

Grade 12 Biology 30: Year at a Glance

Overview

Biology 30 organizes the year into four units: the nervous and endocrine systems, reproduction and development, cell division and genetics with molecular biology, and population and community dynamics. Unit A examines how the nervous and endocrine systems work together to keep the body in balance, covering neuron function, nerve impulse transmission, reflex arcs and the hormonal control of homeostasis. Unit B studies the human reproductive system as a model mammalian system, the hormonal regulation of reproduction, the major events of embryonic and fetal development, and the reproductive technologies that intervene in these processes. Unit C covers mitosis and meiosis, extends into classical genetics through Mendel's laws and patterns of inheritance, and carries genetics to the molecular level with DNA structure, replication, transcription, translation and genetic engineering. Unit D looks at how populations and communities change over time, using the Hardy-Weinberg principle and population growth curves alongside the ways individuals interact within and between populations. Across all four units, students are encouraged to develop attitudes around collaboration, safety, interest in science, stewardship, scientific inquiry and mutual respect. [See the curriculum: 1, 2, 3, 4, 5, 6.](#)

The year at a glance

Biology › Biology (20, 30) › Biology 30

Unit	General outcomes	Specific outcomes
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Themes: Change and Systems Overview: This unit investigates the human reproductive system as a representative mammalian system responsible for propagating the organism and perpetuating the species.	Students will explain how survival of the human species is ensured through reproduction.; Students will explain how cell differentiation and development in the human organism are regulated by a combination of genetic, endocrine and environmental factors.; Students will explain how human reproduction is regulated by chemical control systems.	Students will: 30-B1.1k identify the structures in the human female reproductive system and describe their functions; i.e., ovaries, Fallopian tubes, uterus, endometrium, cervix, vagina (see the curriculum); Performing and Recording Students will: 30-B1.2s conduct investigations into relationships between and among observable variables and use a broad range of tools and techniques to gather and record data and information - observe the... (see the curriculum); Students will: 30-B1.5k explain how sexually transmitted infections (STIs) can interfere with fertility and reproduction; e.g., chlamydia, gonorrhea, human papilloma virus. (see the curriculum); Students will: 30-B1.2k identify the structures in the human male reproductive system and describe their functions; i.e., testes, seminiferous tubules, interstitial cells, Sertoli cells, epididymides, vasa (ductus) deferentia, Cowper's... (see the curriculum); Students will: 30-B1.4k describe the chromosomal factors and hormonal influence on the formation of the gonads and reproductive organs in the female and male embryo and fetus; i.e., Y chromosome and role of testosterone (see the curriculum); Students will: 30-B1.1sts explain that decisions regarding the application of scientific and technological development involve a variety of perspectives, including social, cultural, environmental, ethical and economic considerations... (see the curriculum); Communication and Teamwork Students will: 30-B1.4s work collaboratively in addressing problems and apply the skills and conventions of science in communicating information and ideas and in assessing results - *work cooperatively as a... (see the curriculum); ## Initiating and Planning Students will: 30-B1.1s formulate questions about observed relationships and plan investigations of questions, ideas, problems and issues - *identify ethical concerns about reproductive technologies,... (see the curriculum); Analyzing and Interpreting Students will: 30-B1.3s analyze data and apply mathematical and conceptual models to develop
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and assess possible solutions - evaluate practical solutions to decreased fertility; i.e., low sperm count,... (see the curriculum); Students will: 30-B1.3k distinguish sperm and egg from their supporting structures; i.e., seminiferous tubules, interstitial cells, Sertoli cells, follicle, corpus luteum (see the curriculum); Analyzing and Interpreting Students will: 30-B3.3s analyze data and apply mathematical and conceptual models to develop and assess possible solutions - observe the changes during embryo development, using preserved material such as... (see the curriculum); Students will: 30-B3.2sts explain why decisions regarding the application of scientific and technological development involve a variety of perspectives, including social, cultural, environmental, ethical and economic considerations... (see the curriculum); Students will: 30-B3.2k describe development from fertilization to parturition in the context of the main physiological events that occur in the development of organ systems during each major stage (trimester); i.e., zygote, blastocyst,... (see the curriculum); Students will: 30-B3.5k describe the physiological or mechanical basis of different reproductive technologies; i.e., conception control, in vitro fertilization, infertility reversal. (see the curriculum); ## Performing and Recording Students will: 30-B3.2s conduct investigations into relationships between and among observable variables and use a broad range of tools and techniques to gather and record data and information - investigate,... (see the curriculum); Students will: 30-B3.1k trace the processes of fertilization, implantation and extra-embryonic membrane formation, i.e., placenta, amnion, chorion, allantois, followed by embryonic and fetal development, parturition and lactation, and... (see the curriculum); Students will: 30-B3.4k describe the influence of environmental factors on embryonic and fetal development; e.g., maternal lifestyle, teratogens such as alcohol, drugs, viral infections and radiation. (see the curriculum); Initiating and Planning Students will: 30-B3.1s formulate questions about observed relationships and plan investigations

of questions, ideas, problems and issues - design an experiment to investigate hormonal changes during pregnancy... (see the curriculum); Students will: 30-B3.3k identify major tissues and organs that arise from differentiation and morphological development of the ectoderm, mesoderm and endoderm in the embryo; i.e., - ectoderm: nervous system, epidermis - mesoderm:... (see the curriculum); Communication and Teamwork Students will: 30-B3.4s work collaboratively in addressing problems and apply the skills and conventions of science in communicating information and ideas and in assessing results - *develop clear and logical... (see the curriculum); Students will: 30-B3.1sts explain that science and technology are developed to meet societal needs and expand human capability (SEC1) - *analyze the use of technology to solve problems of immunological incompatibility between fetus... (see the curriculum);

Initiating and Planning Students will: 30-B2.1s formulate questions about observed relationships and plan investigations of questions, ideas, problems and issues - *design an investigation to determine at which point during the... (see the curriculum); Students will: 30-B2.1sts explain how science and technology have influenced, and been influenced by, historical development and societal needs SEC2 - *research and assess the effects of the medical use of reproductive hormones on... (see the curriculum); Students will: 30-B2.2k identify the principal reproductive hormones in the female and explain their interactions in the maintenance of the menstrual cycle; i.e., estrogen, progesterone, FSH, LH (see the curriculum); Students will: 30-B2.2sts explain why decisions regarding the application of scientific and technological development involve a variety of perspectives, including social, cultural, environmental, ethical and economic considerations... (see the curriculum); Students will: 30-B2.1k describe the role of hormones, i.e., gonadotropic-releasing hormone (GnRH), follicle-stimulating hormone (FSH), luteinizing hormone (LH), estrogen, progesterone, testosterone, in the regulation of

primary and... (see the curriculum);
Communication and Teamwork
Students will: 30-B2.4s work
collaboratively in addressing
problems and apply the skills and
conventions of science in
communicating information and ideas
and in assessing results - select and
use appropriate... (see the
curriculum); ## Analyzing and
Interpreting Students will: 30-B2.3s
analyze data and apply mathematical
and conceptual models to develop
and assess possible solutions -
analyze blood hormone data and
physiological events for a single
menstrual cycle,... (see the
curriculum); Students will: 30-B2.3k
identify the principal reproductive
hormones in the male and explain
their interactions in the maintenance
and functioning of the male
reproductive system; i.e.,
testosterone, FSH, LH. (see the
curriculum); Performing and
Recording Students will: 30-B2.2s
conduct investigations into
relationships between and among
observable variables and use a
broad range of tools and techniques
to gather and record data and
information - graph the changes...
(see the curriculum)

Students will be encouraged to develop positive attitudes that support the responsible acquisition and application of knowledge related to science and technology.	Collaboration Students will be encouraged to: work collaboratively in planning and carrying out investigations and in generating and evaluating ideas; e.g. - *provide the same attention and energy to the group's product as they...; Safety Students will be encouraged to: show concern for safety in planning, carrying out and reviewing activities with reference to WHMIS and consumer product labelling information; e.g. - *consider safety a positive limiting...; Interest in Science Students will be encouraged to: show interest in science-related questions and issues and confidently pursue personal interest and career possibilities within science-related fields; e.g. - *research the answers...; Stewardship Students will be encouraged to: demonstrate sensitivity and responsibility in pursuing a balance between the needs of humans and a sustainable environment; e.g. - *assume part of the collective responsibility for the...; Scientific Inquiry Students will be encouraged to: seek and apply evidence when evaluating alternative approaches to investigations, problems and issues; e.g. - *consider the social and cultural contexts in which a theory...; Mutual Respect Students will be encouraged to: appreciate that scientific understanding evolves from the interaction of ideas involving people with different views and backgrounds; e.g. - *use a multiperspective approach,...	(none in the selection)
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Themes: Change and Diversity Overview: This unit examines the two types of cell division, mitosis and meiosis.	Students will describe the processes of mitosis and meiosis.; Students will explain the basic rules and processes associated with the transmission of genetic characteristics.; Students will explain classical genetics at the molecular level.	Students will: 30-C1.4k compare the processes of mitosis and meiosis (see the curriculum); Students will: 30-C1.2k explain, in general terms, the events of the cell cycle; i.e., interphase, mitosis and cytokinesis (see the curriculum); Students will: 30-C1.5k describe the processes of crossing over and nondisjunction and evaluate their significance to organism inheritance and development (see the curriculum); Students will: 30-C1.1sts explain that science and technology are developed to meet societal needs and expand human capability ÿ SEC1) - *discuss the role of mitosis and biotechnology in regenerating whole, damaged or missing parts of... (see the curriculum); ## Communication and Teamwork Students will: 30-C1.4s work collaboratively in addressing problems and apply the skills and conventions of science in communicating information and ideas and in assessing results - *work collaboratively in... (see the curriculum); Students will: 30-C1.3k describe the process of meiosis (spermatogenesis and oogenesis) and the necessity for the reduction of chromosome number (see the curriculum); ## Analyzing and Interpreting Students will: 30-C1.3s analyze data and apply mathematical and conceptual models to develop and assess possible solutions - prepare and interpret models of human karyotypes by using hard-copy or online... (see the curriculum)
Themes: Systems, Equilibrium and Change Overview: Population change over time can be examined through a study of population genetics (Hardy-Weinberg principle) and population growth.	Students will describe a community as a composite of populations in which individuals contribute to a gene pool that can change over time.; Students will explain, in quantitative terms, the change in populations over time.; Students will explain the interaction of individuals in a population with one another and with members of other populations.	(none in the selection)
Themes: Equilibrium and Systems Overview: This unit examines the biological processes that mediate the interactions between humans and their environment to maintain equilibrium.	Students will explain how the endocrine system contributes to homeostasis.; Students will explain how the nervous system controls physiological processes.	(none in the selection)

Across the year

- The theme of equilibrium runs through Unit A's study of how the nervous and endocrine systems maintain homeostasis by responding to internal and external stimuli [See the curriculum: 1, 2](#).
- Hormonal regulation is central to Unit A's examination of how the endocrine system contributes to homeostasis [See the curriculum: 1, 2](#).
- Unit C examines chromosome behaviour during cell division and classical genetics, including the transmission of genetic characteristics [See the curriculum: 1, 2](#).
- Data collection, graphing and probability skills recur across all four units, linking biology work to related outcomes in mathematics courses. [See the curriculum: 1, 2, 3, 4](#).
- The attitude outcomes for collaboration, safety, stewardship and scientific inquiry apply throughout the course rather than belonging to any single unit. [See the curriculum](#).