

STATE TEST STUDY CARDS 2011

1. SCIENTIFIC METHOD

- Observation
- Hypothesis
- Data
- Experiment
- Results/Conclusion
- Retest

Hypothesis must be testable

2 Types of data

- Quantitative: measurements such as mass, volume in temperature reported as numbers
- Qualitative: descriptions using sight, sound, and smell

2. PARTS OF AN EXPERIMENT

- Independent Variable: Manipulated or changed (X-axis)
- Dependent Variable: Measured (Y-axis)
- Constants/Controls: must have to test independent variable

A farmer tests the effects of a certain fertilizer on the growth of his corn crops.

Independent: Fertilizer

Dependent: Growth of corn

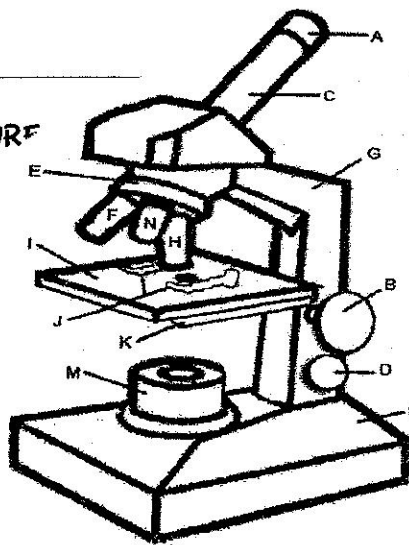
3. THEORY

A well tested explanation that unifies a broad range of observations (Can be modified or discarded at any time)

EX: Spontaneous Generation: The theory that life could arise from non-living matter
Scientists involved in testing the hypothesis of SG

- 1: Francesco Redi
- 2: John Needham
- 3: Lazzaro Spallanzani
- 4: Louis Pasteur

**4. MICROSCOPE
(CUT OUT PICTURE)**



- A.
- B.
- C.
- D.
- E.
- F.
- G.
- H.
- I.
- J.
- K.
- L.
- m.

5. METRIC LADDER

Draw metric mania ladder

6. CHARACTERISITICS OF LIVING

All living things:

<p>THINGS</p>	<ol style="list-style-type: none"> 1: Have cells 2: Reproduce 3: Have DNA 4: Grow & Develop 5: Obtain & Use energy 6: Maintain stable internal environment (Homeostasis) 7: Evolve (change over time)
<p>7. LEVELS OF ORGANIZATION</p>	<p style="text-align: center;"> Biosphere Biome/Ecosystem Community Population Organism Organ System Organ Tissue Cells Molecules/Atoms </p>
<p>8. ATOMS Basic unit of matter</p>	<p> <u>Protons (+charge)</u> Inside the nucleus <u>Neutrons: (Neutral)</u> Inside the nucleus <u>Electrons: (-Charge)</u> Surrounding the nucleus Atoms are neutral because they have an equal number of electrons and protons. </p>
<p>9. ATOMIC STRUCTURE</p> <div style="display: flex; align-items: center; margin-top: 20px;"> <div style="border-bottom: 1px dashed black; width: 150px; margin-right: 10px;"></div> <div style="border-bottom: 1px dashed black; width: 150px; margin-right: 10px;"></div> <div style="border-bottom: 1px dashed black; width: 150px; margin-right: 10px;"></div> <div style="border: 1px solid black; padding: 10px; text-align: center; width: 150px;"> <p>8</p> <p>O</p> <p>Oxygen</p> <p>15.999</p> </div> </div>	<p> <u>Atomic Number: Protons</u> Protons = Electrons </p> <p> <u>Atomic Mass: Protons + Neutrons</u> </p> <p> <u>Valence Electrons:</u> located in the outer most energy level and is involved in bonding of atoms </p>

<p>10.ELEMENT Pure substances that consists entirely of one type of atom</p>	<p>Most common elements found in all living things</p> <p>Carbon Hydrogen Oxygen Nitrogen Phosphorus</p>
<p>11.ISOTOPES</p>	<ul style="list-style-type: none"> • Atoms of the same element that have the same number of electrons but different number of neutrons. • Same chemical properties because they have the same # of electrons
<p>12.COMPOUNDS</p>	<p>Substance formed by the chemical combination of two or more elements and have different chemical and physical properties than the elements from which they are formed</p>
<p>13.CHEMICAL BONDING</p>	<ul style="list-style-type: none"> • <u>Ionic bond</u>: formed by atoms transferring electrons creating positive and negative ions (Na+Cl⁻) • <u>Covalent bond</u>: formed when atoms share electrons (H₂O); forms a • <u>Hydrogen bond</u>: attraction of hydrogen atom of one molecule to an Oxygen, Nitrogen, or fluorine atom of another molecule (H₂O-H₂O) <p>Bond Strength: Ionic>Covalent>Hydrogen</p>
<p>14. IONS</p>	<p>Positive Ion: atom loses e⁻ Negative Ion: atom gains e⁻</p>

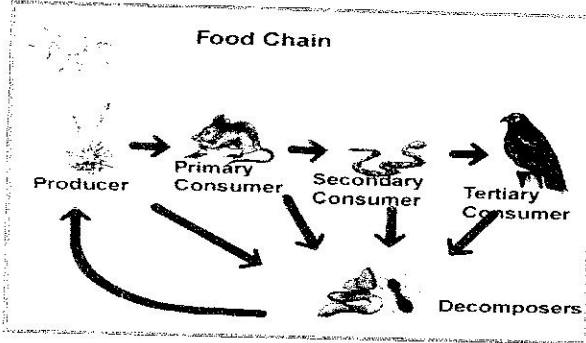
<p>15.PROPERTIES OF WATER</p>	<p>Polar: A molecule in which the charges are unevenly distributed; Oxygen has a slightly negative(-) charge and the hydrogen atoms have a slightly positive(+) charge (Draw water molecule to illustrate charges)</p> <p>Cohesion: Attraction between molecules of the same substance; Surface tension</p> <p>Adhesion: Attraction between molecules of different substances</p>
<p>16.SOLUTIONS & SUSPENSIONS</p>	<ul style="list-style-type: none"> • Mixture formed from water (Solvent) and another substance (Solute) and all components are evenly distributed through out (Salt water) <p>Solute: substance being dissolved Solvent: substance solute is being dissolved in</p> <ul style="list-style-type: none"> • Mixture of water and non-dissolved material (Blood)
<p>17.DISASSOCIATION</p> <p>The splitting of a water molecule</p> <p>$H_2O \text{ -----} \rightarrow H^+ + OH^-$</p>	<ul style="list-style-type: none"> • Water is neutral because it contains the same number ions ($H^+ = OH^-$) <p>H^+= Hydrogen Ion (Acid) OH^-=Hydroxide Ion (Base)</p>
<p>18. pH SCALE</p> <ul style="list-style-type: none"> • Indicates the concentration of H^+ ions in a solution. • The lower the pH, the more H^+ ions, the more acidic • The higher the pH, the less H^+ ions, the more basic 	<p>Draw pH scale on pg 43 labeling all products given</p>

19. ACID	Solutions that contain higher concentrations of H^+ ions than pure water and have pH values less than 7 (1-3 Strong acid, 4-6 Weak acid)
20. BASE	Produces OH^- ions in solution; contain lower concentrations of H^+ ions than pure water and have pH values above 7
21. BUFFERS	<ul style="list-style-type: none"> • Weak acids or bases that can react with strong acids or bases to prevent sudden changes in pH
22. CARBON	<ul style="list-style-type: none"> • Has 4 valence electrons • Forms covalent bonds with other atoms • Can bond with hydrogen, oxygen, phosphorus, sulfur, nitrogen and other carbon atoms • Compounds that contain carbon are called organic.
23. CARBOHYDRATES	<ul style="list-style-type: none"> • Made of: C, H, O • Monomer: Monosaccharide • Function: Energy source for all living things; Plants use for structure • Examples: Glucose, galactose, fructose, glycogen, cellulose, starch • Special Info: Animals store glucose in the form of glycogen, a polysaccharide
24. LIPIDS	<ul style="list-style-type: none"> • Made of: C, H, O • Monomer: glycerol + Fatty acid • Function: Short term energy storage, Makes up cell membrane, non-polar • Examples: Fats, oils, waxes, steroids, hormones, cholesterol

	<ul style="list-style-type: none"> • Special Info: Saturated- all Carbon-Carbon bonds are single bonds Unsaturated- at least 1 Carbon-Carbon double bond
25. PROTEINS	<ul style="list-style-type: none"> • Made of: C,H,O,N • Monomer: Amino acid <ul style="list-style-type: none"> 1: Amino group: NH₃ 2: Carboxyl group: COOH 3: R group • Function: controls rate of chemical rxns, form bones & muscle, transports substances in & out of cells, regulates cell process • Examples: Enzymes, Protein channels in cell membrane, • Special Info: Amino acids bonded together by peptide bonds; 20 diff amino acids
26. NUCLEIC ACIDS	<ul style="list-style-type: none"> • Made of: C,H,O,N,P • Monomer: Nucleotides <ul style="list-style-type: none"> 1: 5 Carbon sugar 2: Phosphate group 3: Nitrogen base • Function: Store & Transmit hereditary material • Examples: RNA & DNA • Special Info: joined by covalent bonds; RNA - Ribose sugar, DNA- Deoxyribose sugar
27. CHEMICAL REACTION Changes substances into different substances by breaking and forming chemical bonds; rearranging atoms	$6O_2 + C_6H_{12}O_6 \rightarrow 6CO_2 + 6H_2O$ <p style="text-align: center;"> Reactants Products </p>

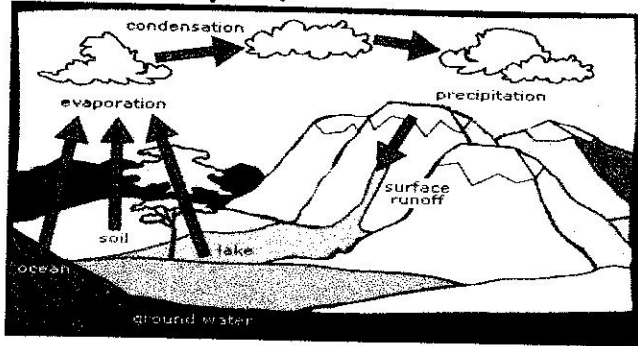
<p>28. ENDOTHERMIC REACTION Chemical reactions that absorb energy and have high activation energy</p>	<p>Reactants have less energy than the Products</p> <p>DRAW GRAPH ON PG 50</p>
<p>29. EXOTHERMIC REACTION Chemical reactions that release energy and have lower activation energy</p>	<ul style="list-style-type: none"> • Reactants have more energy than the products • Often occur spontaneously <p>Draw graph on pg 50</p>
<p>30. ENZYMES Draw illustration of enzyme</p>	<ul style="list-style-type: none"> • Biological catalyst; speeds up the rate of a chemical reaction and work to lower the activation energy; factors that can affect are pH and temperature • Reactants are called Substrates • Specific to only 1 set of substrates (Lock & Key Model)
<p>31. Abiotic & Biotic factors</p>	<ul style="list-style-type: none"> • Abiotic: nonliving; rainfall, temperature, wind, sunlight, and soil • Biotic: living; plants, animals, fungi, and bacteria
<p>32. Producers</p>	<ul style="list-style-type: none"> • Get their energy from nonliving resources; make their own food • Also called autotrophs • Found at base of energy pyramid • <u>Photosynthetic</u>: Form sugars (Carbohydrates) from using sunlight • <u>Chemosynthetic</u>: form sugars from chemicals rather than sunlight
<p>33. Consumers</p>	<ul style="list-style-type: none"> • Get their energy by eating other living or once-living resources such as plants and animals. • Also called Heterotrophs • Herbivores, Carnivores, Omnivores, detritivores, decomposers

34. Food Web



- Producers:
- Primary consumers (Herbivores):
- Secondary consumers:
- Tertiary consumers:

35. Water Cycle (Hydrologic cycle, Hydrogen cycle)

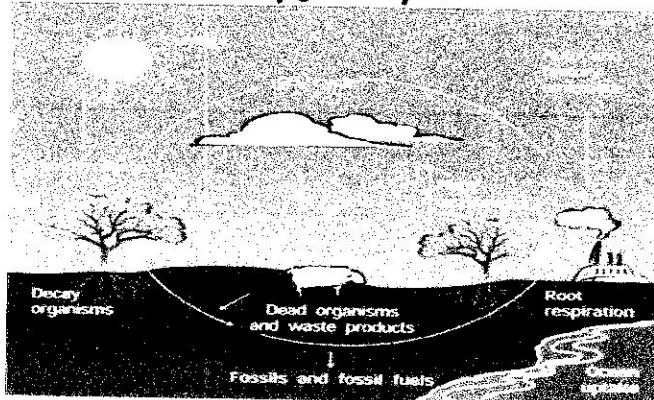


- Condensation: water vapor (gas) changes into liquid water
- Transpiration: evaporation of water from leaves of plants
- Evaporation: water changes from liquid to gas
- Precipitation: water that falls to the earth surface; rain, snow, sleet, hail

36. Biogeochemical cycles

- Movement of a particular chemical through the biological and geological, or living and non-living, parts of an ecosystem
- Carbon & Oxygen Cycle
- Nitrogen cycle
- Phosphorus cycle

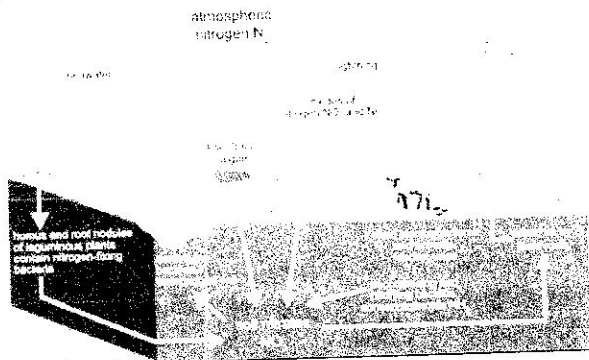
37. Carbon & Oxygen Cycle



- CO_2 is pulled from the atmosphere by: Photosynthesis
- CO_2 is returned by: respiration; combustion of fossil fuels
- Carbon can be found in: CO_2 in atmosphere, Bicarbonate in water, fossil fuels underground, limestone, dead organic matter (humus)

38. Nitrogen Cycle

- Nitrogen fixation: converting Nitrogen gas into ammonia (NH_3) or ammonium (NH_4^+) by bacteria found on roots of

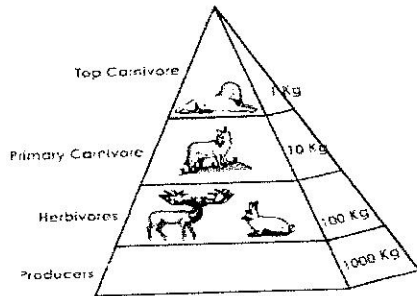


- legume plants or in the soil and is taken up by plants as nutrients
- **Nitrification:** converting ammonium (NH_4) into nitrates by bacteria and is taken up by plants and is converted into amino acids and proteins
- **Denitrification:** converting nitrites back into nitrogen gas by bacteria

39. Phosphorus Cycle

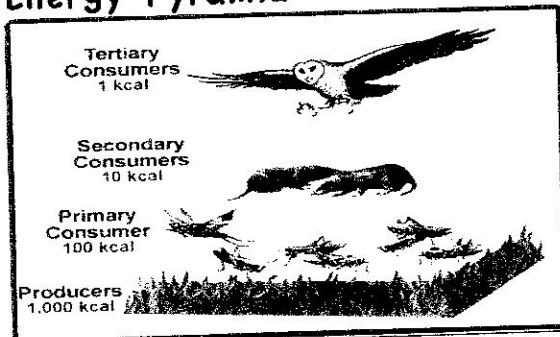
- Phosphate is released by weathering of rocks and taken up by fungi and plants
- Consumers that taken phosphates in through plants return it to the soil when they die and decompose.
- Leaches into groundwater from soil which forms sediments and eventually forms rock
- Only cycle in which the element does not enter the atmosphere, all processes take place below ground level.

40. Biomass Pyramid



- Shows the measure of total dry mass of organisms
- Unit of measurement kg/m^2

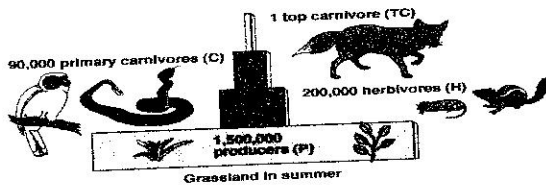
41. Energy Pyramid



- Shows how energy is distributed among trophic levels in an ecosystem
- Unit of measurement is in kcal
- Can be shown as an inverted pyramid
- Only 10% of the energy available at one trophic level is passed to the next

42. Pyramid of numbers

Pyramid Showing Numbers



- Shows the number of individual organisms at each trophic level
- Can be shown as an inverted pyramid

43. **Habitat:** all the biotic and abiotic factors in the area where an organism lives (Address)

Niche: How an organism interacts within the habitat; includes behavioral descriptions (Occupation)

44. **Competitive Exclusion**

No two species can occupy the same niche at the same time. One will always be better suited

45. **Interaction between organisms**

- **Competition:** when two organisms fight for the same limited resources
 - Interspecific-between diff species
 - Intraspecific-between same species
- **Predation:** one organism captures and feeds upon another organism
- **Symbiosis:** close ecological relationship two or more organisms of different species that live in direct contact with one another

46. **Types of Symbiosis**

- **Mutualism:** both organisms benefit (bumble bee & flower)
- **Commensalism:** one organisms benefits and one neither benefits nor is harmed (Whale & Barnacle)
- **Parasitism:** one organisms benefits and the other is harmed (tick & dog)

47. **Population growth**

- **Exponential:** Population size increases dramatically over a period of time; J-Shaped curve
- **Logistic:** begins with a period of slow growth, brief exponential growth, and levels off; s-shaped curve
 - **Carrying capacity:** max # of individuals of particular species the environment can support

<p>48. Limiting factor</p>	<ul style="list-style-type: none"> • Factor that has the greatest effect in keeping down the size of a population <ul style="list-style-type: none"> ○ Density-dependent: Competition, Predation, Parasitism, & disease ○ Density-Independent: unusual weather, natural disasters, human activities
<p>49. Ecological Succession: sequence of biotic changes that regenerate a damaged community or create a community in a previously uninhabited area</p>	<ul style="list-style-type: none"> • Primary: occurs in a previously uninhabited area; where no soil is intact due to volcanic eruption, melting glaciers, & strip mines <ul style="list-style-type: none"> ○ Pioneer Species: lichens & mosses break down solid rock to eventually form soil • Secondary: reestablishment of a damaged ecosystem where soil is still intact due to flood, fire, tornado
<p>50. Tropical Rain Forest</p>	<ul style="list-style-type: none"> • Warm Temps; rains all year • Lush thick forest • Soil is thin and low in nutrients due to shade from canopy formed by branches of trees • Most biodiversity than any other land biome
<p>51. Tropical Savannah</p>	<ul style="list-style-type: none"> • Found in south America, Africa, & Australia • Grassland, scattered trees, or shrubs • Warm temperatures, definite dry & rainy season (10cm/year) • Hoofed animals and grazing herbivores
<p>52. Temperate Grassland (Prairie)</p>	<ul style="list-style-type: none"> • Central US • Short and tall grasses • Warm summer and cool winters • Most precipitation falls as snow in winter (50-90cm) • Grazing buffalo, prairie dogs
<p>53. Desert</p>	<ul style="list-style-type: none"> • Less than 25 cm annual precipitation • Water storing plants such as cacti • Animals are nocturnal because of high temps during the day • Australia, Northern Africa, Western US
<p>54. Temperate deciduous forest</p>	<ul style="list-style-type: none"> • Hot summers, cold winters & Precip is spaced evenly throughout the year (75-150cm/year)