What did you learn before?	_____ _____
How does this fit into the Big Picture?	_____ _____

Title: Investigating Matter Date:

Matter	– anything that has both mass and volume
Chemical Change	– when the combination of two or more substances creates a new substance with different properties
Physical Change	– change of shape or state, but not the nature of the substance
Kinetic Molecular Theory	– (copy main points from p19)

Summary:_____
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What did you learn before?	_____ _____
How does this fit into the Big Picture?	_____ _____

Title: Investigating Matter con't Date:

Temperature and Changes of State	Copy Figure 1.10 from p21
Pure substance	A substance made up of only one kind of matter Eg.
Element	Pure substance that cannot be broken down into smaller substances Eg.
Compound	Pure substance that is composed of two or more elements combined in a specific way Eg.

Summary:_____
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Title: Bohr Model Diagrams Date:

Questions/Reflections	Elements with similar properties have similar electron arrangements. Bohr model diagrams show electron arrangement in shells: • First shell up to 2 e^- • Second shell up to 8 e^- • Third shell up to 8 e^- • Fourth shell up to 18 e^- Electrons are places in Bohr models from inner most shell outward. Eg. Patterns: • Elements in the same period have the same number of shells • Chemical families (groups) have the same number of valences (outer shell) electrons.

Summary:_____
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Title: Electron Arrangement and Stability Date:

Questions/Reflections	_____ are normally unreactive and do not form _____ substances with other atoms. • If you examine the _____ of the nobel gases you discover that the _____ is always full. Eg. Atoms of other elements form _____ that mimic the _____. • Atoms will _____ or _____ electrons to form these "stable" ions. Eg.

Summary:_____
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Title: Compounds	Date:
Questions/Reflections	A compound is a substance made with more than one kind of element. Compounds form by creating chemical bonds or links between atoms. There are two basic types, ionic and covalent compounds. Covalent compound – atoms combine by sharing one or more pairs of electrons to form molecules Eg. Ionic compounds – atoms gain or lose electrons by transfer to form ions which when combined are electrically neutral Eg.
Summary:_____ _____ _____ _____	

What did you learn before?	_____ _____
How does this fit into the Big Picture?	_____ _____

Title: Names and Formulas Date:

Questions/Reflections	The chemical name indicates the elements present in the compound. Chemical names for ionic compounds are given according to rules. • The positive ion is always the first part of the name • The negative ion is always the second part of the name • The non-metal ion's name ends with the suffix "-ide" Eg. In an ionic compound, the positive charges balance the negative charges. This balance of charge is used to determine the smallest whole number ratio of positive to negative ions. Eg.

Summary:_____
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What did you learn before?	_____ _____
How does this fit into the Big Picture?	_____ _____

Title: Compounds with Multivalent Metals Date:

Questions/Reflections	
	Multivalent metals are those who form two or more different ions with different charges. To distinguish between the two or more different ions of a multivalent metal we use Roman numerals based on the ion charge. The numerals are placed in brackets directly after the name of the metal. Copy Table 3.5 p88 Eg. 1._____ _____ 2._____ _____

Summary:_____
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What did you learn before?	_____ _____
How does this fit into the Big Picture?	_____ _____

Title: Compounds with Polyatomic Ions Date:

Questions/Reflections	
	•Covalent and ionic bonds can occur together •A molecule can gain or lose electrons to become charged, forming a polyatomic ion. •Polyatomic ions form compounds like other ions. •Example: Ammonium ion (NH_4^+) •There are many types of polyatomic ions, both positively and negatively charged. Rules: (cut and paste)

Summary:_____
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What did you learn before?	_____ _____
How does this fit into the Big Picture?	_____ _____

Title: Cells and the Nucleus Date:

Questions/Reflections

Animal cells are equipped with many structures that allow the cell to perform a variety of functions.
Plant cells are equipped with some structures that animal cells do not have:

- Chloroplasts, cell walls, vacuoles

The nucleus contains DNA (deoxyribonucleic acid); DNA is the molecule has the master set of instructions for how cells function, what they will produce, and when they will die

Structure of DNA

- DNA looks like a twisted ladder - two strands wrap around each other in a spiral shape.
- The sides of the DNA ladder are made of sugar and phosphate.
- The steps of the ladder are made of four nitrogen bases: adenine (A), guanine (G), cytosine (C), and thymine (T).
- The bases join in a specific way
  - A always joins with T
  - G always joins with C

Summary:_____
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What did you learn before?	_____ _____
How does this fit into the Big Picture?	_____ _____

Title: From DNA to Proteins Date:

Questions/Reflections

Most of the time DNA is in the form of **chromatin**. Chromatin coils tightly into X-shaped **chromosomes.**

Every organism has a specific number of chromosomes. Human cells have 46 chromosomes arranged in 23 pairs
The 23rd pair determines sex:

- XX for females
- XY for males

Genes are small segments of DNA located on a chromosome. Genes store the information needed to produce proteins. Each chromosome can carry thousands of genes.

All your body cells have the same genes, but only specific genes are "read" in each cell to produce specific proteins. Specialized proteins called enzymes and hormones carry out important specific functions in the body.

- Eg. GH, growth hormone – stimulates cell division – gigantism if out of control

Summary:_____
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What did you learn before?	_____
How does this fit into the Big Picture?	_____

Title: **Mutations** Date:

Questions/Reflections

A gene mutation involves a change in the order of bases (A,C,T,G) that make up the gene. There are several types of gene mutation:

- Deletion (base missing)
- Addition (extra base added)
- Substitution (one base substituted for another)

Positive Mutations

- When a gene mutation benefits the individual.
- Example: Some plants have developed resistance to bacterial and fungal infections.

Negative Mutations

- When a gene mutation harms the individual
- Example: Sickle cell genes in affected humans cause blood cells that are abnormally shaped.

Neutral Mutation

- When a gene mutation has no effect on the individual
- Example: The white Kermode bear

Mutagens are substances or factors that cause mutations. Environmental mutagens such as mercury, cigarette smoke, X-ray and UV radiation, and certain viruses can cause mutations

Correcting mutations is difficult, but new techniques such as **gene therapy** offer hope.

Summary:_____

What did you learn before?	_____ _____
How does this fit into the Big Picture?	_____ _____

Title: The Cell Cycle Date:

Questions/Reflections	The life of a cell is divided into three stages known as the cell cycle: • Interphase: cell carries out normal functions. DNA replicates in late interphase. • Mitosis: nucleus contents duplicated and divide into two equal parts. • Cytokinesis: separation of two nuclei and cell contents into two daughter cells. Draw Diagram of Cell Cycle: **Mitosis** Mitosis is the shortest stage of the cell cycle where the nuclear contents divide, and two daughter nuclei are formed. It occurs in 4 stages: • Prophase, Metaphase, Anaphase and Telophase.

Summary:_____
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What did you learn before?	_____ _____
How does this fit into the Big Picture?	_____ _____

Title: Cell Cycle and Mitosis Date:

Questions/Reflections	
	Stages of Mitosis • **Prophase** - nucleolus disappears and spindle fibres form, spindle fibres attach to centromeres of chromosomes • **Metaphase** - chromosomes align on equator of cell • **Anaphase** - spindle fibres pull sister chromatids to opposite poles of cell • **Telophase** - in this final stage, spindle fibres disappear and a nuclear membrane forms around each separated set of chromosomes Remember: "Don't ***P***ee on the ***MAT"*** • **Cytokinesis** is the separation of the nuclei into two daughter cells Checkpoints in the cell cycle will prevent division if: • If the cell is short of nutrients • If the DNA within the nucleus has not been replicated • If the DNA is damaged Mutations in genes involving checkpoints can result in an out-of-control cell cycle. The result can be uncontrolled cell division: cancer.

Summary:_____
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What did you learn before?	_____ _____
How does this fit into the Big Picture?	_____ _____

Title: Asexual Reproduction Date:

Questions/Reflections

A **clone** is an identical genetic copy of its parent. Many organisms naturally form clones via asexual reproduction. Cloning is also used in agriculture and research to copy desired organisms, tissues and genes

Type of Asexual Reproduction

- Binary fission
- Budding
- Fragmentation
- Vegetative reproduction
- Spore formation

Reproductive cloning - purpose is to produce a genetic duplicate of an existing or dead organism.

Therapeutic cloning - purpose is to correct health problems

1. Very important to therapeutic cloning are **stem cells** - cells that can become different types of cells
2. Diabetes, spinal injuries, Parkinson's disease are only a few that can benefit from stem cell therapy

Summary:_____
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What did you learn before?	_____ _____
How does this fit into the Big Picture?	_____ _____

Title: Meiosis Date:

Questions/Reflections	
	Meiosis is an important aspect of **sexual reproduction.** Sexual reproduction, through the shuffling of DNA, produces genetic diversity. •This variation offspring produces individuals that may have advantages over one another. Normal body cells have a **diploid** chromosome number, meaning chromosomes occur in pairs. •when human **fertilization** takes place, 23 (egg) + 23 (sperm) = 46 (zygote) The zygote goes on to develop into an embryo, and on into a complete individual. When the time comes, the cycle repeats - humans produce **gametes** (either egg or sperm) that have half (**haploid**) the normal number of chromosomes. Meiosis produces gametes (eggs and sperm) with half the chromosomes compared to body cells: **Gametes do not form equally in males and females** •In males, all 4 cells resulting from meiosis develop into sperm. •In females, 1 cell gets most of the cytoplasm and becomes the egg.

Summary:_____
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What did you learn before?	_____ _____
How does this fit into the Big Picture?	_____ _____

Title: Sexual Reproduction Date:

Questions/Reflections	
	Sexual reproduction brings non-identical gametes together to form a new organism - it occurs in 3 stages: • Mating - the process by which gametes are bought together at same place and same time • Fertilization - process by which egg and sperm join to form a new organism • Development - the process by which an organism develops as an embryo In external fertilization, sperm and egg join outside parents • Eg. Salmon Spawning In internal fertilization, sperm and egg join inside parents, embryo is nourished inside mother • Eg. Human Most plants transfer male gametes as pollen. Pollen can be carried by wind or other organisms.

Summary:_____
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What did you learn before?	_____ _____
How does this fit into the Big Picture?	_____ _____

Title: Static Electricity Date:

Questions/Reflections

Static Charge

- Electrical charge that is collected in one place

Positive and Negative Charges

- All matter is made of atoms - at their centre is a nucleus containing protons (positively charged) and neutrons (no charge). Surrounding the nucleus are electrons (negatively charged)
- Solid materials are charged due to the movement of electrons :
  - When electrons are gained, the object becomes negative.
  - When electrons are lost, the object becomes positive.
- Electrons are most often transferred through friction, when objects rub against each other.

Materials that do not allow charges to move easily are called electrical insulators
Materials that allow electrons to travel freely are called electrical conductors

Charge is measured with a unit called the coulomb (C)

Summary:_____
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What did you learn before?	_____ _____
How does this fit into the Big Picture?	_____ _____

Title: Electric Force Date:

Questions/Reflections

Force is a push or pull - electric force can do both, without touching the object - it is an action-at-a-distance force.

Laws of Static Charge

- Like charges repel
- Opposite charges attract
- Neutral objects are attracted to charged objects

Charging By Conduction

- Charging through direct contact
- Extra electrons will move to a location where there is less of them

Charging By Induction

- Bringing a charged object nearby a neutral object will cause charge movement and separation in the in the neutral object.

Summary:_____
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What did you learn before?	_____ _____
How does this fit into the Big Picture?	_____ _____

Title: Electric Potential Energy and Voltage Date:

Questions/Reflections

Electrochemical cells convert chemical energy into electrical energy. Connecting cells together forms batteries.

The ends of batteries are terminals – connecting to them can allow electrons to flow from the battery through a device that converts electric energy into different forms.

Electric Potential Energy

- Electric energy can do work. Electric energy that is stored is potential energy; when it is moving it is kinetic energy.

The amount of electric potential energy per coulomb of charge is called the potential difference or **voltage**. This can be measured with a voltmeter.

Producing Voltage

- Electrodes in an electrolyte chemically react to produce electrons and relatively difference charges on each electrode. This creates a potential difference.

Summary:_____
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What did you learn before?	_____ _____
How does this fit into the Big Picture?	_____ _____

Title: Electric Current Date:

Questions/Reflections

A complete pathway that allows electrons to flow is called an electric circuit. Electrons flow through devices (loads) in the circuit that converts electricity to other forms of energy.

Basic Circuit Components

- Source: source of energy
  -
- Conductor: wire where current flows
  -
- Load: turns electricity into other forms
  -
- Switch: turns circuit on or off
  -

The continuous flow of charge in a complete circuit is called current electricity.

Electricity is defined as the amount of charge passing a point in a conductor every second.

Current is measured in amperes (A), and can be detected with an ammeter.

Summary:_____
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What did you learn before?	_____ _____
How does this fit into the Big Picture?	_____ _____

Title: **Resistance and Ohm's Law** Date:

Questions/Reflections

Resistance is the property of any material that slows down the flow of electrons, and converts electrical energy into other forms.

Ohm's Law

- The greater the amount of resistance, the lower the current
- Resistance = Voltage ÷ Current
- Unit of resistance is the ohm (Ω)
- Resistance can be measured in a circuit with an ohmmeter

Example: You have a simple circuit with a 10 V battery and you measure 0.5 A flowing through the circuit. What is the resistance of the wire?

R= ?	R= V / I
V= 10 V	R= 10 V / 0.5 A
I= 0.5 A	R= 20 Ω

The resistance of the wire is 20 Ω.

Summary:_____
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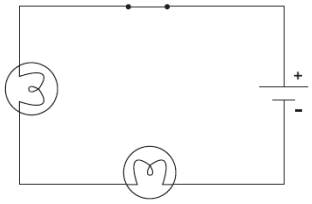
What did you learn before?	_____ _____
How does this fit into the Big Picture?	_____ _____

Title: **Series and Parallel Circuits** Date:

Questions/Reflections

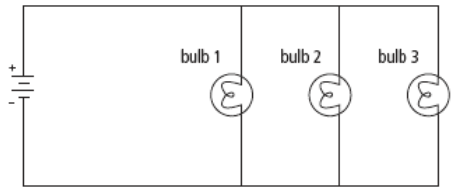
Series Circuits

- There is only a single pathway for current to flow
- The sum of the voltages lost on the loads equals the total voltage supplied by the battery
- Current measured anywhere in the series circuit will be the same



Parallel Circuits

- Multiple pathways for current to flow, adding more pathways lowers resistance
- Voltage remains the same through each pathway of the parallel circuit
- Current splits up between the different current pathways



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What did you learn before?	_____ _____
How does this fit into the Big Picture?	_____ _____

Title: **The Early Universe** Date:

Questions/Reflections	
	Using powerful telescopes, astronomers like Edwin Hubble discovered many new celestial bodies, and observed that everything in the universe was moving further apart. By examining the light from distant stars, astronomers can estimate the speed and directions the star is traveling. A red shift means the wavelength is getting longer, and the star is moving away from us. Blue shift is the opposite; the star is getting closer. The Big Bang theory suggests that everything in the universe came from a single starting point, approximately 13.7 billion years ago. Although there are other theories about the beginning of the universe, much scientific evidence supports the Big Bang theory like the presence of cosmic background radiation, which is the energy left over from the Big Bang.

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What did you learn before?	_____ _____
How does this fit into the Big Picture?	_____ _____

Title: **10.2 Galaxies** Date:

Questions/Reflections	
	Our star, the sun, is one of ~100 million stars in the Milky Way galaxy - and there are ~125 billion galaxies in the universe! A galaxy is a large group of stars. A nebula is a cloud of gas and dust in space that is often produces a new star, or is the remains of an old star. Galaxies can be: spiral elliptical irregular • How fast a galaxy spins helps define its shape. Each galaxy has stars clustered as globular clusters or open clusters.

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What did you learn before?	_____ _____
How does this fit into the Big Picture?	_____ _____

Title: **11.1 Stars** Date:

Questions/Reflections	
	A star is a massive sphere of gases with a core like a thermonuclear reactor. Stars form from the dust and gases found in a nebula, when enough gravity causes all the molecules to collapse in on themselves. Stars can vary greatly in size. Although our Sun is an average size, many of the stars we see in the night sky are up to 3000 times as large as the Sun. • The Hertzsprung-Russell diagram was developed to show the different stages of a star's life. • 90% of stars are in the main sequence, where energy is produced combining hydrogen atoms into helium. The colour of a star reveals its temperature and composition to astronomers. • Red stars = cool = 3000 ºC • Yellow stars = hot = 6000 ºC • Blue stars = hottest = 20 000 ºC - 35 000 ºC The Doppler effect refers to the way waves either compress as their source gets closer, or lengthen as the source gets farther away.

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What did you learn before?	_____ _____
How does this fit into the Big Picture?	_____ _____

Title: **11.2 The Sun** Date:

Questions/Reflections

Our Sun, an average star in the universe, is the center of our solar system.

Our solar system formed approximately 4.5 billion years ago. The four inner, rocky planets in the first 100 million years on the Sun's existence, while the outer, gaseous planets formed later from the remnants of the Sun's original nebula.

- The Sun has no solid surface, but has distinctive features such as sun spots, flares and prominences.
- The photosphere is the surface of the Sun. It looks blotchy due to rising and cooling gases.
- The corona is the outer portion of the Sun's atmosphere.

Sometimes, gases from the Sun's corona erupt outwards like a bursting soap bubble.

The resulting solar wind is full of high-energy particles that would kill any life on Earth they struck.

Summary:_____
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