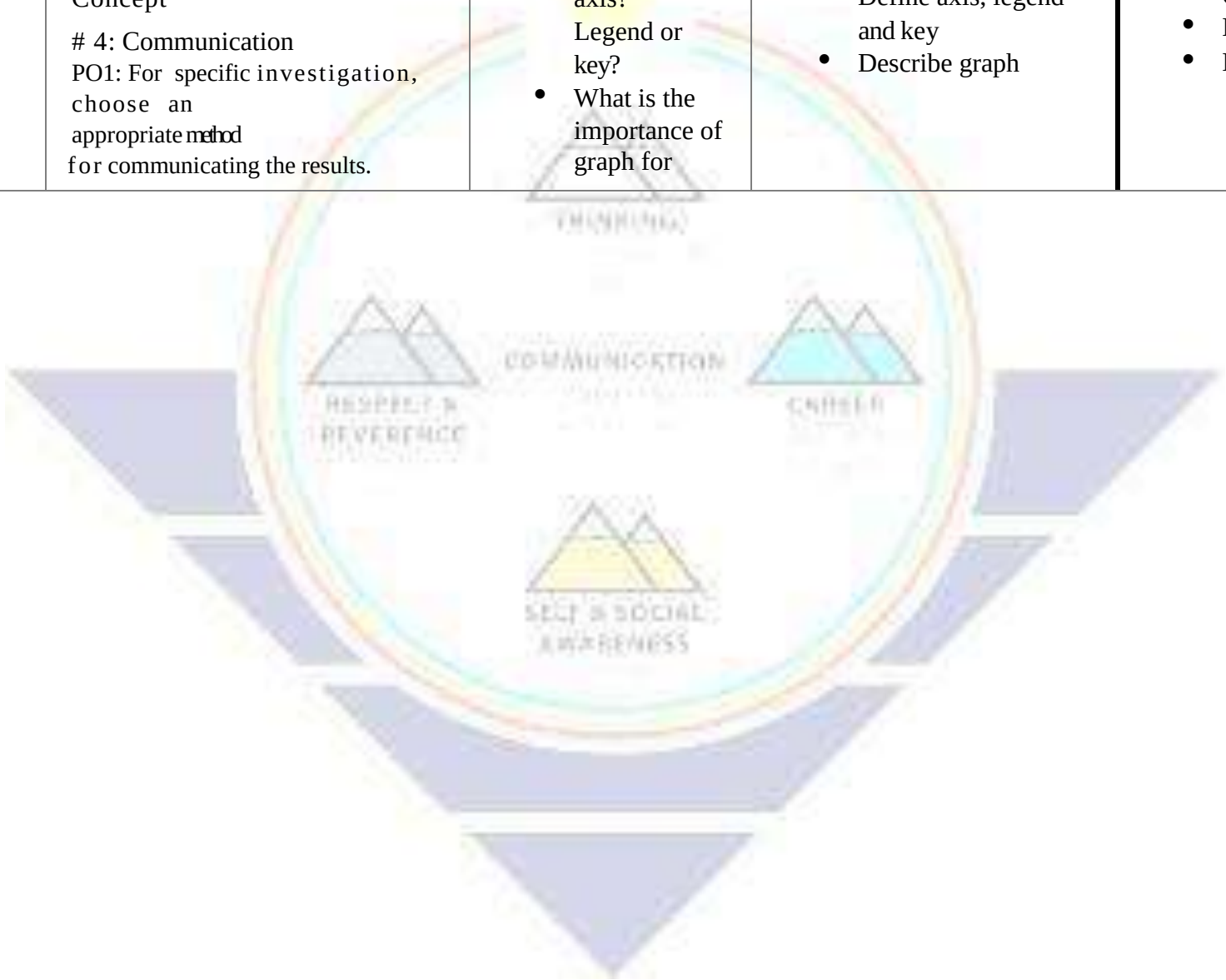
Ganado Unified School District
BIOLOGY/ GRADE 10-12th

Timeline & Resources	AZ Standard and Career Readiness Standard	Essential Question (HESS Matrix)	Learning Goal	Vocabulary (Content/ Academic)
1st Quarter Week 1 • Resource Book • Power Point Presentation • Work Sheets	Strand 1: Inquiry Process Concept #3: Analysis, Conclusions, and Refinements • Evaluate experimental design, analyze data to explain results and propose further investigations. PO 1: Interpret data that show a variety of possible relationship between variables.	• What are the differences between observation and inference? • What are the differences among a control, independent variables and dependent variables? • What are the scientific methods a biologist uses for research? • Why are the metric system and SI important?	I will be able to: • Compare an observation and an inference • Describe and differentiate control, independent variables and dependent variables • Identify scientific methods that will be used at Biological Research • Describe the importance of Metric System and SI unit.	• Observation • Inference • Scientific method • Hypothesis • Control group • Experimental group • Independent variable • Dependent variable • Constant • Data • Metric system • SI unit

Week 2 • Resource Book	Strand 1: Inquiry Process Concept # 4: Communication PO1: For specific investigation, choose an appropriate method for communicating the results.	• What is axis? Legend or key? • What is the importance of graph for	I will be able to: • Define axis, legend and key • Describe graph	• Axis • Graph • Legend • Key



• Power Point Presentation • Scientific experiments	PO 2: Produce graph that communicate data PO 3: Communicate results clearly and logically PO 4: Support conclusions with logical scientific arguments	scientific research or study? • What are the different form of graph? • What are the different components that support a given conclusion?	• Identify the different forms of graph used to interpret data • Name several components and factors that will best support a given conclusion	• Positive • Negative • Relationship • No relationship • Frequency • Result • Mean

Week 3 • Resource Book • Power Point presentation • Worksheets	Strand 1: Inquiry Process Concept 1: Observations, Questions and Hypotheses PO 1: Evaluate scientific information for relevance to a given problem PO 3: Formulate a testable hypothesis PO 4: Predict the outcome of an investigation based on prior evidence, probability and/or modeling	• How scientific information can be relevant to a given problem? • What are the different ways to test a hypothesis? • How to formulate a testable hypothesis? • How scientific investigation conducted? • What is the relationship between predicting outcome using evidence, probability and/or modeling?	I will be able to: • Describe the relevance of scientific information to a given problem • Identify ways to test hypothesis • Formulate a testable hypothes is • Conduct a simple scientific investigation • Predict the outcome of an investigation based on prior evidence, probability and/or modeling	• Test tube • Beaker • Evidence • Accuracy • Precision • Theory • Predict • Percentage

Week 4 • Resource Book • Power Point presentation • Worksheets	Strand 2: History & Nature of Science Concept 1: History of Science as a Human Endeavor • Identify individual, culture, & technological contributions to scientific knowledge. P.O. 1: Describe how human curiosity and needs have influenced science, impacting the quality of life worldwide. Concept 2: Nature of Scientific Knowledge • Understand how science is a process of generating knowledge. P.O. 1: Specify the requirements of a valid, scientific explanation (theory), including that it be: - logical - subject to peer review public - respectful of rules of evidence	• What is biology? • What are possible benefits of studying biology? • What are the characteristics of living things? • What are the characteristics of scientific inquiry? • What are the difference between science and pseudoscience? • Why is scientific literacy important?	I will be able to: • Define biology • Describe the possible benefits of studying biology. • Identify the characteristics of living things • Describe the character-ristics of scientific inquiry. • Compare science and pseudoscience. • Describe the importance of scientific literacy.	• Biology • Organism • Organization • Growth • Development • Reproduction • Species • Stimulus • Response • Homeostasis • Adaptation • Science • Law • ethics

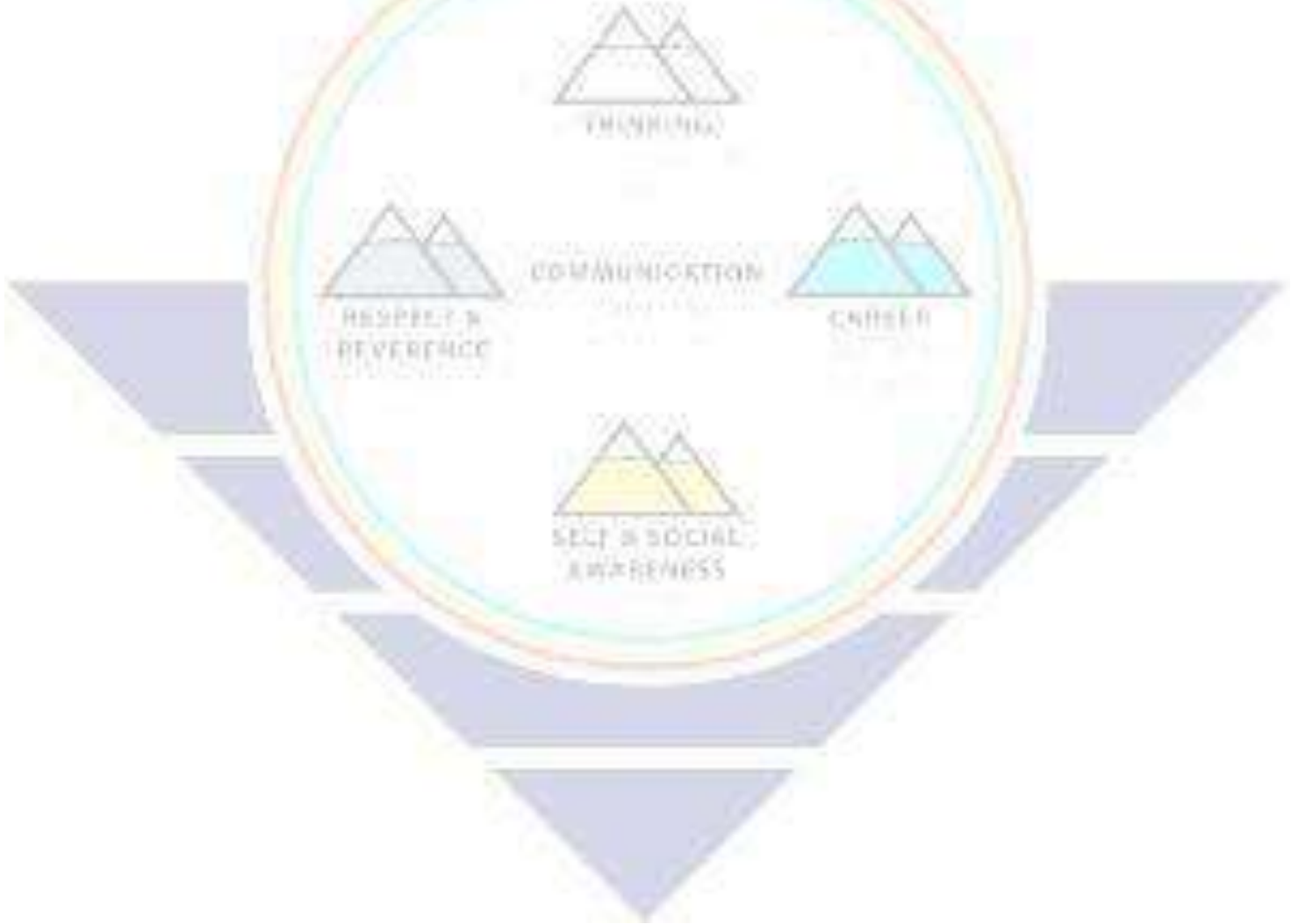
	Strand 4: Life Science Concept 3: Interdependence of Organisms. P.O. 2: Describe how organisms are influenced by a particular combination of biotic and abiotic factors in an environment.	• What is the difference between abiotic and biotic factors? • What are the interactions between the levels of biological communities? • What is the difference between an organism's habitat and its niche?	• Compare biotic and abiotic factors. • Describe the interactions between the levels of biological communities. • Compare habitat and niche.	• Ecology • Biosphere • Biotic factor • Abiotic factor • Population • Biologic al community • Ecosystem • Biome • Habitat • Niche • Predation • Symbiotic • Mutualism • Commensalism • Parasitism

Week 5 • Resource Book • Power Point presentation • Worksheets	Strand 4: Life Science Concept 3: Interdependence of organisms. P.O. 1: Identify the relationships among organisms which populations, communities, ecosystems and biome. Concept 5: Matter, Energy, and Organization in Living Systems. P.O. 4: Diagram the energy flow in an ecosystem through a food chain P.O. 3: Diagram the Biochemical cycles in an ecosystem.	• What are the producers and consumers in an ecosystem? • How does energy flow through an ecosystem? • What are food chains, food web and ecological pyramid models? • How do nutrients move through biotic and abiotic parts of an ecosystem? • Why are nutrients important to living organisms ? • What are the biogeochemical cycles of nutrients and	I will be able to: • Define producer and consumer • Describe how energy flows through an ecosystem • Define food chain and food web. • Compare food chain and food web • Describe ecological pyramid models. • Describe how nutrients move through biotic and abiotic parts of an ecosystem. • Explain the importance of nutrients to living organisms. Describe the different	• Community • Limiting factor • Tolerance • Ecologic al succession • Primary succession • Climax community • Secondary succession • Weather • Latitude • Climate • Tundra • Boral forest • Temperate forest • Woodland • Grassland • Desert • Tropical savanna • Tropical seasonal forest • Tropical rainforest

			biogeochemical cycles. • Describe how unfavorable abiotic and biotic factors affect species do.	

		how are they alike? • How do unfavorable abiotic and biotic factors affect species? • How do ranges of tolerance affect the distribution of organisms? • What are the stages of primary and secondary succession? • How is latitude related to the three major climate zones? • What are the major abiotic factors that determine the location of terrestrial biome? • How are the terrestrial	• Explain how ranges of tolerance affect the distribution of organisms. • Identify the different stages of primary and secondary succession. • Compare primary and secondary successions • Describe how latitude relates to the three major climate zones. • Identify the major biotic factors that determine the location of terrestrial biome. • Distinguish terrestrial biomes based on climate and biotic factors.	

Week 6	Strand 4: Life Science Concept 3: Interdependence of Organisms	• What are the major abiotic factors that	I will be able to:	• Sediment • Littoral zone • Limnetic zone



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• Resource Book • Power Point presentation • Worksheets	P.O. 2: Describe how organisms are influenced by a particular combination of biotic and abiotic factors in an environment.	determine the aquatic ecosystems? • What are transitional aquatic ecosystems and why are they important? • What are the zones of marine ecosystems? • What are the characteristics of populations and how they are distributed?	• Identify the major factors that determine the aquatic ecosystems. • Describe the transitional aquatic ecosystems. • Explain the importance of transitional aquatic ecosystems • Identify the zones of marine ecosystems. • Describe the characteristics of population and hoe they are distributed.	• Plankton • Pro-fundal zone • Wetlands • Estuary • Intertidal zone • Photic zone • Aphotic zone • Benthic zone • Abyssal zone • population

Week 7 • Resource Book • Power Point presentation • Worksheets	Strand 4: Life Science Concept 3: Interdependence of Organisms P.O. 3: Assess how the size and the rate of growth of a population are determined by birth rate, death rate, immigration, emigration, and carrying capacity of the environment.	• What are the differences between density-independent and density-dependent limiting factors? • What are the similarities between the different models used to quantify the growth of a population? • How does carrying capacity affect	I will be able to: • Compare density-independent and density-dependent limiting factors. • Describe the similarities between different models used to quantify the growth of a population. • Define carrying capacity. • Describe how does carrying capacity affect reproductive rates. • Identify the aspects affect human population growth.	• Population density • Dispersion • Density-independent factor • Density-dependent factor • Population growth rate • Emigration • Immigration • Carrying capacity • Demography • Demographic transition • Zero population growth

		reproductive rates? • What aspects affect human population growth? • What are the trends in human population growth? • What are the age structures of representative non-growing, slowly growing and rapidly growing countries? • What might be the consequences of continued population growth?	• Describe the trends in human population growth. • Identify the age structures that represent the non- growing, slowly growing and rapidly growing countries. • Predict the Consequence of continued population growth.	• Age structure

Week 8 • Resource Book • Power Point presentation • Worksheets	Strand 3: Science in Personal and Social Perspectives Concept 1: Changes in Environment P.O.5: Evaluate the effectiveness of conservation practices and preservation techniques on environmental quality and biodiversity.	• What are the three types of biodiversity? • Why is biodiversity important? • What are the direct and indirect values of biodiversity? • What are the threats to biodiversity? • How is the current extinction rate different from the background extinction rate? • How does the decline of a single species affect an entire ecosystem?	I will be able to: • Identify the three types of biodiversity. • Explain the importance of biodiversity in the ecosystem. • Compare direct and indirect values of biodiversity. • Describe the different threats to biodiversity. • Explain how the current extinction rate different from the background extinction rate. • Describe how the decline of a single species affects an entire ecosystem.	• Extinction • Biodiversity • Genetic diversity • Species diversity • Ecosystem diversity • Background extinction • Mass extinction • Natural resources • Overexploitation • Habitat fragmentation • Edge effect • Biological magnification • Eutrophication • Introduced species

Week 9 • Resource Book • Power Point presentation • Worksheets	Strand 3: Science in Personal and Social Perspectives Concept 1: Changes in Environment P.O.5: Evaluate the effectiveness of conservation practices and preservation techniques on environmental quality and biodiversity?	• What are the two classes of Natural Resources? • What are the methods used to conserve biodiversity? •What are the two techniques used to restore biodiversity?	I will be able to: • Identify the two classes of Natural Resources. • Describe the methods used to conserve biodiversity. • Name and describe the two techniques u s e d to restore biodiversity.	• Renewable resources • Nonrenewable resources • Sustainable use • Endemic • Bioremediation • Biological augmentation

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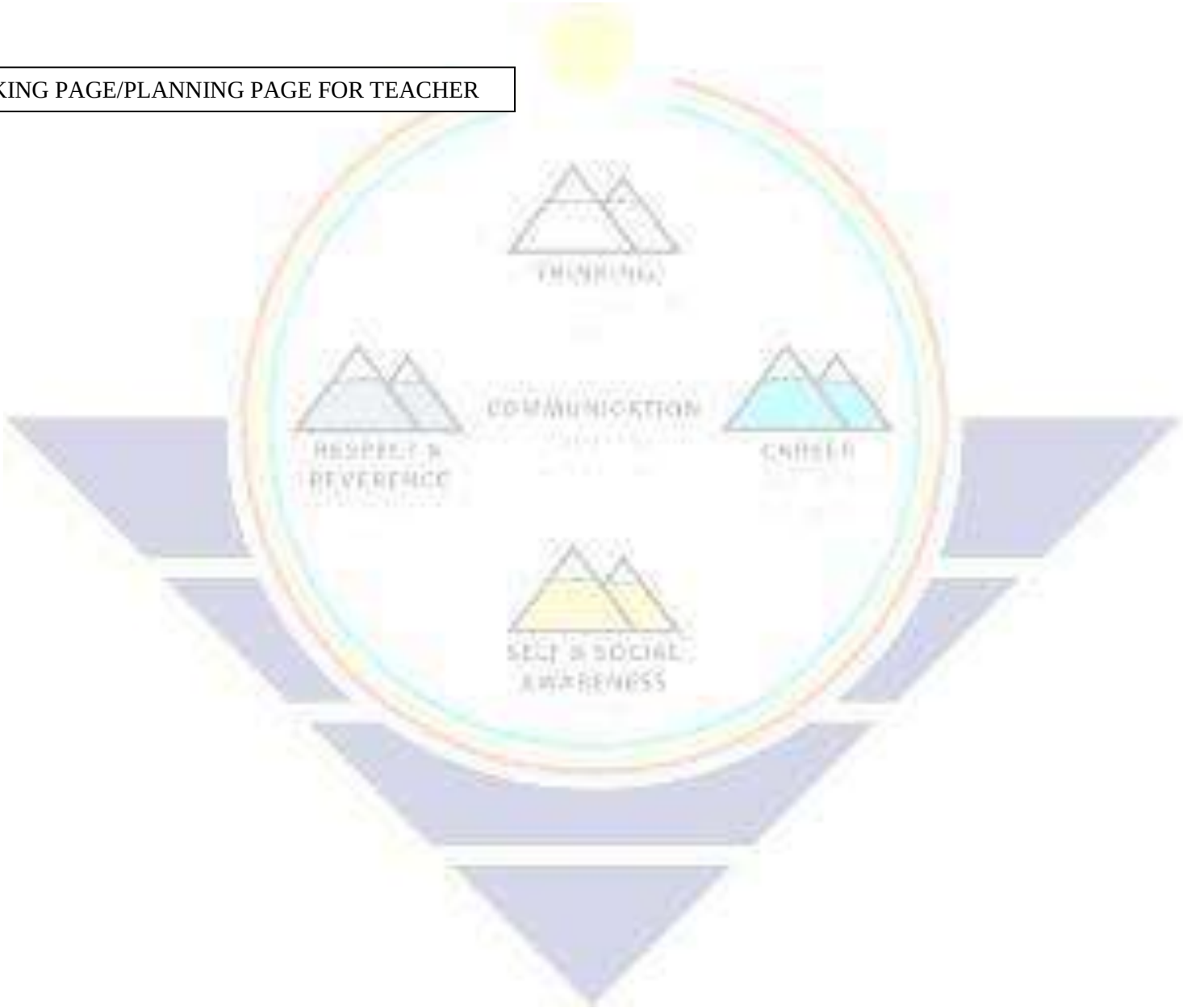

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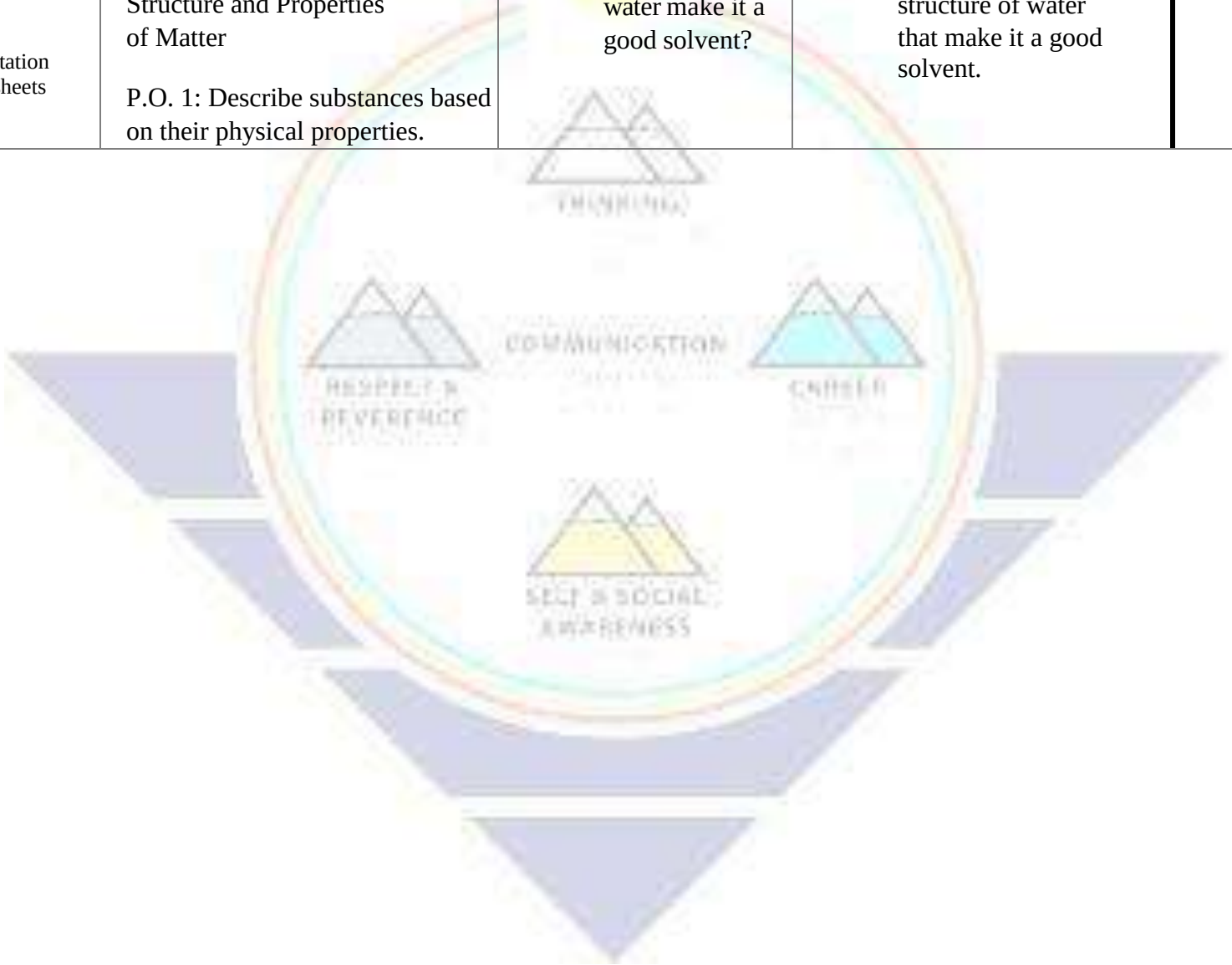
2nd Quarter Week 1 • Resource Book • Power Point Presentation • Work Sheets	Strand 5: Physical Science Concept 1: Structure and Properties of Matter P.O. 6: Describe the features and components of the atom.	• What are atoms? • How are the particles that make up atoms diagrammed? • What are the similarities between covalent and ionic bonds? • How van der Waals forces describes? • What are the parts of a chemical reaction? • How can energy changes be related to chemical reactions? • What is the importance of enzymes in living organisms?	I will be able to: • Define atom • Describe how the particles that make up atoms diagrammed. • Compare covalent and ionic bonds. • Describe van der Waals forces. • Identify the parts of chemical reaction. • Explain how can energy changes be related to chemical reactions. • Describe the importance of enzyme in living organisms.	• Atom • Nucleus • Proton • Neutron • Electron • Element • Isotope • Compound • Covalent bond • Molecule • Ion • Ionic bond • Van der Waals force • Chemical reaction • Reactant • Product • Activation energy • Catalyst • Enzyme • Substrate • Active site

Week 2 • Resource Book • Power Point presentation • Worksheets	Strand 5: Physical Science Concept 1: Structure and Properties of Matter P.O. 1: Describe substances based on their physical properties.	• How does the structure of water make it a good solvent?	I will be able to: • Describe how does structure of water that make it a good solvent.	• Polar molecule • Hydrogen bond • Mixture • Solution • Solvent



	P.O. 2: Describe substances based on their chemical properties.	• What are the similarities and differences between solutions and suspensions? • What are the differences between acids and bases? • What is the role of carbon in living organisms? • What are the four major families of biological macromolecules?	• Compare solution and suspension. • Compare and describe acids and bases. • Define carbon • Explain the importance of carbon to living organisms • Identify the four major families of biological macromolecules.	• Solute • Acid • Base • pH • buffer • macromolecule • polymer • lipid • protein • amino acid • nucleic acid • nucleotide
Week 3 • Resource Book • Power Point presentation • Worksheets	Strand 4: Life Science Concept 1: The Cell P.O. 1: Describe the role of energy in cellular growth, development, and repair.	• How are the advances in microscope technology related to the discoveries	I will be able to: • Compare biotic and abiotic factors. • Describe the interactions between	• Cell • Cell theory • Plasma membrane • Organelle

	P.O. 2: Compare the form and function of prokaryotic and eukaryotic cells and their cellular components.	about cells? • What are the similarities and differences between compound light microscopes and electron microscopes? •What are the principles of the cell theory? •What are the differences between a prokaryotic cell and eukaryotic cell?	the levels of biological communities. • Compare habitat and niche.	• Eukaryotic cell • Nucleus • Prokaryotic cell • Microscope • Light microscope • Electron microscope

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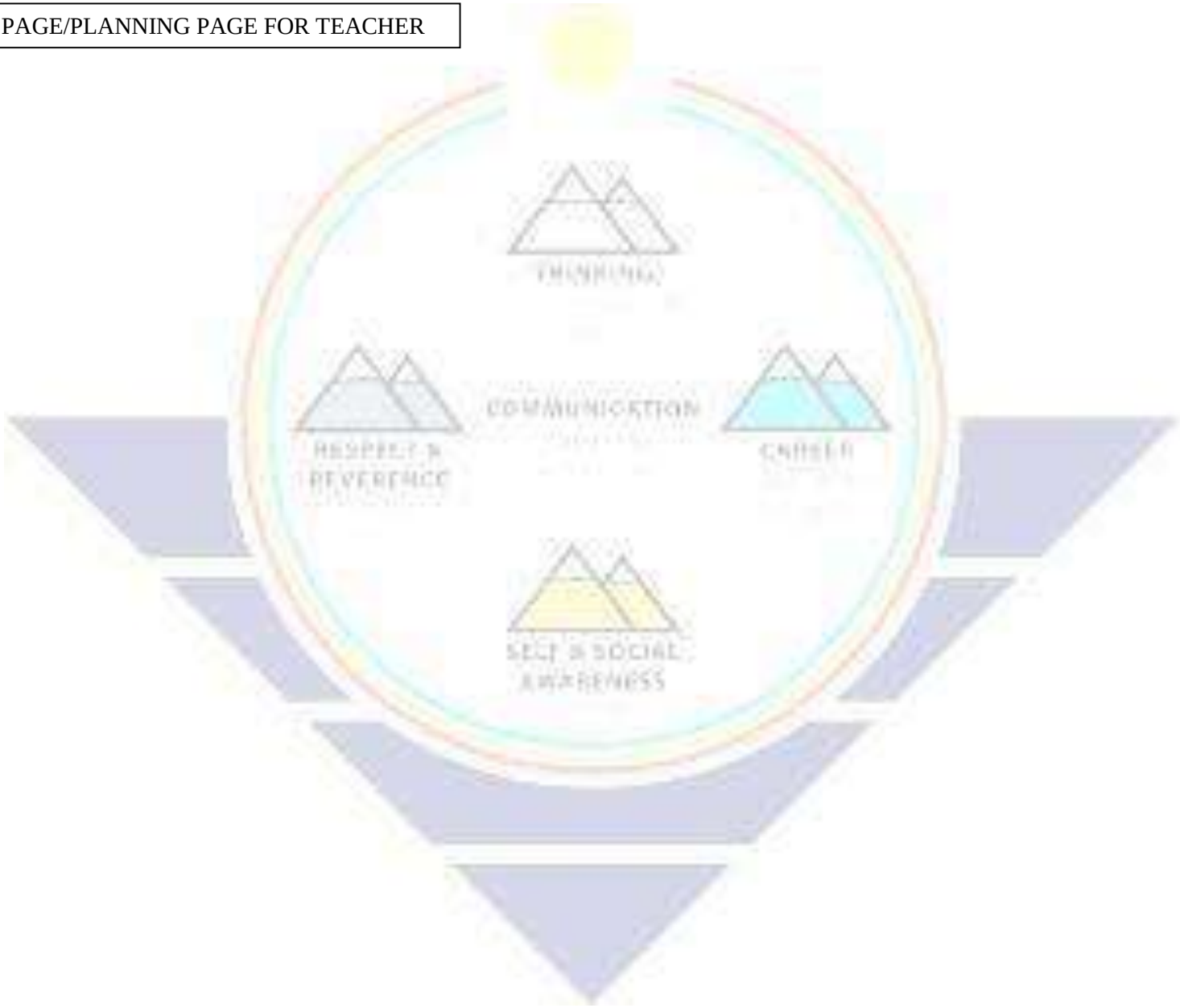

Week 4 • Resource Book • Power Point presentation n n • Worksheets	Strand 4: Life Science Concept 1: The Cell P.O. 2: Compare the form and function of prokaryotic and eukaryotic cells and their cellular components.	• How does a cell's plasma membrane function? • What are the roles of proteins, carbohydrates, and cholesterol in the plasma membrane? • What are the structures of a typical eukaryotic cell, and what are their functions? • What are the similarities and differences between plant and animal cells?	I will be able to: • Describe the function of plasma membrane. • Describe the roles of proteins, carbohydrates, and cholesterol in the plasma membrane. • Identify the parts and function of typical eukaryotic cell. • Compare plant and animal cells.	• Selective permeability • Phospholipid bilayer • Transport protein • Fluid mosaic model • Cytoplasm • Cytoskeleton • Ribosomes • Nucleolus • Endoplasmic reticulum • Golgi apparatus • Vacuole • Lysosome • Centrioles • Mitochondrion • Chloroplast • Cell wall • Cilium • Flagellum

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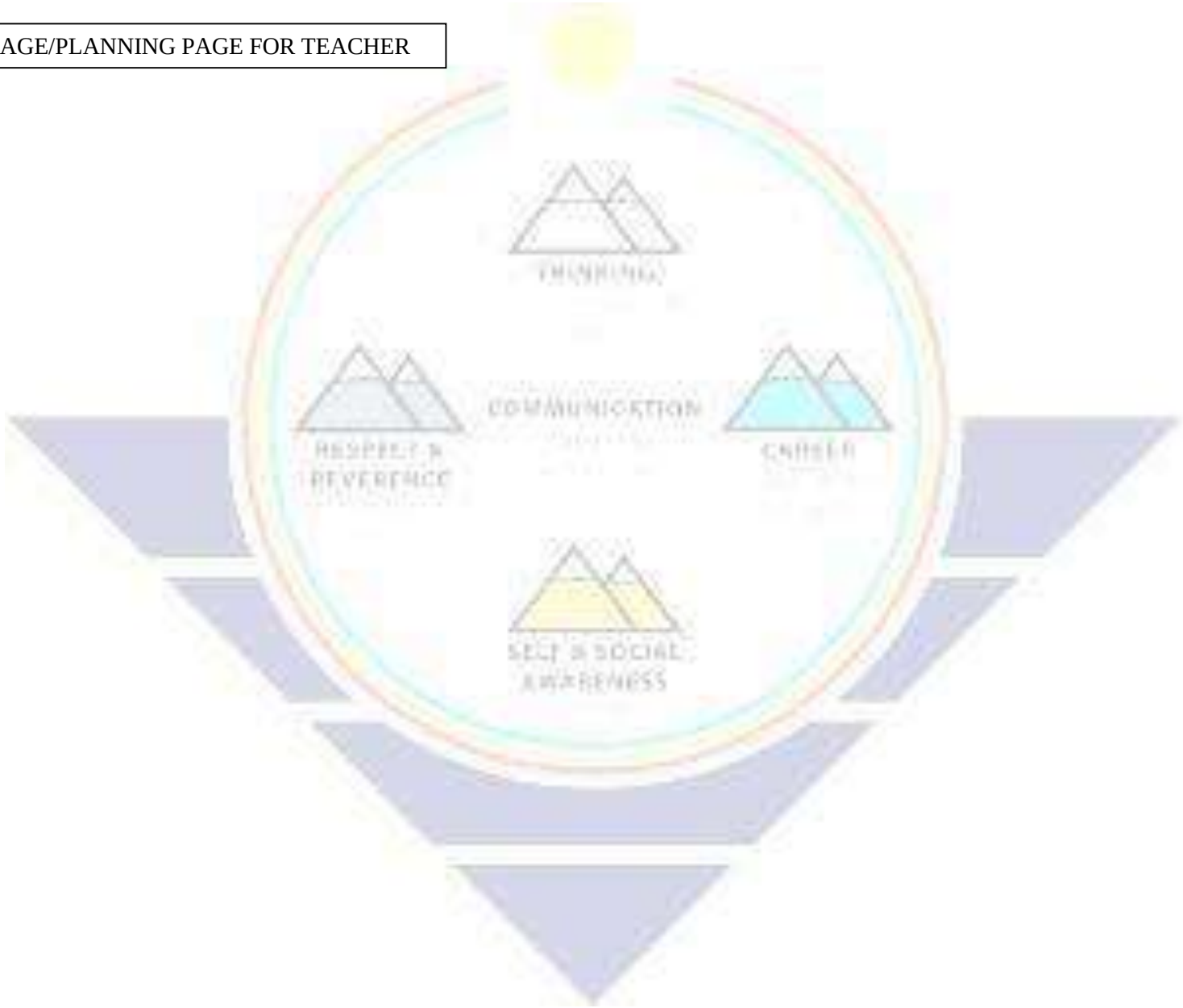


Week 6 • Resource Book • Power Point presentation • Worksheets	Strand 4: Life Science Concept 5: Matter, Energy, and Organization in Living Systems P.O. 1: Compare the processes of photosynthesis and cellular respiration in terms of energy flow, reactants, and products.	• What are the two phases of photosynthesis? • What is the function of a chloroplast	I will be able to: • Identify the two phases of photosynthesis. • Explain the function of chloroplast during light reactions.	• Thylakoid • Granum • Stroma • Pigment • NADP • Calvin cycle

		during the light reactions? • How can electron transport be described and diagrammed? • What are the stages of cellular respiration? • What is the role of electron carriers in each stage of cellular respiration? • What are the similarities between alcoholic fermentation and lactic fermentation?	• Describe how electron is being transport. • Identify the different stages of cellular respiration. • Describe the role of electron carriers in each stage of cellular respiration • Compare alcoholic fermentation and lactic fermentation.	• Rubisco • Anaerobic process • Aerobic respiration • Aerobic process • Glycolysis • Krebs cycle • fermentation

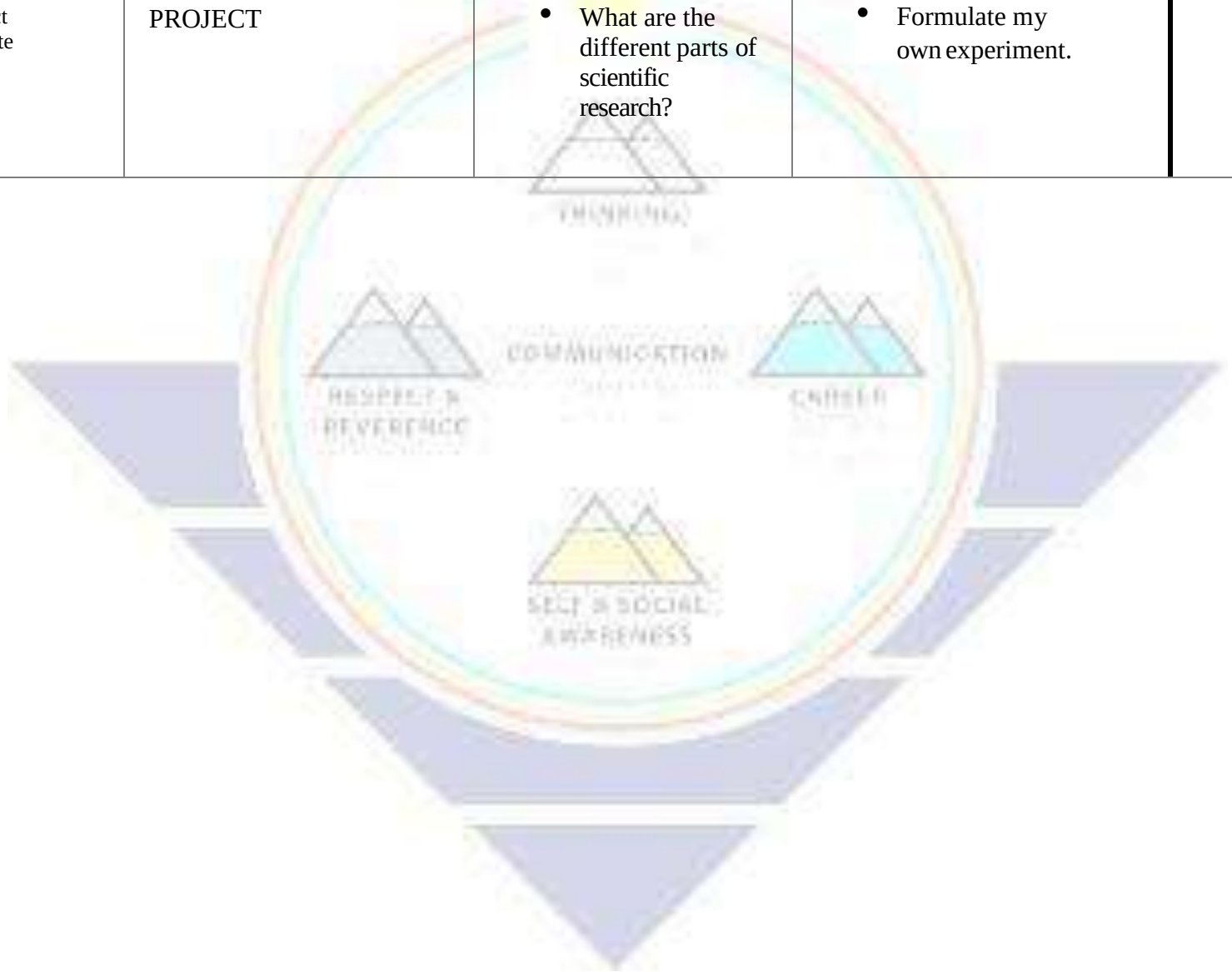
Week 7 • Resource Book • Power Point presentation • Worksheets	Strand 4: Life Science Concept 1: The Cell P.O. 1: Describe the role of energy in cellular growth, development, and repair.	• Why are cells relatively small? • What are the primary stages of the cell cycle? • What are the stages of interphase? • What are the events of each stage of mitosis?	I will be able to: • Explain why are cells relatively small. • Describe the primary stages of the cell cycle. • Identify the stages of interphase. • Describe the events of each stage of mitosis. • Define cytokinesis • Describe the process of cytokinesis	• Cell cycle • Interphase • Mitosis • Cytokinesis • Chromosome • Chromatin • Prophase • Sister chromatid • Centromere • Spindle apparatus • Metaphase • Anaphase

		• What is the process of cytokinesis? • What is the role of cyclin proteins in controlling the cell cycle? • What is the role of apoptosis? • What are the two types of stem cells and what are their potential uses?	• Identify the role of cyclin proteins in controlling the cell cycle. • Define apoptosis • Describe the two types of stem cells and their uses.	• Telophase • Cyclin • Cyclin-dependent kinase • Cancer • Carcinogen • Apoptosis • Stem cell
Week 8 • Resource Book • Power Point presentation • Worksheets	Strand 4: Life Science Concept 2: Molecular Basis of Heredity P.O. 4: Describe how meiosis and fertilization maintain genetic variation	• How does the reduction in chromosome number occur during meiosis? • What are the stages	I will be able to: • Describe how the reduction in chromosome number occur during meiosis. • Identify the stages of meiosis. • Explain the	• Gene • Homologous chromosome • Gamete • Haploid • Fertilization

		of meiosis? • What is the importance of meiosis in providing genetic variation? • What is the significance of Mendel's experiments to the study of genetics?	importance of meiosis in providing genetic variation. • Describe the Significance of Mendel's experiments to the study of genetics. • Define law of segregation and law of independent assortment • Define and describe Punnett Square	• Diploid • Meiosis • Crossing over • Genetics • Allele • Dominant • Recessive • Homozygous • Heterozygous • Genotype • Phenotype • Law of segregation

Week 9 • Resource Book • Power Point presentation • Worksheets	Strand 4: Life Science Concept 2: Molecular Basis of Heredity P.O. 4: Describe how meiosis and fertilization maintain genetic variation	• What is the law of segregation and the law of independent assortment? • What are the possible offspring from a cross using a Punnett square? • How does the process of meiosis produce genetic recombination? • How can gene linkage be used to make chromosome maps? • Why is polyploidy important to the field of agriculture?	I will be able to: • Describe how the process of meiosis produce genetic recombination does. • Explain gene linkage be used to create chromosome maps. • Explain polyploidy important to the field of agriculture.	• Hybrid • Law of independent assortment • Genetic recombination • Polyploidy

• Online resources • Science project website	SCIENCE RESEARCH PROJECT	• What is research? • What are the different parts of scientific research?	I will be able to: • Conduct research about science project. • Formulate my own experiment.	• It varies depend on the given research



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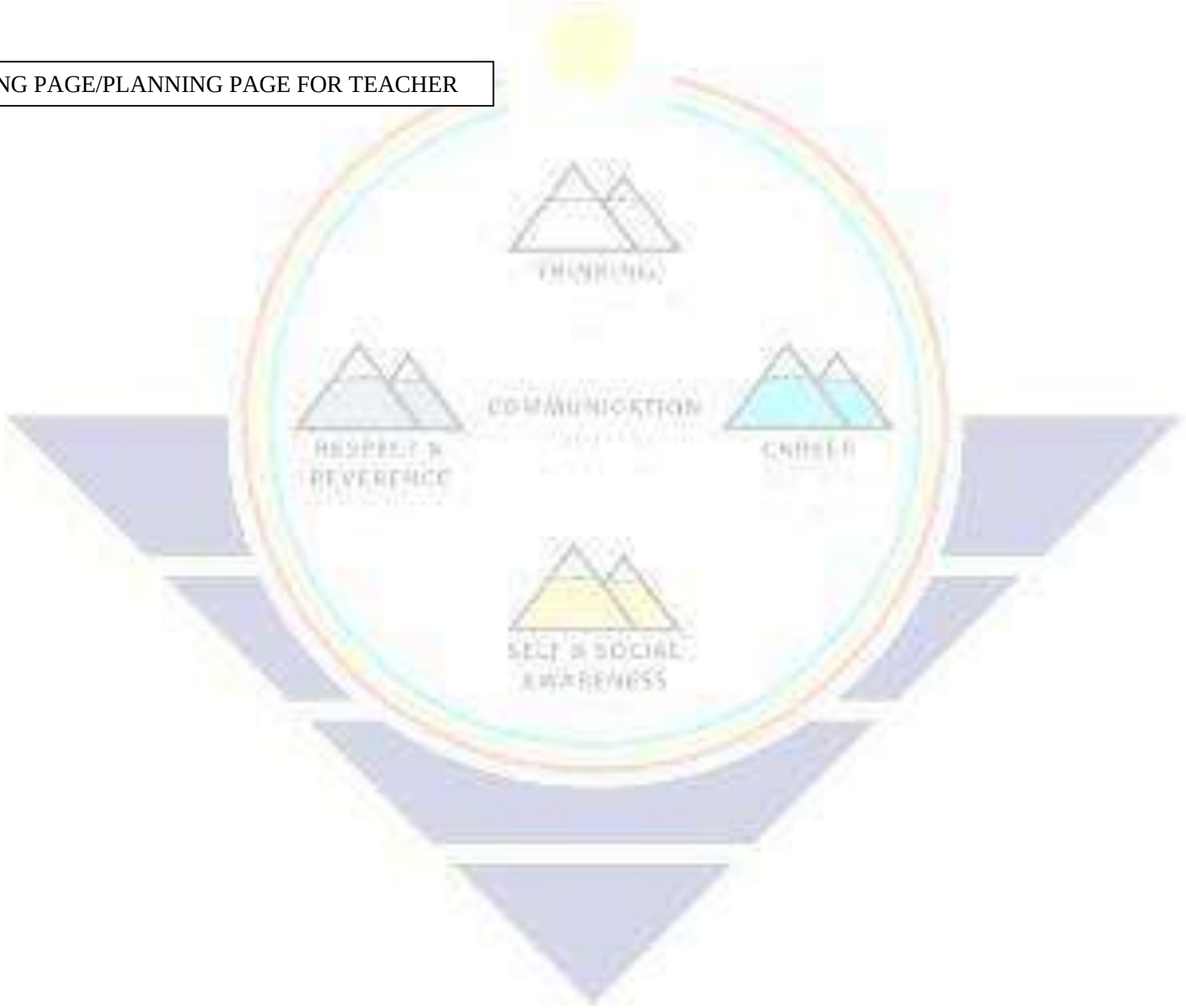
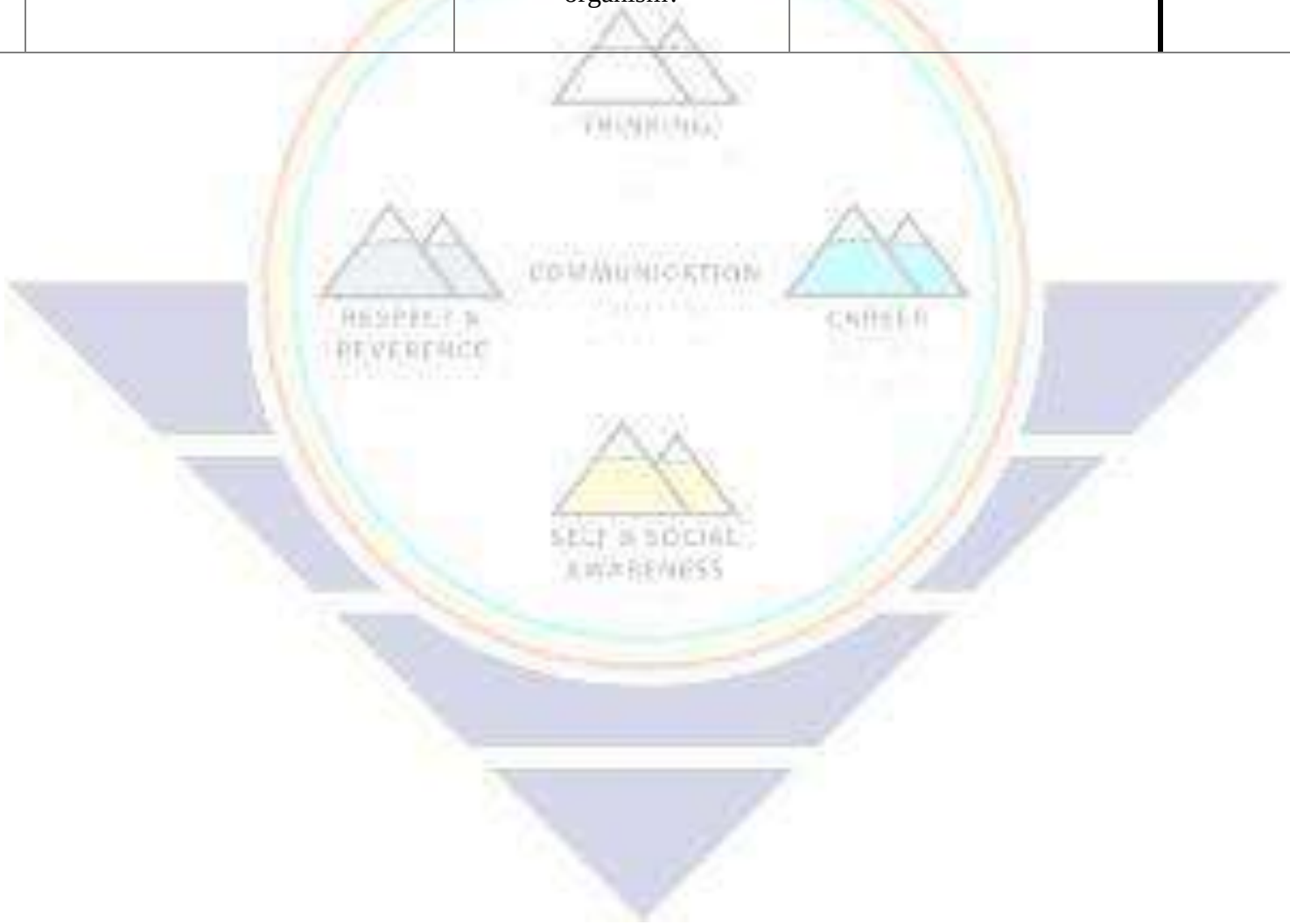


3rd Quarter Week 1 • Resource Book • Power Point Presentation • Work Sheets	Strand 4: Life Science Concept 2: Molecular Basis of Heredity P.O. 2: Describe the molecular basis of heredity, in viruses and living things, including DNA replication and protein synthesis.	• How can genetic patterns be analyzed to determine dominant or recessive inheritance patterns? • What are examples of dominant and recessive disorders? • How can human pedigrees be constructed from genetic information? • What are the differences between various complex inheritance patterns? • How can sex-linked inheritance patterns be analyzed?	I will be able to: • Describe genetic pattern that determine dominant or recessive inheritance patterns. • Name examples of dominant and recessive disorders. • Explain how human pedigrees be constructed from genetic variation • Describe the different complex inheritance pattern. • Explain how can sex- linked inheritance patterns be analyzed.	• Carrier • pedigree • Incomplete dominance • Codominance • Multiple alleles • Epistasis • Sex chromosome • Autosome • Sex-linked trait • Polygenic trait

		• How can the environment influence the phenotype of an organism?		



Week 2 • Resource Book • Power Point presentation • Worksheets	Strand 4: Life Science Concept 2: Molecular Basis of Heredity P. O. 3 : E x p l a i n h o w genotypic variation occurs and results the phenotypic diversity.	• How are karyotypes used to study genetic disorders? • What is the role of telomeres? • How is nondisjunction related to Down syndrome and other abnormal chromosome numbers? • What are the benefits and risks of diagnostic fetal testing? • Which experiments led to the discovery of DNA as the genetic material? • What is the basic structure of DNA? • What is the basic structure	I will be able to: • Define karyotypes and its importance in the study of genetic disorders. • Describe telomeres. • Relate nondisjunction to Down syndrome and other abnormal chromosome numbers. • Explain the benefits and risks of diagnostic fetal testing. • Identify the experiments that led to the discovery of DNA as the genetic material. • Describe the basic structure of DNA. • Identify the basic structure of eukaryotic chromosomes.	• Karyotype • Telomere • Nondisjunction • Double helix • nucleosome

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Week 3 • Resource Book • Power Point presentation • Worksheets	Strand 4: Life Science Concept 2: Molecular Basis of Heredity P.O. 1: Analyze the relationships among nucleic acids (DNA, RNA), genes, and chromosomes P.O. 2: Describe the molecular basis of heredity, in viruses and living things, including DNA replication and protein synthesis.	• What is the role of enzymes in the replication of DNA? • How are leading and lagging strands synthesized differently? • How does DNA replication compare in eukaryotes and prokaryotes? • How are messenger RNA, ribosomal RNA, and transfer RNA involved in the transcription and translation of genes? • What is the role of RNA polymerase in the synthesis of messenger RNA? • How is the	I will be able to: • Describe the role of enzymes in the replication of DNA. • Explain how are leading and lagging strands synthesized differently. • Compare DNA replication of eukaryotes and prokaryotes. • Explain how mRNA, rRNA and tRNA involved in the transcription and translation of genes. • Describe the role of RNA polymerase in the synthesis of mRNA? • Explain how is the code of DNA translated into mRNA and utilized to synthesize a protein.	• Semiconservative replication • DNA polymerase • Okazaki fragment • RNA • Messenger RNA • Ribosomal RNA • Transfer RNA • Transcription • RNA polymerase • Intron • Exon • Codon • Translation

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Week 4 • Resource Book • Power Point presentation • Worksheets	Strand 4: Life Science Concept 2: Molecular Basis of Heredity P.O. 1: Analyze the relationships among nucleic acids (DNA, RNA), genes, and chromosomes. P.O. 3: Explain how genotypic variation occurs and results in phenotypic diversity.	• How are bacteria able to regulate their genes by two types of operons? • How do eukaryotes regulate the transcription of genes? • What are the various types of mutations? • How is selective breeding used to produce organisms with desired traits? • What are similarities and	I will be able to: • Describe how bacteria regulates their genes by two types of operons. • Describe h o w eukaryotes regulate the transcription of genes. • Identify the various types of mutations. • Explain how selective breeding used to produce organisms with desired traits. • Compare inbreeding and hybridization. • Explain how Punnett square test cross help assess the genotypes of organisms.	• Gene regulation • Operon • Mutation • Mutagen • Selective breeding • Inbreeding • Test cross

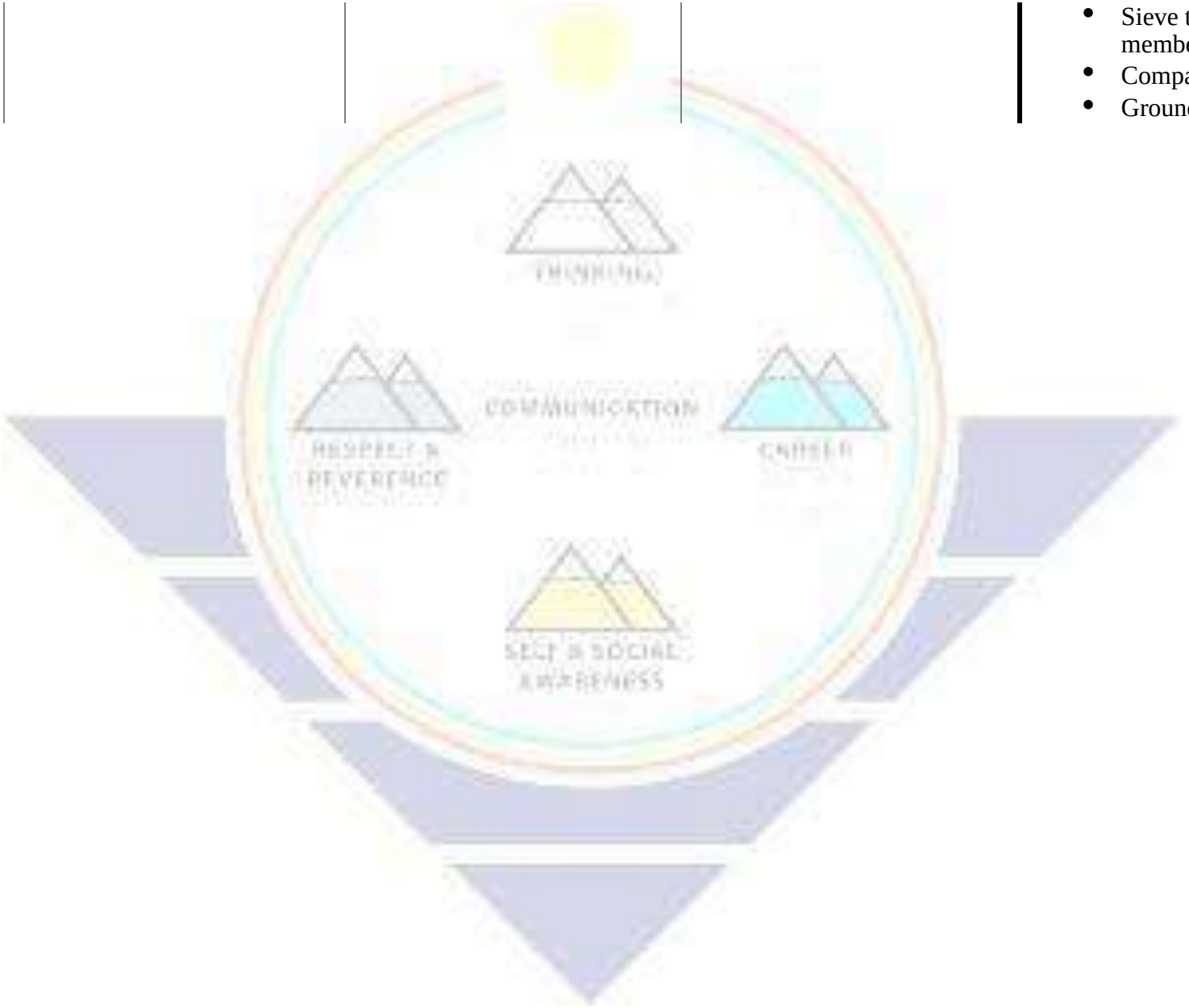
		differences between inbreeding and hybridization? • How does a Punnett square test cross help assess the genotypes organisms?		
Week 5 • Resource Book • Power Point Presentation	Strand 4: Life Science Concept 2: Molecular Basis of Heredity P.O. 3: Explain how genotypic	• What are the different tools and processes used in genetic engineering?	I will be able to: • Describe the different tools and processes used in genetic engineering.	• Genetic engineering • Genome • Restriction enzyme • Gel electrophoresis • Recombinant DNA

• presentation • Worksheets	variation occurs and results in phenotypic diversity.	• How does genetic engineering manipulate recombinant DNA? • What are the similarities between selective breeding and genetic engineering? • How can genetic engineering and biotechnology be used to improved human life?	• Explain how genetic engineering manipulate recombinant DNA. • Compare selective breeding and genetic engineering? • Explain how genetic engineering and biotechnology be used to improved human life.	• Plasmid • DNA ligase • Transformation • Cloning • Polymerase chain reaction • Transgenic organism

Week 6 • Resource Book • Power Point presentation • Worksheets	Strand 4: Life Science Concept 2: Molecular Basis of Heredity P.O. 3: Explain how genotypic variation occurs and results in phenotypic diversity.	• What are the components of the human genome? • How do forensic scientists use DNA fingerprinting? • How can information from the human genome be used to treat human diseases?	I will be able to: • Identify the components of the human genome. • Explain how forensic scientists use DNA fingerprinting. • Describe how can information from the human genome be used to treat human diseases.	• DNA fingerprinting • Bioinformatics • DNA microarray • Single nucleotide polymorphism • Haplotype • Pharmacogenomics • Gene therapy • Genomics • proteomics
Week 7 • Resource Book • Power Point	Strand 4: Life Science Concept 4: Biological Evolution P.O. 3: Describe how the continuing operation of natural selection underlies a population's	• How do the characteristics of plants and green algae compare? • What are the adaptations of	I will be able to: • Compare the characteristics of plants and green algae.	• Stomata • vascular tissue • vascular plant • nonvascular plant • seed

• presentation • Worksheets	ability to adapt to changes in the environment and leads to biodiversity and the origin of new species.	plants to land environments? • What is the importance of vascular tissue to plant life on land? • What is the alternation of generations of plants? • What are divisions of the plant kingdom?	• Identify the adaptations of plants to land environment. • Explain the importance of vascular tissue to plant life on land. • Describe the alternation of generations of plants. • Identify the divisions of plant kingdom.	
Week 8 • Resource Book • Power Point presentation • Worksheets	Strand 4: Life Science Concept 4: Biological Evolution P.O. 3: Describe how the continuing operation of natural selection underlies a population's ability to adapt to changes in the environment and leads to biodiversity and the origin of new species	• What are the major types of plant cells? • What are the major types of plant tissues? • What are the differences among the functions of plant cells and tissues?	I will be able to: • Describe the different types of plant cells. • Identify the major types of plant tissues. • Compare the functions of plant cells and tissues.	• Parenchyma cell • Collenchyma cell • Sclerenchyma cell • Meristem • Vascular cambium • Cork cambium • Epidermis • Guard cell • Xylem • vessel element • Tracheid • Phloem

			• Sieve tube member • Companion cell • Ground tissue



Week 9 •Resource Book •Power Point presentation •Worksheets	Strand 4: Life Science Concept 4: Biological Evolution P.O. 3: Describe how the continuing operation of natural selection underlies a population's ability to adapt to changes in the environment and leads to biodiversity and the origin of new species	• How are the structures of roots, stems and leaves related to their functions? • How the structures and functions of roots do, stems, and leaves compare?	I will be able to: • Describe how structures of roots, stems, and leaves related to their functions. • Explain how the structures and functions of roots, stems and leaves compare.	• Root cap • Cortex • Endodermis • Pericycle • Petiole • Palisade mesophyll • Spongy mesophyll • transpiration

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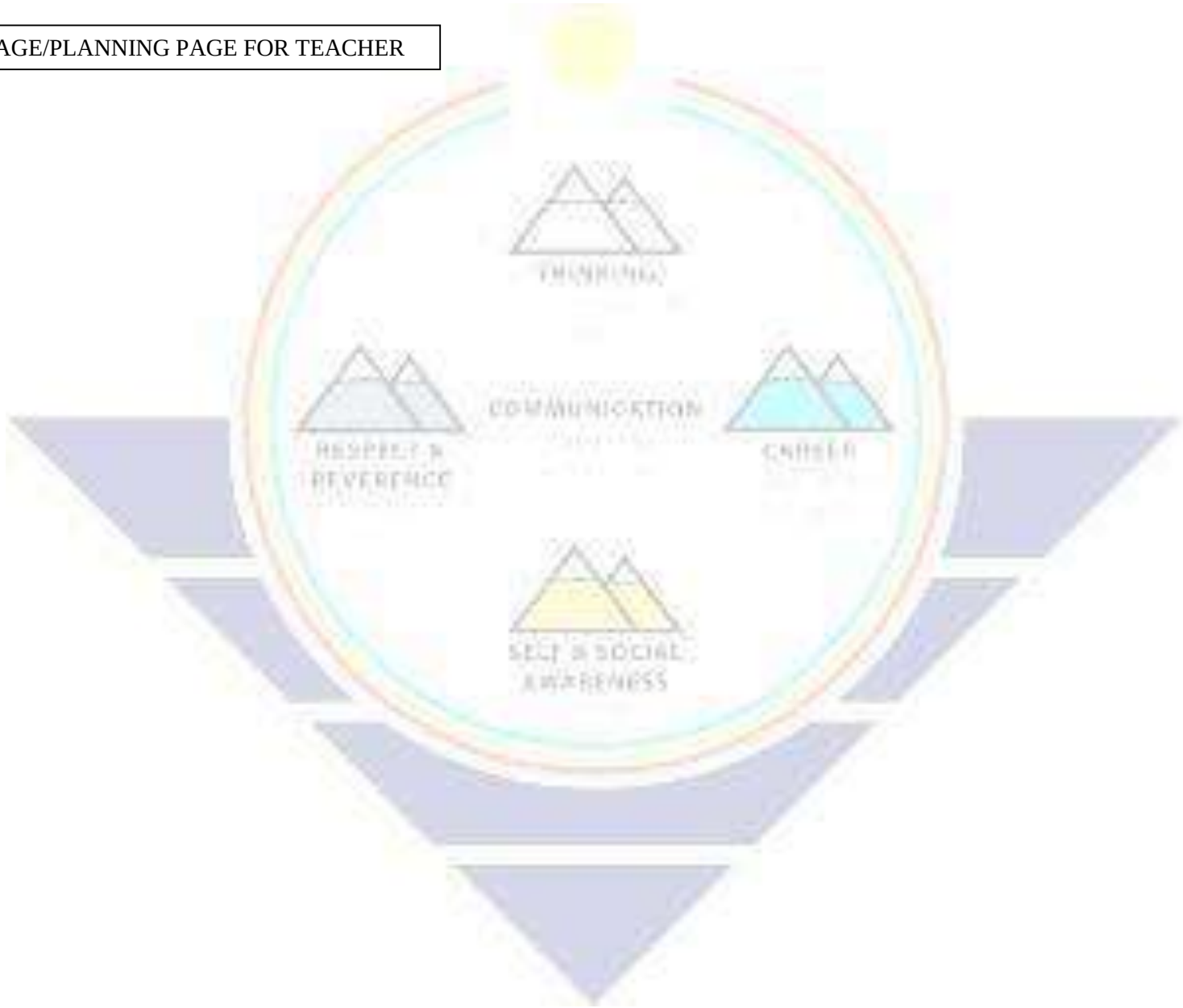

4th Quarter Week 1 • Resource Book • Power Point Presentation Work Sheets	Concept 4: Biological Evolution Understand the scientific principles and processes involved in biological evolution. P.O. 1: Identify the components of natural selection which can be lead to speciation	• What is Evolution? • What are the three geological theories? • Who is Charles Darwin? How does he arrive at his idea about species variation? • How Darwin discoveries supported ancient Earth history?	I will able to: • Examine early ideas about evolution. • Identify three geological theories that influenced scientific debate over evolution. • Describe how Darwin arrived at his idea about species variation. • Recognize how Darwin's discoveries supported Lyell's ancient-Earth theory.	• Evolution • Species • Fossil • Catastrophism • Gradualism • Uniformitarianism • Variation • Adaptation

Week 2 • Resource Book • Power Point presentation • Worksheets	Concept 4: Biological Evolution Understand the scientific principles and processes involved in biological evolution. P.O. 1: Identify the components of natural selection which can be lead to speciation	• What is the difference between artificial selection and natural selection? • What are the four principles of Natural Selection? • How does the major sources affect the evidence of evolution? • What are the different types of evidence that support evolution?	I will be able to: • Compare artificial selection to natural selection. • Examine the factors Darwin considered in forming his theory of Natural Selection. • Summarize the four principles of Natural Selection • Recognize the major sources of evidence for evolution. • Examine the pattern Of features that reveal the history of a species. • Summarizes different types of evidence that support evolution.	• Artificial Selection • Heritability • Natural Selection • Population • Fitness • Biogeography • Homologous structure • Analogous structure • Vestigial structure • Paleontology

Week 3 • Resource Book • Power Point presentation • Worksheets	Concept 4: Biological Evolution Understand the scientific principles and processes involved in biological evolution. P.O. 2: Explain how genotypic and phenotypic variation can result in adaptations that influence an organism's success in an environment.	• What is the importance of evolution? • What is the significance of genetic variation within a population? • How Natural Selection acts on distribution of traits in a population? • How gene flow, genetic drift and sexual selection can lead to the evolution of population?	I will be able to: • Recognize the importance of evolution in unifying all branches of biological study. • Describe the significance of genetic variation within a population. • Identify sources of genetic variation • Describe how natural selection acts on the distribution of traits in a population. • Explain three ways natural selection can change the distribution of a trait in a population. • Explain how gene • flow, genetic drift, and sexual selection can lead to the evolution of population.	• Gene pool • Allele frequency • Microevolution • Direction al selection • Stabilizing selection • Disruptive selection • Gene flow • Genetic drift • Bottleneck effect • Founder effect • Sexual selection

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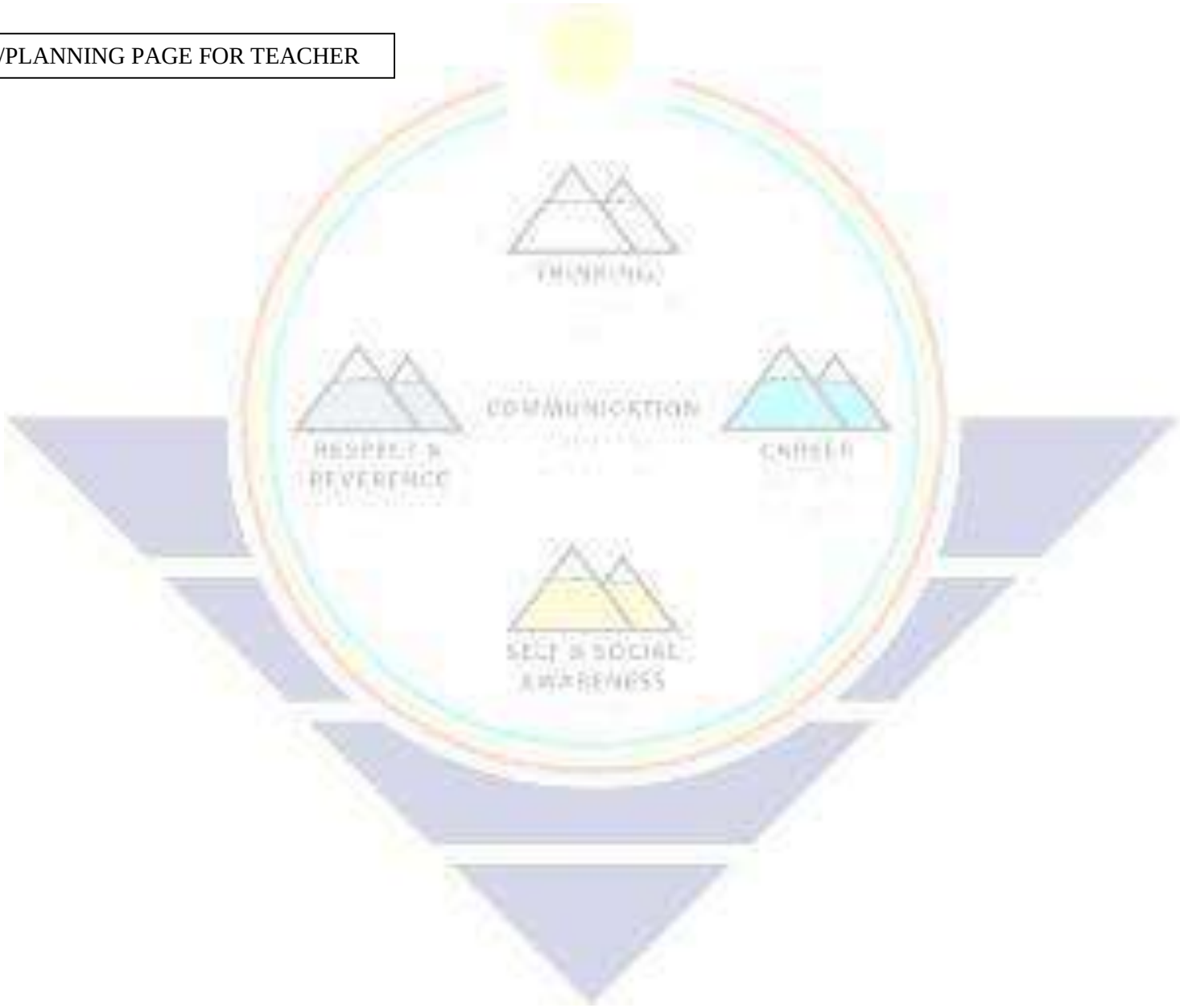

Week 4 • Resource Book • Power Point presentation • Worksheets	Concept 4: Biological Evolution Understand the scientific principles and processes involved in biological evolution. P.O. 3: Describe how the continuing operation of Natural Selection underlies a population's ability to adapt to changes in the environment and leads to biodiversity and the origin of new species.	• What is Hardy-Weinberg equilibrium? • What are the condition and predictive value of the Hardy-Weinberg equation? • How isolation of populations can lead to speciation? • What are the different types and rates of evolution? • What is extinction? What are the different types and rates of extinction?	I will be able to: • Identify the conditions that define Hardy-Weinberg equilibrium. • Explain the predictive value of Hardy-Weinberg equation. • Explain how isolation of populations can lead to speciation. • Describe how populations can become isolated. • Describe different types and rates of evolution • Compare different types and rates of extinction.	• Hardy-Weinberg equilibrium • Reproductive isolation • Speciation • Behavioral solation • Geographic isolation • Temporal isolation • Convergent evolution • Divergent evolution • Coevolution • Extinction • Punctuate d equilibrium • Adaptive radiation

Week 5 • Resource Book • Power Point presentation • Worksheets	Concept 4: Biological Evolution Understand the scientific principles and processes involved in biological evolution. P.O. 5: Analyze how patterns in the fossil record, nuclear chemistry, geology, molecular biology and geographical distribution give support to the theory of organic evolution through natural selection over billions of years and the resulting present day biodiversity.	• What is fossil? How fossils can form? • What is the difference between relative dating and absolute dating techniques? • What is geologic time scale? • What is the condition on Earth billions of years ago? • What are the different hypotheses of how life begun on Earth?	I will be able to: • Describe the ways that fossils can form. • Identify the use of Relative dating and absolute dating techniques. • Recognize the role of index fossils in determining the age of rocks. • Identify the major intervals of the geologic time scale. • Describe the conditions on Earth billions of years ago. • Summarize the main hypotheses of how life began on Earth. • Recognize the role of microbes played in shaping life on Earth.	• Relative dating • Radiometric dating • Isotope • Half life • Index fossil • Geologic time scale • Era • Period • Epoch • Nebula • Ribozyme • Cyanobacteria • endosymbiosis

Week 6 • Resource Book • Power Point presentation • Worksheets	Concept 4: Biological Evolution Understand the scientific principles and processes involved in biological evolution. P.O. 4: Predict how a change in an environmental factor can affect the number and diversity of species in an ecosystem.	• What is endosymbiosis theory? • How will you relate increased biodiversity to sexual reproduction? • What are the key events in the Paleozoic, Mesozoic, and Cenozoic Eras? • How changes in environmental conditions affect the evolution and radiation of animal groups? • What are the events and forces that shaped human evolution?	I will be able to: • Summarize the theory of endosymbiosis. • Relate increased biodiversity to sexual reproduction. • Summarize the key events in the Paleozoic, Mesozoic, and Cenozoic eras. • Identify how changes in environmental conditions affected the evolution and radiation of animal groups. •Examine the evolutionary relationships between humans and other primates. •Recognize the names and relative ages of extinct hominids. •Summarize the events and forces that shaped human evolution.	• Paleozoic • Cambrian explosion • Mesozoic • Cenozoic • Primate • Prosimian • Anthropoid • Hominid • Bipedal

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Week 7 • Resource Book • Power Point presentation • Worksheets	Concept 4: Biological Evolution Understand the scientific principles and processes involved in biological evolution. P.O. 6: Analyze using a biological classification system, the degree of relatedness among various species.	• Who is Carolus Linnaeus? What is the scientific naming system developed by Linnaeus? • What is cladistics? • How molecular evidence reveals species relatedness? • What are the two types of molecular clocks? • What are the 3 domains in the tree of life?	I will be able to: • Examine the scientific naming system developed by Linnaeus. • Identify the limitations of the Linnaeus system. • Describe classification by cladistics. • Summarize how molecular evidence reveals species relatedness. • Describe two types of molecular clocks: mitochondrial DNA and ribosomal RNA. • Describe classification as a work in progress. • Identify the three domains in the tree of life as Bacteria, Archaea & Eukarya?	• Taxonomy • Taxon • Binomial Nomenclature • Genus • Phylogeny • Cladistics • Cladogram • Derive d character • Molecular clock • Mitochondria DNA • Ribosomal RNA • Bacteria • Archaea • Eukarya

Week 8 • Resource Book	Concept 4: Biological Evolution Understand the scientific principles and processes involved in biological evolution. P.O. 6: Analyze using a biological classification system, the degree of relatedness among various species.	• How animals comprise a diverse kingdom? • What are the characteristics of animals? • What are the unique body plans of the animal phyla? • How Genetics reveals the evolutionary history of animals?	I will be able to: • Describe how animals comprise a diverse kingdom • Identify the defining characteristics of animals. • Describe the unique • body plans of the animal phyla. • Describe the criteria • used to group animals. • Explain how Genetics • reveals the evolutionary history of animals.	• Collagen • Homeotic • Vertebrate • Invertebrate • Phylum • Bilateral • symmetry • Radial • symmetry • Protostome • Deuterostome

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Note: Under the new "Arizona Science Standards, only the Essential Standards that will be assessed on the state exam & are intended for ALL students to have learned by the end of 3 credits of high school courses" (Arizona 2018 Science Standards Modified March 7. 2019).

Essential Standards are marked "Essential HS" plus the code in this pacing guide. Science Plus Standards are marked "Plus HS+ plus the code.

Plus HS+B.L2U1.1
Develop a model showing the relationship between limiting factors and carrying capacity, and use the model to make predictions on how environmental changes impact biodiversity.

Plus HS+B.L4U1.2
Engage in argument from evidence that changes in environmental conditions or human interventions may change species diversity in an ecosystem.

Plus HS+B.L2U1.3-
Use mathematics and computational thinking to support claims for cycling of matter & flow of energy through trophic levels in an ecosystem.

Plus HS+B.L1U1.4
Develop and use models to explain the interdependency and interactions between cellular organelles.

Plus HS+B.L1U1.5
Analyze and interpret data that demonstrates the relationship between cellular function and the diversity of protein functions.

Plus HS+B.L1U1.6
Develop and use models to show how transport mechanisms function in cells.

Plus HS+B.L1U1.7
Develop and use models to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms (plant and animal).

Plus HS+B.L2U1.8
Develop and use models to develop a scientific explanation that illustrates how photosynthesis transforms light energy into stored chemical energy and how cellular respiration breaks down macromolecules for use in metabolic processes.

Plus HS+B.L1U1.9
Develop and use a model to communicate how a cell copies genetic information to make new cells during asexual reproduction (mitosis).

Plus HS+B.L3U1.10
Use mathematics and computational thinking to explain the variation that occurs through meiosis and calculate the distribution of expressed traits in a population.

Plus HS+B.L3U1.11
Construct an explanation for how the structure of DNA and RNA determine the structure of proteins that perform essential life functions.

Plus HS+B.L3U1.12
Analyze and interpret data on how mutations can lead to increased genetic variation in a population.

Plus HS+B.L4U1.13
Obtain, evaluate, and communicate multiple lines of empirical evidence to explain the change in genetic composition of a population over successive generations.

Plus HS+B.L4U1.14
Construct an explanation based on scientific evidence that the process of natural selection can lead to adaption.

SOURCE: https://www.azed.gov/standards-practices/k-12standards/standards-science/