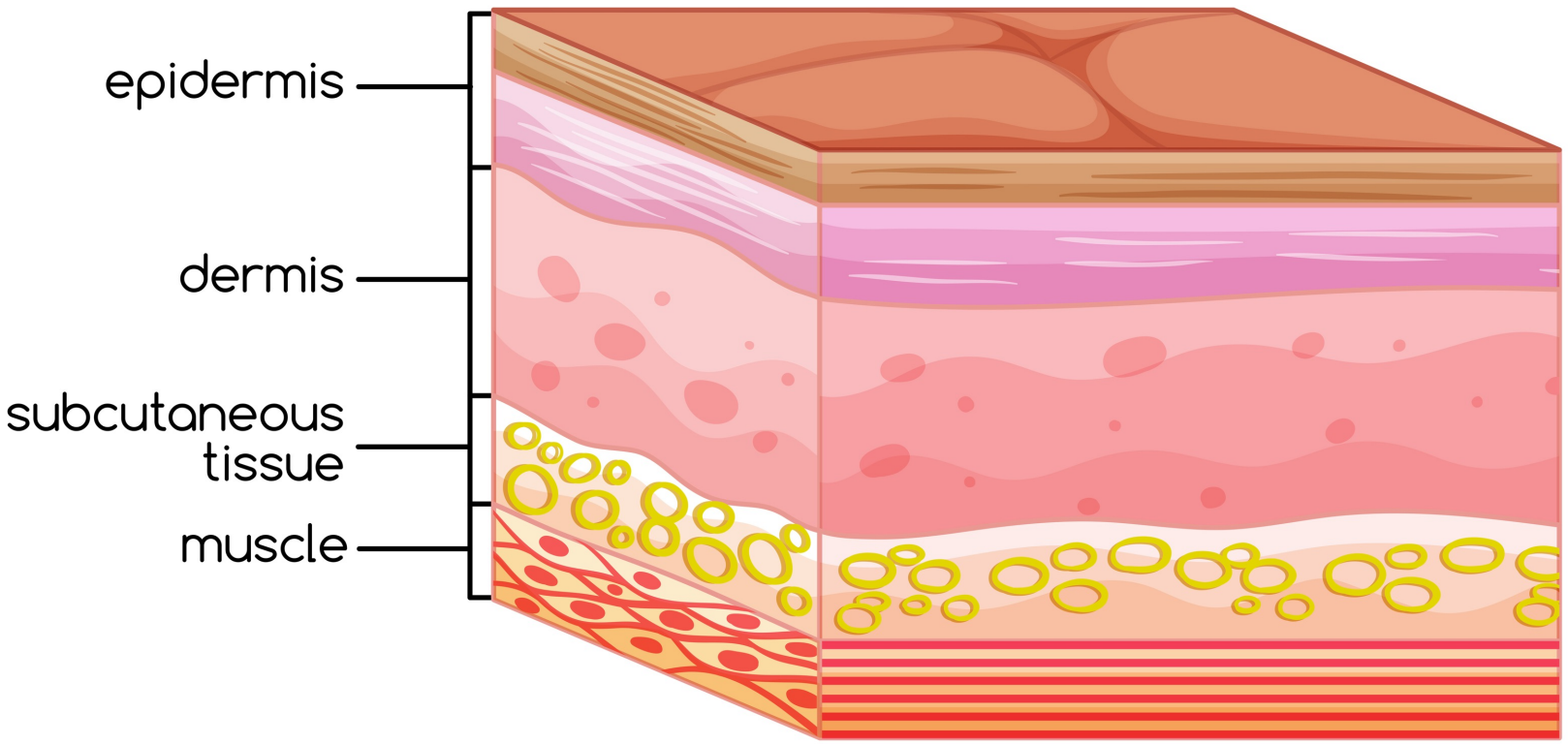
INTEGUMENTARY SYSTEM

Anatomy Unit



9 day unit

Includes print and digital

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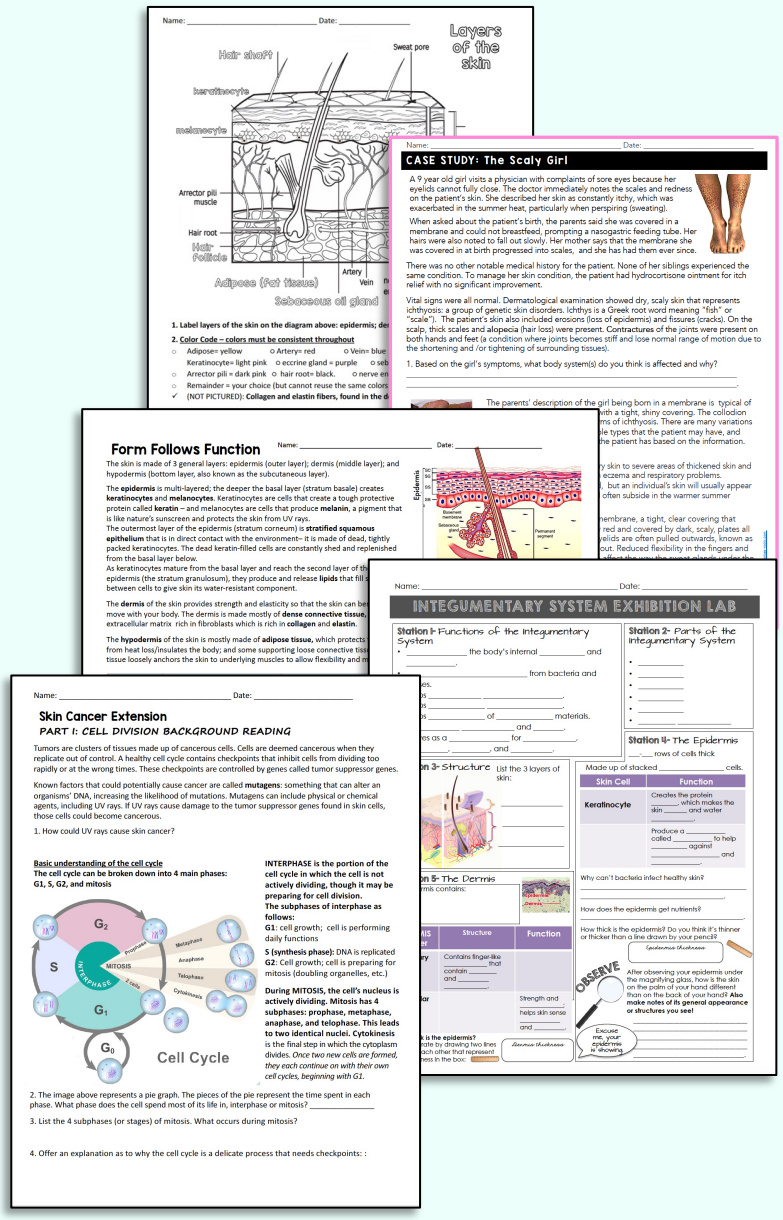
Integumentary System

Topics include:

- ✅ Layers of the Skin
- ✅ Form and function
- ✅ Skin as a sensory organ
- ✅ Hair and Nails
- ✅ Burns: degrees + severity
- ✅ Skin cancer



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INTEGUMENTARY UNIT ~50 MINUTE BLOCKS

DAY/DATE	STUDENT ACTIVITY AND TEACHER NOTES	LEARNING TARGET
1 _____	Integumentary System Notes (notes and open note quiz in notes folder) Open Note Quiz (students can partner-grade, self-grade, or teacher can collect) NOTE- ask students to bring a tissue box (or equivalent) for their model on Day 5. Not all students will be able to provide a box, so it's good to have extras!)	To introduce the functions and structures of the integumentary system
2 _____	Review Open Note Quiz Layers of the Skin Integumentary System Graphic Organizer (homework if not finished) .	To outline the structures in the integumentary system; To further explore the structures found in each layer of skin
3 _____	Skin Case Study Form Follows Function (homework if not finished) Heads up: Model tomorrow! Organize Materials for tissue box skin model *Heads up: Exhibition Stations (separate folder), coming up soon on Day 5 (protective sheets ensure you only need to print once!) Please review materials needed so you are prepared.*	To understand how faulty structures can lead to dysfunctional skin. To summarize how form follows function with the integumentary system.
4 _____	Build Skin Model Homework: Accessory Features *Heads up: Exhibition Stations next class- print and hang in classroom / set up materials*	To model the layers of the skin by building an accurate 3D portrayal of which layers contains which structures
5 _____	Give 10 minutes to finish skin model, if needed. Begin Integumentary System Stations *Heads up: Burn Simulation coming up- review and prepare materials* ***Heads up: Test coming up soon! Announce date (Day 9)***	To further review and explore the integumentary system; To explore tactile function in the skin
6 _____	Finish Integumentary System Stations (25 minutes) Begin Burn Unit Rule of Nines - model next class	To further review and explore the integumentary system; To explore tactile function in the skin

50 minute pacing guide

INTEGUMENTARY UNIT ~90 MINUTE BLOCKS

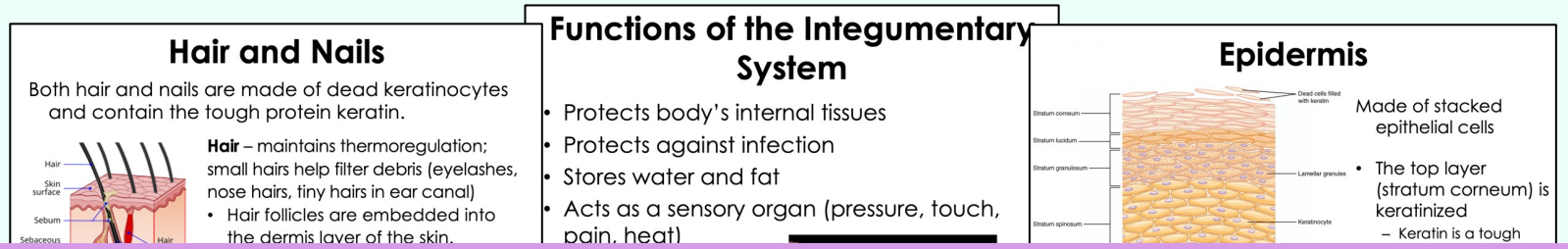
DAY/DATE	STUDENT ACTIVITY AND TEACHER NOTES	LEARNING TARGET
1 _____	Integumentary System Notes Open Note Quiz (students can partner-grade, self-grade, or teacher can collect) Layers of the Skin NOTE- ask students to bring a tissue box (or equivalent) for their model on Day 3. Not all students might be able to provide a box, so it's good to have extras!)	To introduce the functions and structures of the integumentary system; To further explore the structures found in each layer of skin To outline the structures in the integumentary system
2 _____	Review Open Note Quiz Integumentary System Graphic Organizer Graphic Organizer Skin Case Study Form Follows Function (homework if not finished) ***Heads up: Model tomorrow!*** Organize Materials for tissue box skin model. *Heads up: Exhibition Stations (separate folder), coming up soon on Day 4 (protective sheets ensure you only need to print once!) Please review materials needed so you are prepared.*	To understand how faulty structures can lead to dysfunctional skin. To summarize how form follows function with the integumentary system.
3 _____	Build Skin Model Accessory Features *Heads up: Exhibition Stations next class- print and hang in classroom, prepare materials* ***Heads up: Test coming up soon! Announce date (Day 6)***	To model the layers of the skin by building an accurate3D portrayal of which layers contains which structures
4 _____	Integumentary System Stations Burn Unit Rule of Nines (written part only- wound models next class- prepare materials!)	To further review and explore the integumentary system; To explore tactile function in the skin
5 _____	Burn Unit: Finish Models Optional: Skin Cancer Extension (Reading, Mini Stations; Sunscreen Lab). - If you choose to skip, students can complete study guide instead) Study Guide (complete for homework if needed)	To understand the 3 degree burn model in medical terms and symptoms of each, and how they related to the function of each layer of skin To review cell division and how it is related to cancer; to explore how UV rays can lead to skin cancer and the role of sunscreen as a preventative
		view
		ssessment

90 minute pacing guide

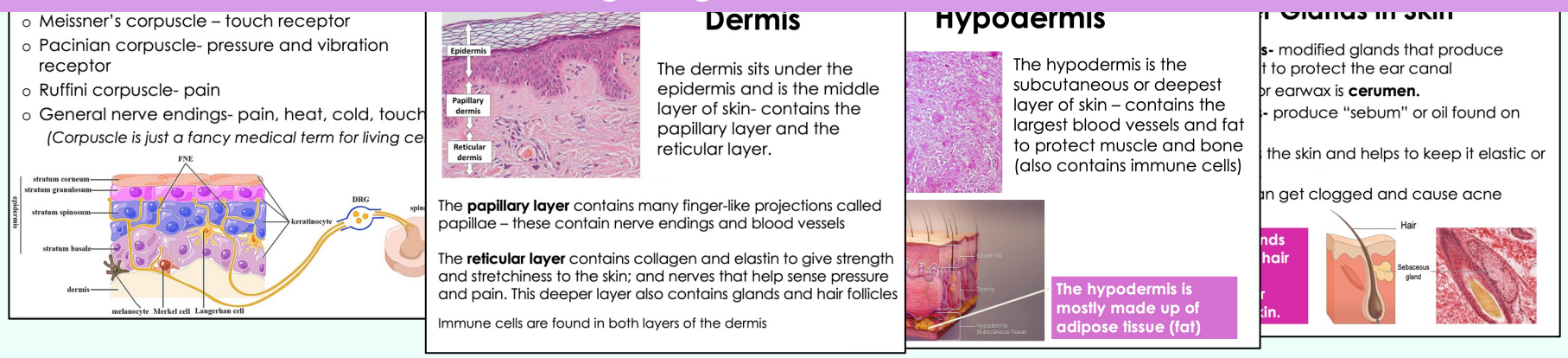
A pacing guide with learning targets is provided to guide you with lesson planning throughout the entire unit.

Includes both 50 and 90 minute blocks.

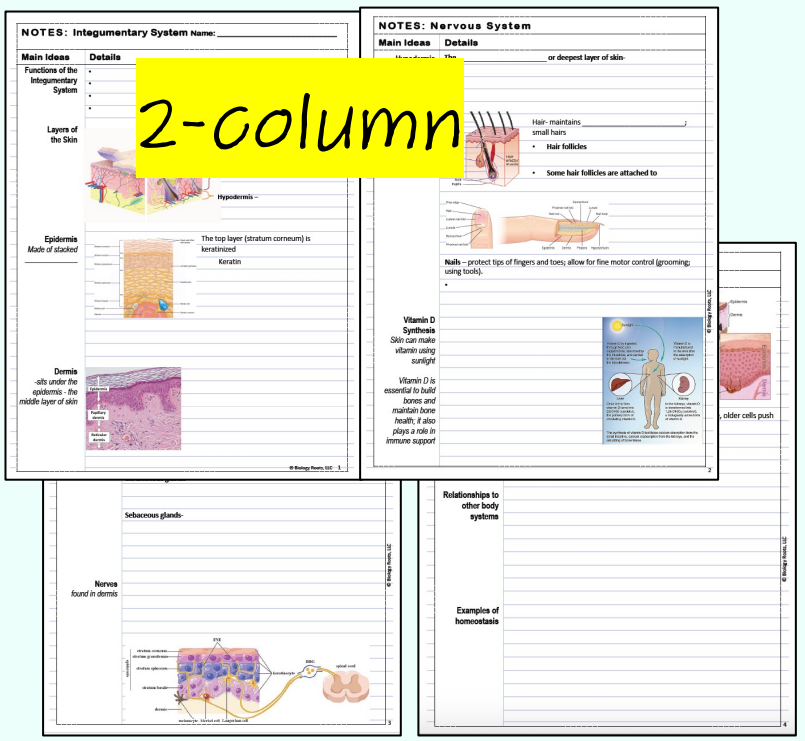
Editable PowerPoint Presentation

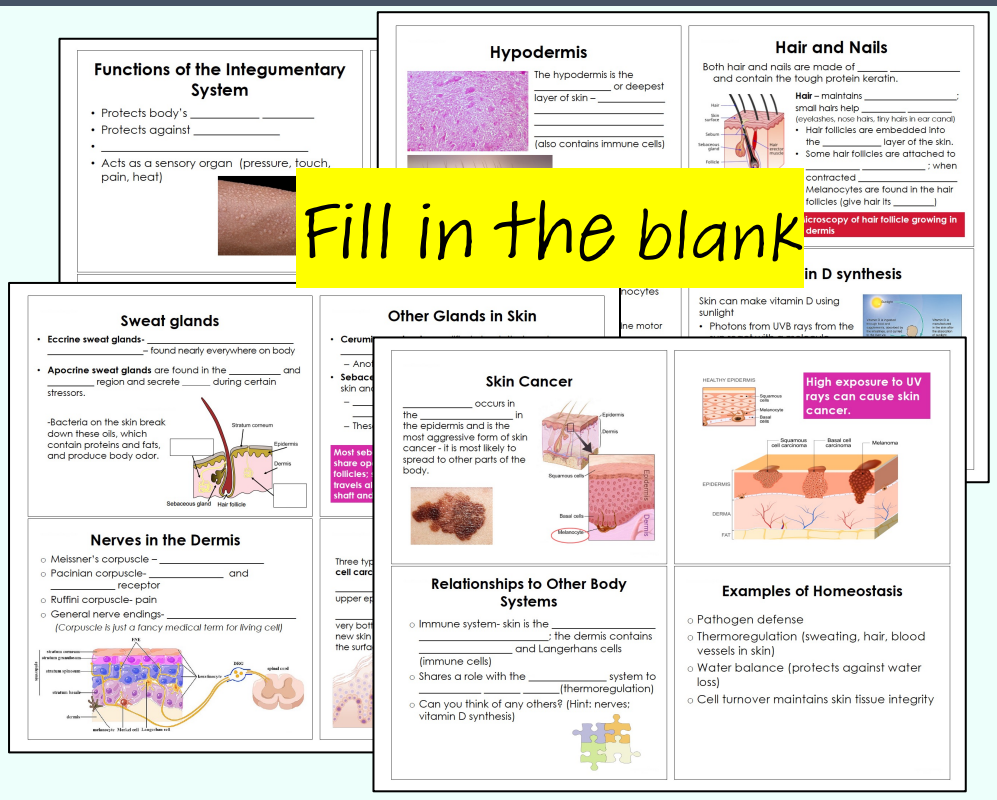


19 slides: covers layers of skin; form and function; cells found in the skin; nerve endings; glands; hair, nails; and skin cancer

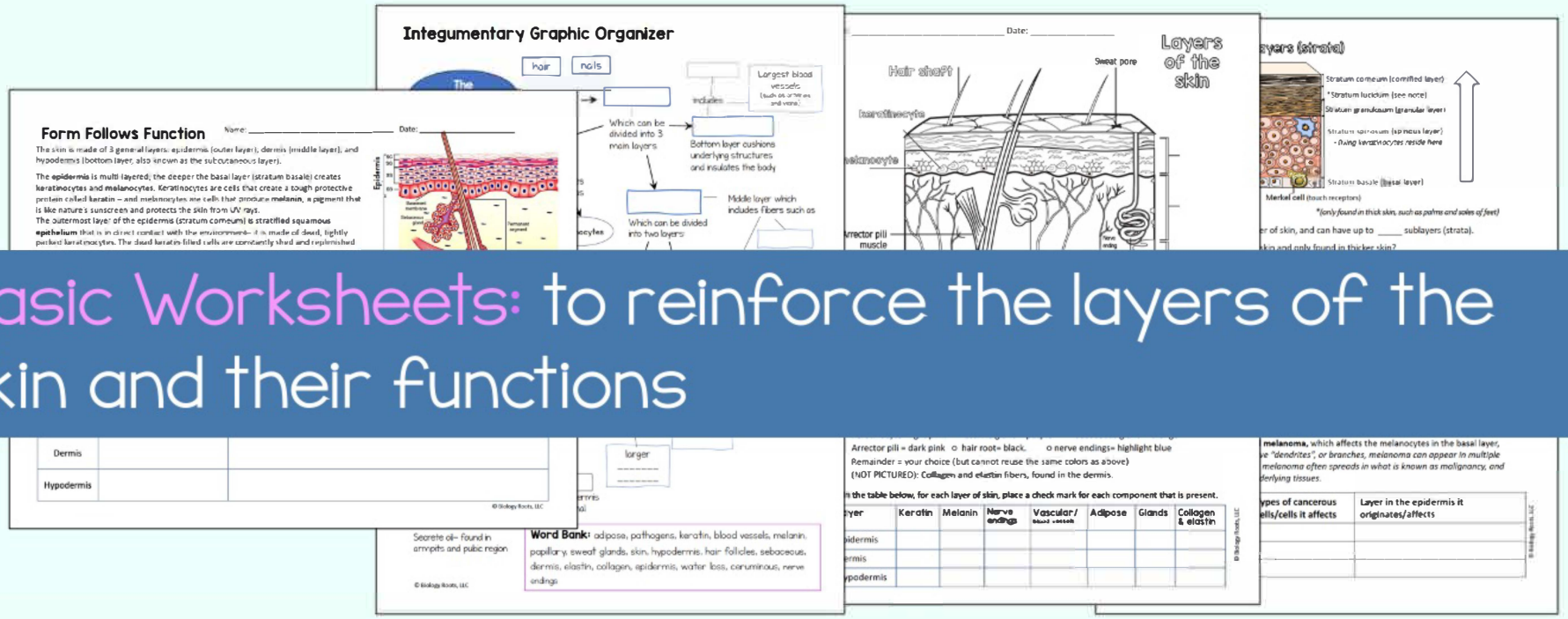


2 types of student notes to choose from

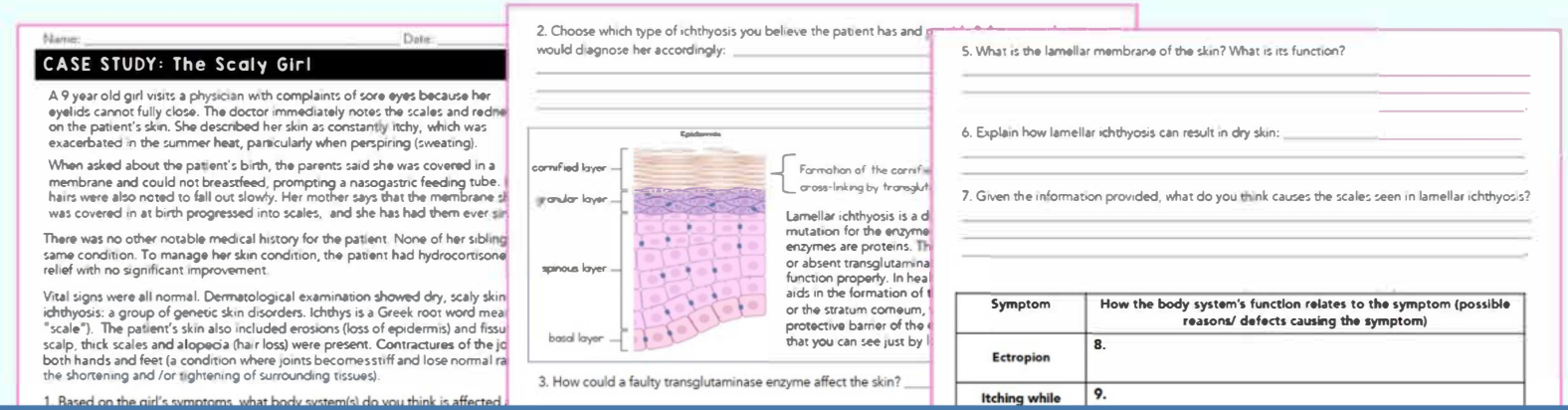




Integumentary System Classwork



Basic Worksheets: to reinforce the layers of the skin and their functions



Case Study: Lamellar Ichthyosis

Explores the importance of the epidermis

EXHIBITION STATIONS

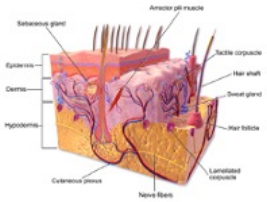
Station 1
Functions

- Protects the body's internal tissues and organs
- Protects against infection from bacteria and viruses
- Helps maintain temperature
- Helps prevent dehydration
- Helps dispose of waste materials
- Stores water and fat
- Serves as a receptor for pressure, touch, pain, and heat.



Station 2
Parts of the integumentary system

The following structures make up the integumentary system:



The Components of the Integumentary System

- Skin
- Hair
- Nails
- Nerves
- Glands
- Blood vessels

Station 6
Dermis and Fingerprints

The middle layer of skin…

Fingerprints are patterns that are formed from the ridges on our fingerprints.

These ridges are protrusions of the papillary layer of the dermis, which tends to be thicker in the fingertips and cause a pattern to protrude from under the epidermis.



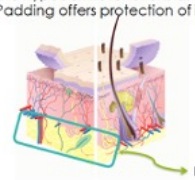


Look at your fingerprints under the magnifying glass. What patterns do you see?

Station 8
Hypodermis

Deepest layer of skin

The hypodermis is the subcutaneous layer of skin- it is a flexible layer of loose connective tissue and fat which separates the skin from the underlying muscles and bones.
The hypodermis functions as insulation and padding. Padding offers protection of internal organs.



The hypodermis contains fat in all parts of the body except the eyelids, ears, and genitalia.

Hypodermis (aka subcutis)

The hypodermis also contains larger blood vessels. The blood vessels become smaller in diameter as they approach the surface of the skin.

Macrophages are immune cells that reside in the hypodermis – they are ready to gobble up any bacteria that may get passed the skin through a wound!



Station 12
Receptors/Senses

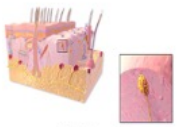
The skin as a sensory organ

The layers of the skin contain numerous sensory receptors that can sense pain, heat, cold, and touch.

Sensory Receptor	Function	Location
Meissner's corpuscle	Touch receptors	Dermis of the palms of hands and soles

✓ Editable





Tactile Corpuscle (Meissner's Corpuscle)

Station 14
Touch Receptors Part 2

TESTING RECEPTOR ADAPATION- ACTIVITY 2

After a prolonged amount of time, touch receptors tend to slow down their response rate and "get used to" a stimulus. For example, you are not constantly aware that you have socks on, or jewelry, or are holding a utensil, etc. This is called adaptation.

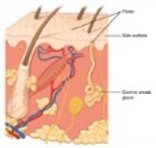
ORE we begin… **predict!**

v much time do you think it takes for receptor aptation to occur?



Station 15
Glands of the integumentary system

Gland		Function	Location
Sweat glands (Sudoriferous glands)	Eccrine sweat gland	Secretes water and salt (sweat) to lower the body temperature via evaporative cooling.	Almost every region of skin
	Apocrine sweat gland	These secrete an oil along the hair shaft and are also called "scent glands".	Axillary (armpit) and pubic regions
Sebaceous glands (oil glands)		Produces sebum, an oil that covers the skin or hair to provide elasticity and waterproofing.	Every region of the skin except the palms of the hand and the soles of the feet.
Ceruminous Glands		Produces earwax	Ear canal

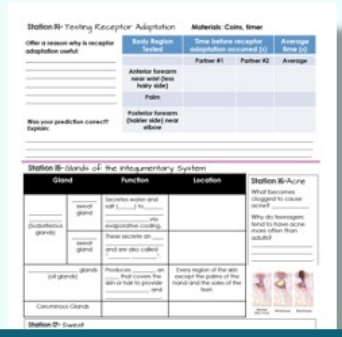


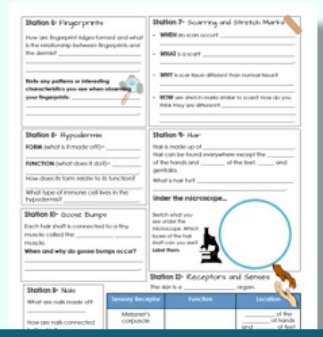
Station 21
Skin Cancer

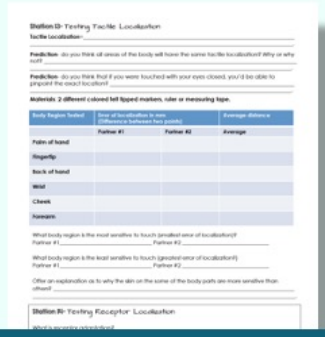
Skin cancer is typically caused by UV radiation from sunshine or tanning beds. The UV radiation damages the DNA of skin cells, which causes the cells to rapidly multiply and form malignant tumors.

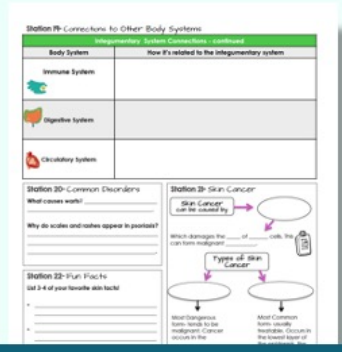












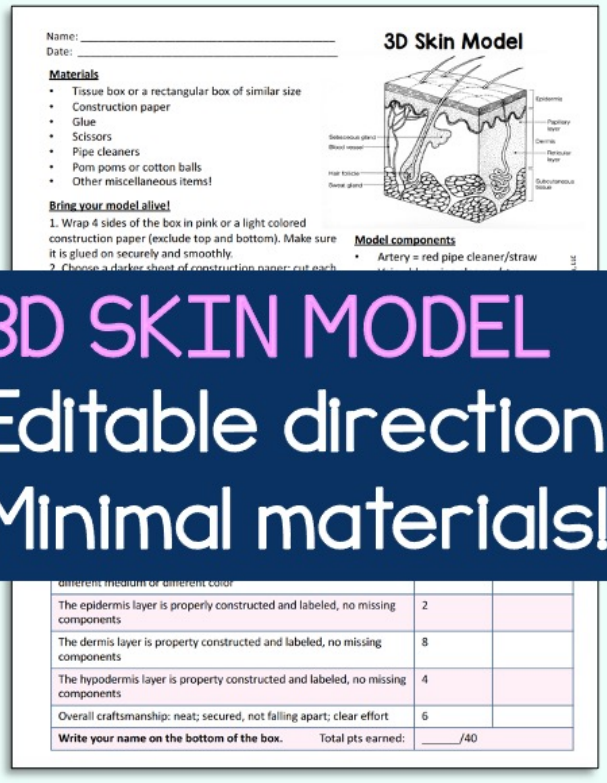
Student Recording Sheet

3D SKIN MODEL









Name: _____
Date: _____

3D Skin Model

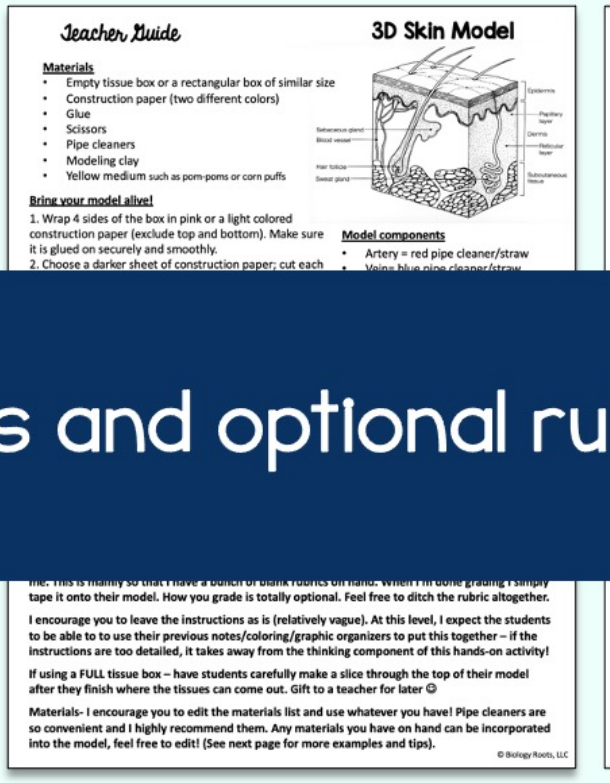
Materials
- Tissue box or a rectangular box of similar size
- Construction paper
- Glue
- Scissors
- Pipe cleaners
- Pom poms or cotton balls
- Other miscellaneous items!

Bring your model alive!

1. Wrap 4 sides of the box in pink or a light colored construction paper (exclude top and bottom). Make sure it is glued on securely and smoothly.
2. Choose a darker sheet of construction paper; cut each

Model components
- Artery = red pipe cleaner/straw

different medium or different color		
The epidermis layer is properly constructed and labeled, no missing components	2	
The dermis layer is property constructed and labeled, no missing components	8	
The hypodermis layer is property constructed and labeled, no missing components	4	
Overall craftsmanship: neat; secured, not falling apart; clear effort	6	
Write your name on the bottom of the box. Total pts earned:	_____/40	



Teacher Guide

3D Skin Model

Materials
- Empty tissue box or a rectangular box of similar size
- Construction paper (two different colors)
- Glue
- Scissors
- Pipe cleaners
- Modeling clay
- Yellow medium such as pom-poms or corn puffs

Bring your model alive!

1. Wrap 4 sides of the box in pink or a light colored construction paper (exclude top and bottom). Make sure it is glued on securely and smoothly.
2. Choose a darker sheet of construction paper; cut each

Model components
- Artery = red pipe cleaner/straw

tape it onto their model. How you grade is totally optional. Feel free to ditch the rubric altogether.

I encourage you to leave the instructions as is (relatively vague). At this level, I expect the students to be able to to use their previous notes/coloring/graphic organizers to put this together – if the instructions are too detailed, it takes away from the thinking component of this hands-on activity!

If using a FULL tissue box – have students carefully make a slice through the top of their model after they finish where the tissues can come out. Gift to a teacher for later 😉

Materials- I encourage you to edit the materials list and use whatever you have! Pipe cleaners are so convenient and I highly recommend them. Any materials you have on hand can be incorporated into the model, feel free to edit! (See next page for more examples and tips).

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Sweat pores = black paper from 3-hole punch
Arrector pili= pink yarn
Adipose = yellow pom poms
Hair follicles = pipe cleaner
Sweat gland = pipe cleaner

You can add more components if you wish!

Tips/hints: showing students a model beforehand is helpful! If this is your first time, take pictures of the student models after they are complete to show next year's class.

Starting with the bottom layer first tends to help shape things best.

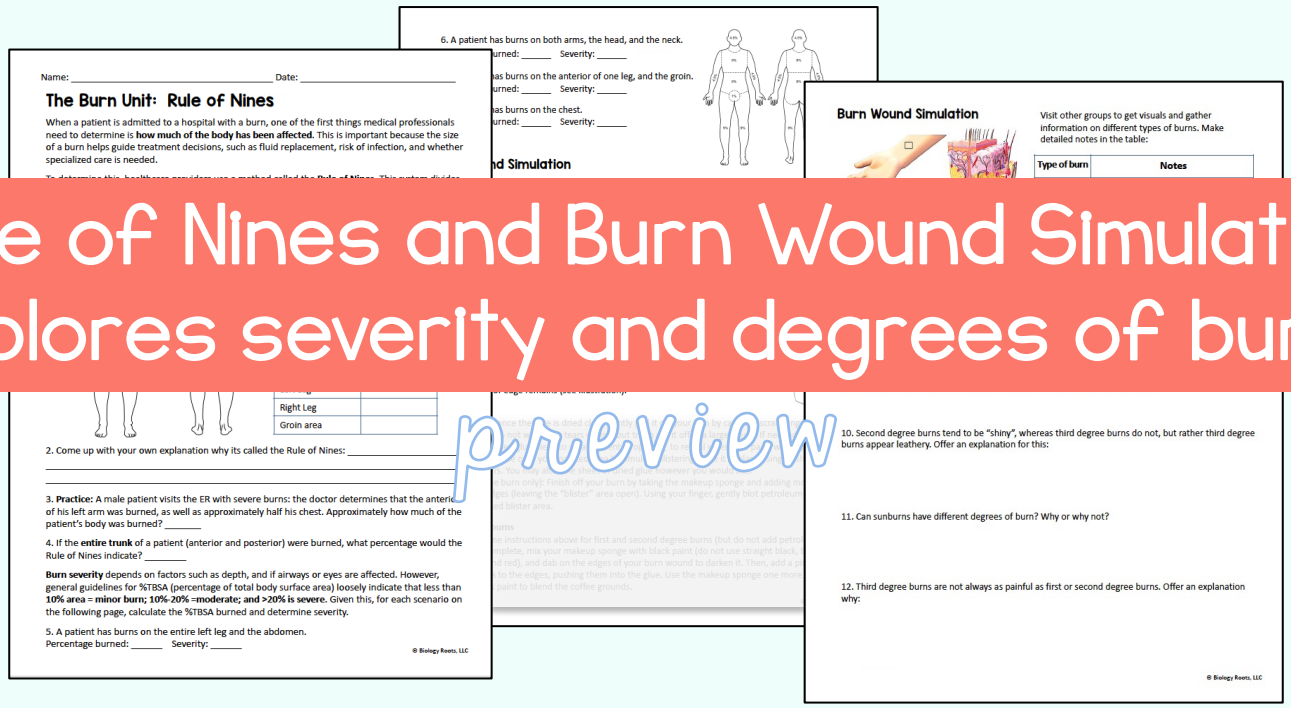
Students can draw things on if you don't have enough materials.

3D SKIN MODEL

Editable directions and optional rubric included.

Minimal materials!

Rule of Nines and Burn Wound Simulation Explores severity and degrees of burns



Name: _____ Date: _____

The Burn Unit: Rule of Nines

When a patient is admitted to a hospital with a burn, one of the first things medical professionals need to determine is **how much of the body has been affected.** This is important because the size of a burn helps guide treatment decisions, such as fluid replacement, risk of infection, and whether specialized care is needed.

Right Leg	
Groin area	

2. Come up with your own explanation why its called the Rule of Nines: _____

3. **Practice:** A male patient visits the ER with severe burns: the doctor determines that the anteri of his left arm was burned, as well as approximately half his chest. Approximately how much of the patient's body was burned? _____

4. If the **entire trunk** of a patient (anterior and posterior) were burned, what percentage would the Rule of Nines indicate? _____

Burn severity depends on factors such as depth, and if airways or eyes are affected. However, general guidelines for %TBSA (percentage of total body surface area) loosely indicate that less than **10% area = minor burn; 10%-20% =moderate; and >20% is severe.** Given this, for each scenario on the following page, calculate the %TBSA burned and determine severity.

5. A patient has burns on the entire left leg and the abdomen.
Percentage burned: _____ Severity: _____

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6. A patient has burns on both arms, the head, and the neck.
urned: _____ Severity: _____

as burns on the anterior of one leg, and the groin.
urned: _____ Severity: _____

as burns on the chest.
urned: _____ Severity: _____

d Simulation

Burn Wound Simulation

Visit other groups to get visuals and gather information on different types of burns. Make detailed notes in the table:

Type of burn	Notes

10. Second degree burns tend to be "shiny", whereas third degree burns do not, but rather third degree burns appear leathery. Offer an explanation for this:

11. Can sunburns have different degrees of burn? Why or why not?

12. Third degree burns are not always as painful as first or second degree burns. Offer an explanation why:

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preview

First degree burn



Second degree burn



Third degree burn



(no one was harmed in the making of this lab) 😉

Skin Cancer Extension

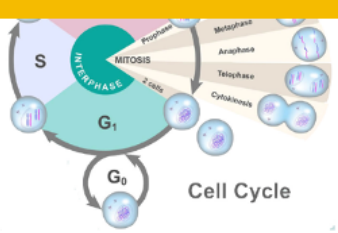
Includes reading activity to tie in cell division; mini stations; and a hands-on sunscreen activity.

Name: _____ Date: _____

Skin Cancer Extension

PART I: CELL DIVISION BACKGROUND READING

Tumors are clusters of tissues made up of cancerous cells. Cells are deemed cancerous when they replicate out of control. A healthy cell cycle contains checkpoints that inhibit cells from dividing too rapidly or at the wrong times. These checkpoints are controlled by genes called tumor suppressor genes.



daily functions

S (synthesis phase): DNA is replicated
G2: Cell growth; cell is preparing for mitosis (doubling organelles, etc.)

During MITOSIS, the cell's nucleus is actively dividing. Mitosis has 4 subphases: prophase, metaphase, anaphase, and telophase. This leads to two identical nuclei. Cytokinesis is the final step in which the cytoplasm divides. *Once two new cells are formed, they each continue on with their own cell cycles, beginning with G1.*

2. The image above represents a pie graph. The pieces of the pie represent the time spent in each phase. What phase does the cell spend most of its life in, interphase or mitosis? _____

3. List the 4 subphases (or stages) of mitosis. What occurs during mitosis?

4. Offer an explanation as to why the cell cycle is a delicate process that needs checkpoints: :

5. What are cancerous cells? How are tumors related to cancerous cells? _____

PART II: MINI STATIONS

Station 1: Tanning and Homeostasis

UVA and UVB waves:

UVA	UVB

Station 3: Skin Cells and Cancer

Type of cancer	Cell/layers affected	General appearance
Squamous cell carcinoma		
Basal cell carcinoma		
Melanoma		

Station 4: ABCDE's of

PART III: SUNSCREEN LAB

Materials:

- Dark piece of construction paper (blue; black; purple)
- Sunscreen (non-mineral)
- Regular lotion (0 SPF)

Procedure:

- Fold one piece of dark construction paper 3 sections
- Fold one outer third most section in half and secure with a piece of tape.
- Use the remaining two-thirds to designate each to one type



Predict: What do you think will happen to the paper after being the sun for 6+ hours?

What serves as the control for this basic experiment?

Results (next class):

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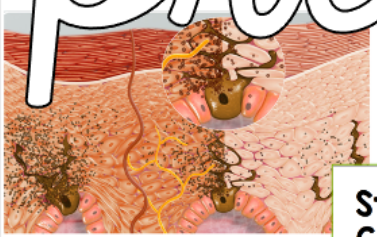
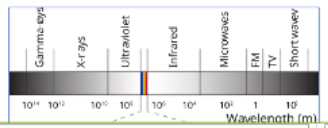
Station 1 : Tanning and Homeostasis



Melanin is often calle nature's sunscreen because it can absorb some harmful UV ray and protect skin fror harmful radiation.

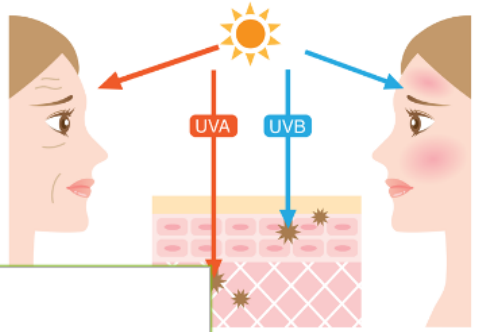
Station 2: UVA and UVB

The ...tromagnetic Spect...m is categorized by **wavelength.** ...e, but they are still capable of ...ns that can penetrate deeper into skin ...can still penetrate the skin but not ...



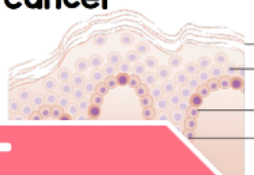


Station 2: UVA and UVB (cont.)



...; UVB rays contribute to sunburn

Station 3: Skin Cells and Cancer



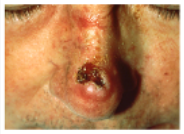
...rous growth of keratinocytes in the

...owth of keratinocytes in the

...anocytes – can be in any layer of the ...spread to organs

Station 3 cont.

Squamous cell carcinoma



Outer most layer of skin is affected – typically starts as scaly patch

Basal cell carcinoma



Innermost layer is affected; may first appear as a bump as cells are pushed outward.



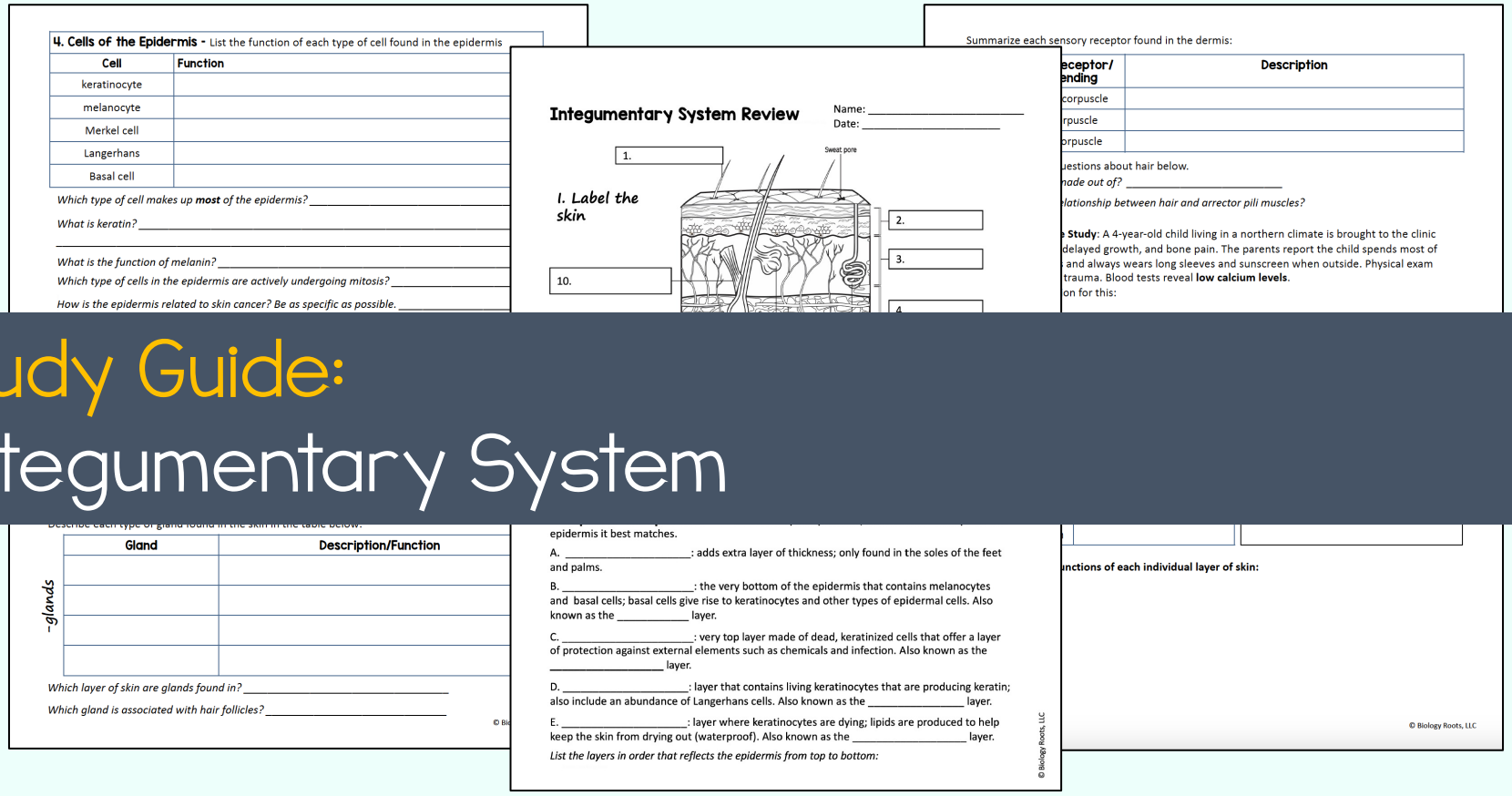
Melanoma



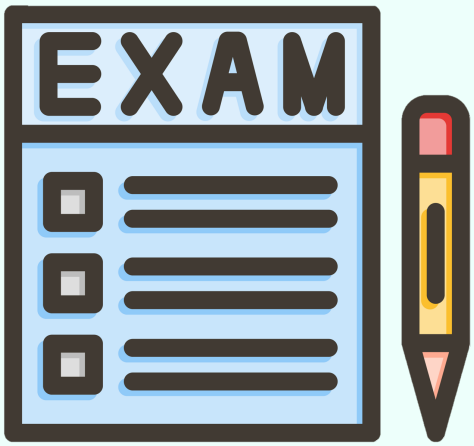
Melanocytes divide uncontrollably, producing uneven pigment patterns.

MINI STATIONS

preview

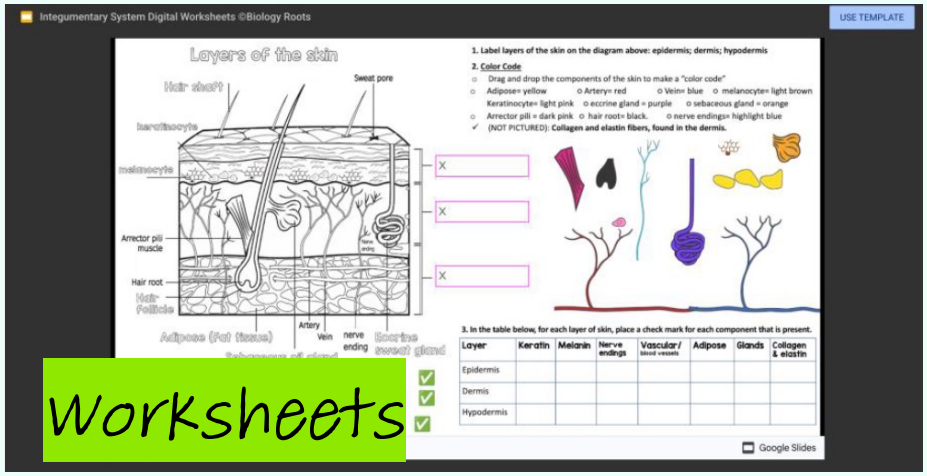


Study Guide:
Integumentary System

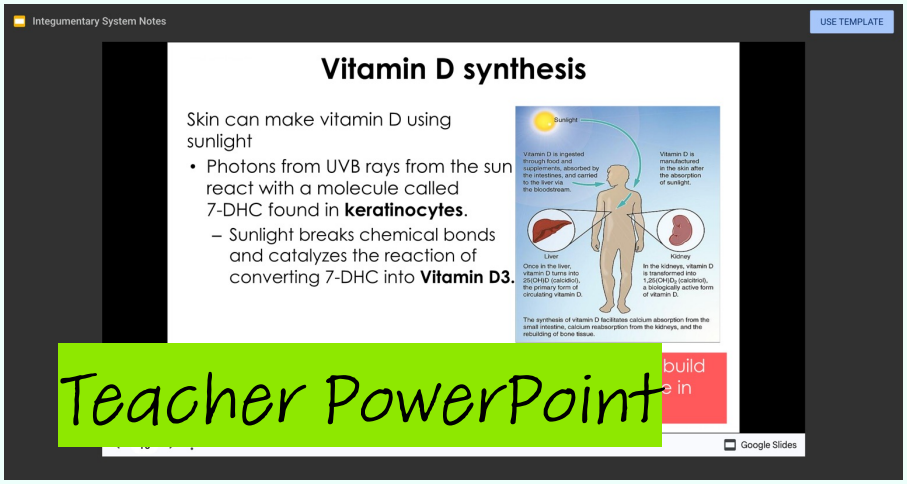


Not pictured: TEST
(Includes both an honors version and a college prep version to choose from)

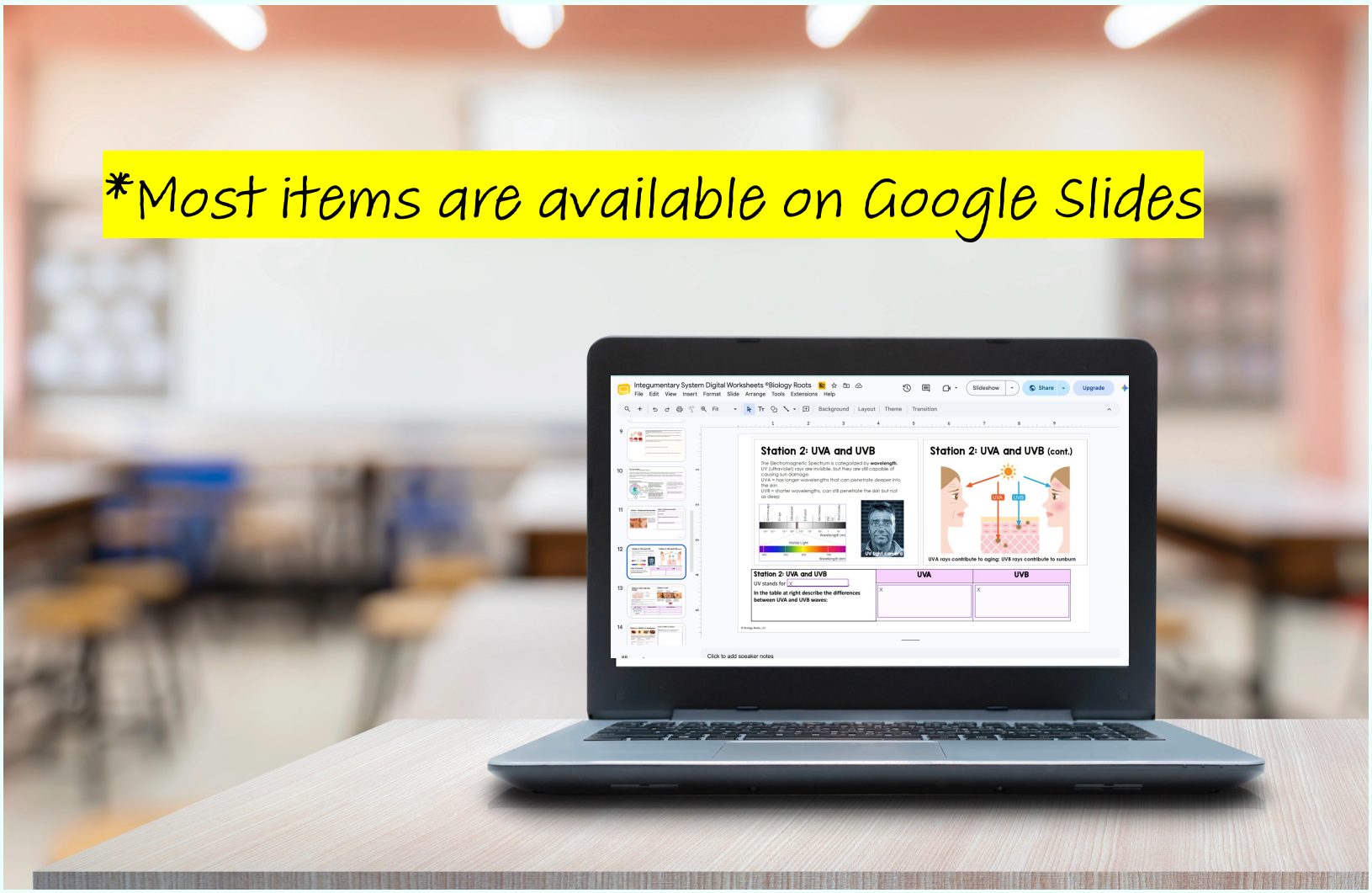
Digital options available



Worksheets



Teacher PowerPoint



Features in a Nutshell:

Answer keys included.

Most items are editable

Differentiated Tests

Pacing Guides outline your daily agenda!

Still not sure if you need this resource?

This unit is for any teacher who is looking for a fully prepared anatomy unit from start to finish, with fun, fresh activities to keep your students engaged! The integumentary unit is COMPLETE and can be used as is –or if you already have an existing unit, this can absolutely be used to supplement, support, or freshen up. Every piece has been thoughtfully curated and mapped out for your anatomy classroom to give you the most successful (and fun) year of anatomy yet!

Questions? Reach out to me at vanessa@biology-roots.com

-Vanessa