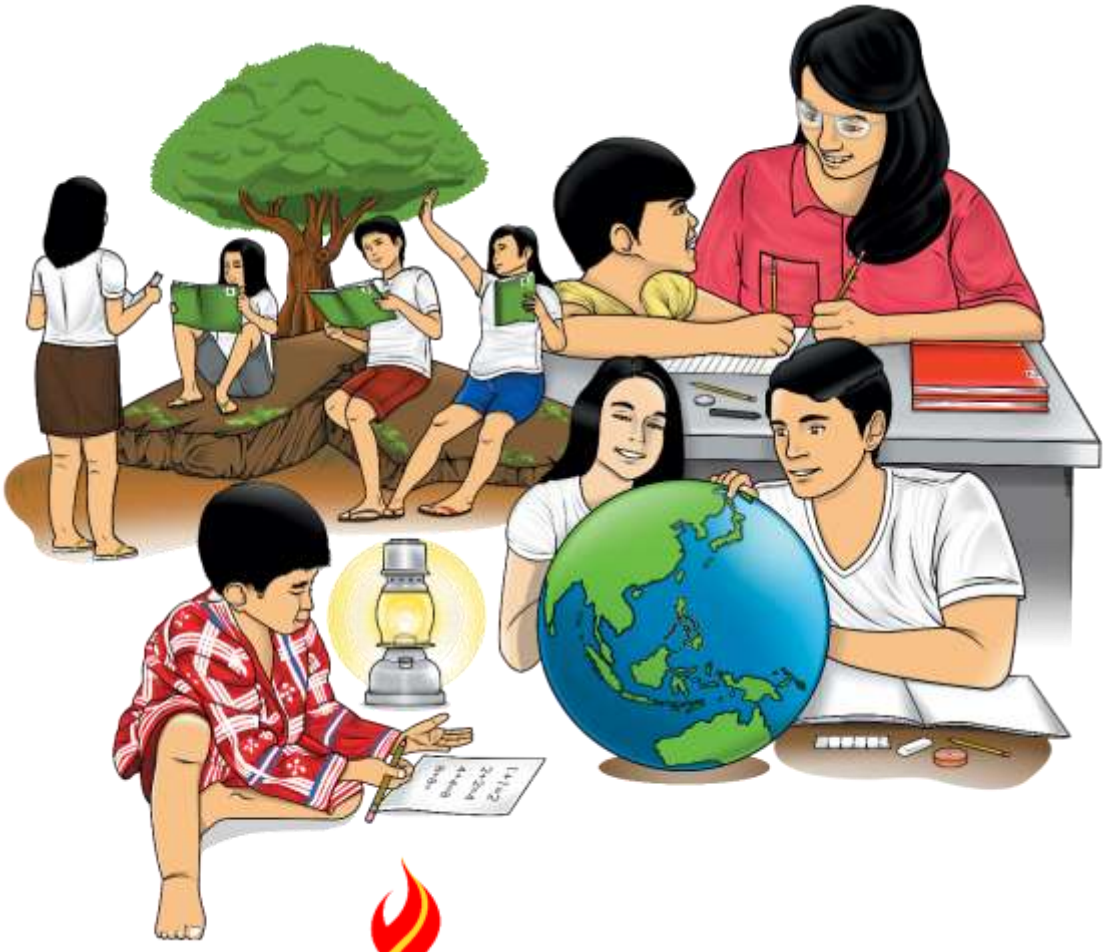
8

DepED
DEPARTMENT OF EDUCATION

Science

Quarter 4 – Module 3:
The Significance of Meiosis



ALTERNATIVE DELIVERY MODE
ADM

Science – Grade 8
Alternative Delivery Mode
Quarter 4 – Module 3: The Significance of Meiosis
First Edition, 2020

Published by the Department of Education
Secretary: Leonor Magtolis Briones
Undersecretary: Diosdado M. San Antonio

Development Team of the Module

Writer: Marilou C. Salazar

Editor: Melvyn C. Montes

Reviewers: Bernabe L. Linog, Corazon P. Roa, Juvy B. Luna, Arlene L. Abala, Kathyleen S. Torculas and Nonita C. Patalinghug

Illustrators: Marilou C. Salazar and Rosa Mia L. Pontillo

Layout Artist: Edgardo D. Pamugas III

Layout Evaluators: Celeste Faith R. Almanon and Jay S. Ayap

Management Team: Francis Cesar B. Bringas
Isidro M. Biol, Jr.
Maripaz F. Magno
Josephine Chonie M. Obseñares
Gregoria T. Su
Marvilyn C. Francia
Jay S. Ayap
Nonita C. Patalinghug

Printed in the Philippines by _____

Department of Education – Caraga Region

Office Address: Teacher Development Center
J. P. Rosales Avenue, Butuan City, Philippines 8600
Telefax: (085) 342-8207/ (085) 342-5969
E-mail Address: caraga@deped.gov.ph

8

Science

Quarter 4 – Module 3:
The Significance of Meiosis

DepED
DEPARTMENT OF EDUCATION

Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

This module was designed and written with you in mind. It is here to help you master the significance of meiosis. The scope of this module permits it to be used in many different learning situations. The language used recognizes the diverse vocabulary level of students. The lessons are arranged to follow the standard sequence of the course. But the order in which you read them can be changed to correspond with the learner's material you are now using.

This module contains:

- **Lesson 1** – The Significance of Meiosis

After going through this module, you are expected to:

1. explain gametogenesis;
2. explain the role of meiosis in gametogenesis;
3. describe the abnormalities that may occur during meiosis; and
4. explain the significance of meiosis in maintaining the chromosome number of an organism. *(MELC Week 2 S8LT-IVe-17)*

What I Know

Directions: Choose the letter of the correct answer. Write your answers on a separate sheet of paper.

1. Gametogenesis is the formation of _____.
   A. body cells
   B. gonads
   C. sex cells
   D. somatic cells

2. Which statement describes gametogenesis?
   A. It produces haploid cells.
   B. It takes place in plants alone.
   C. It does not occur in mammals.
   D. It always starts with haploid cells.

3. Which is true about spermatogenesis? Each primary spermatocyte produces _____.
   A. four diploid spermatids
   B. four haploid spermatids
   C. one diploid spermatid; four polar bodies
   D. one haploid spermatid; four polar bodies

4. After a complicated process of differentiation or transformation, the spermatids become _____.
   A. primary spermatocytes
   B. secondary spermatocytes
   C. spermatogonia
   D. sperms

5. Which part of the sperms has the genetic information?
   A. acrosome
   B. head
   C. middle piece
   D. tail

6. Which are produced during meiosis in the testes?
   A. 4 diploid sperms
   B. 4 haploid sperms
   C. 23 diploid sperms
   D. 23 haploid sperms

7. Which of the following is produced during meiosis in the ovary?
   A. 1 diploid ovum
   B. 1 haploid ovum
   C. 4 haploid ova
   D. 23 diploid ova

8. In oogenesis, which one produces the first polar body?
    A. oogonia
    B. primary oocyte
    C. secondary oocyte
    D. primordial germ cell

9. Which statement is FALSE about oogenesis?
    A. Production of haploid ovum.
    B. Degeneration of polar bodies.
    C. Production of haploid primary oocyte.
    D. Production of haploid secondary oocyte.

10. What processes are involved in gametogenesis?
    A. meiosis I and II
    B. mitosis and meiosis
    C. mitosis and meiosis I
    D. mitosis and meiosis II

11. Which causes Down syndrome?
    A. viral infection
    B. bacterial infection
    C. chromosomal abnormality
    D. lack of oxygen supply to the brain at birth

12. The following are the characteristics of a person with Patau syndrome EXCEPT:
    A. cleft lip
    B. extra fingers
    C. Simian crease
    D. small stature

13. A child with Klinefelter syndrome has how many chromosomes?
    A. 44
    B. 45
    C. 46
    D. 47

14. The other name for Cri-du-Chat syndrome is _____.
    A. Trisomy 13
    B. Trisomy 21
    C. 47, XXY syndrome
    D. "Cat cry" syndrome

15. Which is the main role of meiosis in gametogenesis?
    A. for growth of body cells
    B. for asexual reproduction
    C. for cell repair and replacement
    D. for reduction of chromosome number of gametes

Lesson 1 The Significance of Meiosis

What's In

Directions: Write **True** if the statement is correct and **False** if the statement is wrong. Write your answers on a separate sheet of paper.

1. Gametes are sex cells.
2. Each meiosis has four phases.
3. Gametes have 22 chromosomes.
4. The parent cell divides three times.
5. Meiosis 1 is similar with meiosis 2.
6. Sister chromatids are identical chromosomes.
7. Prophase 1 is the longest phase during meiosis.
8. Meiosis is a process in which identical cells are produced.
9. A diploid cell has twice the quantity of genetic information.
10. Gametes through meiosis are with similar genes to their parents.

Meiosis is a type of cell division that takes place during the creation of sex cells. During meiosis, the chromosome number is decreased by half. This is to ensure that the zygote would receive the exact number of chromosomes during fertilization. The creation of germ cells or gametes is referred to as gametogenesis. These gametes are used for sexual reproduction.

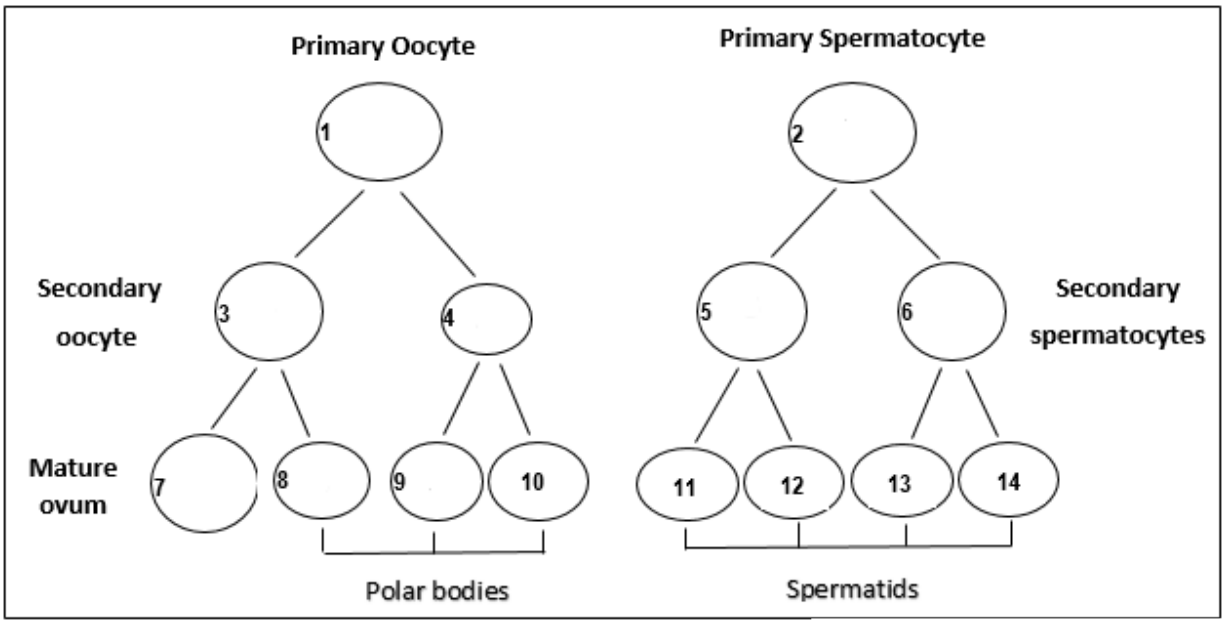
During gametogenesis, a cell which contains one set of every pair of chromosome comes from a diploid cell (2N). Male and female individuals produce their gametes through meiosis. In males, gametogenesis is known as **spermatogenesis**. This process produces spermatozoa (singular form is spermatozoon) or sperm cells. Gametogenesis in females is known as **oogenesis**, since it produces oocytes and yields mature ova (singular form ovum) or egg cells. Both processes begin with meiosis. The creation of sperm cells happens in the testes while egg cell production happens inside the ovary. The formation of embryo does not occur normally without the process of meiosis.

Meiosis functions for the proper conditioning of cells inside the gonads in preparation for reproduction and for genetic diversity among organisms. But the basic function of meiosis is to maintain the standard number of chromosomes of the organism or species after the union of sex cells during fertilization. This is possible when the division and the reduction of chromosome number of gametes from diploid (2N) to haploid (N) occurs.

What's New

Activity 1. What is the Number?

Directions: Study the diagram of gametogenesis where egg cells and sperm cells undergo meiosis I and meiosis II. Note the number assigned to each cell. Identify the number of chromosomes in the different cells, represented by a circle, by writing the symbol **N** for haploid and **2N** for the diploid. Write your answers on a separate sheet of paper.



Illustrated by: Marilou C. Salazar

What is It

Role of Meiosis in Gametogenesis

Multicellular organisms are formed by the union of gametes or sex cells. These sex cells, eggs and sperms are created through the process gametogenesis. For gametogenesis to occur successfully, meiosis is required in reducing the number of chromosomes of gametes from diploid (2N), having a complete set of chromosomes, to haploid (N) where the gametes carry only half the standard number of chromosomes. When these eggs and sperms unite during fertilization, a diploid zygote forms. The zygote has one full set of chromosomes received from each parent. In humans, both the father and the mother contribute 23 chromosomes each

through their sex cells. Thus, the zygote has 46 chromosomes. The zygote divides through mitosis many times. This produces a new diploid multicellular organism. Four haploid cells (N) are produced after meiosis. These cells undergo development for them to become mature and functional gametes. The process of gametogenesis differs between male and female organisms. This happens inside the gonads or the testes and ovaries.

Gametogenesis involves the following steps:

1. Multiple mitotic divisions and cell growth of reproductive cells. This explains why there are numerous sperm cells produced.
2. Two meiotic divisions (Meiosis I and II) occurs to produce haploid cells.
3. Haploid daughter cells undergo development for them to become functional mature gametes.

Spermatogenesis

This process refers to the production of spermatozoa called sperms which occur inside the testes during puberty among males. Figure 1 shows the stages of the formation of sperms.

- The reproductive cells in males known as spermatogonium (plural spermatogonia) undergo a period of proliferation by mitosis and become primary spermatocytes. This primary spermatocyte has a complete set or number of chromosomes (2N).
- During the first meiotic division, the primary spermatocyte divides and forms secondary spermatocytes with only half the number of chromosomes (N).
- The secondary spermatocytes divide. Cell division occurs during meiosis II and form into four haploid (N) daughter cells known as spermatids. These are the cells created after meiosis II. Then, the spermatids develop and grow a flagellum or tail and become functional sperm cells known as spermatozoa.

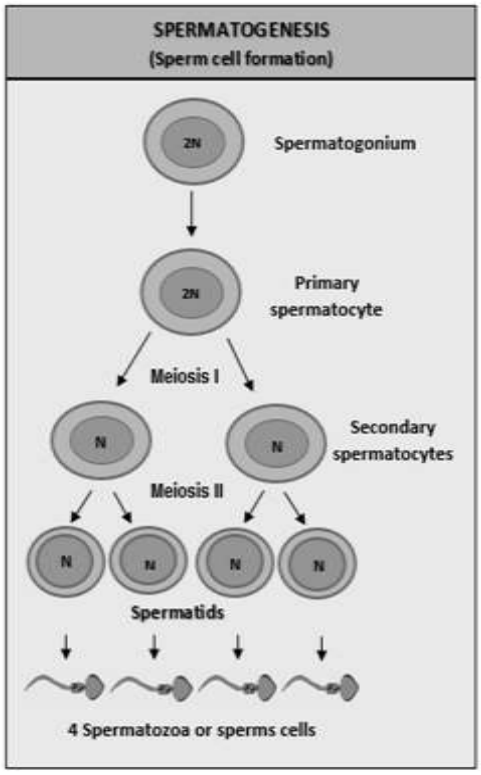


Figure 1. Formation of Sperm Cell
Illustrated by: Rosa Mia L. Pontillo

Figure 2 shows the parts of the spermatozoa, namely:

1. Nucleus (plural form nuclei) is found in the head.
2. Mitochondrion (plural form mitochondria) is at the middle piece that connects the head to its tail. It provides energy for the locomotion.

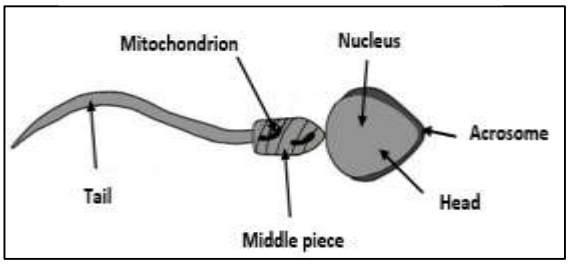


Figure 2. Sperm Cell
Illustrated by: Rosa Mia L. Pontillo

3. Acrosome is a cap-like structure which develops on the head. It contains digestive enzymes. These enzymes penetrate the outer sheath of the ovum, resulting to the merging of the sperm and the ovum haploid nucleus.

Oogenesis

This process refers to the creation of gametes called ova which happens inside the ovaries among female organisms. It begins during the developmental stages of fetus inside a mother's womb, when the reproductive cells of females are formed by meiosis. Figure 3 shows the phases of the formation of an ovum or egg cell.

- The reproductive female cells known as oogonium (plural oogonia) undergoes mitosis and cell growth until it is ready to undergo meiosis and becomes primary oocyte. This primary oocyte is diploid (2N).
- The primary oocyte begins Meiosis I but stops its development in prophase I until puberty, when a girl begins her menstrual cycle.
- Each month, a hormone known as Follicle-stimulating hormone (FHS) will trigger the continued division of the primary oocyte. The pituitary gland is responsible for the production of FHS. The functions of both the ovaries and the testes are controlled by this hormone.

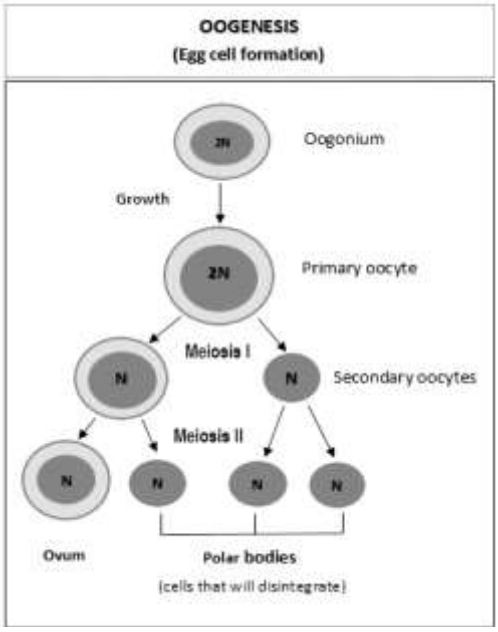


Figure 3. Formation of Egg Cell
Illustrated by: Rosa Mia L. Pontillo

- The primary oocyte divides during the first meiotic division and two cells of unequal size are formed. One of the cells receives the complete parts of the cytoplasm and forms a secondary oocyte, the other cell of smaller size, becomes a polar body. Both cells contain only one of the pairs of the complete set of chromosomes.
- The haploid secondary oocyte is released by the rupture of the follicles of the ovary during ovulation and move into the fallopian tube and divides again during the second meiotic division, but its development is arrested in metaphase II. After fertilization is initiated, the secondary oocyte completes its second meiotic division, resulting in the formation of a mature ovum and another polar body. At this point, the ovum is ready to fuse with the spermatozoan. The polar body may or may not divide, and eventually degenerate at the end of Meiosis II. The polar bodies shed the excess haploid sets of chromosomes.
- If fertilization occurs, the ovum is stimulated to complete meiosis II. It contains a lot of stored food which is used by the growing embryo at the start of its development.

What would happen if meiosis suddenly stops?

The process of meiosis is needed in the formation of gametes, sexual reproduction, and for the increase of genetic diversity. If there is no meiosis, reproduction among sexually producing creatures will never occur. Production of offspring would stop and eventually, no more future generations. The earth will suffer extinction of most species among multicellular eukaryotes.

What would happen when something goes wrong during meiosis?

Meiosis may not always proceed normally. Problems during meiosis sometimes happen and cause great harm during embryonic development. Accidents like miscarriages, genetic errors, and birth defects may occur. These accidents may affect the movement of the chromosomes and the functioning of the spindle fibers. In humans, non-disjunction of the chromosomes in Meiosis 1 or Meiosis 2 have been known to cause abnormal conditions such as:

Down syndrome is also identified as Trisomy 21. This condition happens in chromosome pair 21. During Meiosis I, chromosome pair 21 did not detach from each other at Anaphase I. One of the gametes produced acquires both members of the pair of chromosomes. The offspring has 47 chromosomes in his or her cells instead of the standard 46 chromosomes. Problems with the way the body and the brain develop are the effects brought by this excess chromosome. Common physical characteristics of people with Down syndrome include:

1. short neck
2. small ears
3. small mouth
4. small stature
5. flattened nose
6. low muscle tone
7. upward slanting eyes
8. short hands and short fingers
9. Brushfield spots - or white spots on the colored part of the eye.

Cri-du-chat Syndrome

Cri-du-chat, the French for cat's cry, is the sound of a baby having this condition when he/she cries. This is a genetic condition which is also known as 5p- (5p minus) syndrome and cat cry syndrome. This is caused by deletion, an uncommon genetic condition whereby a part of the genetic segment in the small arm known as the p arm of chromosome 5 is missing. Persons with cri-du-chat syndrome suffers different symptoms. The variation of symptoms depends on the size of the deleted part of the p arm. Common physical characteristics of people with Cri-du-chat syndrome include:

1. small head size
2. widely-spaced eyes
3. round or moon-like face
4. high-pitched cat-like cry
5. low weight at birth and
6. weak muscle tone during infancy

Patau Syndrome

Patau syndrome is also identified as Trisomy 13 syndrome. This is a condition in which each cell of the body of the affected individual has three copies of chromosome 13 instead of two which is the standard number. This results to an excess of genetic material which bring disruptions to the normal development of the individual.

Persons having this chromosomal condition suffer serious physical abnormalities and intellectual disability which include:

1. cleft lip
2. cleft palate
3. heart defects
4. weak muscle tone
5. brain abnormalities
6. extra fingers or toes
7. eyes are poorly developed

Klinefelter Syndrome

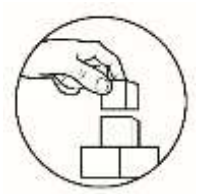
Klinefelter Syndrome is also identified as 47, XXY syndrome. This condition is a sex chromosome disorder due to the occurrence of an extra X chromosomes in the cell among male individuals. Normally, each human cell has 46 chromosomes. Twenty-two pairs or 44 chromosomes are called body chromosomes while only one pair or two of these are called sex chromosomes. Humans have two sex chromosomes, the X and the Y. Males possess one X sex chromosome and one Y sex chromosome (XY), and females have two X sex chromosomes (XX). Males with Klinefelter syndrome hold an extra X chromosomes (XXY) or 47 chromosomes in their cells. This results to multiple genes in the X chromosomes. These extra genetic materials interrupt many developmental activities including sexual development. Common physical characteristics of people with Klinefelter syndrome include:

1. small testes
2. breast enlargement
3. decreased bone density
4. decreased muscle mass
5. unusually small penis or micropenis
6. presence of few hair on the body and face

The affected individual produces a decreased amount of testosterone hormone, a hormone that controls the male sexual development even before birth and during puberty. The affected males are infertile.

Why is meiosis important?

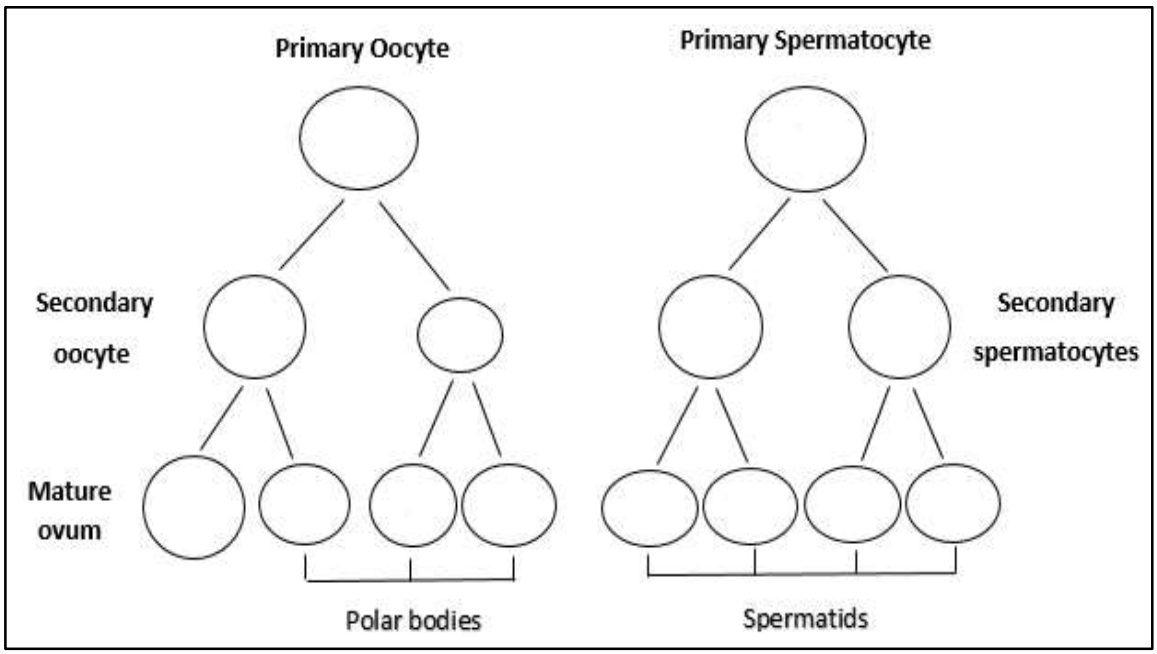
Meiosis is important in the formation of sex cells. It makes sure that all organisms produced sexually contain the standard number of chromosomes. Among human beings and most other mammals, meiosis produces genetic variation through recombination whereby different species exchange genetic materials. This process produces offspring with mixed traits that vary from either parent. When two germ cells combine during fertilization, the chances for genetic variation to occur increase even further. Due to this random recombination of DNA in sexual reproduction, diversity of life on Earth increases.



What's More

Activity 2. Math Time!

Directions: Use the diagram on gametogenesis to answer the given questions. Write your answers on a separate sheet of paper.



Illustrated by: Marilou C. Salazar

1. Suppose there are ten primary oocytes that underwent meiosis, compute the following:

   a. Number of secondary oocytes
   b. Number of mature ova
   c. Number of polar bodies

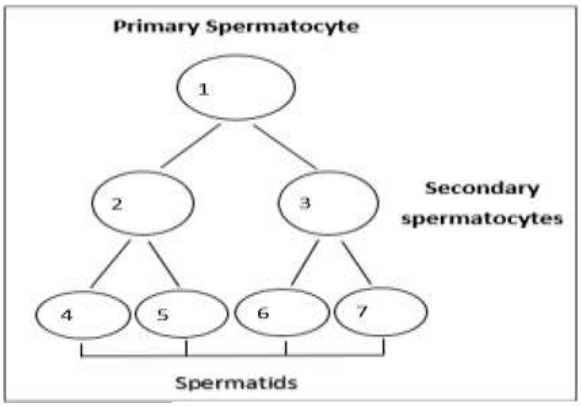
2. Suppose there are six primary spermatocytes, compute for the following:

   a. Number of secondary spermatocytes
   b. Number of spermatids
   c. Number of sperm cells

Activity 3. Cool Chromosomes!

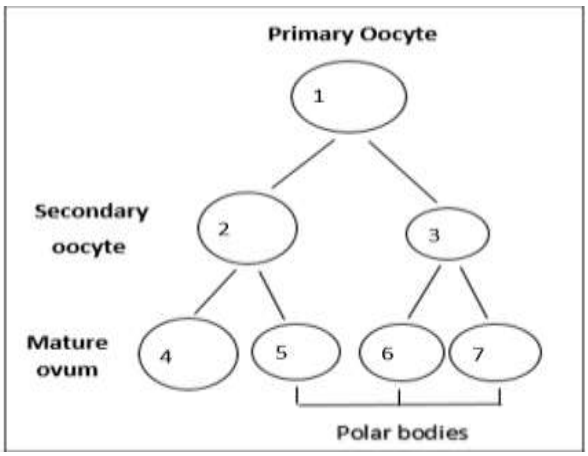
Directions: Write the correct number of chromosomes in each cell during spermatogenesis and oogenesis. Write your answers on a separate sheet of paper.

A.) *Felis catus* or cat has a chromosome number of 38 (2N).



Illustrated by: Marilou C. Salazar

B.) *Ananas comosus* or pineapple has a chromosome number of 50 (2N).



Illustrated by: Marilou C. Salazar

Activity 4. All about Down Syndrome!

Directions: Answer the questions below. Write your answers on a separate sheet of paper.

1. Which chromosome carries Down syndrome?

2. What are the physical characteristics possessed by a person with Down Syndrome? Give at least two.

3. What happens to chromosome 21 in Meiosis I which results to Down Syndrome condition?

Scoring Rubric for Question no. 3

3: Discussions do not have misconceptions and cite complete scientific evidence.
2: Discussions do not have misconceptions and cite incomplete scientific evidence.
1: Discussions have misconceptions and cite incomplete scientific evidence.
0: No discussions.

Activity 5. What's Cri-du-chat Syndrome?

Directions: Answer the questions below. Write your answers on a separate sheet of paper.

1. When a person has Cri-du-Chat Syndrome, what chromosome is altered?

2. What are the physical characteristics possessed by a person with Cri-du-Chat Syndrome. Give at least two.

3. What are the other names for Cri-du-Chat Syndrome?

What I Have Learned

Activity 6. Matching Type

Directions: Match Column **A** with its corresponding description in Column **B**. Write the letter of your answers on a separate sheet of paper.

Column A	**Column B**
1. Gametes	A. testes and ovary
2. Gametogenesis	B. exchange of genetic material between different organisms
3. Genetic recombination	
4. Gonad	C. common physical characteristics of people with Patau syndrome
5. Haploid	
6. Importance of meiosis	D. ensures that all organisms produced via sexual reproduction contain the correct number of chromosomes by producing haploid gametes.
7. Oogonium	E. an illness in the sex chromosome among males which is also identified as Klinefelter Syndrome
8. Ovulation	
9. With extra fingers	
10. 47, XXY syndrome	F. the release of eggs from the ovary
	G. having a complete set of each pair of chromosome
	H. The immature female reproductive cells
	I. sex cells
	J. single set of unpaired chromosomes
	K. process by which gametes, or sex cells, are produced by an organism

What I Can Do

Activity 7. Amazing Meiosis!

Directions: A. Write the correct chromosome number of the selected organisms. Write your answers on a separate sheet of paper.

Organism	Diploid Number	Haploid Number
1. Chicken		39
2. Corn	20	
3. Durian	56	
4. Frog		13
5. Guava	22	
6. Melon	24	
7. Mosquito		3
8. Rat		21
9. Starfish	36	
10. Sunflower		17

Directions: B. Explain the significance of meiosis in maintaining the chromosome number of an organism. (3 points)

3: Discussions do not have misconceptions and cite complete scientific evidence. 2: Discussions do not have misconceptions and cite incomplete scientific evidence. 1: Discussions have misconceptions and cite incomplete scientific evidence. 0: No discussions.

Assessment

Directions: Choose the letter of the correct answer. Write your answers on a separate sheet of paper.

1. Which is the correct series of cellular stages in spermatogenesis?
   A. spermatids – spermatocytes - spermatozoa
   B. spermatids – spermatozoa - spermatocytes
   C. spermatocytes – spermatozoa - spermatids
   D. spermatocytes – spermatids - spermatozoa
2. Which process does the creation of polar bodies happen?
   A. cytokinesis
   B. mitosis
   C. oogenesis
   D. spermatogenesis
3. Which of the following is involved in the maturation of sperms?
   A. growth of primary spermatocytes through mitosis
   B. formation of ovum from primary oocytes through meiosis
   C. creation of polar bodies from primary oocytes through meiosis
   D. development of spermatids from primary spermatocytes through meiosis II
4. How many spermatozoa are produced after a primary spermatocyte undergo spermatogenesis?
   A. 2
   B. 4
   C. 6
   D. 8
5. Which statement is TRUE about oogenesis?
   A. Polar bodies degenerate.
   B. Ovum produced is diploid.
   C. Primary oocyte is haploid.
   D. Secondary oocyte is diploid.
6. Which statement is FALSE about spermatogenesis?
   A. The secondary spermatocytes are haploid.
   B. It takes place in the testes of male animals.
   C. Each primary spermatocyte becomes four diploid spermatids.
   D. Each primary spermatocyte becomes four haploid spermatids.
7. Which is produced by each primary oocyte after oogenesis?
   A. four ova
   B. one ovum
   C. one polar body and three ova
   D. three polar bodies and one ovum

8. Which of the following are formed after gametogenesis?
    A. body cells
    B. gonads
    C. sex cells
    D. somatic cells

9. What is the role of the polar bodies during oogenesis?
    A. It increases the number of sperms.
    B. It increases the number of egg cells.
    C. It weakens the ovum during fertilization.
    D. It removes the excess haploid sets of chromosomes.

10. Which statement is FALSE about acrosome?
    A. It is a cap-like structure.
    B. It contains digestive enzymes.
    C. It develops on the head of the ovum.
    D. Its enzymes break the outer sheath of the ovum.

11. The following are the common physical characteristics of people with Klinefelter syndrome EXCEPT:
    A. small testes
    B. breast enlargement
    C. increased muscle mass
    D. presence of few hair on the body and face

12. What is the number of the altered chromosome in Patau syndrome?
    A. 5
    B. 13
    C. 18
    D. 21

13. Which is correct about spermatogenesis and oogenesis?
    A. spermatogenesis: 1 sperm; oogenesis: 2 eggs
    B. spermatogenesis: 2 sperms; oogenesis: 1 egg
    C. spermatogenesis: 4 sperms; oogenesis: 1 egg
    D. spermatogenesis: 8 sperms; oogenesis: 4 eggs

14. Which one indicates a normal human male?
    A. X chromosome
    B. XX chromosomes
    C. XY chromosomes
    D. XXY chromosomes

15. The following are the significance of meiosis EXCEPT:
    A. genetic variability
    B. sex cell formation
    C. asexual reproduction
    D. normal chromosomal number upkeep

Additional Activities

Activity 8. Healthy Tips!

Directions: Put a check mark (✓) if the statement is a preventive health care practice against fetal abnormalities and an **X** mark if not. Write your answers on a separate sheet of paper.

1. Manage stress.
2. Exercise regularly.
3. Avoid prenatal care.
4. Keep a normal weight.
5. Self-medicate when sick.
6. Eat plenty of sweet foods.
7. Drink alcoholic and caffeinated beverages.
8. Expose self to radiation and x-rays often.
9. Avoid smoking and stay away from second-hand smoke.
10. Keep track of medical history, medications, and immunizations before pregnancy.

Answer Key

What I Know

(Pretest)

1. A	9. C
2. A	10. A
3. B	11. C
4. B	12. D
5. B	13. D
6. B	14. D
7. B	15. D
8. B	

What's In

True or False

1. True	6. True
2. True	7. True
3. False	8. False
4. False	9. True
5. False	10. False

What's New

Activity 1 – What's the Number?

1. 2N	8. N
2. 2N	9. N
3. N	10. N
4. N	11. N
5. N	12. N
6. N	13. N
7. N	14. N

What's More

Activity 2: Math Time!

A.) a. 10
b. 10
c. 30

B.) a. 12
b. 24
c. 24

What's More

Activity 3: Cool Chromosomes!

A.)	B.)
1. 38	1. 50
2. 19	2. 25
3. 19	3. 25
4. 19	4. 25
5. 19	5. 25
6. 19	6. 25
7. 19	7. 25

What's More

Activity 4: Down Syndrome

1. Chromosome 21
2.) 1. Low muscle tone
2. Flattened nose
3. Short neck
4. Small ears
5. Wide, short hands with short fingers
6. White spots on the colored part of the eye known as Brush field spots
7. Small stature
8. Small mouth
9. Slanting eyes

3. Chromosome pair 21 fails to separate from each other during Meiosis I.

What's More

Activity 5: Cri-du-chat Syndrome

1. Chromosome 5
2.) 1. Small head size
2. Round or moon-like face
3. High-pitched cat-like cry
4. Weak muscle tone during infancy
5. Widely spaced eyes
6. Low birth weight

3.) 1. Cat's cry syndrome
2. 5p- or 5p minus

What I Have Learned

Activity 6: Matching Type

1. I	6. D
2. K	7. H
3. B	8. F
4. A	9. C
5. J	10. E

Additional Activities

Activity 7: Amazing Meiosis!

A.)

1. 78	4. 26	7. 6	10. 34
2. 10	5. 11	8. 42	
3. 28	6. 12	9. 18	

B.) The primary function of meiosis is the reduction of the number of chromosomes of the gametes from diploid (2N) to haploid (N) so that the normal chromosome number of the organism may be maintained after the union of sex cells during fertilization.

Assessment

1. D	11. C
2. C	12. B
3. D	13. C
4. B	14. C
5. A	15. C
6. C	
7. D	
8. C	
9. D	
10. C	

Additional Activity

Activity 8: Identification

1. √	6. X
2. √	7. X
3. X	8. X
4. √	9. √
5. X	10. √

References

Books

Campo, Pia C., May R. Chavez, Maria Helen D.H. Catalan, Ph.D., Leticia V. Catris, Ph.D., Marlene B. Ferido, Ph.D., Ian Kendrich C. Fontanilla, Ph.D., Jacqueline Rose M. Gutierrez, Shirley R. Jusayan, Michael Anthony B. Mantala, Cerilina M. Maramag, Marie Paz E. Morales, Eligio C. Obille, Jr., Digna Paningbatan, Genevieve Faye Pasamonte, Ma. Dulcelina O. Sebastian, Rolando M. Tan, and Rodolfo S. Treyes, Ph.D. *Science Learner's Module.* Philippines: Vibal Publishing House, Inc., 2013.

Gerona, Zonia M., Rebecca C. Nueva España, Lolita M. Salmorin, and Aurora M. Villamil. *Science and Technology. Biology. SEDP.* Quezon City: Abiva Publishing House, Inc., 1997.

Treyes, Rodolfo S., Ph.D., Ma. Dulcelina O. Sebastian, Maria Helen D.H. Catalan, Ph.D., Pedro Jesus Orbita, Bella Ducaño, Celeste Gonzalez, Linor Marcel Tongson, Elvira Aslarona, Divinelinda de la Cruz, Marissa Gatapia, Myrna Lumague, Myrna Nacional, Marilou Sergote, Violeta Tupas, Liwayway Ventura, Marilyn Bautista, Susana Ibay, Josephine Obligar, Reynaldo San Mateo. *Lesson Plans in Science II. Biology.* Philippines: Bureau of Secondary Education. Department of Education, 2003.

For inquiries or feedback, please write or call:

Department of Education - Bureau of Learning Resources (DepEd-BLR)

Ground Floor, Bonifacio Bldg., DepEd Complex
Meralco Avenue, Pasig City, Philippines 1600

Telefax: (632) 8634-1072; 8634-1054; 8631-4985

Email Address: blr.lrqad@deped.gov.ph * blr.lrpd@deped.gov.ph