The arms have different conductivities.
- (B) The arms have different convection rates.
- (C) The wax beads were different sizes.
- (D) The wax beads were made by different candles.

95. Using the dichotomous key below, choose the **correct order** of steps to identify the organism pictured.



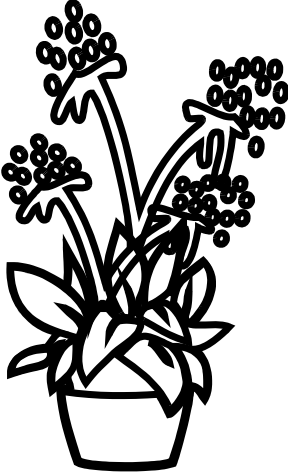


1. (a) shell absent ..... crail  
(b) shell present ..... go to 2
  2. (a) shell spiralled ..... go to 3  
(b) shell straight ..... strail
  3. (a) shell smooth ..... smail  
(b) shell with ridges ..... go to 4
  4. (a) one pair of antenna ..... unail  
(b) two pair of antennae ..... bail
- (A) 1(b), 2(b)  
(B) 1(b), 2(a), 3(a)  
(C) 1(b), 2(a), 3(b), 4(a)  
(D) 1(b), 2(a), 3(b), 4(b)

96. For the past 20 years, scientists have carried out a spray program to control the earwig population on an island. They found that in the last three years, the earwig population has been increasing. Which choice would be the most likely cause of this?

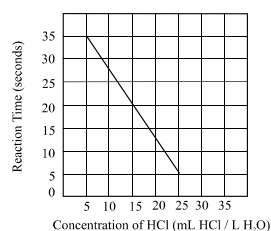
- (A) Earwigs from other areas moved in to take their place.
- (B) The adult earwigs became used to the poison over their lifetimes.
- (C) The earwigs which were resistant survived to produce more earwigs with the same characteristic.
- (D) The pesticide caused the earwigs to grow longer legs allowing them to run away from the spray.

97. Plants were placed in a box and light was shone through various filters to determine the effect filter colour had on plant growth. The experiment was set up as shown below. What variables are controlled in this experiment?

Variables	1	2	3
Plant Growth			
Temperature	15°C	15°C	15°C
Filter Type	blue	orange	red
Plant Type	geranium	geranium	geranium
Fertilizer	Green Thumb	Green Thumb	Green Thumb

- (A) temperature, filter type, plant growth  
 (B) temperature, plant type, fertilizer  
 (C) temperature, fertilizer, plant growth  
 (D) fertilizer, filter type, plant growth
98. What conclusion can be made from the graph shown below?

Concentration of hydrochloric acid vs Reaction Time



- (A) Concentrated solutions of HCl will have lower reaction times.  
 (B) Concentrated solutions of HCl will have higher reaction times.  
 (C) Dilute solutions of HCl will have lower reaction times.  
 (D) Concentration of HCl has no effect on reaction time.

99. Which term describes the variable changed by an experimenter when conducting a scientific activity?
- (A) estimation
  - (B) inference
  - (C) manipulated
  - (D) responding
100. Bobby conducted an experiment to determine the pH of five local ponds. What type of graph would best display his results?
- (A) bar
  - (B) circle
  - (C) line
  - (D) pie