



Grade 7 Science Curriculum

Last Updated May, 2021 by Jen Wyland

Course Description: The course will begin with scientific inquiry, cells, the basic unit of all life, cell transport, mitosis and cancer. Students will then move into DNA and genetics, followed by forensics, and setting the stage for evolution and the chain of life. The rest of the course is spent on living creatures: bacteria, viruses, protists, fungi, plants, and animals. The course work includes many hands-on activities, projects, and labs.

Table of Contents

| Unit # | Title | # of Weeks | Month(s) |
|-----------|---|------------|------------|
| <u>1</u> | <i>Scientific Inquiry</i> | 3 | Sept. |
| <u>2</u> | <i>Ecology</i> | 3-4 | Sept.-Oct. |
| <u>3</u> | <i>Energy Flow and Cycles</i> | 3 | October. |
| <u>4</u> | <i>Environmental Issues</i> | 4-5 | November |
| <u>5</u> | <i>Microscopy & Cells</i> | 4-5 | December |
| <u>6</u> | <i>Cell Transport</i> | 3-4 | January |
| <u>7</u> | <i>Mitosis and Cancer</i> | 3 | February |
| <u>8</u> | <i>Genetics</i> | 4 | Feb.-Mar. |
| <u>9</u> | <i>Evolution and Diversity of Life</i> | 4 | April |
| <u>10</u> | <i>Microorganisms: Bacteria, Viruses, Protists, and Fungi</i> | 5 | May |

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|---------------------|----------------------|-------------------|---------|
| Unit #/Title | 1/Scientific Inquiry | Time Frame | 3 Weeks |
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Stage 1 - Identify Desired Results

Standards

Science as Inquiry: 3.1.7.A9, 3.1.8.A9, 3.1.6.B6, 3.1.7.B6, 3.1.8.B6, 3.1.6.C4, 3.1.7.C4, 3.1.8.C4, 4.1.6.F, 4.1.7.F, 4.1.8.F, 4.2.6.D, 4.2.7.D, 4.2.8.D, 4.3.6.C, 4.3.7.C

- Identify questions that can be answered through scientific investigations and evaluate the appropriateness of questions.
- Design and conduct a scientific investigation and understand that current scientific knowledge guides scientific investigations.
- Describe relationships using inference and prediction.
- Use appropriate tools and techniques to gather, analyze, and interpret data and understand that it enhances accuracy and allows scientists to analyze and quantify results of investigations.

CC.3.6-8.B. Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.

CC.3.6-8.C. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

CC.3.5-8.B. Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

CC.3.5-8.C. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

Big Ideas

- Scientists use tools of the mind – both mental and conceptual tools to explore and understand the world.

Essential Questions

- How is the scientific method used and applied in the larger world?
- How is scientific knowledge generated and validated?
- What is science and how do we know what to believe in science?
- What makes an experiment good?

Content

- Scientists come in all different shapes and sizes.
- Scientists use previous knowledge and current information/data to create new developments, inventions, and/or ways of thinking.
- Scientific inquiry is a cyclic process with many steps used in all types of decision-making and critical thinking.

Skills

- Observe, infer, predict, classify, and make models
- Differentiate between testable questions, hypotheses, principles, theories, and laws
- Create good testable questions and hypotheses thus allowing the design process to occur
- Choose tools and techniques that will support the construction and completion of an entirely self-run scientific investigation

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| Unit # /Title | 2/Ecology | Time Frame | 3-4 Weeks |
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Stage 1 - Identify Desired Results

Standards

Science as Inquiry: 4.2.6.D, 4.2.7.D, 4.2.8.D

- Identify questions that can be answered through scientific investigations and evaluate the appropriateness of questions.
- Describe relationships using inference and prediction.
- Use appropriate tools and techniques to gather, analyze, and interpret data and understand that it enhances accuracy and allows scientists to analyze and quantify results of investigations.
- Understand that scientific investigations may result in new ideas for areas of study, new methods, or procedures for an investigation or new technologies to improve data collection.

4.1.7.A. Describe the relationships between biotic and abiotic components of an ecosystem. Compare and contrast different biomes and their characteristics. Describe symbiotic and predator/ prey relationships.

4.5.6.D. Identify reasons why organisms become threatened, endangered, and extinct.

4.5.7.D. Explain how biological diversity relates to the viability of ecosystems. Compare and contrast monoculture with diverse ecosystems. Explain how biological diversity relates to the ability of an ecosystem to adapt to change. Explain how an adaptation is an inherited, structure, function, or behavior that helps an organism survive and reproduce.

4.1.7.E. Identify factors that contribute to change in natural and human-made systems. Explain the processes of primary and secondary succession in a given ecosystem.

4.2.7.B. Explain the primary functions of a wetland within a watershed. Providing habitat, flood control, water purification. Serving as buffer zones, wildlife propagation areas, and food and fiber systems.

3.1.7.A8. Apply the appropriate models to show interactions among organisms in an environment.

CC.3.6-8.C. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

CC.3.6-8.H. Draw evidence from informational texts to support analysis reflection, and research.

CC.3.6-8.J.I. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

CC.3.5-8.G. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g. in a flowchart, diagram, model, graph, or table).

CC.3.5-8.J. By the end of grade 8, read and comprehend science/technical texts in the grades 6-8 text complexity band independently and proficiently.

Big Ideas

- Everything is connected in an ecosystem to support life.
- Organisms on Earth interact and depend on other living and nonliving things in their environment in a variety of ways.
- All organisms have an impact on their surroundings.

Essential Questions

- How does the environment stay balanced?
- What could happen if one component within an ecosystem becomes imbalanced?
- What types of relationships and interactions do organisms have that allow for environmental stability?
- How do organisms and ecosystems depend on one another?

Content

- There are several components found within an environment: abiotic and biotic factors.
- An ecosystem is the largest level of organization within an environment.
- Organisms and ecosystems interact with each other in many different ways allotting for a natural balance within the world.

Skills

- Provide examples of abiotic and biotic factors
- List and differentiate the levels of organization within the environment
- Describe the three main ecosystems
- Explain the importance of wetlands
- Discuss succession and its importance
- Investigate population density

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| | <ul style="list-style-type: none">• Compare the interactions among living things while providing examples of each• Hypothesize how adaptations occur and fit within ecosystem balance |
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| Unit #/Title | 3/Energy Flow & Cycles | Time Frame | 3 Weeks |
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Stage 1 - Identify Desired Results

Standards

Science as Inquiry: 4.1.6.F, 4.1.7.F, 4.1.8.F

- Identify questions that can be answered through scientific investigations and evaluate the appropriateness of questions.
- Design and conduct a scientific investigation and understand that current scientific knowledge guides scientific investigations.
- Describe relationships using inference and prediction.
- Use appropriate tools and techniques to gather, analyze, and interpret data and understand that it enhances accuracy and allows scientists to analyze and quantify results of investigations.
- Analyze alternative explanations and understanding that science advances through legitimate skepticism.
- Use mathematics in all aspects of scientific inquiry.
- Understand that scientific investigations may result in new ideas for areas of study, new methods, or procedures for an investigation or new technologies to improve data collection.

3.1.6.A2. Describe how energy derived from the sun is used by plants to produce sugars (photosynthesis) and is transferred within a food chain from producers (plants) to consumers to decomposers.

3.1.7.A2. Describes how organisms obtain and use energy throughout their lives.

3.1.7.A3. Explain why the life cycles of different organisms have varied lengths.

3.1.7.A8. Apply the appropriate models to show interactions among organisms in an environment.

4.1.7.B. Explain biogeochemical cycles within an ecosystem.

4.1.7.C. Explain the flow of energy within an ecosystem. Compare and contrast the flow of energy between organisms in different habitats. Explain the concept of trophic levels.

CC.3.6-8.J.I. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

CC.3.5.6-8.A. Cite specific textual evidence to support analysis of science and technical texts.

CC.3.5.6-8.D. Determine the meaning of symbols, tasks, key terms, and other domain-specific words or phrases as they are used in a specific scientific or technical context relevant to *grades 6-8 texts and topics*.

CC.3.5.6-8.G. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g. in a flowchart, diagram, model, graph, or table).

CC.3.5.6-8.I Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

CC.3.5.6-8.J. By the end of grade 8, read and comprehend science/technical texts in the grades 6-8 text complexity band independently and proficiently.

| Big Ideas | Essential Questions |
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| <ul style="list-style-type: none"> • The world is built on cycles. | <ul style="list-style-type: none"> • In what ways can energy flow through an ecosystem? • How do cycles allow for survival and balance within ecosystems? |
| Content | Skills |
| <ul style="list-style-type: none"> • Four main cycles within ecosystems: food webs, nitrogen cycle, carbon/oxygen cycle, and water cycle • The interconnections and components within each cycle. | <ul style="list-style-type: none"> • Identify the components within a food web and explain how they all work together, in addition to where the energy flows • Using pictures and words, construct a visual diagram of the water cycle |

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| <ul style="list-style-type: none">• The phases within food webs, the water cycle, carbon/oxygen cycle, and nitrogen cycle, in addition to how they allow for the balance in nature. | <ul style="list-style-type: none">• Compare photosynthesis, respiration, combustion, and decomposition• Describe the steps within the nitrogen cycle• Draw conclusions as to how these different cycles allow for a balance in nature |
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| Unit #/Title | 4/Environmental Issues | Time Frame | 4-5 Weeks |
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Stage 1 - Identify Desired Results

Standards

Science as Inquiry: 4.1.7.F, 4.1.8.F, 4.3.6.C, 4.5.7.F, 4.5.8.F

- Identify questions that can be answered through scientific investigations and evaluate the appropriateness of questions.
 - Design and conduct a scientific investigation and understand that current scientific knowledge guides scientific investigations.
 - Use mathematics in all aspects of scientific inquiry.
 - Understand that scientific investigations may result in new ideas for areas of study, new methods, or procedures for an investigation or new technologies to improve data collection.
- 3.1.7.C2.** Explain why the extinction of a species may occur when the environment changes. Explain that mutations can alter a gene and are the original source of new variations in a population.
- 4.5.6.D.** Identify reasons why organisms become threatened, endangered, and extinct.
- 4.3.7.A.** Explain how products are derived from natural resources. Describe the process of converting raw materials to consumer goods. Differentiate between renewable and nonrenewable resources.
- 4.3.7.B.** Explain the distribution and management of natural resources. Differentiate between resource uses: conservation, preservation, and exploitation.
- 4.4.7.A.** Describe how agricultural practices, the environment, and the availability of natural resources are related.
- 4.5.6.C.** Identify key people and events that shaped the environmental history in the United States.
- 4.5.7.C.** Explain how human actions affect the health of the environment. Identify residential and industrial sources of pollution and their effects on environmental health
- 4.5.8.C.** Describe how humans can reduce pollution.
- 4.5.6.D.** Explain the costs and benefits of recycling in controlling resource use.
- 4.5.7.D.** Describe the wastes derived from using resources, how the waste is managed, and the potential impact on the environment.
- 4.5.8.D.** Compare and contrast waste generated from various sources of energy
- 4.5.7.E.** Describe how length and degree of exposure to pollutants may affect human health.
- 4.5.7.E.** Identify diseases/conditions that have been associated with exposure to pollutants.
- CC.3.6-8.A.** Write arguments focused on *discipline-specific content*.
- CC.3.6-8.C.** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
- CC.3.6-8.F.** Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
- CC.3.6-8.J.I.** Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
- CC.3.5-8.A.** Cite specific textual evidence to support analysis of science and technical texts.
- CC.3.5-8.B.** Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
- CC.3.5-8.E.** Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.
- CC.3.5-8.G.** Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g. in a flowchart, diagram, model, graph, or table).
- CC.3.5-8.I** Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.
- CC.3.5-8.J.** By the end of grade 8, read and comprehend science/technical texts in the grades 6-8 text complexity band independently and proficiently.

| Big Ideas | Essential Questions |
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| <ul style="list-style-type: none"> ● Groundwork shaped by leaders in the past will lead to a better environmental future, if the proper changes are undergone. ● Biodiversity affects the stability of ecosystems and their sustainability. ● Humans have both positive and negative effects on their world. | <ul style="list-style-type: none"> ● In what ways has environmental science changed and shaped our lives? ● What is the worth of biodiversity to humans, as well as ecosystems? ● Will there always be enough resources to go around? ● What actions are humans involved with that both degrade and reshape the environments in which they live? ● How can one live a sustainable life? |
| Content | Skills |
| <ul style="list-style-type: none"> ● An understanding of how environmental science came to be, with some key players. ● Three general categories of environmental issues and how they affect the world around us. ● Positive and negative human interactions within their environment. ● A perspective on trash and how humans waste. ● A growing understanding of the human footprint and how farm to table works. ● Insight on biodiversity and its positive attributes. | <ul style="list-style-type: none"> ● Identify the key players in environmental science, while listing how they impacted the study ● Explain, in depth, the three categories of environmental issues ● Explain the types of resources ● Summarize the process of how paper is produced ● Draw conclusions on some negative effects of pollution ● Investigate different ways to dispose of trash and explain their pros and cons ● Assess what happens when biodiversity is lost, and explain how humans can work to bring biodiversity back ● Cite evidence for the human footprint ● Show ways to create a more sustainable life |

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| Unit #/Title | 5/Microscopy & Cells | Time Frame | 4-5 Weeks |
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Stage 1 - Identify Desired Results

Standards

Science as Inquiry: 3.1.6.A9, 3.1.7.A9, 3.1.8.A9

- Identify questions that can be answered through scientific investigations and evaluate the appropriateness of questions.
 - Use appropriate tools and techniques to gather, analyze, and interpret data and understand that it enhances accuracy and allows scientists to analyze and quantify results of investigations.
 - Use mathematics in all aspects of scientific inquiry.
 - Understand that scientific investigations may result in new ideas for areas of study, new methods, or procedures for an investigation or new technologies to improve data collection.
- 3.1.6.A4.** Recognize that all organisms are composed of cells and that many organisms are unicellular and must carry out all life functions in one cell.
- 3.1.7.A4.** Explain how cells arise from preexisting cells.
- 3.1.6.A5.** Describe basic structures that plants and animals have that contribute to their ability to make or find food and reproduce.
- 3.1.7.A5.** Explain how the cell is the basic structural and functional unit of living things.
- 3.1.6.A6.** Identify examples of unicellular and multicellular organisms.
- 3.1.7.A6.** Identify the levels of organization from cell to organism.
- 3.1.7.A7.** Compare life processes (e.g. growth, digestion) at the organism level with life processes at the cellular level.
- 3.1.6.A8.** SCALE Explain why the details of most cells are visible only through microscope.
- 3.1.7.A8.** MODELS Apply the appropriate models to show interactions among organisms in an environment.
- 3.1.8.A8.** CHANGE AND CONSTANCY Explain mechanisms organisms use to adapt to their environment.

CC.3.6-8.C. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

CC.3.6-8.J.I. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

CC.3.5.6-8.C. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

CC.3.5.6-8.D. Determine the meaning of symbols, tasks, key terms, and other domain-specific words or phrases as they are used in a specific scientific or technical context relevant to *grades 6-8 texts and topics*.

CC.3.5.6-8.J. By the end of grade 8, read and comprehend science/technical texts in the grades 6-8 text complexity band independently and proficiently.

Big Ideas

- Microscopy allows for detailed sight into minute organisms.
- Cells are the basis of all life.

Essential Questions

- What is required for life?
- How does life result from cellular structure and function?
- How does the microscope contribute to the study of biology?
- Why does the form follow the function of cells, organelles, and cellular molecules?

Content

- Structures, functions, and proper protocol of General microscope.
- Every organism has a set of characteristics that defines life.

Skills

- Utilize microscope unassisted for preserved and wet mount slides: set-up, focus, identify, draw, and clean up
- Create wet-mount slides
- List the eight characteristics of life

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| <ul style="list-style-type: none">● Parameters surrounding the cell theory.● Cells ultimately form organ systems.● Shapes of cells depend on their functions.● Cells are small due to surface area.● Cells are either prokaryotic or eukaryotic.● Within most cells are organelles that allow the cell to function appropriately. | <ul style="list-style-type: none">● Explain the importance of cell size● Distinguish between, with all components, prokaryotes and eukaryotes● Compare plant and animal cells● Label cell diagrams● Relate organelle structures to their functions using analogies● Describe the cell membrane, with all its components● Generalize how cells came to be |
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| Unit #/Title | 6/Cell Transport | Time Frame | 3-4 Weeks |
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Stage 1 - Identify Desired Results

Standards

Science as Inquiry: 3.1.6.A9, 3.1.7.A9, 3.1.8.A9

- Identify questions that can be answered through scientific investigations and evaluate the appropriateness of questions.
- Design and conduct a scientific investigation and understand that current scientific knowledge guides scientific investigations.
- Describe relationships using inference and prediction.
- Use appropriate tools and techniques to gather, analyze, and interpret data and understand that it enhances accuracy and allows scientists to analyze and quantify results of investigations.
- Understand that scientific investigations may result in new ideas for areas of study, new methods, or procedures for an investigation or new technologies to improve data collection.

3.1.6.A2. Describe how energy derived from the sun is used by plants to produce sugars (photosynthesis) and is transferred within a food chain from producers (plants) to consumers to decomposers.

3.1.6.A4. Recognize that all organisms are composed of cells and that many organisms are unicellular and must carry out all life functions in one cell.

3.1.7.A5. Explain how the cell is the basic structural and functional unit of living things.

3.1.7.A7. Compare life processes (e.g. growth, digestion) at the organism level with life processes at the cellular level.

3.1.6.A8. SCALE Explain why the details of most cells are visible only through microscope.

CC.3.6-8.B. Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.

CC.3.6-8.F. Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

CC.3.6-8.J.I. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

CC.3.5-8.C. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

CC.3.5-8.G. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g. in a flowchart, diagram, model, graph, or table).

CC.3.5-8.J. By the end of grade 8, read and comprehend science/technical texts in the grades 6-8 text complexity band independently and proficiently.

Big Ideas

- Through a variety of mechanisms organisms seek to maintain a biological balance between their internal and external environments.

Essential Questions

- What allows for the organismal biological balance?
- In what circumstances do organisms maintain their internal and external environments?

Content

- All types of cellular transport occur across the cell membrane, which is selectively permeable.
- Diffusion is a type of passive transport, but there are other transports that are active.
- Osmosis can be one of the following: isotonic, hypotonic, or hypertonic.
- To get particles in and out of the cell, endocytosis and exocytosis are used.
- Respiration, fermentation, and photosynthesis all work together as examples of transport.

Skills

- Draw, with explanations, osmosis and diffusion
- Compare passive to active transport
- Differentiate between isotonic, hypotonic, and hypertonic
- Label endocytosis and exocytosis, with descriptions of the steps involved
- List the components involved in respiration, fermentation, and photosynthesis

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| Unit #/Title | 7/Mitosis & Cancer | Time Frame | 3 Weeks |
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Stage 1 - Identify Desired Results

Standards

Science as Inquiry: 3.1.6.A9, 3.1.8.A9

- Identify questions that can be answered through scientific investigations and evaluate the appropriateness of questions.
- Understand that scientific investigations may result in new ideas for areas of study, new methods, or procedures for an investigation or new technologies to improve data collection.

3.1.7.A3. Explain why the life cycles of different organisms have varied lengths.

3.1.6.A4. Recognize that all organisms are composed of cells and that many organisms are unicellular and must carry out all life functions in one cell.

3.1.7.A4. Explain how cells arise from preexisting cells.

3.1.6.A5. Describe basic structures that plants and animals have that contribute to their ability to make or find food and reproduce.

3.1.7.A7. Compare life processes (e.g. growth, digestion) at the organism level with life processes at the cellular level.

3.1.6.A8. SCALE Explain why the details of most cells are visible only through microscope.

3.1.7.A8. MODELS Apply the appropriate models to show interactions among organisms in an environment.

3.1.8.A8. CHANGE AND CONSTANCY Explain mechanisms organisms use to adapt to their environment.

3.1.7.B2. Compare sexual reproduction with asexual reproduction.

CC.3.5.6-8.G. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g. in a flowchart, diagram, model, graph, or table).

Big Ideas

- New cells arise from the division of pre-existing cells.
- Diseases can arise when the mechanisms within cell division are dysfunctional or become sporadic through genetic mutations.

Essential Questions

- How are the stages of life relevant to the cell cycle?
- What allows for dysfunctionality within cells?
- How do organisms live and grow?
- How are the characteristics of one generation passed to the next?

Content

- Cells reproduce for three main reasons.
- Prokaryotic cells divide differently than eukaryotic cells.
- Mitosis is a process consisting of many different steps and components that lead to new cells.
- Cancer is uncontrolled cell division.

Skills

- List the three main reasons as to why cells divide
- Describe the process that both prokaryotic and eukaryotic cells go through to divide
- Draw, label, manipulate, and communicate the steps within mitosis
- Explain how cancer is related to mitosis