🔬 Lesson Plan: The Endocrine system and Reproduction

Grade Level: 8
Subject: Life Science
Duration: 45–60 min
NGSS MS-LS1-3: Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.

🎯 Learning Objectives

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

- **Identify** the major endocrine glands shown in the Study Guide, including the hypothalamus, pituitary gland, thyroid, adrenal glands, pancreas, ovaries, and testes.
- **Explain** how a hormone released into the bloodstream reaches the whole body but changes

- **Hormone:** A chemical messenger made by an endocrine gland and carried in the blood to the rest of the body. Because the blood reaches everywhere, a hormone can speed up, slow down, or switch on a body activity far from the gland that made it.
- **Target cell:** A cell that reacts to one particular hormone because that hormone's structure matches it. An organ without the matching target cells will not respond to a hormone even when that hormone is in its blood supply.
- **Negative feedback:** The control method the endocrine system uses to stop releasing a hormone once the amount in the blood is high enough, the same way a house heater shuts off once the room is warm enough.

- **Hypothalamus:** A small part of the brain that links the nervous system to the endocrine system. It sends nerve impulses to endocrine glands that control hunger, sleep, and other important body functions.
- **Pituitary gland:** A peanut-sized gland just below the hypothalamus. When nerve impulses reach it, it releases hormones that direct the other endocrine glands to take action, which is why it controls so many body functions at once.
- **Menstrual cycle:** The monthly set of changes in the female reproductive system. It begins when an egg starts to mature in one of the ovaries and the uterus starts to thicken; the egg is then released into the oviduct in a process called ovulation, and if it is not fertilized, the egg and the uterus lining break down and pass out of the body.

💼 Materials Needed: (all links are included in this PDF)

- Printed copies of the Study Guide: The Endocrine System and Reproduction

- Clear jar of water and one bottle of food coloring, to model a hormone spreading through the bloodstream
- A padlock with a ring of keys of which only one fits, to model a hormone matching its target cells
- A household thermostat, or a photograph of one, to model negative feedback

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📝 Lesson Procedure

Step 1: Introduction (5 minutes)

- Ask students: 'Your heart pounds within seconds when something startles you, but growing taller takes years. How can one body control both a fast change and a slow one?'
- Explain that the endocrine system handles both jobs using chemical messengers called hormones, and that this lesson follows those messengers from the brain to the reproductive organs.
- Display the labeled gland diagram on page 1 of the Study Guide and have students name every gland they can already place on the body outline. (https://newpathworksheets.com/api/guide/study-guide-science-grade-8-the-endocrine-system-and-reproduction-1.pdf)

Step 2: Direct Instruction (15 minutes)

- Work through the Study Guide diagram gland by gland: hypothalamus, pituitary gland, thyroid, adrenal glands, pancreas, ovaries, and testes, naming what each one controls. (https://newpathworksheets.com/api/guide/study-guide-science-grade-8-the-endocrine-system-and-reproduction-1.pdf)
- Demonstrate hormone transport by adding one drop of food coloring to the clear jar of

topic (endocrine system, endocrine glands, amniotic sac) and have students mark the terms that come from other Human Body units. (https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-8-the-endocrine-system-and-reproduction-1-1.pdf)

- Work through Practice Worksheet 1 as a class, comparing the testes, which make testosterone and sperm cells, with the ovaries, which make estrogen and egg cells, and tracing the egg from ovary to oviduct to uterus. (https://newpathworksheets.com/api/worksheet/worksheet-science-grade-8-the-endocrine-system-and-reproduction-1-1.pdf)

Step 4: Independent Practice (15 minutes)

- Have students complete Practice Worksheet 0 on their own, covering hormones, target cells, the hypothalamus, and the jobs of the pituitary gland. (https://newpathworksheets.com/api/worksheet/worksheet-science-grade-8-the-endocrine-system-and-reproduction-1-0.pdf)
- Assign Practice Worksheet 2, which follows the egg from ovulation through fertilization, the amniotic sac, the placenta and umbilical cord, the three stages of childbirth, and the growth stages from infancy to adolescence. (https://newpathworksheets.com/api/worksheet/worksheet-science-grade-8-the-endocrine-system-and-reproduction-1-2.pdf)
- Using the Study Guide, ask students to sketch and label the path of an egg cell from the ovary to the oviduct to the uterus and to mark the point where a zygote would form. (https://newpathworksheets.com/api/guide/study-guide-science-grade-8-the-endocrine-system-and-reproduct-1.pdf)

Step 5: Assessment (10 minutes)

Differentiation Strategies

For advanced learners:

- Have students diagram the full hypothalamus to pituitary gland to target gland chain for one hormone and mark the point where negative feedback shuts the chain down.
- Ask students to argue, using the Study Guide, why an underactive thyroid can disturb the menstrual cycle even though the thyroid is not part of the reproductive system.

For learners needing support:

- Give students a desk-sized copy of the Study Guide gland diagram with the hypothalamus and pituitary gland already highlighted so they can locate glands while answering worksheet questions.
- Leave the padlock and ring of keys at the desk so students can physically test which key fits before writing why a hormone changes only its target cells.

Extension Activities

- Run a hormone relay: assign groups the hypothalamus, the pituitary gland, and a target gland, then have them pass a labeled token to act out the signal path and call out where negative feedback stops it.
- Map the menstrual cycle on a 28-day calendar strip, marking when the uterus lining thickens, when ovulation releases the egg into the oviduct, and when menstruation begins.
- Order picture cards of labor, delivery, and afterbirth into the three stages of childbirth and

- Vocabulary PDF 1 (https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-8-the-endocrine-system-and-reproduction-1-1.pdf)
- Vocabulary PDF 2 (https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-8-the-endocrine-system-and-reproduction-1-2.pdf)
- Vocabulary PDF 3 (https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-8-the-endocrine-system-and-reproduction-1-3.pdf)
- Vocabulary PDF 4 (https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-8-the-endocrine-system-and-reproduction-1-4.pdf)
- Vocabulary PDF 5 (https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-8-the-endocrine-system-and-reproduction-1-5.pdf)

THE ENDOCRINE SYSTEM AND REPRODUCTION

Hormones and the Endocrine System

The **endocrine system** controls long-term and short-term changes of the body and many of the daily activities of the body. The system is made up of glands, which are organs that produce and secrete chemicals.

Hormones

Endocrine glands release chemicals called hormones into the bloodstream, which will then be carried throughout the body.

There are many hormones, and each controls different functions of the body. They speed up or slow down and/or turn on or off activities of the body. Because hormones are transported by the blood, they are able to regulate body activities far away from the glands in which they are produced.

Hormones can cause quick changes that are short-term, such as adrenalin to help you move or think quickly during an emergency, or slow responses that are long-term, such as human growth hormone which works over time to spur your body's growth. Hormones are able to target specific organs because they all have a unique chemical structure. A particular hormone will only react with specific target cells.

A **target cell** is a cell that will only recognize a hormone that has a certain chemical structure. An organ that does not have the specific target cells for a hormone will not react with that particular hormone. Each endocrine gland produces a particular hormone and releases it into the bloodstream.

Lesson Checkpoint:

reaches a certain level.

Hypothalamus

The **hypothalamus** is a small part of the brain that links the nervous system and the endocrine system together.

The hypothalamus sends nerve impulses to the endocrine glands that control hunger, sleep, and other important body functions.

Pituitary

The structure immediately below the hypothalamus that is the size of a peanut communicates with the hypothalamus to control many body functions. This is the **pituitary gland**.

The pituitary gland releases hormones in response to receiving nerve impulses from the hypothalamus. The hormones from the pituitary gland direct other endocrine glands to take action.

Lesson Checkpoint:
Where is the hypothalamus located?

Male and female reproductive systems

As we learned in Topic 5, a male produces a sperm sex cell and a female produces an egg sex cell. When the two sex cells come together, the egg is fertilized and becomes a **zygote**.

Testosterone is the **hormone** that controls the physical characteristics of men. **Sperm** starts being produced in a male at some point during their teenage years. The sperm is composed of a head with the male DNA inside and a tail.

Once the sperm are formed in the testes, they mix with a fluid. The fluid produced is called **semen**. When the semen leaves the body, they exit through the urethra and a structure called the penis.

The **female reproductive organs** produce egg sex cells and nourish the developing offspring until birth if an egg is fertilized.

There are two **ovaries** that are located on each side of the body. The ovaries produce the egg cells and the hormone called **estrogen**. Estrogen is the **hormone** of the female reproductive system that controls the physical characteristics of a female. The ovaries are connected to the uterus by structures called **oviducts**. The uterus is a muscular organ where the egg develops after fertilization. Once the baby is fully developed, it exits through a muscular structure that leads to the outside of the body called the **vagina**.

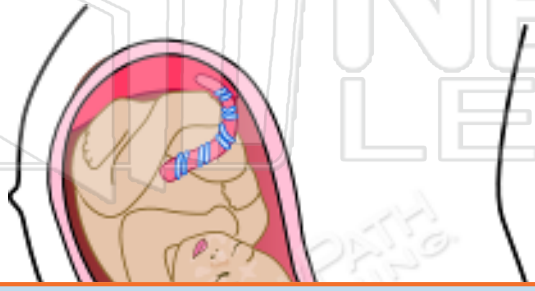
the oviduct. This is the time that an egg may be fertilized by a sperm cell. If the egg is not fertilized, both the egg and the lining of the uterus will begin breaking down and pass through the vagina in a process called **menstruation**. This process takes between 4 and 7 days. During menstruation another egg starts to mature. Menstruation begins in females from the ages 10 through 14 years of age.

Lesson Checkpoint:
What is happening in one ovary while a female is menstruating?

The Human Life Cycle

As we know, a fertilized egg becomes a **zygote**. The zygote develops into an **embryo**. Then the embryo develops into a **fetus**. Nine months after fertilization takes place, a baby will be born.

Once the zygote develops into an embryo, the embryo will attach to the lining of the uterus. A membrane will then surround the embryo and develop into a sac that is fluid-filled called an **amniotic sac**.



The **umbilical cord** forms between the embryo and the placenta. At about the 9th week of pregnancy, the embryo is called the fetus. Organs have already begun to develop at this point. After approximately nine months, the baby is ready to be born.

Lesson Checkpoint:
Why is the placenta important?

Three stages of childbirth

There are three separate stages of child birth: **labor, delivery, and afterbirth.**

Labor: The first stage of child birth called labor is when the muscles of the uterus begin to contract. These contractions cause the cervix to widen so that the baby can fit through the vagina.

Delivery: The second stage of birth is delivery. This is the process of the baby exiting the uterus through the vagina. The umbilical cord is cut moments after delivery.

Afterbirth: Shortly after delivery, the third stage of birth begins called the afterbirth. During this stage, the placenta is delivered through the vagina. Moments after a child is born, the child will begin to breathe on its own.

Stages of Human Growth

- **Infancy** is the first two years of a child's life when many changes

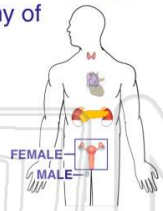
The Endocrine system and Reproduction

Sci H

Name_____ Class_____ Date_____

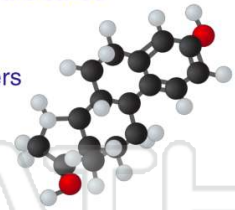
1 The **endocrine system** controls long-term and short-term changes of the body and many of the daily activities of the body.

A true
B false



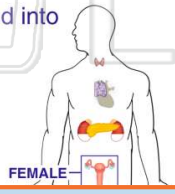
2 The **chemicals** created by the endocrine system are called _____.

A neurotransmitters
B proteins
C hormones
D carbohydrates



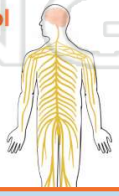
3 **Hormones** are released into the bloodstream by _____ glands.

A eight pituitary
B endocrine



4 The hormones are in **control** of _____.

A the brain
B the nervous system
C the functions of the body



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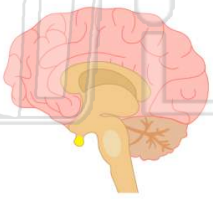
7

C impulses, hormones
D hormones, impulses

C It links the digestive system and the endocrine system together.
D It makes all of the hormones in the body.

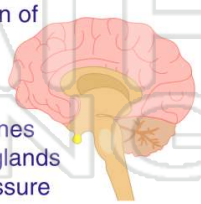
9 The structure immediately **below** the hypothalamus is called the _____.

A kidney
B pancreas
C target cell
D pituitary gland



10 Which is not a function of the **pituitary gland**?

A regulate growth
B release sex hormones
C control endocrine glands
D regulate blood pressure



The Endocrine system and Reproduction

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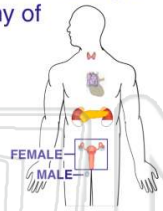

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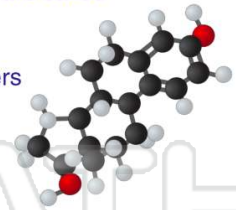

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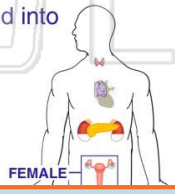

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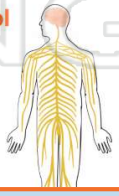

C

5

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7

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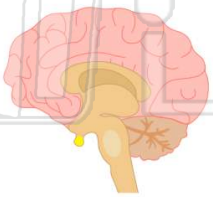

D

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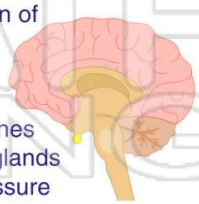


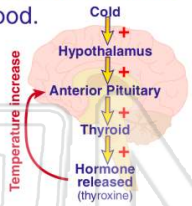
B

The Endocrine system and Reproduction

Sci H

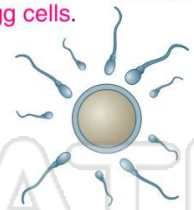
Name_____ Class_____ Date_____

1 _____ is a system used by the endocrine system to **control** the levels of hormones in the blood.



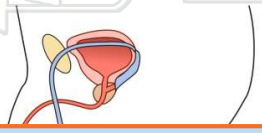
A Negative feedback
B Positive feedback
C Neutral feedback
D Feedback

2 The **male reproductive system** is specialized to produce the estrogen hormone and egg cells.



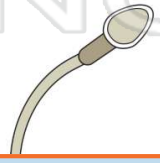
A true
B false

3 Which structure(s) of the male reproductive system produces **testosterone**?



A scrotum
B urethra
C testes

4 What are two structures of a **sperm cell**?



A head and tail
B head and foot
C tail and egg
D tail and thorax

5

7

C ovaries
D vagina

D vagina

9 The _____ is a **muscular organ** of the female reproductive system that leads to the outside of the body.

A oviducts
B uterus
C ovaries
D vagina

10 The **menstrual cycle** starts when the _____.

A uterin walls thicken
B egg is released from the ovaries
C egg is fertilized
D egg begins to mature in the ovaries

The Endocrine system and Reproduction

Sci H

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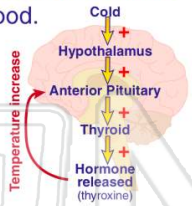

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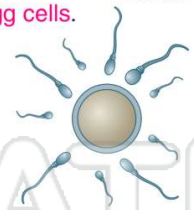

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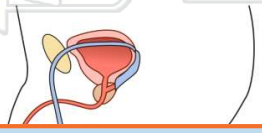

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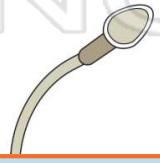

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The Endocrine system and Reproduction

Sci H

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1 In a process called _____, the **egg is released** from the ovary into the oviduct.

A menstruation
B menstrual cycle
C ovulation
D ovaries

2 During **ovulation**, the egg may be fertilized by a sperm cell.

A true
B false

3 If the egg is **fertilized**, both the egg and the lining of the uterus will begin breaking down and pass through the vagina in a process called **menstruation**.

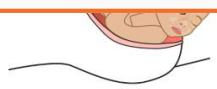
A true

4 The **fluid-filled membrane** that surrounds an embryo after fertilization is called _____.

A placenta
B zygote

C the placenta
D the amniotic sac

C delivery
D labor



9 During **infancy**, the child is able to perform many of its daily functions on its own.

A true
B false

10 Which process occurs at the beginning of **adolescence**?

A childhood
B infancy
C placenta
D puberty

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5

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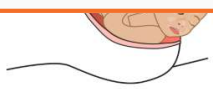

B

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A true
B false

B

10 Which process occurs at the beginning of **adolescence**?

A childhood
B infancy
C placenta
D puberty

D

The Endocrine system and Reproduction

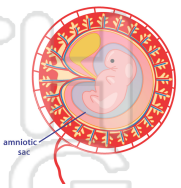
Sci H

Name_____ Class_____ Date_____

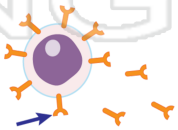
Match each of the following terms to its definition:

Appendicular skeleton	Endocrine glands	Endocrine system	Antibodies
Dermis	Axial skeleton	Antigen	Amniotic sac

1. - a membrane that surrounds an embryo and develops into a sac filled with fluid



2. - a specific protein produced by B lymphocytes that attaches to an antigen and leads to its removal

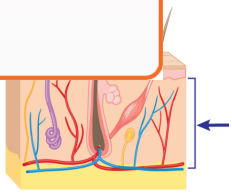


3. recogn

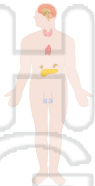
4. found

5. skelet

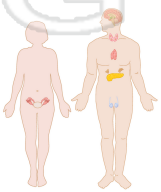
6. fat, wh



7. - glands found throughout the human body that act to control body functions by releasing hormones into the bloodstream



8. - a body system made up of different glands that control long-term and short-term changes of the body, including many daily activities of the body



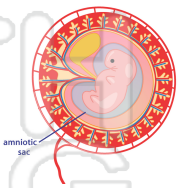
The Endocrine system and Reproduction

Name_____ Class_____ Date_____

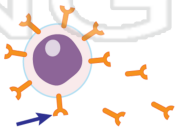
Match each of the following terms to its definition:

Appendicular skeleton	Endocrine glands	Endocrine system	Antibodies
Dermis	Axial skeleton	Antigen	Amniotic sac

1. amniotic sac - a membrane that surrounds an embryo and develops into a sac filled with fluid



2. antibodies - a specific protein produced by B lymphocytes that attaches to an antigen and leads to its removal



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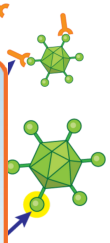

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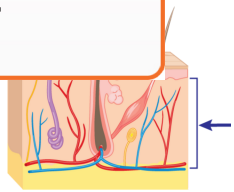
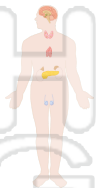


7. endocrine glands - glands found throughout the human body that act to control body functions by releasing hormones into the bloodstream



8. endocrine system - a body system made up of different glands that control long-term and short-term changes of the body, including many daily activities of the body