Name _____ Biology Date _____ Collea/Oliver

MENSTRUAL CYCLE LAB Background Information

Puberty and the Menstrual Cycle

When a human female is born, her ovaries already contain all the immature eggs that will later mature and produce functional eggs during her lifetime. Eggs usually begin to mature between the ages of 12 and 14, when a release of hormones triggers **puberty**, and a young woman reaches sexual maturity. Most commonly, eggs mature every 28 days or so. They usually mature **ONE** at a time, in alternating ovaries. This rhythmic maturation of eggs and of chemical and physical events are called the **menstrual cycle**.

Endocrine Gland	Hormone	Function
Anterior Pituitary	FSH	 Stimulates follicular growth in ovaries Stimulates estrogen secretion (from developing follicles)
	LH	Surge causes ovulationResults in the formation of a corpus luteum
Ovaries	Estrogen	 Thickens uterine lining (endometrium) Inhibits FSH and LH for most of cycle Stimulates FSH and LH release pre-ovulation
	Progesterone	Thickens uterine lining (endometrium)Inhibits FSH and LH

The Pituitary Gland

The pituitary gland is located at the base of the brain and secretes the hormones **FSH** and **LH**. Increasing levels of a hormone, **FSH** (follicle stimulating hormone), eggs start to mature in a woman's ovary. Each egg matures inside an egg sac, or follicle. When the egg is fully mature, another hormone, **LH** (luteinizing hormone) reaches peak level, causing the follicle to burst and the release of the egg. The process is called ovulation. Tiny microscopic hairs called cilia at the opening to the Fallopian tube will sweep the egg into the tube which leads to the uterus.

- FSH stimulates the egg to mature
- L<u>H</u> causes the egg to rupture from the ovary in a process called **ovulation**!

The Ovary

The ovary produces the hormones **estrogen** and **progesterone**. As a result of the increasing levels of the hormone **estrogen**, the lining of the uterus has been prepared to receive a fertilized egg by building up its lining with nurturing tissues and blood vessels. After ovulation, the ovary releases the hormone **progesterone**. High levels of **progesterone** to help maintain the uterine lining.

- Estrogen builds up the uterine lining
- **Progesterone** maintains the uterine lining

If the egg is **NOT** fertilized and it does not implant in the uterus lining, the thick lining is no longer needed. Both **estrogen** and **progesterone** levels **drop** causing the lining to shed and pass out of the body in a process called menstruation (a period or menses). **Menstruation** marks **Day 1** of the monthly menstrual cycle.

If fertilization takes place, the uterine lining needs to remain thick to support the developing embryo. Progesterone levels stay high to support the thick lining.

All of these changes are coordinated by hormones carried in the bloodstream from their releasing glands to their responding target cells. The hormones act through **feedback mechanisms**, which keeps hormone **balance**. Increased or decreased hormone concentrations can occasionally trigger hormone release or slow down hormone secretion.

Part A: Hormones from the Pituitary Gland and the Ovary Figure 1:

Hormones from the Pituitary gland:
 Follicle Stimulating Hormone (FSH) stimulates the egg to mature
 Luteinizing Hormone (LH) causes the egg to rupture from the ovary - ovulation!



Part B: ANATOMY

Review and label the anatomy of the human female reproductive system.

a. **<u>ovary</u>**: the female reproductive organ in which eggs are produced. It also acts as a gland and secretes estrogen and progesterone sex hormones.

b. **<u>uterus (womb)</u>**: the muscular organ in which a fetus develops and is nurtured during pregnancy.

c. **<u>uterus lining</u>**: the inner tissue in the uterus which builds up in preparation for the implantation of a fertilized egg. It is rich in blood vessels to nurture the embryo.

d. eqq (ovum): female sex cell with one copy of the mother's genes.

e. **Fallopian tube (oviduct)**: two very thin tubes that serve as a path for the egg from the ovaries to the uterus.

f. **vagina:** muscular tube that serves as the birth canal for delivering the baby from the uterus (womb) to the outside world.

g. **follicle**: tissue in ovary surrounding developing egg. The follicle cells are the cells of the ovaries that secrete the hormone, estrogen.

h. **<u>cervix</u>**: opening of the uterus that leads to the vagina. During birth, the cervix must dilate enough (up to 10 cm or —4 inches) to allow the baby to pass through.

SUMMARY QUESTIONS



Name	
Biolog	y

Date _____ Collea/Oliver

MENSTRUAL CYCLE LAB

Summary Questions

1. Part A: FSH Questions

- a. What gland secretes FSH (follicle-stimulating hormone)? ______ The Pituitary Gland
- b. On what day does the FSH reach its peak concentration? Day <u>14</u>
- c. What happens to the egg follicle in the ovary as FSH rises (during Days 1-12)?

The egg follicle is maturing and growing.

d. If the picture below is illustrating a cell secreting FSH, then draw what the receptors would look like on the target cell in the ovary. Label the **pituitary gland** and the **ovary**.



2. Part A: Estrogen Questions

- a. What gland secretes estrogen? ______ The ovary
- b. On what day does the estrogen reach its peak concentration? Day <u>13</u>
- c. What happens to the uterus lining during days 1-12 days, as estrogen is rising?

As estrogen is rising, the uterine lining is building up and becoming thicker.

d. If the picture below is illustrating a cell secreting estrogen, then draw what the receptors would look like on the target cell in the uterus. Label the **ovary** and the **uterus**.





TARGET CELL Uterus

3. Part A: LH Questions

- a. What gland secretes LH (luteinizing hormone)? _____ The Pituitary Gland
- b. On what day does the LH reach. its peak concentration? Day _____
- c. What happens to the egg in the ovary on Day 14 after LH levels reach their peak?

After LH reaches its peak, the ovary releases an egg in the process of ovulation.

d. If the picture below is illustrating a cell secreting LH, then draw what the receptors would look like on the target cell in the ovary. Label the **pituitary gland** and the **ovary**.



4. Part A: Progesterone Questions

- a. On Day 14 the egg is released (ovulation). After that the corpus luteum forms in the remaining follicle.and it starts releasing **progesterone**. On what day does the progesterone reach its peak concentration? Day 21
- b. While progesterone stays at a high level what happens to the lining of the uterus?

While progesterone stays at a high level, the lining of the uterus remains thick.

c. If the woman **does not** get pregnant, then the corpus luteum breaks down and the level progesterone starts declining. Once progesterone decreases what happens to the lining of the uterus?

Once progesterone starts declining, the uterine lining breaks down in the process of menstruation.

Structure:	Function:
ovary	produces and releases an egg; acts as a gland to release estrogen and progesterone
fallopian tube	path of the egg; site of fertilization
uterus	muscular organ in which the fetus develops and is nutured
uterine lining	builds up in preparation of a fertilized egg; rich in blood vessels to nurture embryo

5. **Part B & C Questions: Explain the role of the following structures:**

Use Figures 2B AND 3B "Day by Day Changes in The Menstrual Cycle" to complete questions 7-10.

Days 1-4

- 7. Describe the changes that take place during the menstrual cycle from **Day 14** to the following:
 - a. unfertilized egg in ovary A new follicle starts to grow.
 - b. uterus lining The uterine lining is shedding during the process of menstruation.
- 8. Describe the changes that take place during the menstrual cycle from **Day 5-13** to the following:
 - a. unfertilized egg in ovary ______ The follicle is maturing into an egg.
 - b. uterus lining ______ The uterine lining is building up.
- 9. Describe what happens to the egg during the menstrual cycle on **Day 14**.

The egg is released from the ovary in a process called OVULATION.

- 10. Describe the changes that take place to an **egg...**
 - a. from Day 15-28, if **no fertilization** occurs. The egg, blood and tissues are expelled from the uterus through the

process of menstruation.

- b. from Day 21-266, if **fertilization** does occur. The egg develops into an embryo
- 11. Explain why the female needs a thick uterus lining if fertilization does occur.

The uterine lining provides nuturing tissues and blood vessels to support the developing fetus.

- At what time during a woman's menstrual cycle is it easiest to become pregnant?
 During ovulation on Day 14 of the mentrual cycle. (14 days after a woman STARTS her period)
- 13. Why is this whole process called a "cycle"?

It is called the menstrual cycle because it repeats itself.

14. Complete the chart below by writing "increase" or "decrease" to show how the menstrual cycle is an example of a feedback mechanism.



15. Match the following diagrams with their places on the chart of Days by writing each letter from the chart below the proper diagram. The first one is done for you.



16. Examine the pictures below. Then answer the questions beside each diagram.



Name: _

Figure 2A: No Fertilization of the Egg

Review the calendar and the boxes below. Determine the order of the boxes and then cut them out and place on the appropriate **EMPTY** date on the calendar labeled **"Figure 2B Day by Day Changes in The Menstrual Cycle: No Fertilization of Egg."**

NOTE: Do **not** paste over the days with writing in them. Paste into the **empty** day **next** to the correct description.



Figure 3A: No Fertilization of the Egg

Review the calendar and the boxes below. Determine the order of the boxes and then cut them out and place on the appropriate **EMPTY** date on the calendar labeled **"Figure 3B Day by Day Changes in The Menstrual Cycle: Fertilization of Egg."**

NOTE: Do **not** paste over the days with writing in them. Paste into the **empty** day **next** to the correct description.

