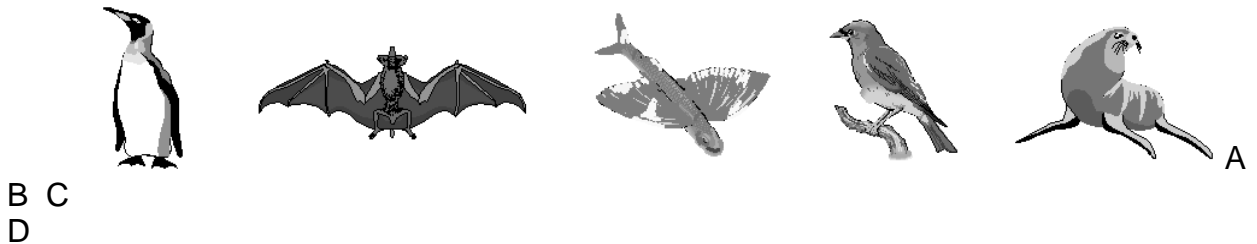


The Periodic Table of Elements

	1																8
	H 1 hydrogen																He 2 helium
		2															
	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 75 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 mendeleevium	No 102 nobelium			

1. Which process refers to the replacement of an old organism by a new organism of the same species?
- (A) regeneration
 - (B) renewal
 - (C) reproduction
 - (D) respiration

2. Bill compared the structures that enable animals to move.



Which structure does a penguin's wing most closely resemble?

- (A) bat wing
 - (B) fish fin
 - (C) robin wing
 - (D) seal flipper
3. Which is an example of a living organism?
- (A) a growing quartz crystal
 - (B) a kangaroo's pouch
 - (C) a rotting log
 - (D) a spider's web
4. Which is the definition for an organism's range of tolerance?
- (A) the lower limit of an abiotic factor which permits an organism to survive
 - (B) the upper limit of an abiotic factor which permits an organism to survive
 - (C) the upper and lower limits of an abiotic factor within which an organism can survive
 - (D) the upper and lower limits of a biotic factor within which an organism can survive

5. Which relationship is an example of commensalism?
- (A) Bacteria in the human large intestine break down cellulose and gain food and shelter.
 - (B) Old man's beard is grown on weakened fir and spruce trees.
 - (C) The bumble bee obtains nectar from the clover flower which in turn is cross pollinated.
 - (D) The small remora rides on the back of a shark and eats leftovers from the shark's meal.
6. 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
7. Ducks Unlimited wanted to determine the population of ducks in a small area around Sandy Pond, NF. The mark-recapture method was used to obtain the results.

On day 1 - 15 ducks were captured, marked and released

On day 2 - 40 ducks were captured, 10 had been marked, 30 were unmarked

Using the following formula, what is the estimate of the Sandy Pond duck population?

$$\frac{\# \text{ marked originally}}{\text{Estimate of population}} = \frac{\# \text{ marked when recaptured}}{\text{Total recaptured}}$$

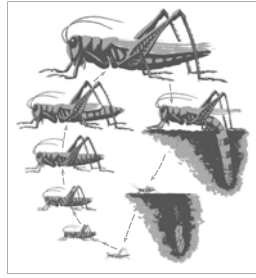
- (A) 50
- (B) 60
- (C) 66
- (D) 75

8. In a closed ecosystem each organism is totally dependent on each other. Plants carry out photosynthesis and animals carry out respiration. If the animals in the ecosystem die, what raw materials would have to be added to the ecosystem in order for the plants to survive?
- (A) carbon dioxide and water
 - (B) oxygen and starch
 - (C) oxygen and water
 - (D) starch and carbon dioxide
9. One concern with cutting down the Amazon Rain Forest is the effect on all animals on earth. In terms of animal survival, what key process is reduced by the loss of this rain forest?
- (A) photosynthesis - oxygen concentration of air
 - (B) photosynthesis - carbon dioxide concentration of air
 - (C) respiration - humidity levels in air
 - (D) respiration - oxygen levels in air
10. Which sample is the most accurate?
- (A) 2 samples taken, 10 subjects in each sample
 - (B) 5 samples taken, 120 subjects in each sample
 - (C) 8 samples taken, 710 subjects in each sample
 - (D) 12 samples taken, 17 subjects in each sample
11. What is the term used by biologists to represent the variety or difference which exists among organisms?
- (A) adaption
 - (B) diversity
 - (C) evolution
 - (D) metamorphosis
12. Which statement describes the effect of natural selection on organisms?
- (A) Organisms that are well adapted to their environment survive.
 - (B) Organisms are deliberately altered to adapt to their environment.
 - (C) Organisms evolve over time.
 - (D) Organisms remain constant over time.

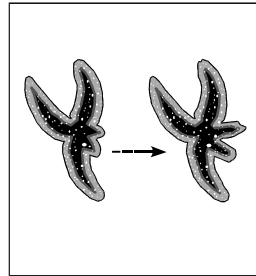
13. What is the name given to the process of change that occurs in organisms over time?
- (A) diversity
 - (B) evolution
 - (C) metamorphosis
 - (D) natural selection
14. Which example illustrates an adaptation which evolved and improves the organism's protection from predators?
- (A) A polar bear's coat is white, the same colour as the snow.
 - (B) Chameleons change colour to match their environment.
 - (C) Frogs bury themselves in mud during the cold months of winter.
 - (D) Robins fly south for the winter.
15. Which set of labels is correctly positioned under the given examples?
- | | | | |
|-----|--------------------------|--|--|
| | frog sitting on lily pad | black and yellow stripes of a bumble bee | butterfly with pattern of owl's eye on back of wings |
| | | | |
| (A) | camouflage | mimicry | warning coloration |
| (B) | mimicry | warning coloration | camouflage |
| (C) | warning coloration | camouflage | mimicry |
| (D) | camouflage | warning coloration | mimicry |
16. What caused industrial melanism in the peppered moth population in England during the industrial revolution?
- (A) A gene for light coloring changed (mutated) to dark coloring due to the moth's presence in a polluted environment.
 - (B) Peppered moths can change their color spontaneously to match their environment.
 - (C) The soot and smoke pollution found in the air settled on the moth's wings turning them dark.
 - (D) When pollution made the tree bark dark, the birds ate the more visible light colored moths resulting in the darker moths surviving to reproduce.

17. Which organism below undergoes complete metamorphosis?

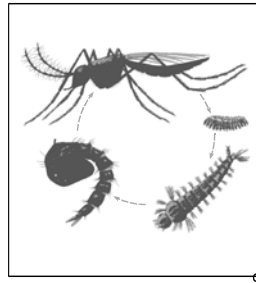
(A)



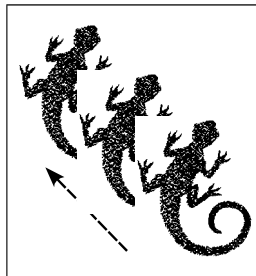
(B)



(C)

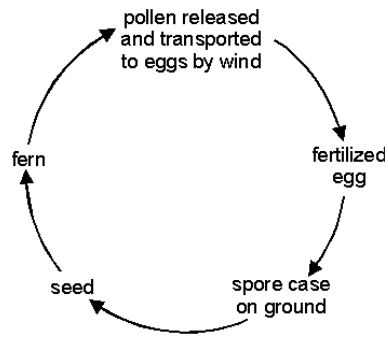


(D)

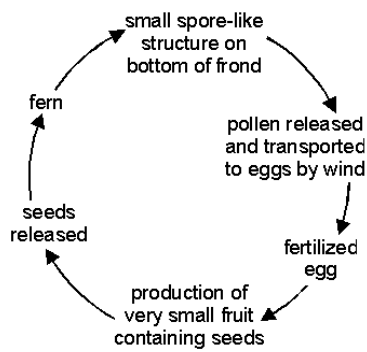


18. A fern undergoes many changes during its development. Which diagram is the correct representation of a fern's life cycle?

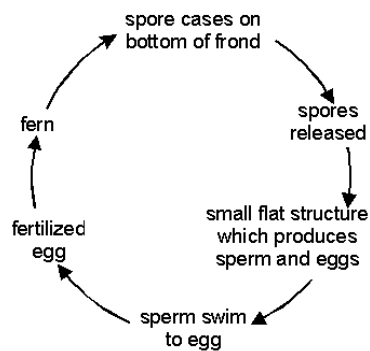
(A)



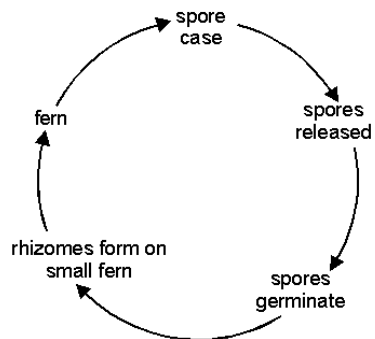
(B)



(C)



(D)



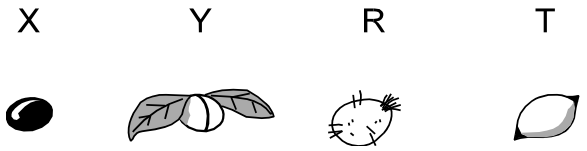
19. In winter bears hibernate. Which factor resulted in the evolution of this behavioral adaptation?
- (A) difficulty moving from place to place
 - (B) difficulty escaping from predators in deep snow
 - (C) protection from low temperatures
 - (D) lack of food

20. After 20 years, which population of organisms will show greatest diversity within its species?

	Population size	Life Span	Reproductive Information	Frequency of change in genetic code	Environmental Conditions
(A)	2 male/2 female	2 years	sexual, ~4 offspring during lifetime	low	favourable
(B)	7 male/7 female	3 years	sexual, ~ 4 offspring during lifetime	moderate - reproduction still possible	unfavourable
(C)	20 male/20 female	2 years	sexual ~ 5 offspring during lifetime	high - reproduction still possible	favourable
(D)	30 male/30 female	1 year	asexual ~ 5 offspring during lifetime	high results in sterilization of organism	favourable

21. Which statement explains the existence of diversity in nature?
- (A) Organisms with traits needed for survival are found and bred to pass on these traits.
 - (B) Organisms from different species frequently reproduce to create new species.
 - (C) Organisms naturally change to meet environmental conditions resulting in the formation of a new species.
 - (D) Organisms with traits best suited for their environment will survive to reproduce and create more of their kind.

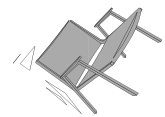
22. Based on the seed shapes given below, which seed is most likely to be dispersed by wind?



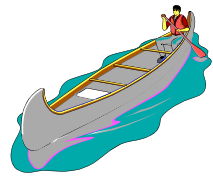
- (A) X
- (B) Y
- (C) R
- (D) T

23. Which action illustrates an effect of a tensile force?

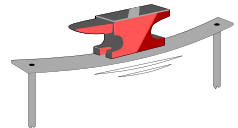
(A)



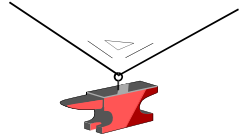
(B)



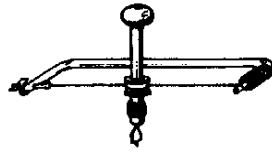
(C)



(D)



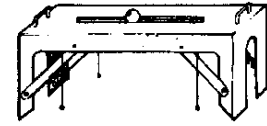
24. Glenn was given the following diagrams.



A



B



C

After inferring the function of each, he came to the conclusion that the diagram represented carpenters' tools. Which group matches each tool with its diagram?

	Diagram A	Diagram B	Diagram C
(A)	drill	level	plane
(B)	drill	plane	level
(C)	level	plane	drill
(D)	plane	drill	level

25. Which characteristic enhances the quality of a 21 speed bike?

- (A) colour of bike
- (B) diameter of wheel
- (C) index gear assembly
- (D) price

26. Why does variation in quality exist between products with the same function?

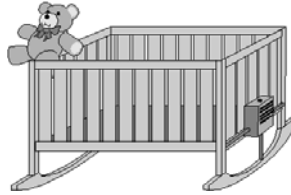
- (A) Manufacturers can not depend on the technology available to produce identical products.
- (B) Products with the same functions can be manufactured out of varying materials therefore providing a product to all consumers at a variety of prices.
- (C) Variations exist so that manufacturers can present the same product to consumers under varying brand names.
- (D) Variations exist because no two products can have the same function.

27. Car manufacturers usually put their product through an accelerated-aging to test the durability of the product over time. The car is put in conditions of extreme heat and extreme cold. The engine and all vehicle systems, ie. heating, lighting and wipers, continually run during this test. The tires are also rotated continually to simulate the actual driving of the car.

How would you evaluate this test with respect to testing the vehicle's durability for the Atlantic Canada market?

- (A) Durability of parts in salt conditions must be considered.
- (B) Exposure to freezing temperatures must be tested as Atlantic Canada has 5 months of cold weather, snow and frost.
- (C) Nothing further needs to be tested as all parts and systems have been checked in extreme heat and extreme cold.
- (D) This test is not reliable as no person continually runs their vehicle. The durability of a car is not affected by its running time.

28. The Consumer Product Test used by Company ABC to test their new product - a battery powered, rocking crib is outlined below:



Features of the crib: made from finest wood, splinter free
rungs of crib no further apart than 5 cm, meeting CSA approval
battery casing made of hard durable plastic
wiring channelled through rungs of crib
exposed wire covered in plastic
all parts meet sizing requirements
powered by 4 C batteries.

Testing Summary: batteries placed in crib for duration of battery lifetime approximately 100
hours of running time
motion observed
crib dropped from 1 m to obtain durability results
rung distance measured
all joints in structure stressed to maximum force to determine structure
strength and durability
wires pulled to determine strength and flexibility

Which statement **BEST** describes the quality of the Consumer Product Test?

- (A) The test was very good, covering all areas of consumer concern.
- (B) The test covered all areas of concern but should require less time (The crib could run for 3 - 4 hours).
- (C) The test was too detailed. (It should have checked just 1 product/production line).
- (D) The test was inadequate. (It should also cover wire casing inspection especially where wire exits crib and that each individual product should be inspected before leaving the company production line).

29. Which change in the environment is related to natural causes rather than the result of human actions?
- (A) depletion of ozone layer/global warming
 - (B) fires caused by lightning resulting in destruction of many organisms
 - (C) extinction and endangerment of many plant and animal species
 - (D) pollution of water, land and air

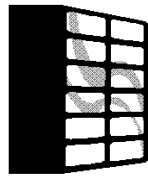
30. People of Twin City observed that there were fewer fish in the rivers around their city. According to the test results below, which environmental factor was causing the decrease in the fish population?

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 μ g/L	0
temperature	10 °C - 28 °C	12 °C - 18 °C

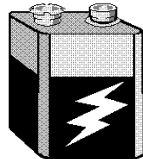
- (A) oxygen levels
 - (B) pH
 - (C) phosphate levels
 - (D) temperature
31. What conclusion about water quality can be made if the pH of a local water supply is determined to be 2.7?
- (A) The biotic levels are too high for safe human consumption.
 - (B) The level of pollutants is low therefore the water is safe to drink.
 - (C) The phosphorus levels in the water supply are low therefore the water can be safely used.
 - (D) The water is very acidic therefore people should be advised not to drink it.

32. Why is the use of phosphate - free detergents important to the quality of water?
- (A) Phosphates are nutrients for algae so if phosphate levels are high there is an overgrowth of algae in the water, which depletes the water of dissolved oxygen causing suffocation of other water organisms.
 - (B) Phosphates cause the water to become thick and less turbid preventing the movement of useful nutrients which causes non-mobile organisms in the water to die.
 - (C) The increased phosphate causes an increase in dissolved oxygen levels which become toxic at 10 mg/L killing all water organisms.
 - (D) The phosphates cause pH levels to increase making the water too basic for organisms to survive.
33. Which object is similar in design to the solar cell shown below?

(A)



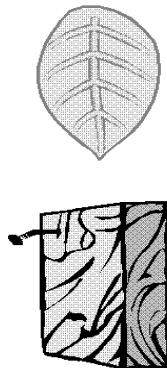
(B)



(C)

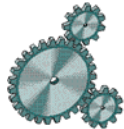


(D)



34. What is affected as a result of unbalanced forces on an object?
- (A) the object's direction only
 - (B) the object's speed only
 - (C) the object's speed and direction
 - (D) neither the object's speed nor direction
35. 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.
36. What effect will inertia have on the students sitting in a school bus if the driver slams on the brakes to avoid a collision?
- (A) They will move backwards.
 - (B) They will move forwards.
 - (C) They will be thrown into the aisle.
 - (D) They will remain at rest.
37. Which item is NOT a simple machine?

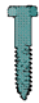
(A)



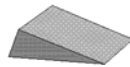
(B)



(C)

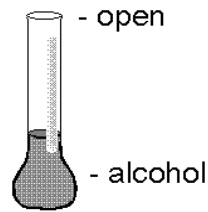


(D)

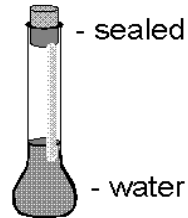


38. Which device gives the most accurate reading when measuring temperature?

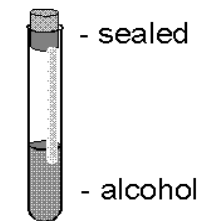
(A)



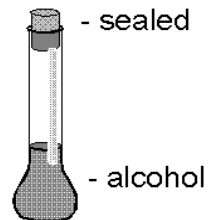
(B)



(C)



(D)



39. Which term is used to describe an object with identical teeth around its edge, used to transfer rotary motion and force?

- (A) fulcrum
- (B) gear wheel
- (C) pivot
- (D) pulley

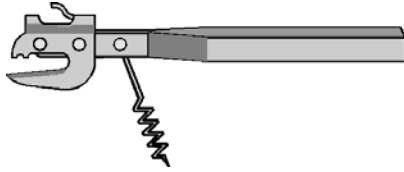
40. To lift a 20 kg bucket of sand 3 m high, a student has been pulling upwards but has not been able to move it. Which simple machine would help to raise the bucket and change the direction of the force?
- (A) inclined plane
(B) lever
(C) movable pulley
(D) screw
41. A shingler used a pulley to lift a 30 kg bucket of tar to the roof of a 2 storey house (10 m high). It took a force of 150 N. If $\text{work(J)} = \text{force(N)} \times \text{distance(M)}$, how much work was done by the pulley?
- (A) 0 J
(B) 15 J
(C) 160 J
(D) 1500 J
42. A force of 40 N is applied to a lever moving it downward 0.5 m. The lever raised a 30 kg rock 0.2 m high.

$$\begin{aligned} &1 \text{ kg} \sim 10 \text{ N}, \\ &\text{work (J)} = \text{force (N)} \times \text{distance (M)} \text{ and} \\ &\text{efficiency} = \frac{\text{work output}}{\text{work input}} \times 100\%, \end{aligned}$$

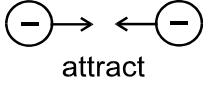
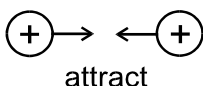
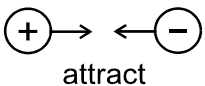
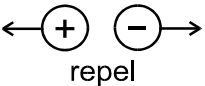
What is the approximate efficiency of the lever?

- (A) 33%
(B) 40%
(C) 75%
(D) 300%

43. Which simple machines are working together to allow the can opener below to function?

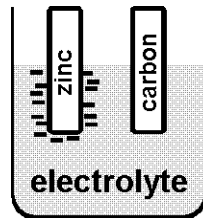


- (A) inclined plane and pulley
(B) screw and lever
(C) wedge and gears
(D) wheel and axle
44. In which situation has NO work been done?
- (A) A grocery store clerk lifts a 5 kg carton of milk out of a grocery cart.
(B) A horse pulls a sleigh 500 m across a snow covered trail.
(C) A young girl stands in her house holding a 10 kg box of wood.
(D) Household movers push a fridge from the front door of a house to the kitchen.
45. What is the term used to describe the electricity which results from a build up of electric charges on an object?
- (A) alternating current
(B) electromagnetism
(C) magnetism
(D) static electricity
46. What causes the piezoelectric effect to produce an electric current in devices such as crystal microphones?
- (A) changing pressure on a crystal
(B) moving a crystal through a coil of wire
(C) the crystal's ability to change heat energy into electrical energy
(D) the crystal's ability to store light energy

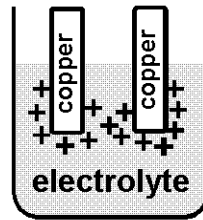
47. Which is the definition for heat?
- (A) a measure of the average energy of the particles that make up a substance
 - (B) form of energy transferred from a hotter substance to a cooler one
 - (C) potential energy stored in chemical compounds
 - (D) radiant energy that reaches Earth from the Sun
48. Which term refers to the transfer of heat by direct collision of materials in a substance?
- (A) conduction
 - (B) convection
 - (C) radiation
 - (D) specific heat
49. Which example is **NOT** of radiant energy?
- (A) microwaves
 - (B) seismic waves
 - (C) sunlight
 - (D) x-rays
50. Which illustration demonstrates the behaviour of electric charges?
- (A) 
attract
 - (B) 
attract
 - (C) 
attract
 - (D) 
repel

51. Which illustration depicts how a chemical cell produces a supply of charge?

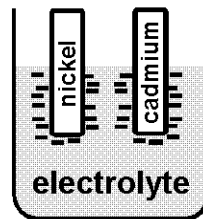
(A)



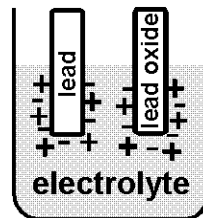
(B)



(C)



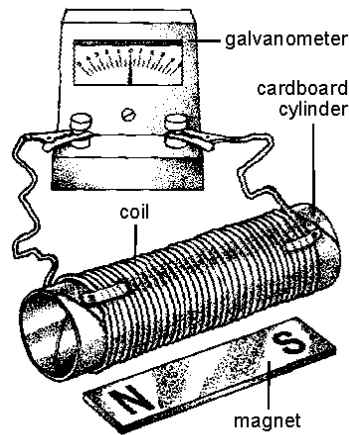
(D)



52. According to scientific terminology, which statement below is worded correctly?

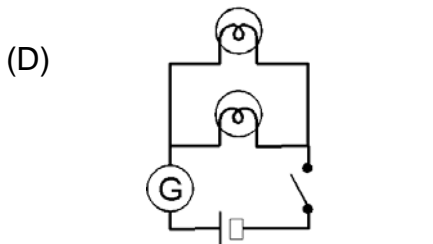
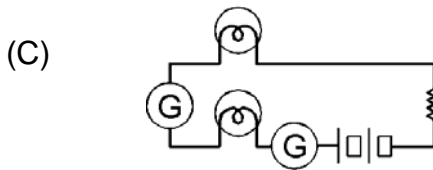
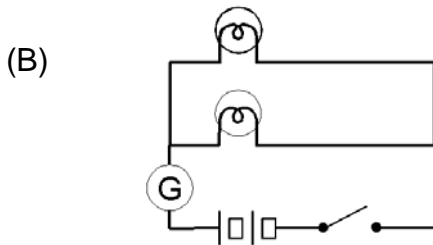
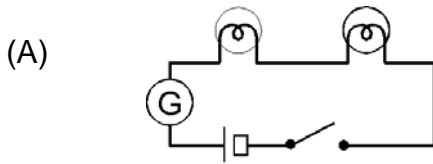
- (A) A 9 V battery contains 6 1.5 V cells.
- (B) A calculator takes 1 AAA battery.
- (C) The 3 V cell of a flashlight contains 2 1.5 V batteries.
- (D) The toy truck runs on 2 D-size 1.5 V batteries.

53. 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 2 storey house.
 - (C) Using copper pots when you have very little time to cook supper.
 - (D) Wearing light colored clothing on the warmest days of summer.
54. Generators are used to produce electricity. What can be done to increase the amount of current produced by the student-made coil wire and magnet generator below?



- (A) Decrease the number of turns in the wire coil.
 - (B) Hold the north end of the magnet as close to the wire coil as possible.
 - (C) Lay the magnet inside the coil of wire.
 - (D) Move the magnet slowly back and forth, just inside the coil.
55. How can the amount of current produced in a solar cell be increased?
- (A) Cover the solar cell with light-colored cellophane.
 - (B) Double the distance between the light source and the solar cell.
 - (C) Place another light source, of the same kind next to the light source already present.
 - (D) Put a red filter between the light source and the solar cell.

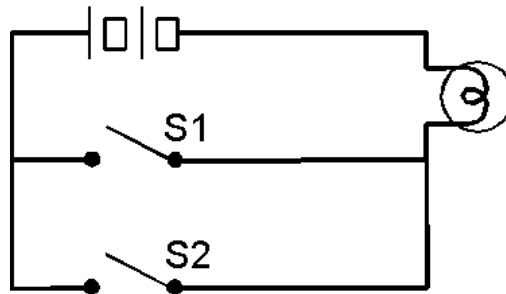
56. Which circuit diagram below represents two lamps connected in parallel to a battery of 2 cells and a switch, where the current is measured with a galvanometer?



57. Which situation is an example of convection?

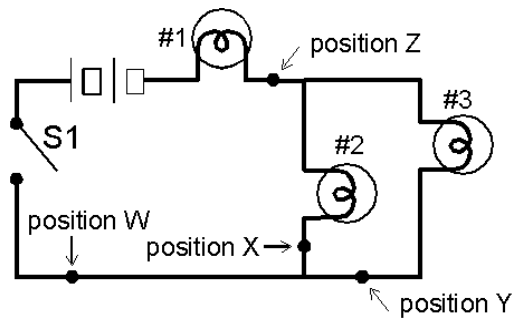
- (A) An egg cooks in a frying pan.
- (B) A piece of steel heats under the sun's light.
- (C) The handle of a pot on the stove becomes hot.
- (D) Warm air is found nearer to the ceiling than to the floor.

58. With respect to various radiant energy/material interactions, which statement correctly describes the effect of radiant energy on a material?
- (A) If the material absorbs radiant energy, the particles in the material gain energy causing the material to increase in temperature.
 - (B) If the material emits radiant energy, the radiant energy passes through the material, therefore, the energy of the material's particles does not change.
 - (C) If the material reflects radiant energy, the particles in the material use up the energy they possess causing the material to become cooler.
 - (D) If the material transmits radiant energy, the energy gets stored in the material causing a large increase in the energy of the material's particles.
59. Which statement about the circuit is true if the diagram shown is a circuit containing a light bulb connected to 2 switches in parallel?



- (A) When both switches are closed the bulb will not light up because the current does not flow in one direct pathway.
- (B) When S1 is open the light bulb will light up as long as S2 is open as well.
- (C) When S2 is open, the current can not pass through the circuit therefore, the bulb will not light.
- (D) When S2 is open and S1 is closed, the current will flow through the shortest loop and the bulb will light up.

60. 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?

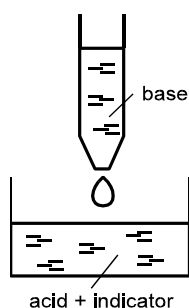


- (A) W
(B) X
(C) Y
(D) Z
61. Why is it important to have good insulation in the attic of homes during winter?
- (A) To protect homes from structural damage caused by cold temperatures and frost.
(B) To provide a thicker barrier for cold air to travel through when entering the home.
(C) To provide extra support against heavy snow build up.
(D) To reduce heat loss, thus conserve energy.
62. During the past six months there has been an increase in the number of dead fish swept up onto the beaches surrounding the Bay of Islands. Which explanation would be the least likely one for this phenomena?
- (A) an increase in the amount of acid rain
(B) industrial wastes being dumped into the waters
(C) oil spills caused by the large number of ships
(D) the release of water from sewage treatment plants

63. Which pair of materials identifies a naturally occurring chemical and an industrially manufactured (man-made) chemical?

	Natural	Manufactured
(A)	water	oxygen
(B)	sweat	nylon
(C)	sugar	salt
(D)	plastic	carbon dioxide

64. What sequence of events occurs when a base is added to an acid containing an indicator which is clear in acids and pink in bases?



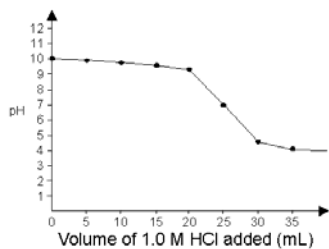
- (A) The acid + indicator will initially be clear and will become pink when 1 drop of base is added.
- (B) The acid + indicator will initially be pink and will become clear when 1 drop of base is added.
- (C) The acid + indicator will initially be clear and will become pink when it becomes neutralized and 1 more drop of base is added.
- (D) The acid + indicator will initially be pink and will become clear only when it becomes neutralized and 1 more drop of base is added.
65. What type of testing is being done by chemists at the Federal Food and Drug Administration if they are using a variety of chemical tests to determine the amount of meperidine in a new drug Daplo-6?
- (A) qualitative analysis
- (B) quantitative analysis
- (C) random sampling
- (D) toxicity level sampling

66. Which graph represents the standard curve for the results presented in the table below?

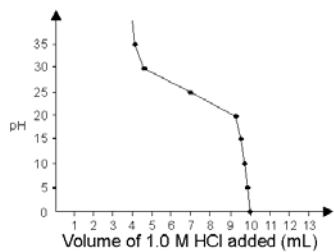
pH of solution of 25 mL of 1.0 M NaOH when 1.0 M HCl is added

volume of 1.0 M HCl added (ml)	pH of Solution
0	10.0
5	9.9
10	9.8
15	9.7
20	9.3
25	7.0
30	4.6
35	4.1

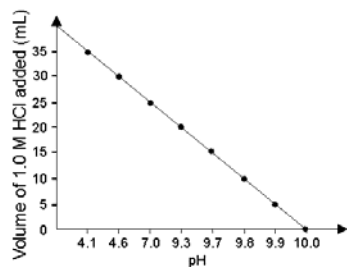
(A)



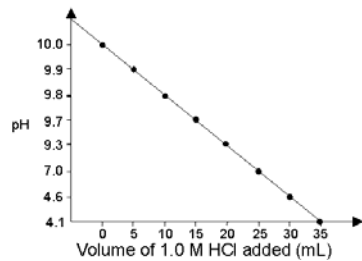
(B)



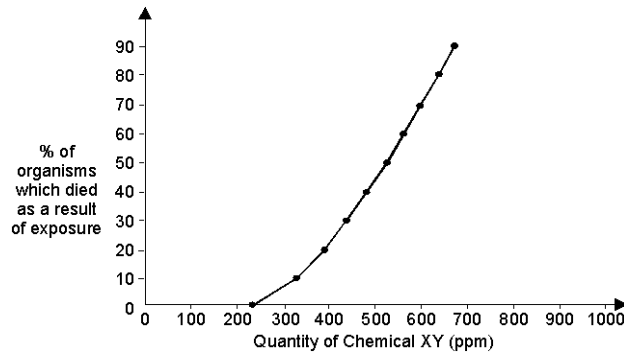
(C)



(D)



67. The graph below illustrates the effect of varying amounts of chemical XY exposure on large chimpanzees. Extrapolating from the information of the graph, what is the LD50 for humans?



- (A) less than 230 ppm
 (B) 230 ppm
 (C) 500 ppm
 (D) 680 ppm

68. Which classification of materials is correct?

gas	liquid	solid
(A) antifreeze	water	food colouring
(B) carbon dioxide	vinegar	copper
(C) copper	lemon juice	lead
(D) oxygen	salt	rock

69. Which statement distinguishes a mechanical mixture from a solution?

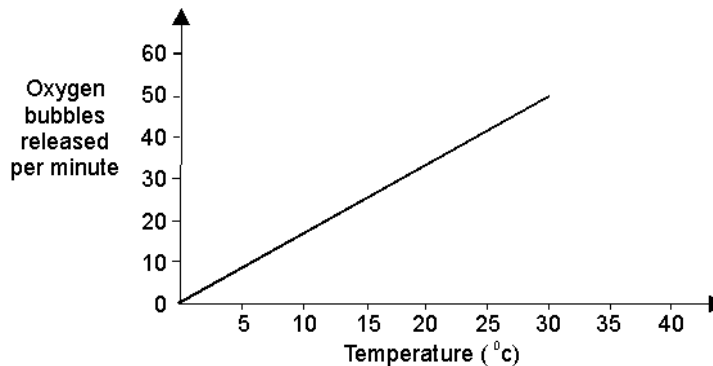
- (A) A mechanical mixture is always composed of solids, while solutions are always liquid.
 (B) A mechanical mixture is made up of two or more substances, while a solution is made up of only one substance.
 (C) Mechanical mixtures are clear while the particles in a solution reflect light making the solution look cloudy.
 (D) The particles of a mechanical mixture are clumped together, while the particles of a solution are completely intermingled.

70. Matter can be classified as solid, liquid or gas. Using the information given in the table about three different kinds of substances, which classification is correct?

substance	force between particles
X	strong but less than that of substance Y
Y	strong
Z	weak

- | | gas | liquid | solid |
|-----|-----|--------|-------|
| (A) | X | Y | Z |
| (B) | Y | Z | X |
| (C) | Z | X | Y |
| (D) | Y | Y | Z |

71. The graph shown represents the number of oxygen bubbles released by a water plant per minute in varying temperatures of water. It is known that the plant releases oxygen at an increasing level until it dies in temperatures above 50 °C.



Extrapolating the data shown in the graph above, how many bubbles would you expect the plant to release at 40 °C?

- (A) 0
- (B) 23
- (C) 53
- (D) 70

72. Which definition describes the particles in an element?

- (A) atoms which are similar in nature and reactivity
- (B) atoms with the same atomic number
- (C) different kinds of atoms
- (D) protons, neutrons and electrons

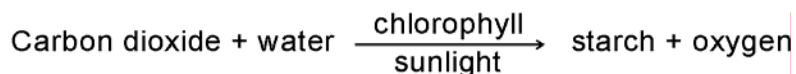
73. What is the chemical formula for carbon dioxide?

- (A) Cd
- (B) CO
- (C) CO₂
- (D) CaO

74. Which statement describes the information chemists can obtain from the periodic table?

- (A) The horizontal rows organize elements from the most reactive to the least reactive.
- (B) The periodic table contains all of the elements and compounds known to man.
- (C) The periodic table organizes all chemicals according to the number of atoms they contain.
- (D) The vertical columns contain elements with similar reactive properties.

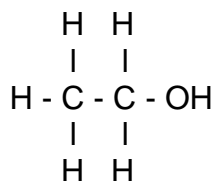
75. Which substance is a product in the reaction given below?



- (A) carbon dioxide
- (B) chlorophyll
- (C) oxygen
- (D) sunlight

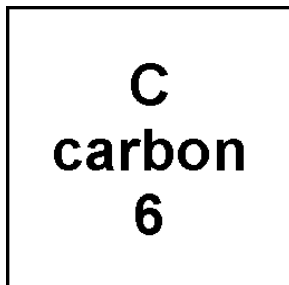
76. According to the atomic theory, which statement is correct?
- (A) All matter is made up of tiny particles called molecules.
 - (B) Atoms are combinations of two or more molecules.
 - (C) Molecules cannot be created or destroyed by any ordinary means.
 - (D) Two or more atoms joining together form a molecule.

77. What is the chemical formula for the compound shown below?



- (A) $\text{C}_2\text{H}_3\text{OH}$
 - (B) $\text{C}_2\text{H}_5\text{OH}$
 - (C) $2\text{CH}_3\text{O}$
 - (D) $6\text{HC}_2\text{O}$
78. The atomic theory states that all atoms are made up of three subatomic particles - protons, electrons and neutrons. What is the relationship between the 3 subatomic particles?
- (A) Electrons and neutrons are neutral particles found in the nucleus of the atom and the positively charged protons move around outside the nucleus.
 - (B) Electrons and protons are the charged particles of an atom with the protons located in the nucleus along with the neutral neutrons and the electrons found outside the nucleus.
 - (C) Protons are positively charged and are found in the nucleus with the negatively charged electrons and neutral neutrons.
 - (D) Protons are positively charged particles found with the neutral neutrons outside the nucleus and the electrons remain fixed in the nucleus.

79. If carbon has an atomic number of 6, as shown in the diagram, how many protons and electrons do carbon atoms contain?



- (A) 2 protons and 4 electrons
(B) 3 protons and 3 electrons
(C) 4 protons and 2 electrons
(D) 6 protons and 6 electrons
80. Which process is an example of a chemical change?
- (A) a liquid freezing at a certain temperature
(B) a material rotting under damp conditions
(C) a solid substance being ground into a powder
(D) a substance dissolving in water
81. What effect does temperature, surface area of reactants and concentration of chemicals have on the rate of a reaction?
- (A) As each factor increases, the reaction occurs at a more rapid rate with the fastest reaction occurring when the temperature, reactant surface area and reactant concentrations are high.
(B) The rate of the reaction will decrease naturally with neither factor affecting the rate of a reaction.
(C) Temperature, and reactant surface area do not affect the rate of a reaction, however, the higher the concentration of reactants the faster the reaction.
(D) The fastest reaction occurs when the concentration of reactants is low and the reactant surface area is small.

82. How can the speed of the reaction below be increased?



- (A) Add more HCl.
- (B) Add water.
- (C) Use more CaCl_2 .
- (D) Use less CaCO_3 .

83. Which change defines the term erosion?

- (A) the breaking down of materials into smaller pieces
- (B) the changing of the earth's surface as mountains form
- (C) the movement of materials from place to place
- (D) the weathering and carrying away of materials

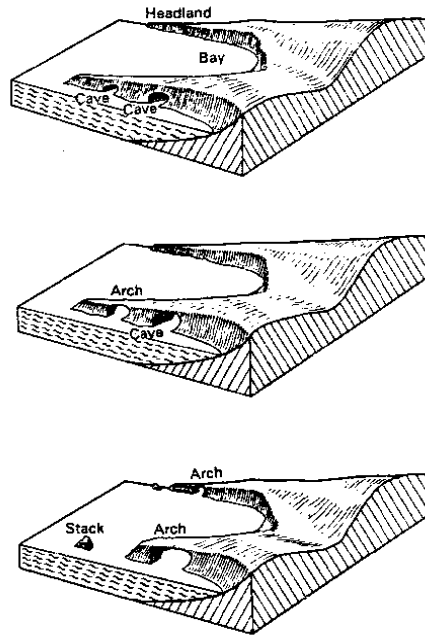
84. Which process is an example of physical weathering?

- (A) High levels of acid rain in an industrial area slowly eats away a stone monument.
- (B) Lichens growing on a rock slowly shatters its surface.
- (C) The freezing and thawing of water in cracks force rocks apart.
- (D) The roots of a tree crack a sidewalk as it is raised.

85. Which classification based on how rocks are formed, is correct?

	rock formed from the cooling of molten lava	rock formed from the buildup of small fragments of other rock	rock formed by altering another rock with heat, pressure or chemical reactions
(A)	igneous	metamorphic	sedimentary
(B)	metamorphic	sedimentary	igneous
(C)	sedimentary	igneous	metamorphic
(D)	igneous	sedimentary	metamorphic

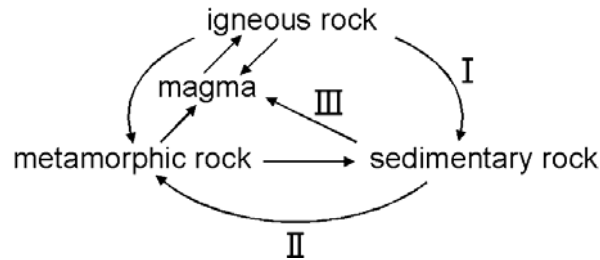
86. Waves and tides produce various shoreline features before a stack is formed. In what order do these features take place?



- (A) arch, cave, headland, stack
(B) cave, arch, headland, stack
(C) headland, arch, cave, stack
(D) headland, cave, arch, stack
87. Which term describes the many solid elements or compounds that occur naturally in the earth's crust?
- (A) atoms
(B) minerals
(C) rocks
(D) sediments

88. Jessie was observing igneous rocks. Sample I had small, brilliant crystals whereas Sample II had large, cloudy crystals. What conclusion could Jessie make from her observations?
- (A) Sample II cooled slowly beneath the earth's surface.
 - (B) Sample I must be hardened magma.
 - (C) Sample I is an extrusive rock which formed quickly.
 - (D) Sample II was formed from the altering of another rock due to extreme heat and pressure.

89. Which group correctly states the missing labels in the Rock Cycle Diagram?

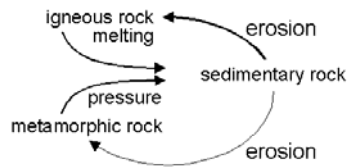


	I	II	III
(A)	erosion	high temperature and pressure	melting
(B)	high temperature and pressure	melting	erosion
(C)	melting	erosion	high temperature and pressure
(D)	melting	high temperature and pressure	erosion

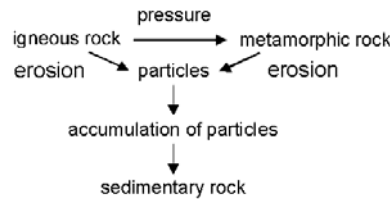
90. Which statement explains how fossils represent specific time periods of the earth's history?
- (A) Fossils are only found in sedimentary rock which is younger than igneous or metamorphic rock.
 - (B) Fossils of one type (A) would generally be found in rock below fossils of another type (B) if organism A existed before organism B.
 - (C) Fossils show evidence that different species of organisms lived at different time periods of history.
 - (D) The type of fossil determines the fossil's age. Petrified fossils would be older than casts and casts would be older than moulds.

91. Which flowchart illustrates the formation of sedimentary rocks?

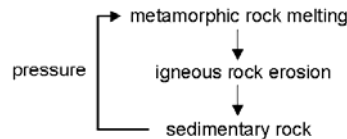
(A)



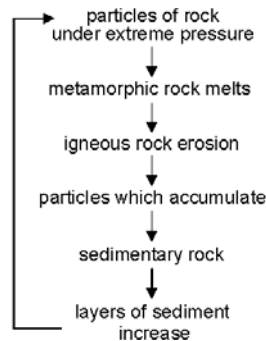
(B)



(C)



(D)

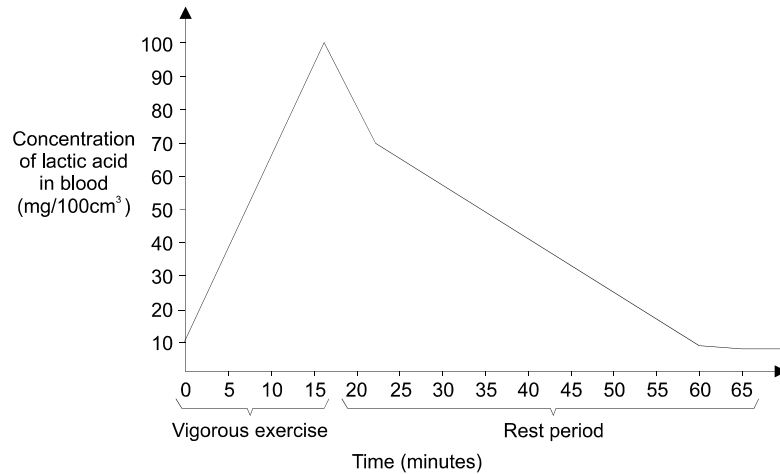


92. What type of project is planned if a group of students want to determine the effect of salt on plants?
- (A) experimental
 - (B) model
 - (C) standard
 - (D) survey
93. What is the manipulated variable in an investigation done to find out how equal amounts of heat affect the volume of four different liquids, A, B, C, D arranged in order of increasing density?
- (A) the change in volume of each of the four liquids
 - (B) the choice of the four liquids tested
 - (C) the colour change which occurs when liquid is heated
 - (D) the time it takes to heat liquids to same temperature
94. What is the responding variable in an experiment carried out to determine if temperature affects the rate of a reaction?
- (A) amount of time heat is applied
 - (B) rate of the reaction
 - (C) temperature
 - (D) type of chemicals used for reaction
95. Which term refers to a randomly selected group, representing an entire population of organisms?
- (A) community
 - (B) field test
 - (C) micro-environment
 - (D) sample

96. The theory of matter states that matter is made up of tiny particles that are in motion as a result of the energy they possess. How did this theory become so widely accepted, if no one can see the “particles” that the theory has been based upon?
- (A) Even though the particles cannot be observed, most other aspects of the theory have been proven.
 - (B) The particles can not be seen with the naked eye but scientists are certain that with increased technology they will observe the particles.
 - (C) The scientist who developed the theory was well known and respected for his research.
 - (D) To date all scientific evidence has supported the theory developed.
97. Which term refers to a list of pairs of alternative characteristics used for classification purposes?
- (A) biological indicator
 - (B) classification scale
 - (C) dichotomous key
 - (D) hierarchy

98. What conclusion can be made from the graph shown below which was part of a science fair project completed by 2 students?

Concentration of lactic acid in blood during and after vigorous exercise



- (A) During exercise the concentration of lactic acid rises to 95 mg/100 cm³ then drops during rest.
- (B) The concentration of lactic acid in your body never rises above 95/100cm³ no matter how long you exercise.
- (C) The concentration of lactic acid in your body increases rapidly during vigorous exercise, drops quickly at the start of the rest period and then continues to drop but at a slower rate, until it reaches its initial concentration.
- (D) The lactic acid concentration in our body rises quicker the more vigorously we exercise and then returns to its normal level until we exercise again.

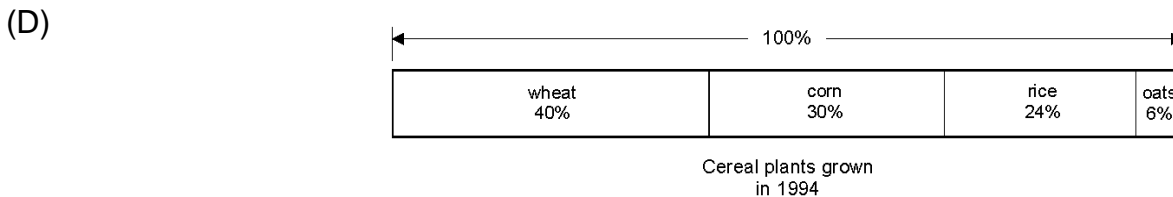
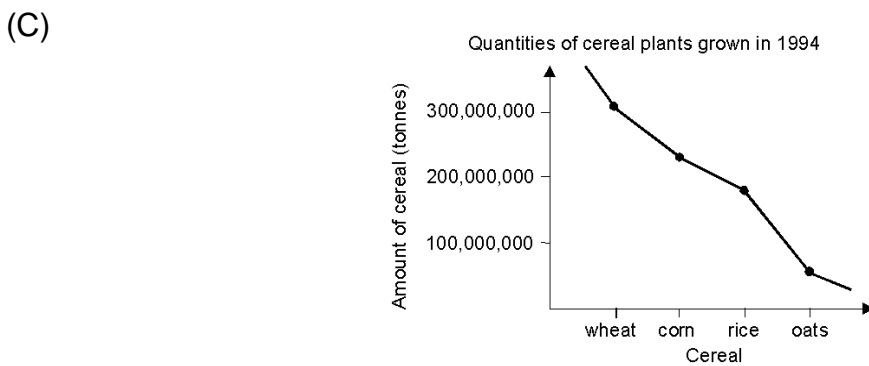
99. Two students gathered the following information while completing a research project on cereal. During 1994, 305 million tonnes of wheat; 233 million tonnes of corn; 181 million tonnes of rice and 51 tonnes of oats were grown. What is the best way for the students to represent this information in their report?

(A) Plants grown for cereal in 1994
 wheat - 305 million tonnes
 corn - 233 million tonnes
 rice - 181 million tonnes
 oats - 51 million tonnes

(B)

Quantities of cereal plants
grown in 1994

cereal	millions of tons
wheat	305
corn	233
rice	181
oats	51



100. A group of students devised 4 different procedures to test their hypothesis that the more water a seed receives the faster it will germinate. Which procedure should they follow?
- (A) Get 2 radish seeds. Plant each separately in pot using potting soil. Water one seed with 10 ml water per day. Don't water other seed. Observe and record results.
 - (B) Get 10 radish seeds. Place 2 along sides of beaker and secure seeds in position with paper towel. Repeat with 8 remaining seeds. Label beakers A - E. Do not water seeds in beaker A. Daily, add 5 ml of water to beaker B, 10 ml to beaker C, 15 ml to beaker D and 20 ml to beaker E. Place all beakers in same area. Observe, record results for 2 weeks. Repeat experiment.
 - (C) Get 14 radish seeds. Place 2 each in separate pots. Plant seeds in nutrient rich potting soil. Label pots A - G. Daily, add 2 ml of water to pot A. Put 4 ml of water in pot B. Continue giving each pot 2 more ml of water than the pot with the preceding letter. Place all pots in same area. Observe and record results for 2 weeks. Repeat experiment.
 - (D) Get 20 radish seeds. Place 5 in separate jars. Label jars A - D. Put 0.5 ml of water in jar A. Put 0.6 ml of water in jar B. Put 0.7 ml of water in jar C. Put 0.8 ml of water in jar D. Place A and B on counter. Put jar C and D in cupboard. Observe and record results. Repeat.