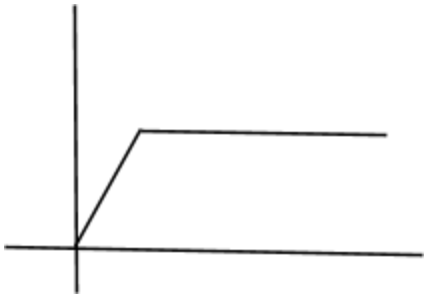
General Strategy

- Read question properly twice at least and answer questions carefully.
- Answer all science questions in their logical sequence.
- When there are specific readings on the graph, do not answer qualitatively, include the values in the answer.
- Do not use enough, little, as a superlative word.
- Be aware that the certain concept not known to you may be given in the question for you to use to answer the question.
- Ensure open ended question has answer with both “KEYWORDS from the QUESTION” and “KEYWORDS from the CONCEPT”.
- Ensure that when there is a comparison, answer the question from all perspectives.
- When the question ask for a conclusion, do not give a observation.
- If you are not possible to tell, do not assume it is TRUE or FALSE.
- Do not answer at the surface of the question but answer to the question.
- If there is a time factor in the question. Present your answer in terms of rate.
- When stating a conclusion, state the conclusion with reference to the data collected in the experiment
- A control of an experiment is normally the setup which is in neutral condition.
- If there is only one keyword, explain the key word in more detail.
- Use the exact term for the key words. Do not use vague word like “survive” to replace the exact terms.
- Physical factors include amount of light, water and temperature.
- When answering question asking about an aim of an experiment, use the terms “how...affect…”



- When interpreting this graph shown above, mention the increase and the constant.

- When answering question about how not changing the variable make the experiment a fair test, must mention the changed variable and the unchanged variable.(Where there is a external factor, do not need to mention unchanged variable and explain the effect of the external factor instead.

General

1. Sequence of an experiment
    a. Describe how the experiment is being set up
    b. Conduct the experiment and record data
    c. Repeat steps by changing relevant variable
    d. Repeat experiment three times to ensure reliability.
2. To have a reliable result in all experiment
    a. To repeat the experiment a few times.
    b. the time a substance takes to melt, is the duration from when it starts to melt to when it has melted completely.
3. If the question ask for making a fair test, same condition is a key word.
4. Relationship between floating water and submerged water plant is that if the floating water plant increase, water surface covered, less sunlight penetrate the surface of water, submerged plant get less sunlight to make food, hence decrease in population

Food Chain and Web

5. Population is one of the important key word for question dealing with food chain.
6. Predator and Prey are keywords in food chain
7. Producers
    a. usually plants
    b. make their own food
    c. ability to trap sunlight
8. Consumers
    a. does not make food
    b. most animals
    c. get food directly or indirectly from producers

9. Predators and prey
    a. Predators hunt and feed on prey
    b. Prey are hunted and eaten by predators
10. Food chain
    a. shows the food relationships with different organisms
    b. shows how energy is transferred
11. Food web
    a. consist of several food chains
12. All organisms depend on one another
13. Decomposers
    a. Bacteria and fungi
    b. helps to break down dead matter into simplest substances.
    c. enrich the soil with nutrients for plants to grow
14. Some animals are not decomposers but they help to break down dead organisms in simpler substances more quickly.

Adaptation

15. 

    a. Long legs: Helps to keep the body away from the cold water.
    b. Long neck: Helps to reach deep underwater to search for food without getting the feathers wet.
    c. Stand on one leg: Helps to reduce contact surface area with the cold water, less heat would be lost, keeping it warm.

d. One leg tucked into the feather: As the feathers trap air which is a poor conductor of heat, less heat would be lost to the surrounding, keeping the leg which is tucked under it warm.
e. Comb-like structures under the beak: As the water passes through the comb-like structure, the tiny organisms get trapped in the structures to be fed on by the flamingo

16. Surrounding is one of the important key word for question dealing with adaptation.
17. When a seed is dispersed, the main reason is to be far from the parent plant so that there would be less competition.
18. Ducks must be short so that it could stay behind tall water plants, so that it could hide from its predators.
19. There are two types of adaptation:
    a. Modified limbs like webbed feet and flippers also help in moving through water.
    b. Moving in air
        - A bird's streamlined body shape helps to reduce air resistance when flying.
        - A bird also has well-developed wings to aid in flying.
        - Not Structural
            - Behavioural
        - Breathing in water
            - Breathe through:
                - moist skin(frogs)
                - Gills(Tadpoles,Fishes)
                - Air tube(Water Scorpions, mosquito larvae)
                - Air bubble (Great Diving Beetle)
                - Special nostrils(Dugong)
                - Blowhole(dolphin, whales)
            - Moving in water
                - The streamlined body shape of aquatic animals to reduce water resistance
                - Most fish have swim bladders that help them stay afloat when swimming.
                - The shark have livers filled with oil. As oil is less dense the water, the shark would stay afloat
                - Fins of fish help it stay balanced and move forward
        - not only does feathers make light but strong wings, it also keeps the bird warm

- Birds have hollow bones that reduces the bird's weight, making flight easier.

c. Some birds, like the ostrich and emu, cannot fly.

20. Catching prey
    a. Strong claws of an eagle helps it hold the prey in a tight grip.
    b. Sharp teeth are used for tearing prey
    c. Chameleons and frogs have sticky tongue that make insects stick to them.
    d. Super senses help animals track down prey.
    e. Cheetah is the fastest when hunting its prey.
    f. Some predators use lures, webs and hidden pits to trap prey.
    g. Sundew plant uses a sweet sticky substance to attract insects.
    h. Army ants and killer whales hunt in teams.
    i. Hunting in a group may increase the chance of capturing prey. that is stronger larger or faster.
21. Obtaining sunlight
    a. Some plants have soft, non - woody stems that cannot grow upright so they have special adaptation to obtain sunlight.
    b. They have thorns and tendrils that cling onto a support.
    c. Carpet grass grow horizontally on the ground.
    d. Such plants can be classified as creepers or climbers
    e. The water lily has large waxy leaves that prevent water from collecting on the leaf
    f. The leaf stalk of a water hyacinth contains air which keep it afloat.
    g. The leaves of a fanwort traps air to help it stay upright underwater
22. Coping with extreme temperatures
    a. A camel can drink up to 100 litres of water at a time and store the water in the hump so that it would travel long distances without drinking any water
    b. The desert fox have large ears to help get rid of excess body heat
    c. Roots of cacti spread deep beneath the soil surface to absorb that is found deep underground
    d. Cacti also has thick fleshy stems to store water
    e. Cacti have spine/s to help in reducing water loss
    f. Polar bear has thick black skin under its white fur

Environment

23. 2 effects resulted from burning of trees.
    a. It will give out carbon dioxide
    b. There would be fewer trees to take in carbon dioxide for photosynthesis
    c. Hence, carbon dioxide would create the greenhouse effect and the heat would be trapped in the Earth's atmosphere, causing global warming.

Food Web

24. describe the effect of different part of the food web on each other when answering the question.

Forces

25. Force is a pull or push that acts on an object
26. When arms and legs are stretched out, it would create a streamlined body that reduces air resistance.
27. These are the three Newton's law of motion

> *When viewed in an inertial reference frame, an object either remains at rest or continues to move at a constant velocity, unless acted upon by an external force.*[2][3]
>
> *The vector sum of the forces F on an object is equal to the mass m of that object multiplied by the acceleration vector a of the object: F = ma.*
>
> *When one body exerts a force on a second body, the second body simultaneously exerts a force equal in magnitude and opposite in direction on the first body.*

    a. Effects of force:
        - If an object is at rest, it might start moving
        - If the object is already motion it may change in speed.It can move faster or slower.
        - If the object is already in motion it might change its direction
        - The shape and size of the object might change.
    b. Types of forces:
        - Friction
        - Elastic spring
        - Extension

- Gravity
- Weight
- Magnetic

c. Friction is a force that oppose motion.

d. Frictional force is produced when two surfaces are rubbed together. When answering question regarding friction, need to mention the 2 surfaces which the friction is produced,

e. Uses of friction
   - Hold objects in position
     - Friction prevents people from sliping on the ground
     - Friction is needed for brakes to stop cars
   - Makes fire

f. Problems of friction
   - It causes objects to slow down
   - It causes objects to overheat
   - It causes objects to wear out

g. Elastic spring force is applied to an object when it is stretched or compressed but returns to its original shape after releasing it

h. Extension is a pulling force the makes a spring extend

i. Gravity is natural force that act at a distance

j. The force of gravity varies with latitude and increases from about 9.780 m/s^2 at the Equator to about 9.832 m/s^2 at the poles.

k. Earth's gravity is the weakest at the equator due to the centrifugal force when the earth rotates.

l. When observing the graph, look carefully at both X axis and Y axis and answer with reference to them

m. When there is a time factor, put 'after some time' in answer

n. To determine the growth of plant, you could measure the number of leaves

Classification

28. No of seeds
    a. 1 seed - longan, rambutan, mango

b. many seed - cassia, saga, flame of the forest

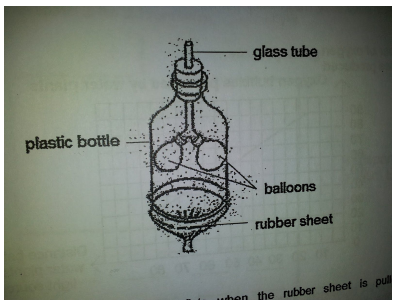
c. Fresh leaves are source of water.

Matter

29. Matter occupies space

Air and the respiratory system

30. For fish- takes in water with oxygen through the mouth. The water will wash over the gills that are rich in blood vessels. The oxygen would be absorbed by the gills and carbon dioxide would be released with the water through the underside of the gill cover.
31. For human- takes in air through the nose. The air will pass through the windpipe into the lungs. The lungs contain tiny air sacs which have a rich supply of blood vessel. The oxygen passes through the wall of the air sacs into the blood vessels. At the same time, carbon dioxide carried in the blood vessels passes into the air sac to be removed through exhaling.
32. For frog- Breathe through the lungs on land and moist skin in water.
33. Insect- Opening that lead to tubes that carry oxygen to internal organs.
34. Earthworm- Breathe through moist skin.
35. Dolphin and Whale- Breathe through blow hole.



a. Rubber sheet is pulled, more space in the plastic bottle, hence air will be drawn in inflate the balloons.

b. Difference of the plastic bottle compared to the human chest is the human chest expand and contract while breathing but the plastic bottle cannot.

36. Watch out: Animal breathe out and breathe all components of air, just that the % content is different.

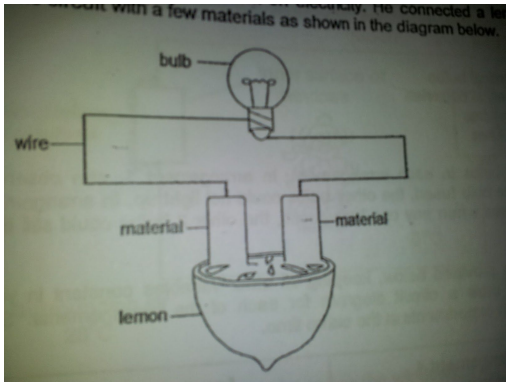
37. Asthma- During an attack, the muscle of the air tube will swell and there will be more mucus secreted, making the airway smaller, hence resulted in difficulty to breathe.

Water and its 3 states

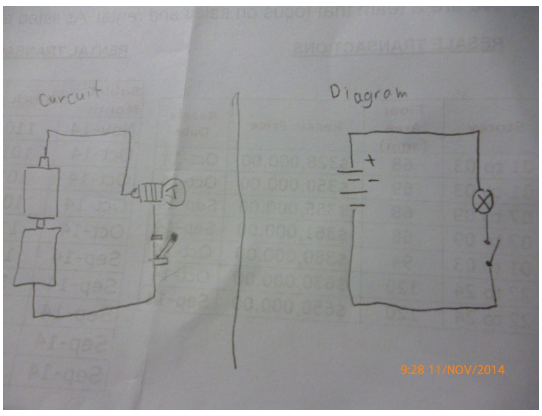
38. Form of water droplet on cold surface: Water vapour from the surrounding come in contact with the colder surface and condense to form water droplets.

Electricity

39. The aim of this set-up below is to find out whether lemon could be a source of electricity.



40. Draw the diagram exactly the same as the circuit.



Human circulatory system

41. 2 main concepts:
    a. Oxygen and Carbon Dioxide exchange at the lungs through blood capillaries.

b. Other parts of the body used up oxygen and produce carbon dioxide due to respiration.

42. The human circulatory system is in 2 way direction while the fish circulatory system is in 1 way direction.

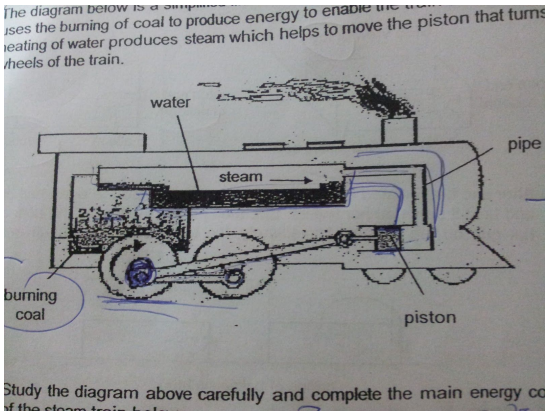
Light energy

43. In periscope, if the question ask for 1 property of light, the property is "Light travel in a straight line".
44. The changed variable in a case where the question is about a man walking past a street lamp is NOT the length of shadow, but the distance between the man and the street lamp.

Heat energy

45. The liquid which is most suitable to make a thermometer is the liquid that expand the most when heated as it is most sensitive to temperature change.
46. Expansion and contraction
    a. The thicker a material, the rate of expansion and contraction would be slower.

Energy conversion

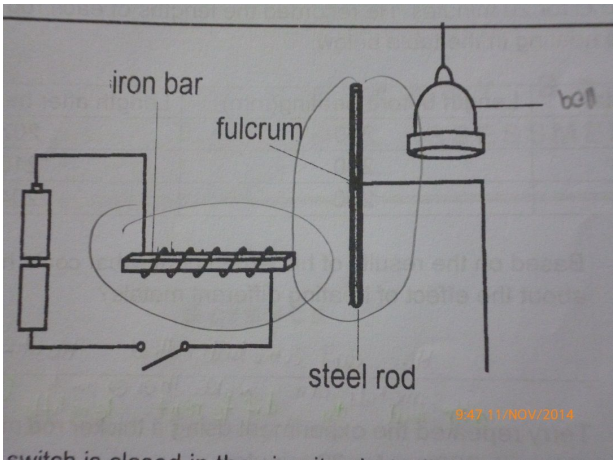
47. When question deals with energy conversion, must state steps of energy conversion of whole process
48. 

49. Ways of making train move faster

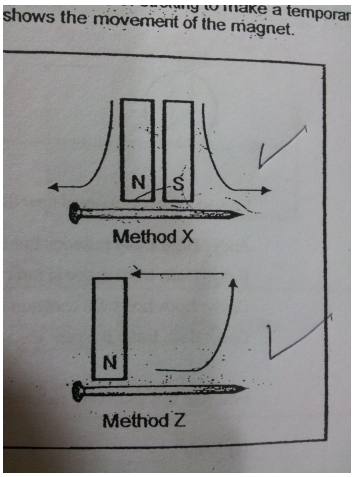
a. add lubricant to piston
b. add coal
c. add a insulant surrounding glass tank
d. add a heater at the pipe

50. As the ball bounce, energy would be lost through heat and sound.Less gravitational potential energy is being converted, causing the height of rebound to be lower.
51. The hardness of the floor is one of the main factors of the amount of energy lost when bouncing a ball. The softer the floor, the more the energy lost in every bounce.

Magnetism



52. The iron bar would be magnetised by the electric current and the steel rod would get attracted to the iron bar which is magnetic, causing it to tilt. When it tilts, it will hit the bell and the bell would ring.



53. Method X and Y can be used to magnetise a nail.

Reproduction in plant

54. Germination.
55. Underground stem - onion, potato, ginger, yam, taro, lotus (lily)
56. Underground root - tulip, carrot, sweet potato, beetroot.
57. Bananas and pineapple both reproduce by sucker.
58. Bryophyllum, begonia are reproduced by leaf.
59. Insects are attracted to flowers because they wanted to get nectar from the flowers.
60. When seed has roots and shoots appearing, it has germinated.

Plant respiratory system

61. Respiration - Take in oxygen to produce energy and give out carbon dioxide.
62. Photosynthesis - Take in carbon dioxide and sunlight to make food and give out oxygen.
63. photosynthesis … sugar produced … starch stored

Life cycle of animal.

64. Frog - Egg -> Tadpole -> Frog

Water cycle

65. Stages
    a. Water evaporates from lakes, rivers, surfaces of the ground and the water living things lose when they breathe or from their bodies.
    b. The water vapour would rise with the air
    c. When the air becomes cooler it condenses and forms water droplets.
    d. Water droplets combine with other water droplets and form bigger ones, making clouds.
    e. As the water droplets become heavier and bigger, it falls as rain.

Water- A precious resource

66. Only one percent of the water on earth is freshwater
67. There are various kinds of water pollution
    a. Littering and dumping waste into water
    b. Oil spills
    c. Deforestation
68. There are different ways to conserve water
    a. Reducing
        - Wash dishes in a tub of water instead of a running tap.
        - Use a piece of cloth and a pail of water to wash the car instead of spraying water from a hose
    b. Reusing
        - Water that can be used for washing vegetables or rice can be used for watering plants.
        - Water that was used for rinsing clothes can be used for washing the toilet.
    c. Recycling
        - Factories use water again for washing and cooling machines.
        - Water can be purified and used again.

From parents to young

74. Heredity- passing on characteristics from parents to young when they reproduce.
75. Write maternal or paternal when describing grandparents
76. Types of hereditary characteristics:
    a. Human
        - Colour of eyes
        - Colour of skin
        - Blood type

- Type of ear lobes
- Type of eyelid
- Colour of hair
- Dimples

b. Plants

- Colour of fruits
- presence of seeds
- taste of fruits
- colour of flowers

Reproduction in flowering plants

77. Parts of a flower:
    a. Male
        - Anthe
    b. Female
        - Stigma
        - Style
        - Ovary
78. Pollination- a transfer of the pollen grain from the anther to the stigma
79. Agents of pollination:
    a. Insects
    b. Birds
    c. Wnd
80. Why insects and birds visit flowers?
    a. Large
    b. Colourful
    c. Scent
81. Fertilisation
    a. Pollen grain produces a pollen tube
    b. The pollen tube would grow from the stigma through the ovary to the ovule
    c. Pollen fuses with the egg cell

d. From flower to fruit
    - Flower petals starts to wither
    - Ovary starts to swell
    - Seeds develop inside the fruit and the fruit grows bigger

Dispersal of fruits and seeds

82. Importance
    a. reduces competition between parent and young plant
    b. prevents overcrowding
83. Effects of overcrowding:
    a. Grows tall and thin
    b. Does not have thick stems
84. Ways of dispersal:
    a. Animal
    b. Most of the time, the animal would swallow the seed. As the seed is indigestible, it would be passed as droppings and land on somewhere far from the parent plant. When the conditions are suitable, it would into a new plant.
        - Beggar-Ticks
        - Mimosa Plant
        - Blackberries
        - Cherry
        - Papaya
        - Tomato
        - Rambutan
    c. Water
        - coconut tree
        - pong pong tree
        - lotus
        - mangrove
        - Nipah
    d. Wind

- Wing - like structure. The more the wing like structure, the larger the contact surface for air. Hence, making the seeds or fruits able to stay in the air for a longer period of time.
- Dandelion
- Shorea fruit
- African tulip
- Angsana
- Lalang
-

e. Explosive action
   - Flame of the forest
   - Balsam Tree
   - Okra
   - Saga
   - Rubber Tree
   - Witch Hazel
   - Kapok Tree
   - Rain tree

Germination

85. Conditions to germinate
    a. air
    b. water
    c. warmth
86. Stages of germination:
    a. First, roots will grow out of the seed
    b. Then the shoots would grow out
    c. Then the leaves would develop

Non-flowering plants

87. They grow from:
    a. Spores
88. found on the underside of the leaf of ferns
89. When spore bags are ripe, they turn brown

Reproduction in human

90. Reproduction takes place in the body of a female
91. Type of sex organs:
    a. Male
        - Testis
        - Penis
    b. Female
        - Ovaries
        - Womb
        - Vagina
92. A baby stays in the mother's womb for nine months
93. The sperm would fuse with the egg to fertilise it.
94. The fertilised egg starts to divide to form more cells.
95. It attaches itself to the wall of the womb and continue to grow
96. The umbilical cord carries food and oxygen from the mother to the baby

Water and its three states

97. Water covers more than the Earth’s surface.
98. Water can exist in:
    a. Solid
        - Ice
        - Snow
    b. Liquid

- Water

c. Gas
    - Steam
    - Water vapour

99. Water can change in state when there is a heat gain or loss.

100. The freezing point of water is 0℃.

101. The boiling of the water is 100℃.

102. The processes of changing states:

a. Freezing
    - From liquid to solid
    - Takes place at freezing point
    - Water loses heat

b. Condensation
    - From gas to liquid
    - Takes place at any temperature
    - Water loses heat

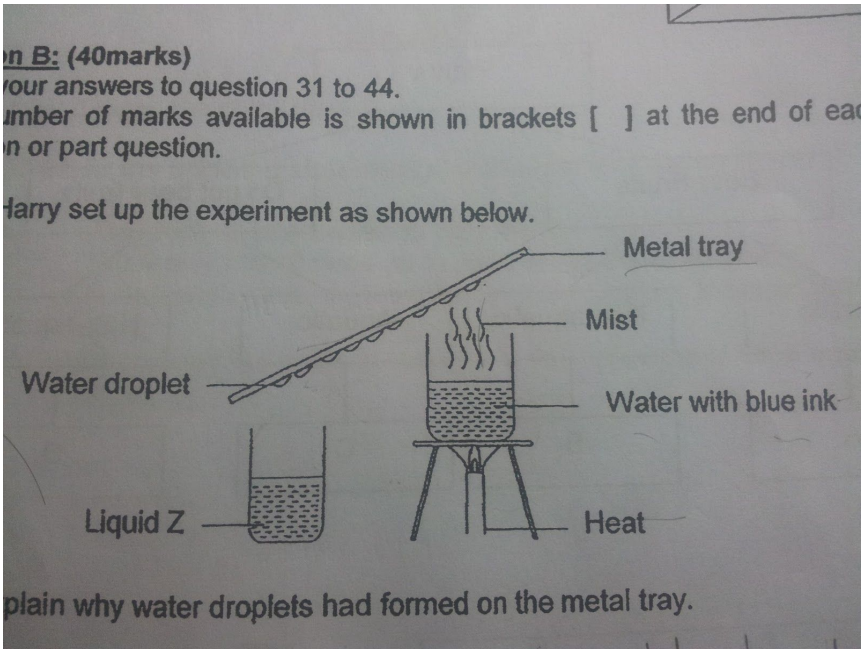
c. Boiling
    - From liquid to gas
    - Takes place at boiling point
    - Water gains heat

d. Melting
    - From solid to liquid
    - Takes place at the melting point
    - Water gains heat

e. Evaporation
    - From liquid to gas
    - Takes place at any temperature unlike boiling
    - Water gains heat

f. Melting point is the same as freezing point

g. After some time, the metal tray gets hotter and the rate of condensation decreases, thus there would be less water droplets.



Rate of evaporation

103. Factors that affects rate evaporation:
    a. Temperature
        - Water would gain the heat faster to evaporate
    b. Wind
        - Carries water vapour above water away, to make space for more.
    c. Area of exposed surface
        - Water evaporates faster if there is more space on the surface where it evaporates
    d. Humidity
        - The humidity is high when there is a lot of water vapour in the air and makes it difficult to take in the water vapour and slows down evaporation

Plant transport system

1. A plant has two separate sets of tube for transporting
2. They run through leaves, stems and roots
3. Tubes:
    a. Water-carrying tubes
        - Transports water and mineral salts from the roots to all parts of the plant

        - Grows in the inner part of the two tubes
    b. Food- carrying tubes
        - Transports sugar made in leaves to other parts of the plant
        - Grows at the outer part of two tubes

Air and the respiratory system

1. The fish has many blood vessels, so there would be more contact surface area in contact with water, thus taking in enough oxygen for respiration.
2. Air consists of:
    - Oxygen
        - Needed for all living things to respire
        - Used for burning
    - Carbon dioxide, water vapour and other gases
        - Breathed out by living things through respiration
        - Carbon dioxide is useful for plants in photosynthesis
    - Nitrogen
        - Makes up four-fifths of the air
3. When air moves, it is called wind

4. When breathing in:
    - Ribcage moves out and up
    - Thin sheet of muscle moves down
5. When breathing out:
    - Ribcage moves in and down
    - Thin sheet of muscle moves up

6. Parts of a respiratory system:
    - Nose
        - Air that enters the nose is cleaned, warmed and moistened
    - Windpipe
    - Lungs

        - Where exchange of gases takes place

Plant respiratory system

7. Plant exchange gases with their surroundings using the stomata
8. The opening of a stomata is called a stoma
9. Plants can photosynthesise and respire at the same time.
10. Plants need carbon dioxide, water and sunlight the photosynthesise
11. When photosynthesising:
    - Take in carbon dioxide and release oxygen
12. When respiring:
    - Take in oxygen and release carbon dioxide
13. Plants respire and photosynthesise in the day and at night

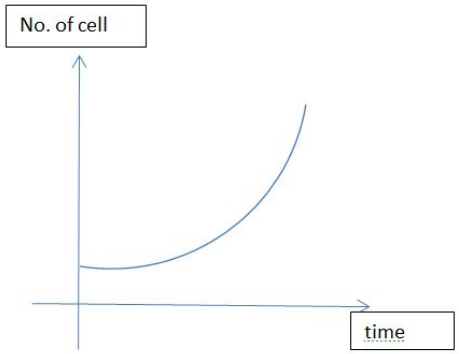
The human circulatory system

14. When exercising, body needs more blood to carry the oxygen to all parts of the body to produce energy, so the heart beat increases.
15. Stethoscope is used for measuring the rate of heartbeat
16. Parts:
    - Heart
        - Vital organ that and pumps blood to all parts of the body
        - Receives oxygen from the lungs
        - Made up of heart muscle which contracts and relaxes continuously without getting tired
    - Blood
        - Transport oxygen, water and digested food
        - Carries waste substances from all parts of the body to be removed
    - Blood vessels
        - Tubes for blood to flow through
        - Consist of:

- Capillaries - have thin walls where the exchange of useful and waste products take place
- Arteries - carries blood rich in oxygen
- Veins - carries blood rich in carbon dioxide

The unit of life

17. Differences between plant and animal cells
    - Plant cell has cell sap while animal cell does not have.
    - Plant cell has cell wall while animal cell does not have.
    - Plant cell is of regular shape and animal cell is of irregular shape.
18. When a cell starts to divide, the rate of division increases exponentially



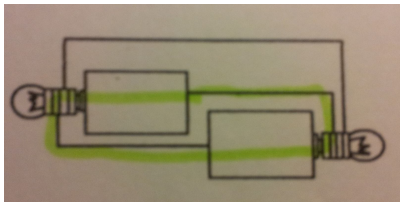
19. If the answer mention chloroplast, please also mention photosynthesis
20. Root cells does not have chloroplasts
21. Stem cells have chloroplasts.
22. Cell is a smallest unit of life in the body
23. Differs in size, shape and function
24. A lot of cells forms a tissue
25. Several tissues work together to form and organ
26. Some organisms are made up of a lot of cells while others are just made of only a few cells
27. Types of cells:
    - Human
        - red blood cell
        - White blood cell

        - Egg cell
        - sperm cell
        - Animal convert excess glucose to fat.
    - Plant
        - Guard cells
        - Leaf cell
        - Stem cell
        - Root cell
        - All plant cell store starch which is convert from excess glucose.

28. Parts of a cell
    - Animal
        - Nucleus
            - Controls all the activities in the cell
            - Contain genetic information that is passed from one generation to the next
        - Cytoplasm
    - Contains cell parts
            - Help the parts move around in the cell
        - Cell membrane
            - controls the substances going in and out of the cell
    - Plant
        - Nucleus
            - Controls all the activities in the cell
            - Contain genetic information that is passed from one generation to the next
        - Cytoplasm
            - Contains cell parts
            - Help the parts move around in the cell
        - Cell membrane
            - controls the substances going in and out of the cell
        - Chloroplasts
            - Contains chlorophyll that help trap sunlight to make food
        - Cell wall

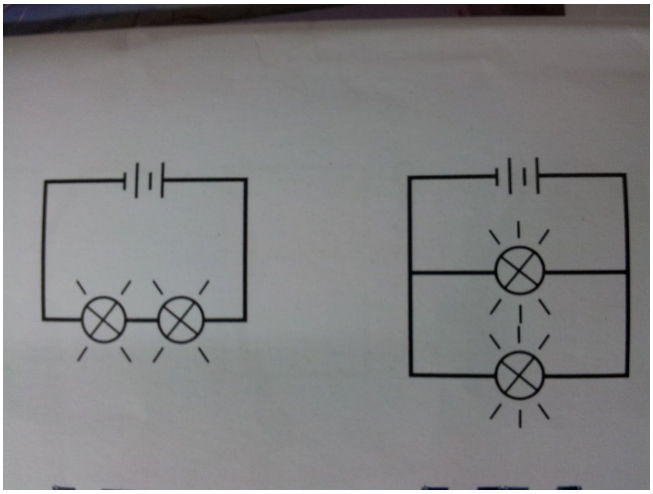
- support and give the cell its shape

Electric circuits

29.  This is a parallel circuit
30. An electric circuit is made of some components.
31. A flow of electricity is called an electric current
32. Parts of a circuit:
    - Battery
        - Has a positive and negative terminal
        - chemicals in battery react to produce energy
        - Drives an electric current through an electric circuit
    - Wire
        - Mostly made of copper
        - Allow electric current to go through
        - Mostly insulated with a rubber covering
    - Bulb
        - Produces light and heat
        - Parts
            - Metal filament - glows and gives off light and heat when current flows through it.
            - Glass bulb - prevent the metal filament from being damaged.
            - Metal casing and metal tip - parts which are connected to an electric circuit.
    - Switch
        - Control electric current flow.
33. A circuit through which electric current can flow is called a closed circuit.
34. A circuit through which electric current cannot flow is called an open circuit.

Using electricity

35. Battery connected in series:
    - If more batteries are connected to the circuit, the brightness of the bulb increases.
36. Bulb connected in series:
    a. If more bulbs are connected in series without increasing the number of batteries, then the brightness of the bulb will decrease.
37. The circuit which bulbs arranged in parallel light up more brightly than the bulbs arranged in series.
38. If one bulb fused, one of the bulbs will still light up in the parallel circuit. Compared to the series circuit which none of the bulbs will light up.



39. Brightness of a bulb depends on:
    - the number of batteries
    - the number of bulbs
    - the arrangement of bulbs
40. Ways to save electricity:
    - Switch of the light when leaving the room
    - Use energy saving bulbs instead of filament bulbs
    - Do not open the refrigerator door unnecessarily

Conductor of electricity

41. Electrical conductor are materials that allow electric current to flow through.
42. Electrical insulators are materials that do not allow electric current to flow through.
43. Examples of electrical conductors:
    - Most of the metals
    - Water
44. Examples of electrical insulators:
    - Glass
        - Wood
        - Plastic

39. Ways to keep safe from electricity:
    b. Never touch switches with wet hands
    c. When using electrical tools, make sure they have plastic or wooden handles.
    d. Check electrical appliances regularly for exposed wire.
    e. Do not put too many plugs into one socket.

Material properties

45. ability to withstand scratch is related to hardness.
46. ability to bend is related to flexibility.

Food Web

47. When answering a food web question, please talk about EATING.
48. Decomposers are organisms that break down dead matters into simpler substances which to provide nutrients for plants for healthy growth.
49. Type of decomposers
    f. moulds
    g. mushroom
    h. bacteria
50. Organisms that help decomposers

i. ants

j. earthworms

k. These organisms help by breaking dead matter down into smaller pieces.