

Level 1

STUDENT ACHIEVEMENT • Grade 9

GRADE 9

KEY ELEMENTS: LIFE SCIENCE

Estimated Time: 20-25 hours

By the end of the grade, students will have developed understanding of the processes of cell division as they pertain to reproduction.

Vocabulary

binary fission, budding, cancer, cell cycle, chromosomes, DNA, embryonic development, fertilization, fragmentation, gametes, genes, meiosis, mitosis, nucleolus, sexual and asexual reproduction, stem cells, vegetative reproduction, zygote

Knowledge

- contents of the nucleus
- relationship between genes and proteins
- changes to cell membrane and nucleus during the cell cycle
- cancer
- sexual and asexual reproduction
- type(s) of reproduction
- adaptability of organisms
- zygote formation (fertilization)
- stem cells in embryonic development

Skills and Attitudes

- use microscopes
- apply the relationship between scientific principles and technology
- respect diverse opinions

STUDENT ACHIEVEMENT • Grade 9

GRADE 9 LIFE SCIENCE: REPRODUCTION

PREScribed LEARNING OUTCOMES	SUGGESTED ACHIEVEMENT INDICATORS
<i>It is expected that students will:</i>	<i>The following set of indicators may be used to assess student achievement for each corresponding prescribed learning outcome.</i>
<i>Students who have fully met the prescribed learning outcome are able to:</i>	
B1 explain the process of cell division	<ul style="list-style-type: none"> <input type="checkbox"/> identify the contents of the nucleus: chromosomes, DNA, genes, and nucleolus <input type="checkbox"/> explain the significance of cell division, with reference to the basic relationship between genes and proteins (i.e., genes code for proteins) <input type="checkbox"/> describe factors that may lead to changes in a cell's genetic information <input type="checkbox"/> describe, in sequence, the stages and features of the cell cycle, including mitosis and cytokinesis <input type="checkbox"/> describe cancer as abnormal cell division <input type="checkbox"/> distinguish meiosis from mitosis in terms of outcomes (i.e., number of chromosomes and number of daughter cells)
B2 relate the processes of cell division and emerging reproductive technologies to embryonic development	<ul style="list-style-type: none"> <input type="checkbox"/> distinguish between male and female gametes <input type="checkbox"/> describe the process by which a single zygote forms (fertilization) and develops <input type="checkbox"/> describe and assess the impact of one or more emerging reproductive technologies (e.g., in vitro, cloning) <input type="checkbox"/> explain the role of stem cells in embryonic development
B3 compare sexual and asexual reproduction in terms of advantages and disadvantages	<ul style="list-style-type: none"> <input type="checkbox"/> distinguish between sexual reproduction (e.g., human) and asexual reproduction (e.g., binary fission, budding, vegetative, fragmentation) in representative organisms <input type="checkbox"/> relate sexual and asexual reproduction to adaptability of organisms

Sc 9
Reproduction

Level 2

Reproduction

By the end of grade 9, you will have developed an understanding of how the processes of cell division relate to reproduction.

Learning Goals	
Explain the process of cell division	
I can identify the contents of the nucleus including: <ul style="list-style-type: none"> • Chromosomes • DNA • Genes • Nucleolus 	
I can explain how genes are related to proteins. I can explain why the duplication and separation of genes is a key part of cell division.	
I can describe factors that may lead to changes in a cell's genetic information.	
I can describe, in sequence, the stages and features of the cell cycle including mitosis & cytokinesis.	
I can describe cancer as abnormal cell division.	
I can distinguish mitosis from meiosis in terms of outcomes (# of chromosomes and # of daughter cells)	
Relate the processes of cell division and emerging reproductive technologies to embryonic development	
I can distinguish between male and female gametes.	
I can describe the process by which a single zygote forms (fertilization).	
I can describe the process by which a zygote develops.	
I can describe an emerging reproductive technology. I can assess the _____ impact of an emerging reproductive technology.	
I can explain the role of stem cells in embryonic development.	
Compare sexual and asexual reproduction in terms of advantages and disadvantages	
I can list different ways organisms asexually reproduce.	
I can describe different ways organisms asexually reproduce.	
I can list the similarities and differences between sexual reproduction and asexual reproduction.	
I can relate sexual and asexual reproduction to adaptability of organisms.	

Level 3

DRAFT

Reproduction

Unit Goal: to understand how cell division relates to reproduction

Know

I can identify the contents of the nucleus. (be able to draw?)

I can describe the contents of the nucleus.

(vocab: *chromosomes, DNA, Genes, Nucleolus*)

I can list the stages of the cell cycle.

I can describe the stages of the cell cycle.

I can list factors that may lead to a change in a cell's genetic information.

I can describe factors that may lead to a change in a cell's genetic information.

I can compare and contrast mitosis and meiosis.

(in terms of **outcome & purpose** for various organisms)

I can define the terms: *gamete, zygote, and embryo*

I can distinguish between male & female gametes.

I can describe an emerging reproductive technology.

I can list different ways that organisms can reproduce ASEXUALLY.

I can describe different ways that organisms can reproduce ASEXUALLY.

I can compare & contrast SEXUAL and ASEXUAL reproduction.

Do

I can explain how genes are related to proteins.

I can describe how genes control the activity of a cell.

I can explain how changes to a cell's DNA can affect the function of a cell.

I can explain how cancer is a form of abnormal cell division.

I can explain why the duplication and separation of genes is a key part of cell division.

I can describe how a single zygote forms. (vocab: *fertilization*)

I can describe how a zygote develops. (vocab: *embryonic development*)

I can describe the role of stem cells in embryonic development.

I can assess the impact/significance/issues of an emerging reproductive technology.

cc Martens 2011

KNOW	Understand That	DO
<p>I can identify the contents of the nucleus. (be able to draw?) I can describe the contents of the nucleus. (vocab: <i>chromosomes, DNA, Genes, Nucleolus</i>)</p> <p>I can list the stages of the cell cycle. I can describe the stages of the cell cycle.</p> <p>I can list factors that may lead to a change in a cell's genetic information. I can describe factors that may lead to a change in a cell's genetic information.</p> <p>I can compare and contrast mitosis and meiosis. (in terms of outcome & purpose for various organisms)</p> <p>I can define the terms: <i>gamete, zygote, and embryo</i> I can distinguish between male & female gametes.</p> <p>I can describe an emerging reproductive technology.</p> <p>I can list different ways that organisms can reproduce ASEXUALLY. I can describe different ways that organisms can reproduce ASEXUALLY.</p> <p>I can compare & contrast SEXUAL and ASEXUAL reproduction</p>	<p>Cell division by Mitosis is a normal part of growth and repair for any multi-cellular organism</p> <p>Every cell in a multi-cellular organism needs a <u>complete set of DNA</u>.</p> <p>A specialized kind of cell division is needed for sexual reproduction.</p> <p>Organisms that sexually reproduce are much more adaptable to changes in their environment.</p> <p>Modern technology has changed the way humans reproduce (not sure how to write this - it's late and I'm tired☺)</p>	<p>I can explain how genes are related to proteins. I can describe how genes control the activity of a cell.</p> <p>I can explain how changes to a cell's DNA can affect the function of a cell. I can explain how cancer is a form of abnormal cell division.</p> <p>I can explain why the duplication and separation of genes is a key part of cell division.</p> <p>I can describe how a single zygote forms. (vocab: <i>fertilization</i>) I can describe how a zygote develops. (vocab: <i>embryonic development</i>) I can describe the role of stem cells in embryonic development.</p> <p>I can assess the impact/significance/issues of an emerging reproductive technology.</p> <p>I can describe the advantages & disadvantages of both sexual & asexual reproduction.</p>

Level 1 +

depth of content knowledge needed at this level

BIG IDEAS

Support

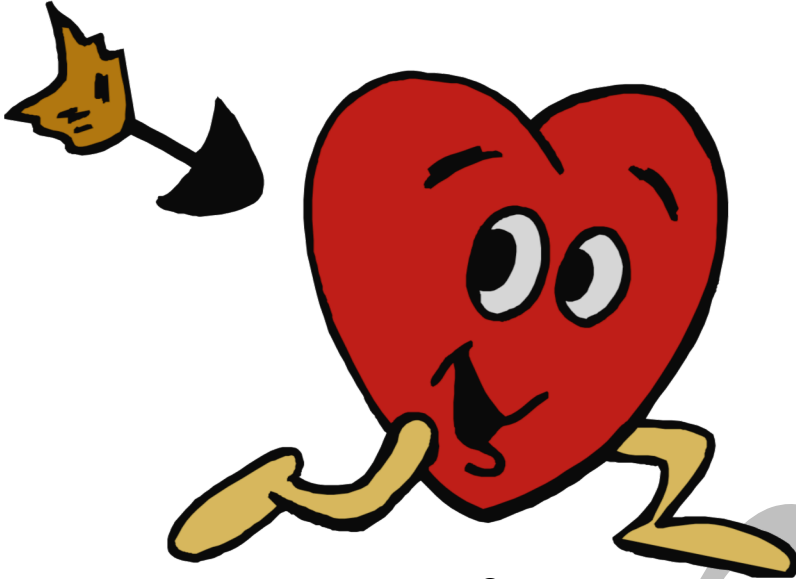
show understanding by what you can do with the knowledge.
CC Martens 2011
show

Is Sex Necessary

Science 9
Mr. Martens

Reproduction

MY QUESTIONS



© MS Clipart

Our Inquiry into **IS SEX NECESSARY** will help us better understand that:

- Cell division by Mitosis is a normal part of growth & repair for any multi-cellular organism.
- The activity of a cell is controlled by its ???
- Cells need complete sets of chromosomes to function.
- A specialized kind of cell division is needed to produce the sex cells needed for sexual reproduction.
- Organisms that reproduce sexually are much more adaptable to changes in their environment.
- Modern technology has increased the ways in which humans can reproduce.

Key Words

- Nucleus
- DNA
- Gene
- Chromosome
- Mitosis
- Meiosis

What's Coming Next



KNOW			
B	D	A	Learning Goal
			I can identify, list & describe the contents of the nucleus.
			I can list & describe the stages of the cell cycle.
			I can list & describe factors that may lead to a change in a cell's genetic information.
			I can compare & contrast MITOSIS & MEIOSIS, in terms of outcome & purpose for various organisms.
			I can define the terms: <i>gamete</i> , <i>zygote</i> , and <i>embryo</i> .
			I can distinguish between male & female gametes (for humans)
			I can describe a reproductive technology.
			I can list & describe several ways by which organisms reproduce ASEXUALLY
			I can compare & contrast ASEXUAL & SEXUAL reproduction.

DO			
B	D	A	I can...
			Explain how genes are related to proteins. Explain how genes control the activity of a cell.
			Explain how changes to a cell's DNA can affect the functioning of a cell. Explain how cancer is a form of abnormal cell division.
			Explain why the duplication and separation is a key part of cell division.
			Describe how a single zygote forms. (<i>fertilization</i>)
			Describe how a zygote develops. (<i>embryonic development</i>)
			Describe the role of stem cells in embryonic development.
			Assess the significance of an emerging reproductive technology.