Review

■ What are hormones?

■ What is the difference between primary and secondary sexual characteristics?
Puberty in Females (Review)

- Underarm and pubic hair appears
- Breasts develop
- Pelvis widens (wider hips)
- Fatty tissues accumulate on hips and breasts primarily
- Menstrual cycle begins
- Genital organs mature
Oogenesis

■ By the time a girl reaches puberty she has around 700,000 oocytes (cells capable of becoming ova)
  - These oocytes will undergo meiosis in order to produce the ova
  
■ Similar to the spermatogonia in the male that undergo meiosis to produce the spermatozoa

■ Unlike sperm, ova are not constantly being produced; a woman only gets one set (she is born with them)
Oogenesis

- Usually, only **one oocyte per cycle** will mature into an **ovum** and be released into the **fallopian tubes** to be fertilized.
  - *If more are released, this is how you get fraternal twins, triplets, etc.*
Identical vs Fraternal Twins

**Identical Twins**
Single egg fertilized by single sperm, then splits in two

- Womb

- Share all of their genes

**Fraternal Twins**
Separate eggs fertilized by separate sperm

- Share only about half their genes
The Ovarian Cycle  

1) **FSH** is secreted by the pituitary gland and stimulates the growth of an **ovarian follicle** around the oocyte

2) the **follicle** starts to release more and more **estrogen**

3) **estrogen** levels cause the pituitary to release **LH** along with **FSH** which triggers the follicle to rupture and **release the ovum (ovulation)**

4) The follicle then turns into the **corpus luteum** and releases **progesterone** that will stop the release of more FSH and LH, and cause the uterine lining (**endometrium**) to **thicken**

**FSH =** follicle stimulating hormone  
**LH =** Luteinizing hormone
The Ovarian Cycle

- 5a) if the ovum is **not fertilized** the **corpus luteum disintegrates**, and the **endometrium detaches** from the uterus and is expelled through **menstruation**

- 5b) if the ovum is **fertilized** the **zygote** (fertilized ovum) will **implant** itself in the uterine wall and the corpus luteum will continue to produce progesterone until the placenta is fully formed

**Fertilization to Pregnancy**
Oogenesis (Figure 42.14)

Primordial germ cells

- Oogonium (diploid)
  - Primary oocyte
    - Resting state
      - First meiotic division
        - Secondary oocyte
          - First polar body
            - Second meiotic division
              - Second polar body
                - Ootid (haploid)
                  - Ovum (haploid)

- Corpus luteum
- Ruptured follicle
- Primary oocyte
- Primary follicle
- Ovary
- Secondary oocyte
- Ovulation
- Mature follicle

(b)
Ovarian follicles

Ovum

Haploid oocyte

Endometrium
The Menstrual Cycle

■ The **menstrual cycle** is trigged as a result of the ovarian cycle and **hormone production**

■ The menstrual cycle has **3 main phases**:
  - The **menstrual phase**: period of **bleeding** due to the expulsion of the endometrium and the unfertilized ovum
  - The **proliferation phase**: the **endometrium** begins to the **thicken**, **estrogen** levels increase due to new ovarian follicle
  - The **secretory phase**: endometrium continues to thicken, **progesterone** levels increase from the corpus luteum
Fertility Period

An ovum lives about 12-24 hours

A sperm lives about 24-72 hours

Note: menstrual cycle always starts with menstruation!