**Topic 11.4: Sexual Reproduction**

**Essential Idea: Sexual reproduction involves the development and fusion of haploid gametes.**

**Statements & Objectives:**

**11.4.U1 Spermatogenesis and oogenesis both involve mitosis, cell growth, two divisions of meiosis and differentiation.**

Define oogenesis and spermatogenesis.

(**Define** Give the precise meaning of a word, phrase, concept or physical quantity.)

Outline the processes involved in spermatogenesis within the testes, including mitosis, cell growth, the two divisions of meiosis and cell differentiation

(**Outline** Give a brief account or summary.)

Outline the processes involved in oogenesis within the ovary, including mitosis, cell growth, the two divisions of meiosis, the unequal division of cytoplasm and the degeneration of polar body

(**Outline** Give a brief account or summary.)

**11.4.U2 Processes in spermatogenesis and oogenesis result in different numbers of gametes with different amounts of cytoplasm.**

Compare the processes of spermatogenesis and oogenesis, including the number of gametes, size of games, the timing of formation and release of gametes.

(**Compare** Give an account of the similarities and differences between two (or more) items or situations, referring to both (all) of them throughout.)

**11.4.U3 Fertilization in animals can be internal or external.**

Define polyspermy and explain why it is detrimental to an organism.

(**Define** Give the precise meaning of a word, phrase, concept or physical quantity.)

Outline the process of fertilization.

(**Outline** Give a brief account or summary.)

Describe mechanisms that prevent polyspermy.

(**Describe** Give a detailed account or picture of a situation, event, pattern or process.)

**11.4.U4 Fertilization involves mechanisms that prevent polyspermy.**

Compare internal and external fertilization.

(**Compare** Give an account of the similarities and differences between two (or more) items or situations, referring to both (all) of them throughout.)

**11.4.U5 Implantation of the blastocysts in the endometrium is essential for the continuation of pregnancy.**

Define zygote, blastocyst and fetus

(**Define** Give the precise meaning of a word, phrase, concept or physical quantity.)

Outline embryonic development from zygote to blastocyst.

(**Outline** Give a brief account or summary.)

Draw a diagram of a blastocyst, labeling the inner cell mass.​

**(Draw** :Represent by means of a labeled, accurate diagram or graph, using a pencil. A ruler(straight edge) should be used for straight lines. Diagrams should be drawn to scale. Graphs should have points correctly plotted(if appropriate) and joined in a smooth curve. )

**11.4.U6 HCG stimulates the ovary to secrete progesterone during early pregnancy.**

List the source, target and function of HCG.

**(List** Give a sequence of brief answers with no explanation.)

**11.4.U7 The placenta facilitates the exchange of materials between the mother and fetus.**

Describe the structure of the placenta, including the fetal villus, fetal capillary, maternal blood pool and chorion).

(**Describe** Give a detailed account or picture of a situation, event, pattern or process.)

Explain the benefits of having a high chorion surface area and a selectively permeable placental barrier.

(**Explain:** Give a detailed account including reasons or causes)

List the direction and mechanism of transport between maternal and fetal blood for CO2, O2, glucose, urea, antibodies and water in the placenta.

**(List** Give a sequence of brief answers with no explanation.)

**11.4.U8 Estrogen and progesterone are secreted by the placenta once it has formed.**

List the source, target and function of estrogen and progesterone as related to pregnancy.

**(List** Give a sequence of brief answers with no explanation.)

 **11.4.U9 Birth is mediated by positive feedback involving estrogen and oxytocin.**

List the source, target and function of estrogen and oxytocin as related to the birth process.

**(List** Give a sequence of brief answers with no explanation.)

**11.4.A1 The average 38-week pregnancy in humans can be positioned on a graph showing the correlation between animals’ size and development of the young at birth for other mammals.**

Analyze a graph to determine the relationship between gestation time and animal mass.

(**Analyze** Break down in order to bring out the essential elements or structure. To identify parts and

relationships, and to interpret information to reach conclusions.)

Contrast altricial and precocial development mechanisms.

(**Contrast** Give an account of the differences between two (or more) items or situations, referring to both (all) of them throughout.)

**11.4.S1 Annotation of a diagram of seminiferous tubule and ovary to show the stages of gametogenesis.**

Label the following on a diagram of a seminiferous tubule: interstitial cells, basement membrane, germinal epithelium cells, primary spermatocyte, secondary spermatocyte, Sertoli cells, spermatids, spermatozoa and spermatogonium.

**(Label** Add title, labels or brief explanation(s) to a diagram or graph.)

Label the following on a diagram of a ovary: basement membrane, primary follicles, primary oocytes, developing follicles, secondary follicles, secondary oocycle, mature follicle, developing corpus luteum, corpus luteum, and degenerating corpus luteum.

**(Label** Add title, labels or brief explanation(s) to a diagram or graph.)

**11.4.S2 Annotations of diagrams of mature sperm and egg to indicate functions.**

Label the following on a diagram of a mature sperm: head, acrosome, plasma membrane, haploid nucleus, midpiece, helical mitochondria, microtubules, protein fibres in tail and tail.

**(Label** Add title, labels or brief explanation(s) to a diagram or graph.)

State the function of each of the following sperm structures: head, acrosome, plasma membrane, haploid nucleus, midpiece, helical mitochondria, microtubules, protein fibres in tail and tail

**(State** Give a specific name, value or other brief answer without explanation or calculation.)

Label the following on a diagram of a mature egg: haploid nucleus, centrioles, polar body, plasma membrane, corona radiata, zona pellucida, cortical granules and cytoplasm.

**(Label** Add title, labels or brief explanation(s) to a diagram or graph.)

State the function of each of the following egg structures: haploid nucleus, centrioles, polar body, plasma membrane, corona radiata, zona pellucida, cortical granules and cytoplasm.

**(State** Give a specific name, value or other brief answer without explanation or calculation.)

**11.4.NOS Assessing risks and benefits associated with scientific research-the risks to human male fertility were not adequately assessed before steroids related to progesterone and estrogen were released into the environment as a result of the use of female contraceptive pill.**

Outline how the female contraceptive pill prevents pregnancy.

(**Outline** Give a brief account or summary.)

Describe problems attributed to estrogen pollution in water.

(**Describe** Give a detailed account or picture of a situation, event, pattern or process.)

**Key Terms**

Haploid

​Testes

external fertilization

​fetus

fetal villus

​positive feedback

​​precocial development

seminiferous tubule

germinal epithelium

​secondary spermatocyte

spermatozoa

​primary follicles

​corpus luteum

​acrosome

​microtubules

​zona pellucida

meiosis

​polyspermy

​endometrium

​HCG

maternal blood pool

​negative feedback

​spermatogonium

​interstitial cells

​implantation

fetal capillary

​oxytocin

​developing follicles

​plasma membrane

protein fibres

​centrioles

cortical granules

​oogenesis

​fertilization

zygote

​progesterone

​chorion

​gestation

gamete

ovary

​embryo

Sertoli cells

​secondary oocycle

​mature follicle

​midpiece

​polar body

​contraception

​spermatozoa

spermatogenesis

​internal fertilization

blastocyst

placenta

estrogen

altricial development

basement membrane

​primary spermatocyte

spermatids

basement membrane

primary oocytes

​secondary follicles

​helical mitochondria

​corona radiate

​parturition