

PURPOSE

To help students deepen their awareness of the brain and hormone connection and confidently identify hormonal biomarkers in a cycle chart.

LEARNING OBJECTIVES

By the end of the lesson students will be able to:

1. Understand the connection between hormones, the body and the brain.
2. Identify the four main reproductive hormones and their role in the cycle.
3. Identify the body's reproductive health biomarkers.

MATERIALS & RESOURCES

- Lesson 5 teenFEMM powerpoint
- Worksheet: Biomarker Symbols Chart + Answer Key
- Review Activity: Puzzles
- FEMM Practice Chart: *Misha*
- FEMM Chart

VOCABULARY

- **Charting:** learning to identify and write down reproductive health biomarkers.
- **Biomarkers:** signs of hormonal and other changes in your body. Biomarkers include fluids such as menstruation and cervical fluid, and other physical and emotional symptoms.
- **Cervical Fluid (mucus):** Fluid secreted by the cervix which changes in consistency (dry/moist) based on changing hormone levels.
- **Menstruation/Period:** At the end of each cycle the lining of the uterus sheds, which causes bleeding.

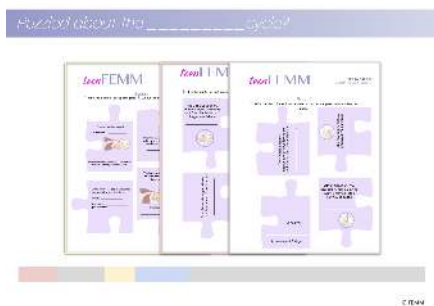
PREPARATION

- ☐ Print three copies of the **Review Activity: Puzzles**. Students will need scissors.
- ☐ Print the **Biomarker Symbols Chart Worksheet** for each student. Students will need pencil crayons in the colors of red, yellow, blue and gray.
- ☐ Print and cut out a **FEMM Practice Chart: Misha** for each student.
- ☐ Print a **FEMM Chart** (double-sided) for each student.

PROCEDURE

Step 1 (5 minutes): Review Activity: Puzzles

Divide the class into three groups. Give each group one of the puzzles.



Instructions:

1. Fill in the blank to answer the question on each puzzle piece.
2. Cut out the pieces and complete the puzzle.
3. Once groups have completed their puzzle, have the class arrange the three puzzles in the correct order of the cycle events.

Step 2 (10 minutes): Hormones + Biomarkers

Estrogen & Progesterone for your body

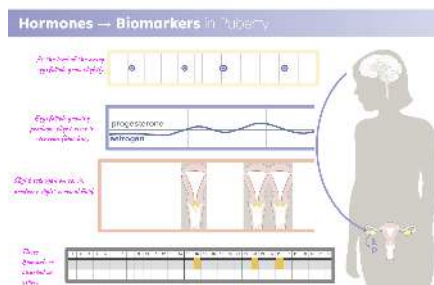
	Estrogen	Progesterone
uterus:	tones, contracts	relaxes
uterine lining:	grows	maintains
breasts:	grows	normalizes
bones:	develops	maintains
blood vessels:	dilates, increases flow	relaxes, normalizes clotting
brain cells:	stimulates	maintains and heals
well-being:	normal levels promote well-being; <u>high levels increase anxiety</u>	promotes sleep and relaxation; <u>decreases anxiety</u>

The image shows a table comparing the effects of Estrogen and Progesterone on various body parts. To the right of the table is a silhouette of a female figure with a brain highlighted, indicating the effects on brain cells and well-being.

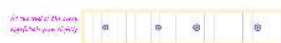
As you are learning, hormones direct all of the physical changes of puberty. Hormones impact **every part** of the body. From the development of the pathways in the brain, to emotional wellbeing, blood vessels, breasts, bones and more. The hormones produced through the ovulatory cycle are vital to overall physical and mental health.

Right now, during puberty, some of you will see signs of estrogen and progesterone before other girls do. You may have lower levels of hormones, but they will continue to develop as you mature through your teen years.

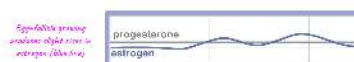
The amazing thing is that all of these hormonal changes are happening inside of us - directed by the brain and happening in the ovaries - and we don't even have to think about them! This slide shows an example of how what is happening with hormones inside our body during puberty impacts what we observe on the outside.



1. The first image (**yellow frame**) →
on the slide shows the ovary.
The egg and follicle grow a little.



2. The second image (**purple frame**) →
shows the slight rise in estrogen,
from the growth of the egg in the ovary.



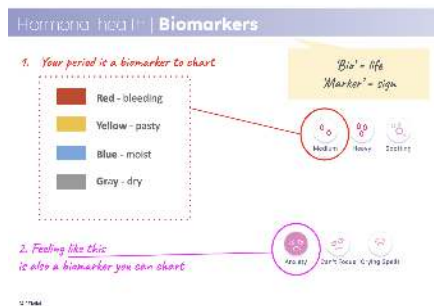
3. The third image (**pink frame**) →
shows the effects of this slight rise in
estrogen in the body, on the cervix.
The rise in estrogen produces a pasty type of cervical mucus.



4. The fourth image (gray frame) → shows a chart, with the body's cervical mucus observations, or **biomarkers**, written down.



What are **Biomarkers**? Bio means 'life' and marker means 'sign'. Biomarkers are signs of what's going on with the hormones inside of our body.



Biomarkers include fluids such as menstruation (bleeding) and cervical fluid, and also emotional and physical symptoms. Cervical fluid is the fluid secreted by the cervix which changes in consistency (from dry to moist) based on the changing hormone levels in the body.

Charting is a way to record these **biomarkers** by writing them down on paper. As your hormonal axis (the communication between your brain and your ovaries) is still developing through your teen years, charting is a great way to be able to see and understand when this process begins for you and make sure it develops as it should. (This is important to note. In grade 8, most of the girls will be menstruating, but there may be a few who are not.)

Step 3 (10 minutes): Worksheet: Biomarker Symbols

Hand out the **Worksheet: Biomarker Symbols** to students, along with pencil crayons.

Date	Symbol	Hormones	Biomarker observation
	REDS	very low estrogen + progesterone	bleeding
			pasty
			moist or slippery
			dry

Today we are going to look at charting (to record on paper) the biomarkers (signs) of hormones that you can observe in your body. Let's fill in the **Biomarker Symbols** chart together.

Probably the most obvious biomarker is menstruation or getting your period.

Bleeding is a sign that the lining of your uterus, called the endometrium, is shedding. This is a normal and vital sign of hormonal health. To chart this, we use the color red. *Students should color in the appropriate box "red" on their Worksheet.*

There are additional symbols you can chart when it comes to your period:

H for heavy

M for moderate

L for light

S for spotting

Spotting is when you have bleeding that is very light or happens outside the time of your menstruation.

A healthy period should last from 3-7 days with at least one day of M or H bleeding if you have had your period for two years or more. During your period (menstruation) both estrogen and progesterone are very low. Why? Remember that the period comes at the end of the ovulatory cycle, and so estrogen is falling and progesterone is dropping after the corpus luteum stops producing progesterone.

Next, after your period, **estrogen** is once again beginning to rise (triggered by FSH in the brain) starting a new cycle. This rise in estrogen in the body acts on the cervix (the small canal at the base of the uterus), producing cervical mucus. **Low levels of estrogen** produce low levels of cervical mucus. As this fluid travels down the vaginal canal, you might observe a pasty or crumbly observation on the inside of your underwear, or on a tissue when you wipe. Totally normal. What color do you chart for this type of cervical mucus? "**Yellow**". *Students should color in the box yellow and write down "low estrogen" under Hormone.*

As estrogen continues to rise, this changes the cervical mucus to a more fluid/wet sensation outside of the vagina. **High levels of estrogen** in the body produce high levels

of cervical mucus. You may feel some wetness or notice a slippery sensation when you use the bathroom or after playing sports. This type of cervical mucus is normal and a sign of your hormonal health. Tracking your cycle can help you to recognize this and feel confident about your body.

To chart this fluid sensation, which indicates high levels of the hormone estrogen, we use the color “**Blue**”. *Students should color in the corresponding box **blue** and write “high estrogen” under Hormone.*

When estrogen is high, this sends feedback to the brain to produce LH (luteinizing hormone) to trigger ovulation. After ovulation, the empty follicle becomes the *corpus luteum* and produces the hormone Progesterone. This changes the cervical mucus once again to a thick mucus. Because this type of mucus is thick, not like estrogen-type mucus, it doesn’t travel towards the vaginal canal and instead of “moist or slippery”, the hormone progesterone is experienced as “dry” at the level of the vagina. *Gray is the color we use to chart the observation/experience of “dry” and the hormone to write is Progesterone.*

*Have students check their Biomarker Symbol Chart against the following slide to ensure it is correct, or use the **Teacher’s Answer Key** provided in the materials.*

Biomarker Symbols: Answer Key

Color	Symbol	Hormone	Biomarker observation
Red	HMLLS	very low estrogen + progesterone	bleeding
Yellow		low estrogen	sticky
Blue		high estrogen	moist or slippery
Gray		progesterone	dry

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Now that you have this handy **Biomarker Symbol** worksheet filled in, you have a great reference for charting the different hormones as they change in your body throughout each cycle.

Step 4 (10 minutes): Learn to Chart Hormonal Health; **FEMM Practice Chart: Misha**
*Hand out a **FEMM Practice Chart: Misha** to each student.*

Practice | Learn to chart hormonal health!

teenFEMM

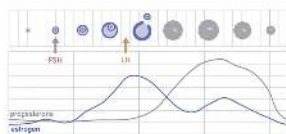
Practice Chart



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(For students who took the teenFEMM course in 7th grade: Does anyone remember learning to chart the cycle from last year?) Did you know that FEMM has a free app for Apple and Android phones to support you in your charting? Allow students to participate by simply raising hands or sharing anything they might remember from last year.

Immature cycle looks like:



This is what a mature ovulatory cycle looks like if the hormones estrogen and progesterone were graphed.

This slide shows what a mature ovulatory cycle looks like, when estrogen and progesterone are produced in the proper amounts through ovulation. You can see Estrogen in blue and Progesterone in gray.

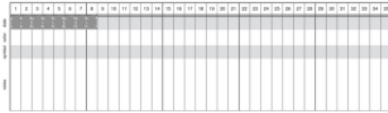
For now, let's look at charting the signs of hormonal health with Misha, as her cycle is still maturing.

Misha is in Grade 8. On days **1-8** of her cycle, she doesn't notice anything and feels dry. What color should she use to chart this?

Click on the slide to reveal the answer. (Gray.)

Making sense of your cycle in puberty

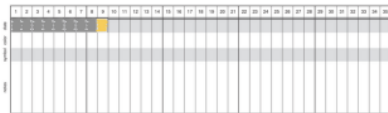
Days 1-8 she doesn't notice anything, and feels dry. What color should she fill in on those days?



On **Day 9**, she notices a slight change to sticky or pasty. What color should she use to chart this biomarker? *Click on the slide to reveal the answer. (Yellow.)*

Making sense of your cycle in puberty

Day 9 she notices a slight change to sticky. Or, maybe it's pasty. What color should she use to chart this biomarker?



On **Days 10, 11, and 12**, she feels dry again. What color does she chart with? *Click on the slide to reveal the answer. (Gray.)*

Making sense of your cycle in puberty

Days 10, 11, and 12 she feels dry again. What color does she use to chart this?



On **Day 13** she notices similar mucus to what she experienced on day 9. What color does she use to chart? *Click on the slide to reveal the answer. (Yellow.)*

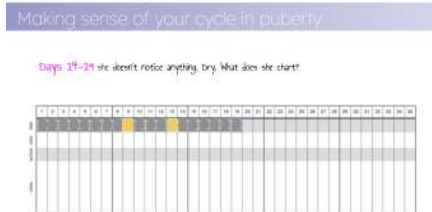
Making sense of your cycle in puberty

Day 13 she notices similar mucus to what she experienced on day 9. What color does she use?



Days 14-19, she doesn't notice anything. Dry. What color does she use to chart? *Click on*

the slide to reveal the answer. (Gray.)



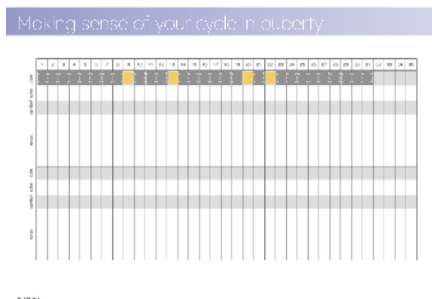
Day 20, she notices a crumbly mucus again. (Yellow.)

Day 21 she feels dry again. (Gray.)

Day 22 she notices a slight something (Yellow.)

Day 23-31 she experienced dryness. (Gray.)

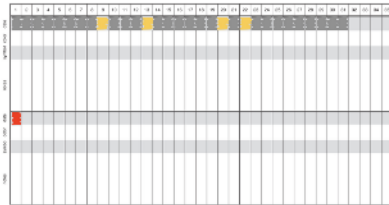
Show the next slide with the completed chart and go over answers together to clarify as needed.



For this cycle, we see that estrogen levels are still low for Misha. She doesn't observe any slippery or high estrogen-type mucus. *Why is this?* Because Misha is not yet ovulating. As a result, her estrogen levels are low and her progesterone levels are staying at the same level. This is a normal and healthy chart for a girl her age in puberty. Her brain is beginning to communicate with her ovaries and her hormones are "waking up" and preparing for a full ovulatory cycle. Until then, she is producing a very small amount of mucus that she notices as a pasty or crumbly mucus.

What happened on day 32? Any guesses?

Making sense of your cycle in puberty



She got her period (menses). She would chart this by starting a new line, counting the first day of her period as Day 1 on the next row on her chart.

CONCLUSION

Provide each student with a **FEMM Chart** for their use.

Review | Chart Your Health

- Charting helps YOU to create your very own health record.
- This helps you to see what your hormones are doing inside of your body!
- Taking time to learn to track your biomarkers helps you to understand your body, feel confident in your body and support your emotional and physical health.



You did a great job today! You can take a FEMM chart home with you and try to chart your own cycle biomarkers. Everyone will be at different stages of their cycle, so it's important to remember that charting is about **your** very own private health record. Charting helps you monitor what's happening with your hormones and your health. It's pretty amazing that as women we can track these signs and have a window into the health of our body! In the next few lessons, we will talk more about what we can do to help keep our hormones and bodies healthy.

REFERENCES

Vigil, P., Ceric, F., Cortés, M.E., & Klaus, H. (2006). Usefulness of monitoring fertility from menarche. *Journal of Pediatric Adolescent Gynaecology*, 19(3), 173-9.

<https://doi.org/10.1016/j.jpaga.2006.02.003>