

**Semester II Exam Review Guide****Unit 6: Cell Reproduction**

1. Contrast the two main ways that organisms reproduce

	Definition	Examples
<b>Sexual Reproduction</b>		
<b>Asexual Reproduction</b>		

2. Name the stages of the cell cycle and explain in words and draw a diagram of what happens during each stage

Phase	Description
<b>G1</b>	
<b>S</b>	
<b>G2</b>	
<b>Mitotic Phase</b>	

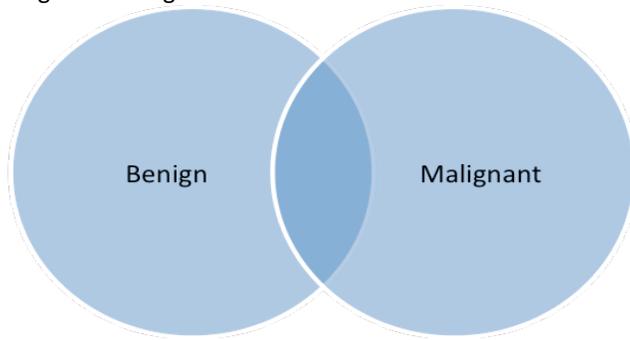
3. Name the stages of **mitosis** and explain in words and draw a diagram of what happens during each stage

Stage	Explanation	Diagram

4. **Explain** and **diagram** how cytokinesis differs in plant and animal cells.

	Explain	Diagram
<b>In Animal Cells</b>		
<b>In Plant Cells</b>		

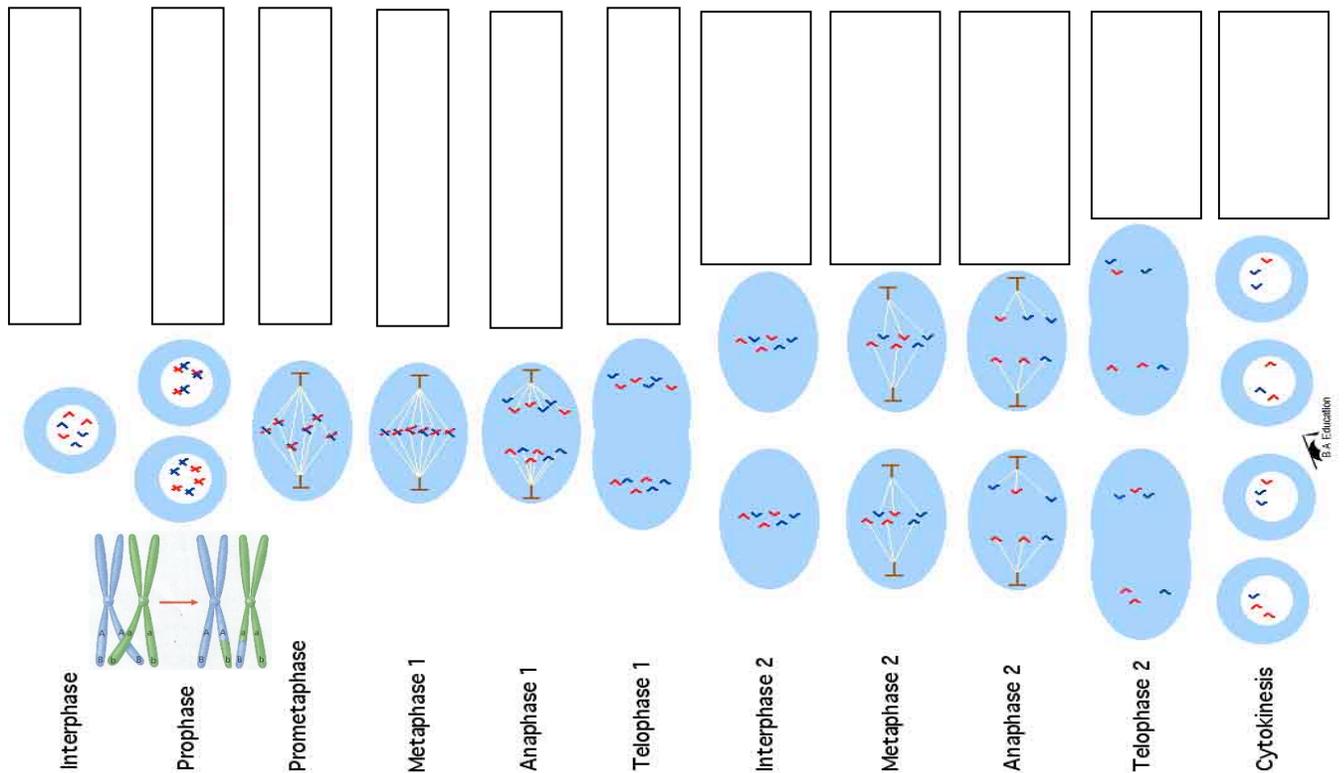
5. Compare benign and malignant tumors



6. Contrast haploid and diploid cells

<b>Haploid</b>	
<b>Diploid</b>	

7. Summarize the process of meiosis-



8. Explain how crossing over contributes to genetic variation and draw a diagram of crossing over occurring.

**Unit 7: DNA and the Language of Life**

9. Explain why DNA's structure is called "the double helix."

10. What are the three parts of a nucleotide? Which parts make up the backbone of a DNA strand?

11. List the two base pairs found in DNA.

12. If six bases on one strand of a DNA double helix is AGTCGG, what are the six bases on the complementary section of the other strand of DNA?

13. What is DNA replication? Describe how DNA replicates by using a template. Explain which strands are new/daughter strands, and which strands are old/parent strands.

14. Distinguish between the following key terms:

Ribonucleic acid (RNA)	
Transcription	
Translation	
Codon	
Mutation	
Plasmid (Chap.13)	

15. Which molecule completes the flow of information from DNA to protein?

**DNA** → \_\_\_\_\_ → **Protein**

16. Describe how a mutation could be helpful rather than harmful.

17. How many codons code for the 20 different amino acids? Why is it possible for an amino acid to be specified by more than one kind of codon? Give an example using Fig 11-13.

18. How many start and stop codons are there? What are they?

19. List and describe two types of mutations that can occur within a gene.

20. Give an example of a mutagen.

21. How can a biologist use plasmids to produce bacteria that carry a specific gene?

22. Give an example of a use of recombinant DNA technology in medicine.

23. What important discovery has led to the development of modern genetic engineering techniques?

24. Define Codons:

25. How many codons are in the following nucleotide sequences? How many amino acids would each sequence code for?

- a. AAATCACGC
- b. ATCCTTTAGGAA

26. Use the following Codon chart to identify the amino acid sequence for the following nucleotide sequences:

		Second Position					
		U	C	A	G		
First Position (5' end)	U	UUU } Phe UUC } UUA } Leu UUG }	UCU } Ser UCC } UCA } UCG }	UAU } Tyr UAC } UAA } Stop UAG } Stop	UGU } Cys UGC } UGA } Stop UGG } Trp	U C A G	
	C	CUU } Leu CUC } CUA } CUG }	CCU } Pro CCC } CCA } CCG }	CAU } His CAC } CAA } Gln CAG }	CGU } Arg CGC } CGA } CGG }	U C A G	
	A	AUU } Ile AUC } AUA } Met AUG }	ACU } Thr ACC } ACA } ACG }	AAU } Asn AAC } AAA } Lys AAG }	AGU } Ser AGC } AGA } Arg AGG }	U C A G	
	G	GUU } Val GUC } GUA } GUG }	GCU } Ala GCC } GCA } GCG }	GAU } Asp GAC } GAA } Glu GAG }	GGU } Gly GGC } GGA } GGG }	U C A G	

- a. AUGCCCCUG
- b. AUGACAAAAGGU
- c. UCUCAUAAC

27. Give an explanation for the following.

- a. GAA --> GUA

28. What are the DNA Replication Base Pairing Rules:

- a. A pairs with \_\_\_\_\_
- b. C pairs with \_\_\_\_\_

29. What are the DNA--> RNA Base Pairing Rules of Transcription?

- a. A pairs with \_\_\_\_\_
- b. C pairs with \_\_\_\_\_

30. What does it mean when we say that DNA replication is semi conservative?

31. Describe a Genetic Engineering Technique. (example: Recombinant DNA, cloning, or transgenic organisms)

**Unit 8: Mendelian Genetics**

32. Describe the methods Mendel used in his plant breeding experiments-Cross-fertilization

33. Punnett Square Practice: A woman that is homozygous recessive for blue eyes and a man that is heterozygous for brown eyes produce a child with blue eyes.

<b>What are the possible gametes produced by this pair?</b>					
<b>Perform a Punnett Square cross for this pair.</b>	<table border="1" style="margin: auto;"> <tr> <td style="width: 50px; height: 50px;"></td> <td style="width: 50px; height: 50px;"></td> </tr> <tr> <td style="width: 50px; height: 50px;"></td> <td style="width: 50px; height: 50px;"></td> </tr> </table>				
<b>What are the probabilities for your cross? (%HomoDom, %HomoRecc, %Hetero)</b>					

34. Contrast genotype and phenotype

<b>genotype</b>	
<b>phenotype</b>	

35. Explain Mendel's principle of independent assortment- Homozygous, Heterozygous, Dominant, Recessive

<b>Independent assortment</b>	
<b>Homozygous</b>	
<b>Heterozygous</b>	
<b>Dominant</b>	
<b>Recessive</b>	

36. Summarize the chromosome theory of inheritance

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37. Explain why most sex-linked disorders are more common in males

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38. Explain the significance of the Human Genome Project

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39. Describe how chromosomes can be damaged- Nondisjunction, Duplication, Deletion, Inversion, Translocation

	<b>Definition</b>	<b>Example (ABC-DEFG → ?)</b>
<b>Nondisjunction</b>		
<b>Duplication</b>		
<b>Deletion</b>		
<b>Inversion</b>		
<b>Translocation</b>		

40. Explain how recessive, dominant, and sex-linked disorders are **inherited**-

<b>Recessive disorder</b>	
<b>Dominant disorder</b>	
<b>Sex-linked disorder</b>	
<b>Carrier</b>	

41. Describe how it is possible to predict certain genetic disorders-

<b>How are genetic disorders predicted?</b>	
<b>Karyotype(human)</b>	
<b>Genetic Counselor</b>	

42. Describe how inheriting certain mutations can increase a person's risk for cancer

<b>Growth factor</b>	
<b>Tumor-suppressor gene</b>	
<b>Oncogene</b>	

**Unit 8: Principles of Ecology – Chapter 13, 14 and 15**

43. Distinguish between the following key terms:

Ecology	
Population	
Community	
Ecosystem	
Biosphere	
Habitat	

44. Draw a diagram (i.e. flow chart) showing the relationship among the five levels of ecological study.

45. Distinguish between the following and give examples:

	Define	Examples
Abiotic factor		
Biotic factor		

46. Explain how the uneven heating of the Earth's surface creates different temperature zones. Draw a diagram showing the differing angles of incoming sunlight as it strikes the Earth's surface.

47. What is a biome?

16. Describe the characteristic features (i.e. climate conditions, typical organisms, etc.) of the 8 following biomes.

Tropical rain forest	
Temperate grassland	
Temperate deciduous forest	
Coniferous forest	
Savannah	
Desert	
Chaparral	
Tundra	

48. What is permafrost? Where is it found?

49. What is an estuary?

50. Contrast population size with population density.

51. Use population size of students in your class and the square footage of your biology classroom to determine the population density of your biology class (show work and units). # of students = 20 , classroom size is 10ft X 20ft

52. Define the following key terms:

Limiting factor	
Carrying capacity	

53. Contrast density-dependent limiting factors with density-independent limiting factors. Include examples of each.

54. List examples of limiting factors that could affect population growth for plant and animal communities

- a. Plant-
- b. Animal –

55. Distinguish between the following five types of community interactions (include specific examples for each):

	Define	Examples
Interspecific competition		
Predation		
Parasitism		
Mutualism		
Commensalism		

56. What is a symbiotic relationship? List the three types of symbiosis.

57. Describe what factors are included in an organism niche.

58. Describe camouflage in animals. How is it an effective adaptation for both predators and prey?

59. What is ecological succession? Compare and contrast the two types of succession; include examples of each.

	Characteristics	Examples
Primary succession		
Secondary succession		

60. The following two human activities that have had a **negative** effect on species diversity in communities worldwide. Describe them and give specific examples of each.

Clearing Land	
Introduced Species	

61. How are the movement of energy and the movement of chemicals in ecosystems different?

62. What is a trophic level?

63. Draw a four step energy pyramid. Identify each trophic level in the pyramid. Correctly label the trophic levels with the following organisms and amounts of energy: snake, flower, field mouse, grasshopper, 1,000kcal, 10kcal, 100kcal, and 10,000kcal,

- 64. Explain why food chains are generally limited to three or four levels. In general, what is the average amount (%) of available energy at a trophic level that is converted to biomass in the next higher trophic level? What happens to the remaining energy?
  
- 65. Draw a detailed diagram of the Carbon Cycle (Chapter 13.5)
  
  
  
  
  
  
  
  
  
  
  
- 66. Explain how photosynthesis and respiration are involved in cycling carbon and oxygen.
  
- 67. Besides respiration, what other ways can carbon be released into the atmosphere?
  
- 68. Give an example showing how pollution relates to biological magnification.
  
- 69. Describe how increased quantities of carbon dioxide in the atmosphere may contribute to global warming?
  
- 70. What is the relationship between chlorofluorocarbons (CFC's) and ozone?
  
- 71. What is biodiversity? What are the four main threats to biodiversity?

**Unit 9: Evolution**

72. Summarize ideas from Darwin's time that influenced his work- Inheritance of acquired characteristics

<b>Buffon</b>	
<b>Lamarck</b>	

73. Describe the two main points of Darwin's theory


74. Describe information the fossil record contains about life on Earth

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75. Explain how similarities in structure and development among different species are evidence for evolution

<b>Homologous structure</b>	
<b>Common ancestor</b>	
<b>Vestigial structure</b>	
<b>Embryology</b>	

76. Relate pesticide resistance in insects to natural selection- *Fill in the blanks: Variation, Artificial. Gene, reproduce*

Because of natural \_\_\_\_\_ some insects in a population are resistant to pesticides. When the population is sprayed, only the insects with the resistant \_\_\_\_\_ will survive. Those naturally resistant insects will \_\_\_\_\_ creating a new population of pesticide resistant insects. This is an example of \_\_\_\_\_ selection, caused by humans.

77. Define:

<b>Allele</b>	
<b>Natural variation</b>	
<b>Gene pool</b>	
<b>Population</b>	

78. Tell how genetic drift, gene flow, mutation, and natural selection contribute to changes in the gene pool

	<b>Definition</b>	<b>Contribution to changes in the gene pool</b>	<b>Example</b>
<b>Genetic drift</b>			
<b>Gene flow</b>			
<b>Mutation</b>			
<b>Natural selection</b>			!

79. Describe the biological species concept- speciation

<b>Biological species concept</b>	
<b>speciation</b>	

80. Distinguish between microevolution and macroevolution

	Definition	Example
Microevolution		
Macroevolution		

81. List types of reproductive barriers between species

	Definition	Example
Temporal Isolation		
Geographic Isolation		
Behavioral Isolation		

82. Explain how geographic isolation and adaptive radiation contribute to species diversity

	Definition	Contribution to Species Diversity
Geographic Isolation		
Adaptive Radiation		

83. Explain how existing structures can take on new functions through evolution.

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84. Explain where and how fossils can form- give examples of fossils

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85. Summarize methods used to determine the ages of fossils

Relative dating	
Radiometric dating	
Half-life	

86. Describe how continental drift and mass extinction relate to macroevolution-

	definition	Relates to macroevolution
Continental drift		
Mass extinctions		

87. Identify two hypotheses about where life began.

Hypothesis #1: \_\_\_\_\_

Hypothesis #2: \_\_\_\_\_

88. Describe the geologic time scale

ERA	PERIOD	TIME (millions of years ago)	KEY NOTES
Cenozoic	Quaternary	1.8- present	
	Tertiary	65-1.8	
Mesozoic	Cretaceous	145-65	
	Jurassic	208-145	
	Triassic	245-208	
Paleozoic	Permian	290-245	
	Carboniferous	363-290	
	Devonian	410-363	
	Silurian	410-363	
	Ordovician	440-410	
	Cambrian	505-440	
Precambrian Time		650-544	

89. Define:

phylogenetic tree	
convergent evolution	
analogous evolution	

90. What is the current system of taxonomical classification in use? List all the levels and use the lion (*Panthera Leo*) as an example at each level. There are 4 kingdoms in eukarya Most diverse groups of eukaryotes?

Level	Description/ Includes...						Classify <i>Panthera leo</i>
<b>3 Domain System</b>							
<b>5 Kingdom System</b>							
<b>Order</b>							
<b>Species</b>							

91. Describe how symbiosis may have contributed to the origin of eukaryotic cells-

<b>Theory of Endosymbiosis</b>	
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92. Explain how prokaryotes reproduce- Binary fission, Endospore

<b>Binary fission</b>	
<b>Endospore</b>	

**Microorganisms**

93. Identify ways that humans defend against bacterial diseases-

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94. Pathogen

Term	Definition	Examples
<b>Pathogen</b>		

95. Explain how viruses cause disease-

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96. Explain how human defend against viral diseases-

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**Unit 11: Human Anatomy and Physiology**

97. Identify the levels of structure in the human body

Level of Organization	Description

98. Identify the four major tissue categories and describe their functions-

Tissue Category	Function/ Description	Microscopic image

99. Define homeostasis and explain its importance

Definition	Importance

100. Describe the basic structure and functions of the nervous system

Nervous System		
Structure	Components	Function
CNS		
PNS		

Nerve		
Sensory Neuron		
Interneuron		
Motor Neuron		

101. Explain the pathway of a reflex arc and define stimulus, reflex

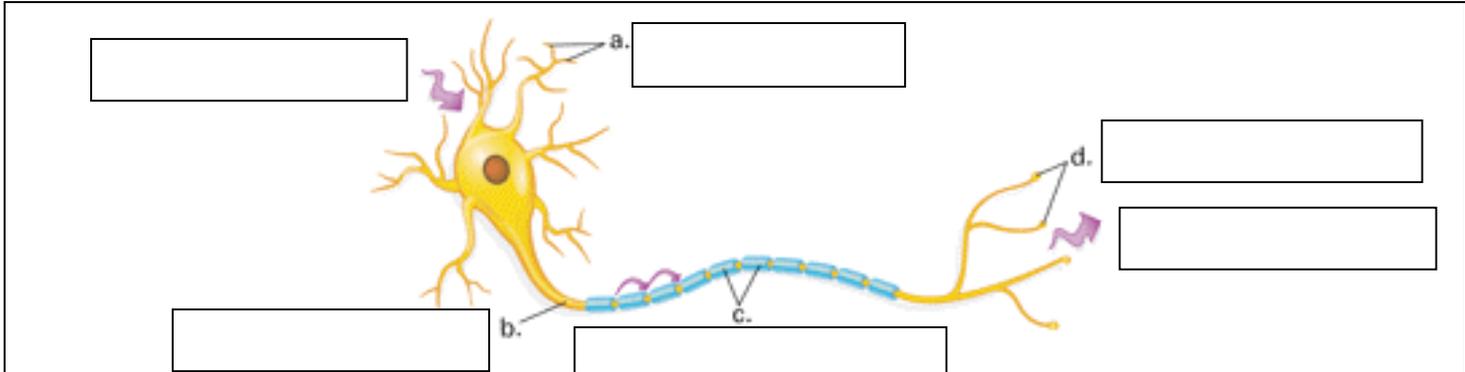
The diagram illustrates a reflex arc in a human leg. A stimulus (1) is applied to the foot. A sensory neuron (2) carries the signal to the spinal cord. In the spinal cord, the signal passes through an interneuron (3a, 3b). A motor neuron (4) then carries the signal to the quadriceps muscle and the opposing muscle. A key identifies the colors: red for Interneuron, green for Motor neuron, and blue for Sensory neuron.

Stimulus	
Reflex	

102. Describe the basic structure of a neuron- define each structure

Structure	Definition
Axon	
Dendrite	
Schwann Cell	

Sensory Input	
Motor output	



103. Describe how body temperature homeostasis is regulated by negative feedback-

104. Explain the role of the endocrine system in the body

105. Identify key female and male reproductive structures

<b>Female</b>	<b>Function</b>
Ovary	
Follicle	
Oviduct	
Uterus	
Cervix	
Vagina	
Ovulation	
Ovum	
Corpus Luteum	
Menstruation	
Endometrium	

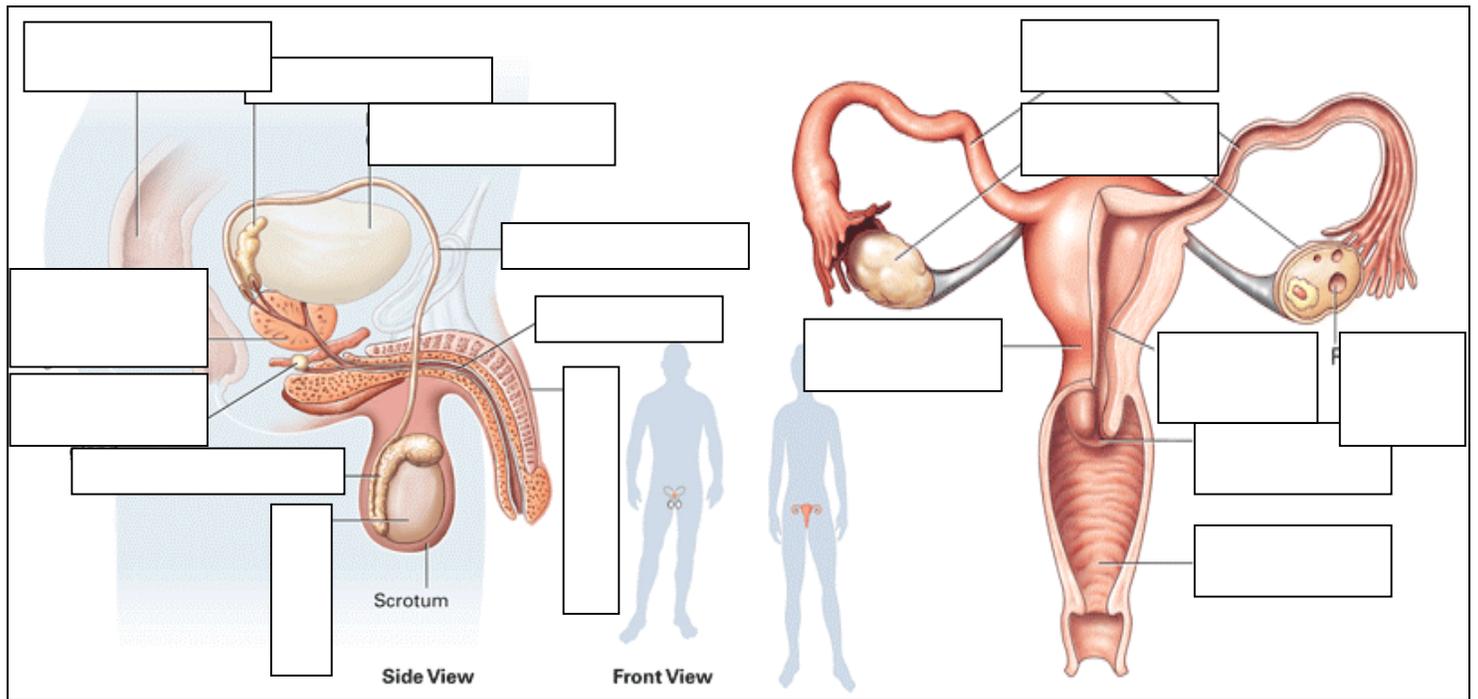
<b>Male</b>	<b>Function</b>
Testes	
Penis	
Scrotum	

Epididymus	
Vas Deferens	
Semen	

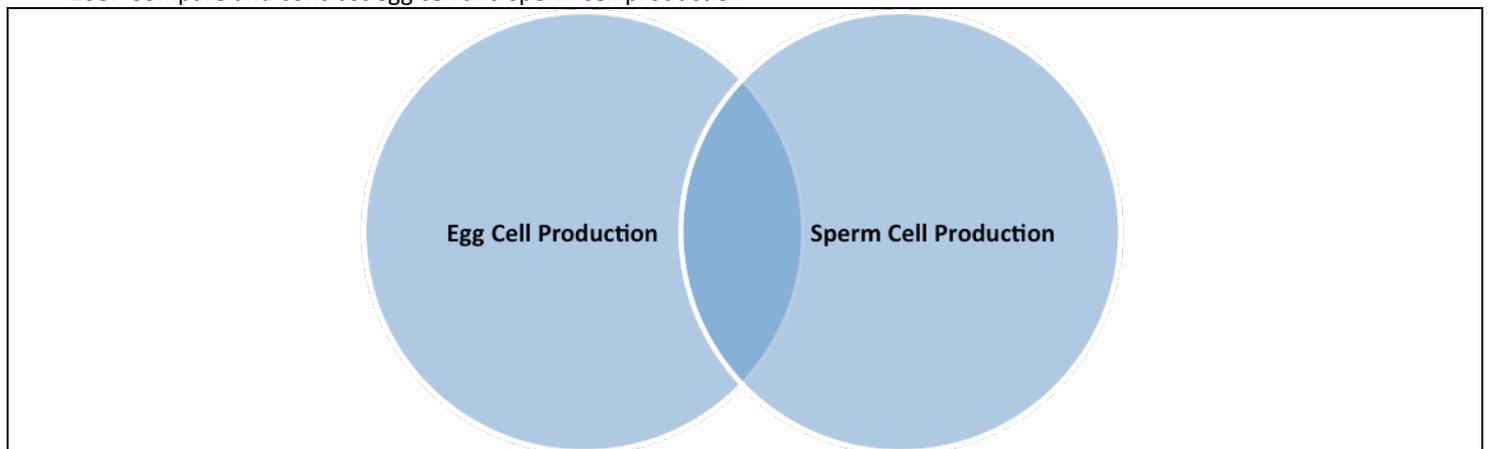
106. Describe the process of fertilization

<b>Fertilization</b>	
<b>Zygote</b>	
<b>Cleavage</b>	
<b>Blastocyst</b>	
<b>Embryo</b>	

107. Label the structures in the Male and Female Reproductive Systems.



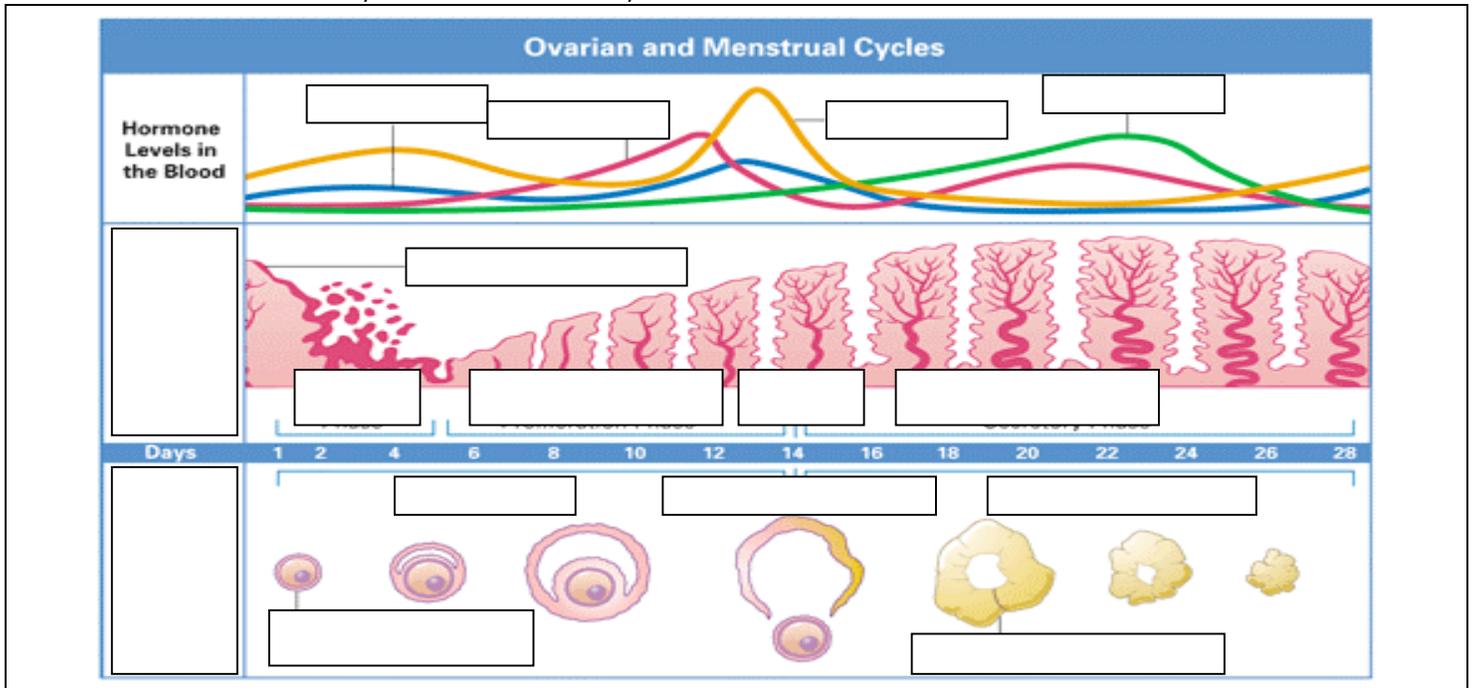
108. Compare and contrast egg cell and sperm cell production



109. Describe the role of hormones in the ovarian and menstrual cycles and how hormones regulate the testes.

Effects of Reproductive Hormones in Females		Effects of Reproductive Hormones in Males	
Hormone (Source)	Function	Hormone (Source)	Function
Releasing hormone (Hypothalamus)		Releasing hormone (Hypothalamus)	
Follicle-stimulating hormone (FSH) (Anterior pituitary)		Follicle-stimulating hormone (FSH) (Anterior pituitary)	
Luteinizing hormone (LH) (Anterior pituitary)		Luteinizing hormone (LH) (Anterior pituitary)	
Estrogen (Follicle and corpus luteum)		Testosterone (Testes)	
Progesterone (Corpus luteum)			

110. Describe the Ovarian cycle and the menstrual cycle



Menstrual Cycle Phase	Description
Menstrual Phase	
Proliferation Phase	
Ovulation	
Secretory Phase	

Ovulation Cycle Phase	Description
Follicular Phase	
Ovulation Phase	
Luteal Phase	

111. Describe the process of fertilization

<b>Fertilization</b>	
<b>Zygote</b>	
<b>Cleavage</b>	
<b>Blastocyst</b>	
<b>Embryo</b>	

112. Describe different STD's and how they are treated- Sexually transmitted disease

<b>Common Sexually Transmitted Diseases (STDs)</b>			
	<b>Disease</b>	<b>Symptoms</b>	<b>Treatment</b>
<b>Bacterial</b>	Chlamydia	Women: no symptoms until chlamydia advances to pelvic inflammatory disease, which can cause infertility. Men: genital discharge, itching, painful urination.	
	Gonorrhea	Women: sometimes no symptoms. Men: genital discharge, painful urination.	
	Syphilis	Initial symptoms: open sore on the genitals, swollen lymph nodes. Secondary symptoms: rash on the hands and feet. If untreated, spreads throughout the body and can be fatal.	
<b>Viral</b>	Genital warts	Small, hard, painless fleshy growths on genitals; highly contagious; easily spread through sexual contact. Linked to some forms of cancer.	
	Genital herpes	Recurring symptoms: painful blisters, intense itching, painful urination. Linked to cervical cancer, miscarriage, birth defects.	
	Human immunodeficiency virus (HIV)	No initial symptoms for some people. Others have flu-like symptoms within a month of exposure, such as fever, headache, and enlarged lymph nodes. HIV leads to acquired immune deficiency syndrome (AIDS) which destroys the immune system.	