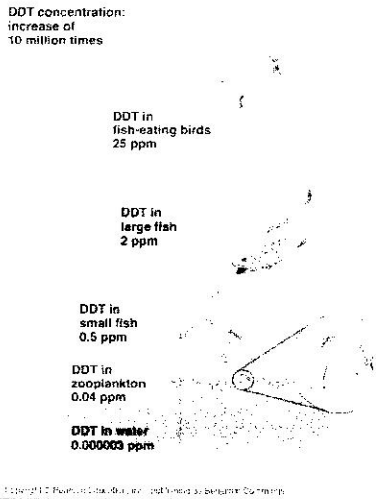
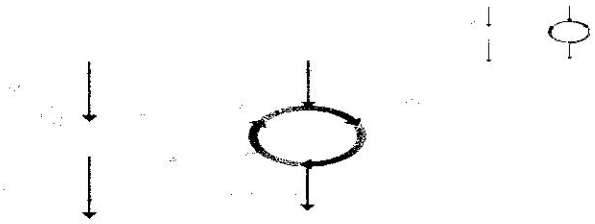
	• Broadleaf forest and deciduous trees that lose their leaves during the cold seasons (oaks, beeches, maples, shrubs & lichens)
55. Taiga (Boreal Forest)	• Long, cold winters lasting 6 months or more and short summers (only 2 to 3 months frost free • Avg annual precip 30-85cm • Coniferous trees • Mammals have heavy fur coats to withstand cold winters (Moose)
56. Tundra	• Long subzero temp winters and very little precipitation (13cm/year) • Permafrost: frozen subsoil • Barren with little vegetation; tiny low lying plants and mosses
57. Chaparral (Mediterranean Shrubland)	• Hot, dry summers & cool moist winters • Annual precip is 38-102cm occurs mostly as rain during winter • Some plants that store water, shrubs that have leaves with thick cuticles to help with water retention. • Sage and rosemary have strong oils that make it susceptible to fires
58. Estuary	• Body of water formed where a river meets an ocean. • High productive ecosystems
59. Biological Magnification 	• Pollutant moves up a food chain as predators eat prey, accumulating in higher concentrations

60. Cell Theory • All living things are composed of cells • Cells are the basic unit of life • New cells are produced from existing cells	Scientists involved • Hooke-first to identify cells and name them • Leeuwenhoek-made a single lense microscope and observed cells in greater detail • Schleiden & Schwann- concluded that both plants and animals are made of cells • Virchow-concluded that cells came from other cells (Cell reproduction)
61. Types of cells	Prokaryotic • No nucleus or other membrane-bound organelles • DNA is one chromosome in a circular strand suspended in cytoplasm • Single celled organisms Eukaryotic • Nucleus containing DNA with multiple chromosomes • Multicellular organisms • Many membrane bound organelles PRO DON'T YOU DO!!!
62. Cell Organelles	Thin flexible barrier around the cell; provides support and protection Strong layer found only in plant cells; provides structure and protection (made of cellulose) contains the DNA and controls the cells activities
63. Cell Organelles	gel-like material inside the cell that surrounds the organelles found inside the center of the nucleus; assemble ribosomes double-membrane layer dotted with nuclear pores allowing material to move in and out of the nucleolus
64. Cell Organelles	made of microtubules; helps support and maintain the cells shape; serves as a "track" along which organelles can move Can be free floating around in the cell or can be attached to ER;

70. Passive Transport- The movement of molecules across a cell membrane WITHOUT energy; moves from high to low concentration (down the concentration gradient)	• Simple Diffusion-movement of molecules in a fluid or gas • Osmosis-diffusion of water molecules across a semipermeable • Facilitated diffusion-diffusion of molecules across a membrane through a transport membrane
71. Osmosis- movement of water molecules through a semipermeable membrane from high water concentration to low water concentration	• Isotonic: same concentration of dissolved particles inside and outside of the cell; water moves into and out at an equal rate • Hypertonic: higher concentration of dissolved particles outside of the cell; water will move out of the cell causing it to shrink • Hypotonic: lower concentration of dissolved particles outside of the cell; water will move in the cell causing it to SWELL leading to cell lysis
72. Active Transport: drives molecules across a membrane, WITH the use of energy, from a region of lower concentration to a region of higher (against the concentration gradient) Example: Sodium-Na^+ Potassium K^- Pump	Other examples include: • Endocytosis (Phagocytosis) • Exocytosis Both processes transport materials across a cell membrane through a vesicle
73. ATP (Adenosine Triphosphate)	A form of chemical energy that consists of 1: Nitrogen base - Adenine 2: Five carbon sugar - Ribose 3: 3 Phosphate groups Draw illustration of ATP molecule showing the high energy bonds
74. Photosynthesis $6H_2O + 6CO_2 + \text{light energy} \rightarrow C_6H_{12}O_6 + 6O_2$ 	**Step 1: Light dependent reaction (thylakoid membrane)** **H_2O splits -- O_2 + NADPH + ATP** **Step 2: light independent/Calvin cycle (Stroma)** **CO_2 + ATP + NADPH --- $C_6H_{12}O_6$** Factors that affect the rate of photosynthesis: Water, Temperature, and light intensity
75. Chlorophyll	**Light capturing pigment located in the thylakoids of chloroplasts that releases electrons when struck by light and are caught by NADP+ to form NADPH**

76. Cellular Respiration

Process of releasing energy in the form of ATP by breaking down food (glucose)

Anerobic Process- Glycolysis
Aerobic Process-Kreb Cycle & Electron transport chain

77. Anaerobic respiration (does not require oxygen)

- Glycolysis- Splits glucose into two 3-carbon molecules called Pyruvic Acid
- Net gain of 2 ATP

78. Aerobic Respiration (Requires oxygen)
happens in plants and animals (all eukaryotic cells)

$C_6H_{12}O_6 + O_2 \rightarrow 6CO_2 + 6H_2O + ATP$

- (1) PA enters the (in the mitochondria) losing electrons which are caught by electron carriers NADH and FADH2 and a total of 2 ATP are formed
- (2) NADH and FADH2 carry electrons to to make a total of 32-34 ATP

79. Fermentation

O_2 Cellular respiration
Glycolysis
NO O_2 Fermentation

- 2 types: Alcoholic & lactic acid
- Allows glycolysis to continue when oxygen is not present by recycling NAD+ which is needed in glycolysis
- Does not make any ATP

80. Photosynthesis vs. Cellular Respiration

	PHOTOSYNTHESIS	CELL RESP
ORGANELLE	Chloroplasts	mitochondria
Reactants	CO2 and H_2O	Sugars ($C_6H_{12}O_6$) and O_2
Electron Transport Chain	Proteins within thylakoid membrane	Proteins within inner mitochondrial membrane
Cycle of chemical reaction	Calvin cycle in stroma of chloroplasts builds sugar molecules	Krebs cycle in matrix of mitochondria breaks down carbon based molecules
Products	Sugars ($C_6H_{12}O_6$) and O_2	CO2 and H_2O

81. Cell Cycle

Interphase

- Gap1 Phase: cell spends most of its time; grows and carries out normal functions
- S Phase: Makes a copy of DNA
- Gap 2 Phase: additional growth; prepares for M phase

M Phase (PMAT): Nuclear Division
Cytokinesis: division of cytosol

92. Codominance	Occurs when 2 dominant genes are expressed and both genes are seen in the organism (A Chicken with black and white feathers, AB Blood type) ***Be able to work blood type punnett square Type A : I^A I^A or I^A i Type B: I^B I^B or I^B i Type AB: I^A I^B Type O: i i
93. Multiple Alleles	When 3 or more alleles exist for a single gene Example: Blood type A,B, and O are the multiple alleles for blood type
94. Polygenic Traits	Traits that are produced by two or more genes such as skin color, eye color, height, and hair color
95. Human Genes`	Humans have 46 Chromosomes (23 pairs) 44 Autosomes (22 pairs) 2 sex chromosomes (1 pair) XX= Female XY= Male Karyotype: Picture of chromosomes arranged in homologous pairs from largest (#1) to smallest (#22)
96. Pedigree	A chart that shows the relationships within a family and shows how a trait is transmitted through generations of a family. ***Draw pedigree on pg 342 (Old book) Be able to interpret pedigree
97. Autosomal Genetic Disorders	Disorders that affect autosomal chromosomes Autosomal Dominant: Huntington's, Achondroplasia Autosomal recessive: Cystic Fibrosis, Tay-Sachs, PKU Autosomal Codominant: Sickle Cell
98. Sex Linked Disorders	• Disorders or traits that are located on the sex chromosomes only, specifically the X-Chromosome. • Sex linked recessive: Hemophilia, Duchenne Muscular Dystrophy, Colorblindness • Males have just one X chromosomes

	thus all X-linked alleles for colorblindness are expressed in males even if they are recessive. (ONLY WOMEN can be "carriers")
99. Non-disjunction Disorders	Caused by non-disjunction during Meiosis in which homologous chromosomes fail to separate Examples: Down Syndrome: two copies of chromosome 21 Sex Chromosome disorders: 1: Turner syndrome in females (Genotype XO) 2: Klinefelter's syndrome in males (Genotype XXY) **No babies have ever been born without an X chromosome
100. DNA	• Deoxyribonucleic acid that makes up chromosomes located in the nucleus of a eukaryotic cell. • Double Helix shape (James Watson and Francis Crick) • Made up of nucleotides: 1: Nitrogen Base 2: Phosphate group 3: 5 Carbon Sugar (Deoxyribose) • Nitrogen bases: Adenine, Guanine, Thymine, and Cytosine A binds T, C binds G
101. DNA Replication	• Replicates during S phase of mitosis resulting in two identical double stranded molecules of DNA each containing 1 ORIGINAL strand from the parent and 1 NEW complementary strand. • DNA Polymerase: principal enzyme involved in DNA replication
102. Central Dogma of molecular Biology	The theory that Protein is synthesized in the following way: DNA→RNA→Protein
103. RNA	• Ribonucleic Acid: a nucleic acid that has ribose as its five carbon sugar and is involved in protein syntheis • Different than DNA in that it:

	1: Single stranded 2: Uracil instead of Thymine 3: Ribose sugar • U binds A, G binds C • Three types: mRNA, rRNA, and tRNA ***Know each of their specific roles in protein synthesis
104. Protein Synthesis	Transcription: The process of making RNA from DNA; mRNA is made in the nucleus and carries the instructions to the ribosomes in the cytoplasm Translation: occurs on a ribosome in the cytoplasm; tRNA brings corresponding amino acid to the codon on mRNA; chain of amino acids will go on to make protein Codon: a sequence of 3 nucleotides on mRNA that codes for one amino acid Anticodon: set of 3 nucletides on tRNA that binds to complimentary codon on mRNA *** Know how to read codon graph pg303 (old book) & 244 (New book)
105. DNA Mutations- Changes in DNA that results in a change in amino acid ultimately leading to a change in protein sequence which can affect a group of genes or an entire chromosome.	• Point Mutations: mutation in which one nucleotide is substituted for another • Frame Shift mutations: insertion or deletion or a nucleotide in a DNA sequence leading to a "shift" in the reading frame and the entire sequence is affect. • Translocation: a piece of one chromosome moves to a nonhomologous chromosome and exchanges information which affects the whole chromosome
106. Gel Electrophoresis	• Cuts DNA into pieces with enzymes and is run through an argose gel substance using an electric current. • Used to sequence and identify DNA • The larger the piece of DNA the slower it moves through the gel.

107. Evolution	Evolution: Change in species over time Evidence of evolution • Adaptations • Fossil records • Homologous structures, vesitgial structures • Similarities of embryonic development • Similarities in DNA
108. Natural Selection	Charles Darwin: theory of evolution based on natural selection Traveled to Galapogos Islands and studied Finches, turtles, and iguanas Published:Origin of Species by Means of Natural Selection) Natural selection: states that organisms with traits well suited to an environment are more likely to survive and produce more offspring than organisms without these favorable traits (AKA: Survival of the fittest)
109. Scientists who contributed to Darwin's theory of evolution	Hutton & Lyell: proposed Earth was extremely old and that geological process change the Earth (Earth is estimated to be over 4 BYO) Larmarck: Inheritance of acquired traits based on law of use and disuse Malthus: predicted human population would grow faster than resources needed to sustain it Wallace: published his own theory of evolution by natural selection about the same time as Darwin
110. Processes of Evolution	Adaptive radiation: process by which a single species or small group of species evolves into several different forms that live in different ways (species move to new environment or after mass extinction) Convergent evolution: the process by which unrelated organisms independently evolve similarities when adapting to similar environments Coevolution: the process by which two species evolve in response to changes in each other over time (Arms Race)

111. Endosymbiosis	[illegible]: theory of early mitochondria and chloroplasts were taken up by larger prokaryotes (This is why they have their own DNA); *Evolution of the first eukaryotic cell First Autotrophic cell: if it took in prokaryote that acted as mitochondria, then it supplied energy [illegible]: if it took in prokaryote that acted as chloroplasts, the larger cell used it to make sugars
112. Speciation	The formation of a new species Mechanisms: Reproductive isolation: When two populations no longer mate and produce offspring Geographic isolation: population separated by barrier such as river, mountain, or ocean preventing reproduction DNA Mutations (can be studied over time AKA: Molecular clocks)