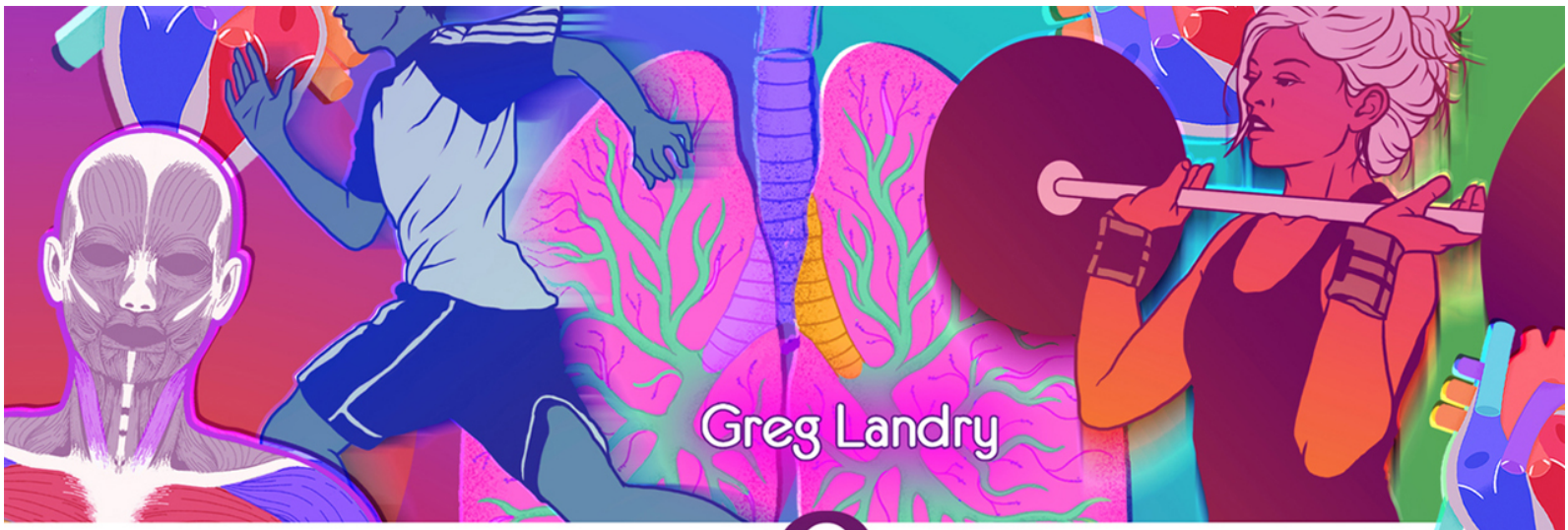


Greg Landry

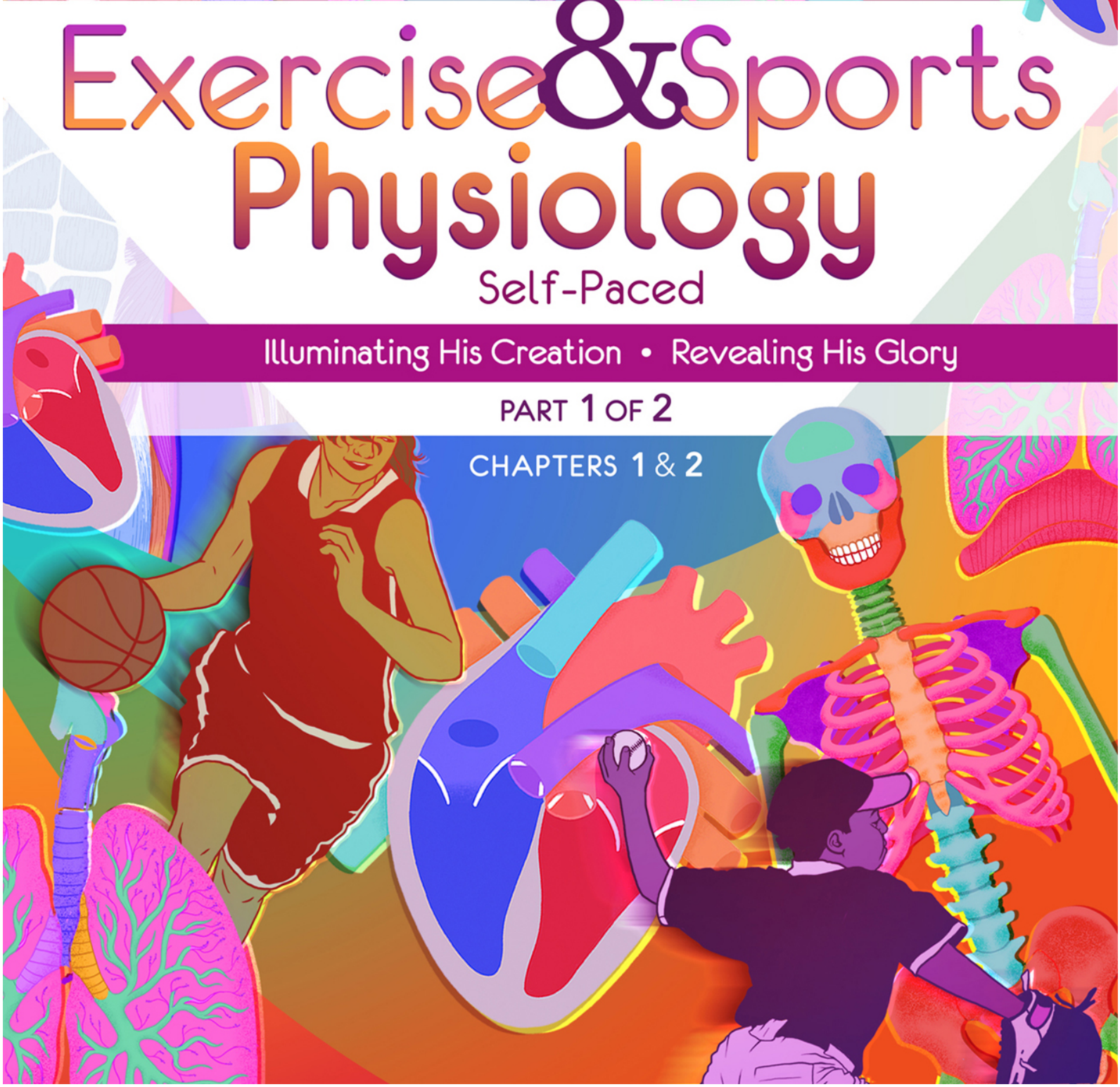
Exercise & Sports Physiology

Self-Paced

Illuminating His Creation • Revealing His Glory

PART 1 OF 2

CHAPTERS 1 & 2



A **Note** to **Students** and **Parents**

It was during college when I first realized how much I loved studying science. I was so amazed at the complexity of **Creation**: the cell, the "simple" flower, the human body, the systematic order of the elements, the perfect arrangement of the heavens, the complexity of bumblebees, and the list goes on!

As both a student and teacher, I still love science today, and I think you will too. As you start to learn this information, you will begin to appreciate that nothing as complex as God's Creation could have come into existence by coincidence, happenstance, or as a mere fluke of nature. I'd encourage you to always ask the question, **"Is this something that likely happened by accident — by pure chance? Or is it more likely there was a designer?"**

We'll start our class with **learning how to learn.** What is **note-taking**, and how do you go about it? What are the most effective methods for **studying**? What signals to our brain that we should **remember** something? What is most important when **taking tests**? As students, we don't often spend the time learning how to learn. We assume and we take for granted that optimal learning will happen naturally; it doesn't. So as a first priority, we will study how to **learn**, **understand**, and **remember** information productively, making the time you spend on a topic as fruitful as possible. We'll also cover the scientific method and writing quality lab reports.

My goal is to teach students to ***think*** **— deeply, critically, biblically,** and **creatively.**

In the field of science, we **absorb** and **reinforce** scientific information and principles with **repetition** and progression in a **layered learning structure.** We start in the early years (prior to sixth grade) with initial introductions to various areas of science. Then we **grow**, **improve**, and **build** on that foundation in middle school years, with additional experience and advancement during the high school years. It's an **ongoing process** with continued repetition and exposure to new material over several years.

Illuminating His Creation — Revealing His Glory

The information covered and direction given in the live (and/or recorded) classes will be the core of this course. This study guide has been designed to support and extend these class discussions with plenty of visuals; students need to **see** science to best understand it. Graphics, worksheets, tables, charts, and more are included within. Much of the homework will involve writing, completing graphics, the construction of lab reports, designing, sketching, and other **creative endeavors** that will help you to learn and to remember material, techniques, and concepts. I'll tell you lots of stories, too! As we learn more about His creation, His glory is more clearly revealed!

Have **fun!**

Looking forward to our learning journey,

Professor Greg Landry

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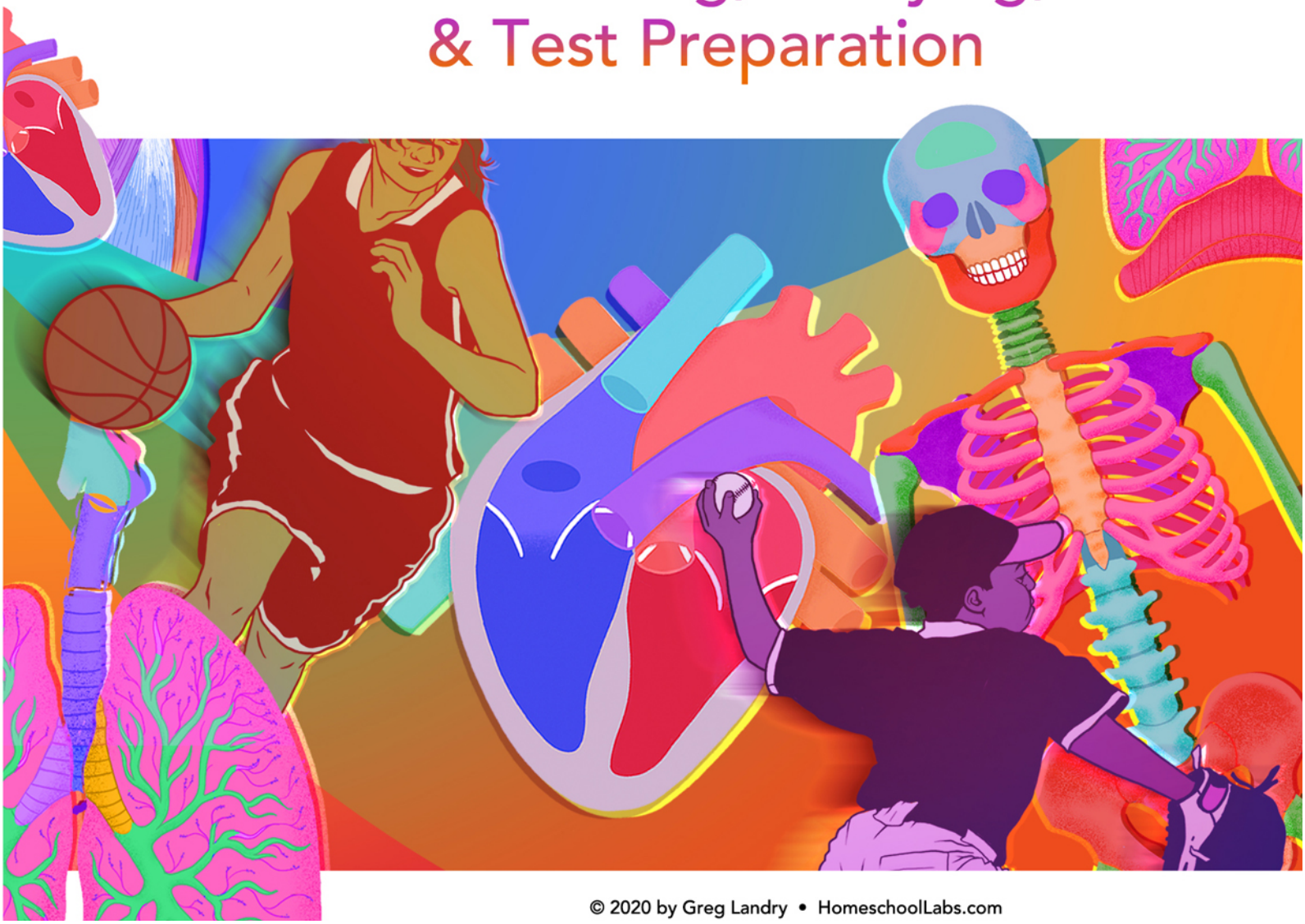
CHAPTER 1

Note-Taking, Studying, & Test Preparation



Introduction to Note-Taking, Studying, & Test Taking

Before we begin studying the subject at hand, the very first thing we're going to cover in this chapter and this course is **learning how to learn**. When you think about it, you realize it may be one of the most important things to cover before taking any type of class. Yet most students have never studied how to most effectively understand, learn, and remember information. And learning takes work!

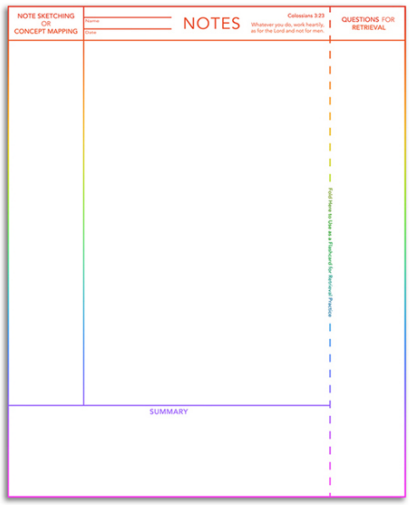
The first step in this process is being able to remember what you're being taught. When you listen to somebody speak – maybe a teacher in class, or a pastor in your church – you remember very little of what you hear, on average. So, if you want to recall that information, it's necessary that you write it down. We call this action **taking notes**. This way, you can always refer back to that information later. In an academic setting, that is certainly required.

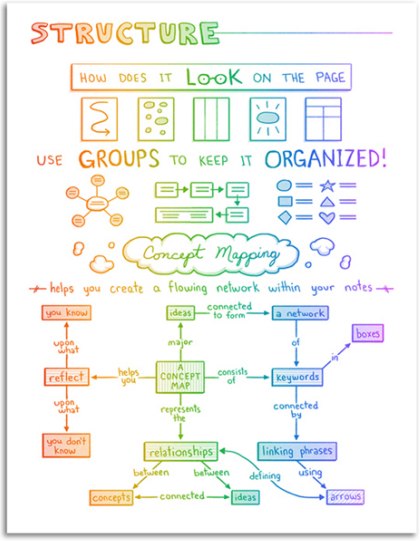
Note-taking is the act of writing down what you think are the most important details from what you're hearing. If you're not experienced with note-taking, this can be a little intimidating at first. All at once, you're listening to somebody speak, determining what's **most important** about what they're saying, and then writing it down.

But I'll encourage you – you will get better at note-taking very quickly. Note-taking is something you should be very proficient in as you move through the high school years, and potentially into the college years. What's the best way to do this? How should you **structure your notes**? How can you take notes that maximize your ability to study and remember the material?

Scientists have done decades of research on how we learn. From their results, we know which methods are the most effective for storing information in our **long-term memory**. I have developed an efficient method for taking notes and learning information, called the **NSSR**.

These letters refer to **Notes**, **Sketches**, **Summary**, and **Retrieval**. Based on the research provided by those scientists, and upon years of practical use where previous students have used parts of these components, I've put these four factors together in a method that works best for students. But it takes **effort**!





The **NSSR** Method

Notes:

These are those important details you write down while listening to your teacher.

Sketches:

Note-sketching is done after class with colored pencils, helping you remember words, concepts, structures, etc. Not only does the act of sketching help you remember just as well as the act of writing, but it's also easier to learn something when you're studying your sketches, your creation. This is not about making beautiful art – if you happen to be a talented artist, great! But for the rest of us, it's just about creating and learning.

Summary:

This is a synopsis of your notes done and reviewed after class ends.

Retrieval:

Practice for recalling or retrieving information happens through a variety of methods. Every time you retrieve memories of learned material, you're telling your brain that it's important to remember that information.

Here are some examples of retrieval practice:

1. Have someone ask you **questions** using your own notes for reference.
2. Create and use **flash cards**.
3. **Teach** someone about the subject, using your notes as little as possible.
4. **Sketch** details about the material from memory, again minimizing the use of your notes.

We'll cover these methods thoroughly and discuss more examples in class. I'll also tell you a story about my own bumpy road to learning how to take notes – in college!

Professor Landry's **NSSR Method** for **Note-Taking** & **Studying**

NOTE SKETCHING OR CONCEPT MAPPING	Name Date NOTES Colossians 3:23 Whatever you do, work heartily, as for the Lord and not for men.	QUESTIONS FOR RETRIEVAL

Fold Here to Use as a Flashcard for Retrieval Practice

SUMMARY

Professor Landry's **NSSR Method** for **Note-Taking** & **Studying**

NOTE SKETCHING OR CONCEPT MAPPING	Name Date NOTES Colossians 3:23 Whatever you do, work heartily, as for the Lord and not for men.	QUESTIONS FOR RETRIEVAL

Fold Here to Use as a Flashcard for Retrieval Practice

SUMMARY

Verbal to Visual Note-Taking

NOTE SKETCH YOUR SCIENCE

SKETCHING NOTES helps us to ORGANIZE our information & ideas into WORDS & PICTURES

ANYONE CAN DO IT!

BUT WHY SHOULD I?

It helps us to UNDERSTAND material & REMEMBER what we are learning

"BUT HOW? I CAN'T DRAW!"

THAT'S OKAY!

SKETCHING is a FUN way to record NOTES + IDEAS — You DON'T NEED TO BE AN ARTIST.

HERE ARE SOME BASIC TIPS TO HELP YOU FIGURE OUT WHAT TO DO...

PROFESSOR LANDRY'S FAVE FACT!

Text

your FONT is your handwriting

Mix UP YOUR Typography

BUT KEEP IT CLEAR & legible

image elements

SHAPES

SYMBOLS

CONNECTORS

PEOPLE

FRAMES

Practice + Have Fun!

Over time, you will DISCOVER your own VISUAL LIBRARY

TEST TUBE

SUN

NEW IDEA

DNA

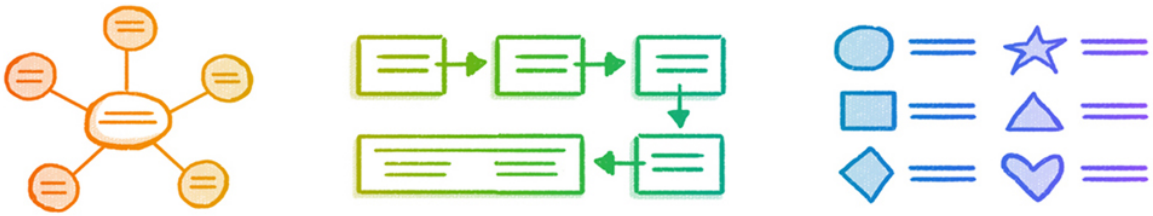
PERSON

ONLY YOU need to understand your SKETCHED NOTES!

STRUCTURE

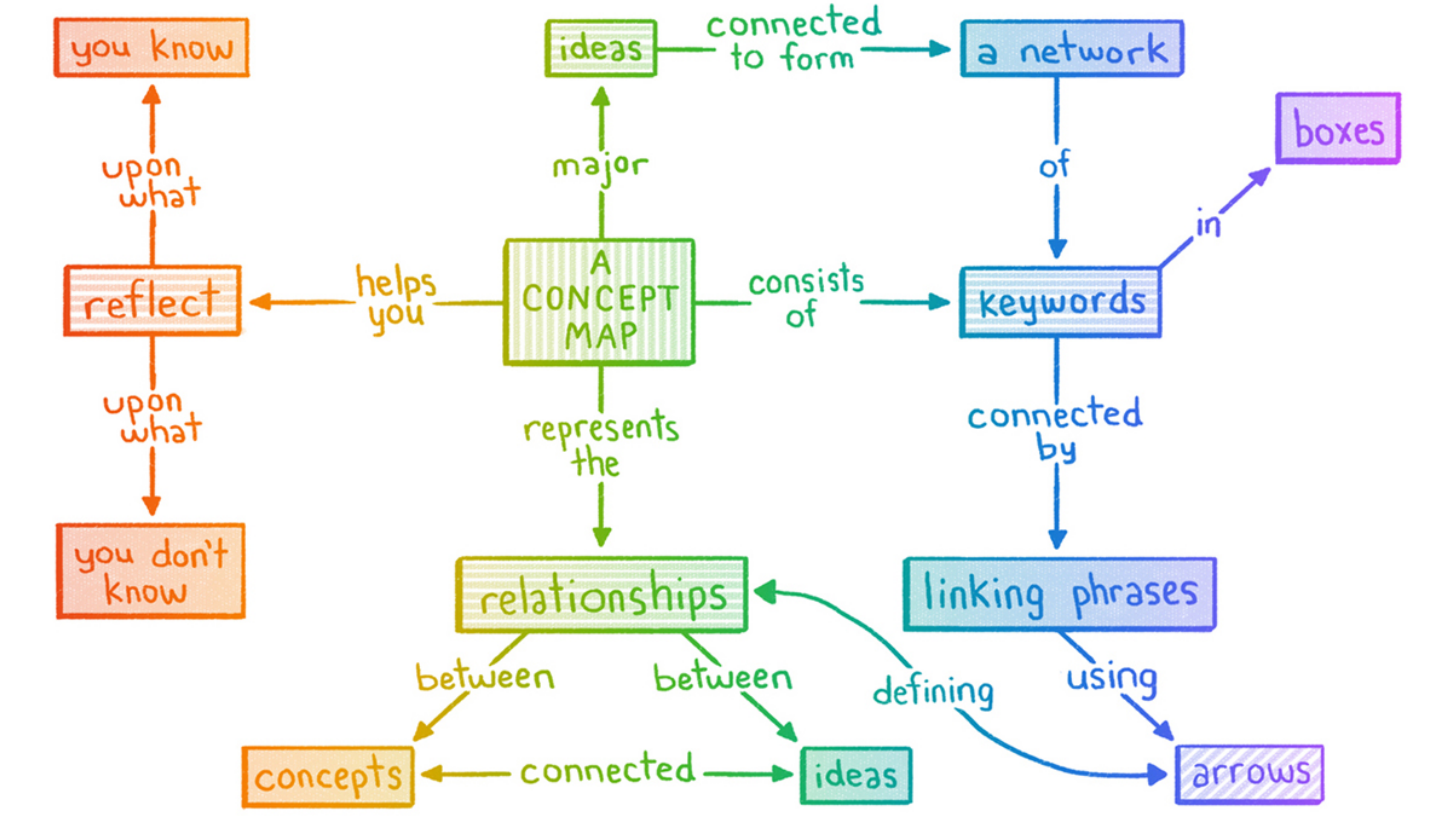
HOW DOES IT LOOK ON THE PAGE

USE GROUPS TO KEEP IT ORGANIZED!



Concept Mapping

helps you create a flowing network within your notes



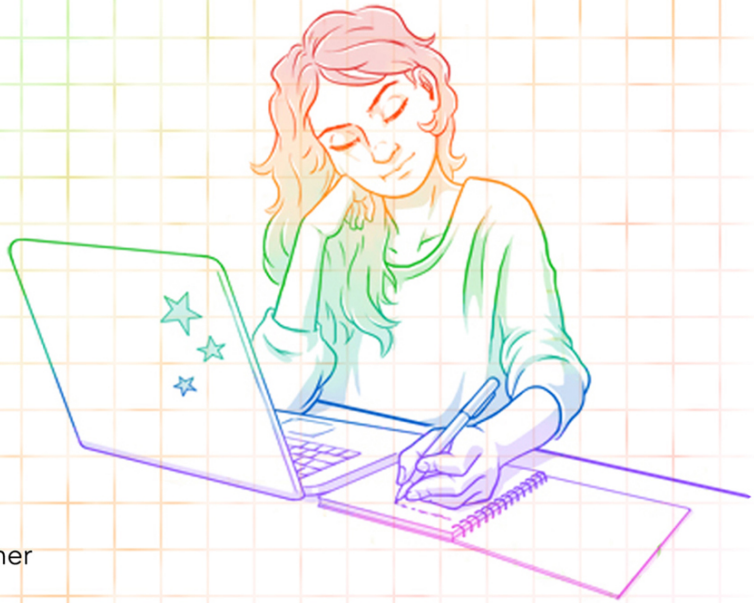
Test Preparation and **Test Taking**

TEST **PREPARATION**

1. Take **good notes** (as discussed earlier) **and, if necessary, listen to class recordings** to fill in missing notes
2. Create **sketch notes** (as discussed earlier)
3. **Review** your notes
4. **On a regular basis** (do a little on most days - don't procrastinate and "cram"), **use a variety of retrieval practice methods:**
   - **flash** cards
   - have someone **ask you questions** from your notes
   - **teach** the information to someone from **memory**
   - **summarize** your notes
   - **sketch** your notes
   - **create a test** for yourself and take it

TEST **TAKING**

1. Be aware of **time** and be aware of spending **too much time** on one question
2. **Totally focus** on one question at a time
3. Work **steadily**
4. If it's **multiple choice** and you don't know the correct answer, try to **eliminate answers** you know are not correct
5. If it's **discussion**, write **everything** you know:
   - many students write **far too little** even when they know more; your job is to show the teacher what you know
6. **Never** leave questions unanswered; if you run out of time, **guess**
7. If you finish early, use any remaining time to systematically **check your answers**



TEST **PREPARATION**

1.

2.

3.

4.

-
-
-
-
-
-

TEST **TAKING**

1.

2.

3.

4.

5.

6.

7.

Chapter 1 Worksheet

1. Have you filled in the black and white printables from this chapter?

2. Have you completed your class notes from this week: taken notes on all of this week's class (going back to the class recording if necessary), sketched, and summarized?

3. Have you studied using retrieval practice until you know all of the information? What types of retrieval practice did you use?

4. For 10 minutes, teach someone what we discussed in class — using your notes as little as possible. Who did you teach and what did you teach them?

5. Explain something about this week's lesson that you found most interesting.

6. List several types of retrieval practice.

7. How would you explain to a friend how to take notes and study?

8. Why is it important to take notes in a class?

9. Why is it important to study your class material every week rather than all at once?

Chapter 1 Worksheet

10. Give an example of some note-sketching you might do during a class.

Your **Science Creation** Worksheet

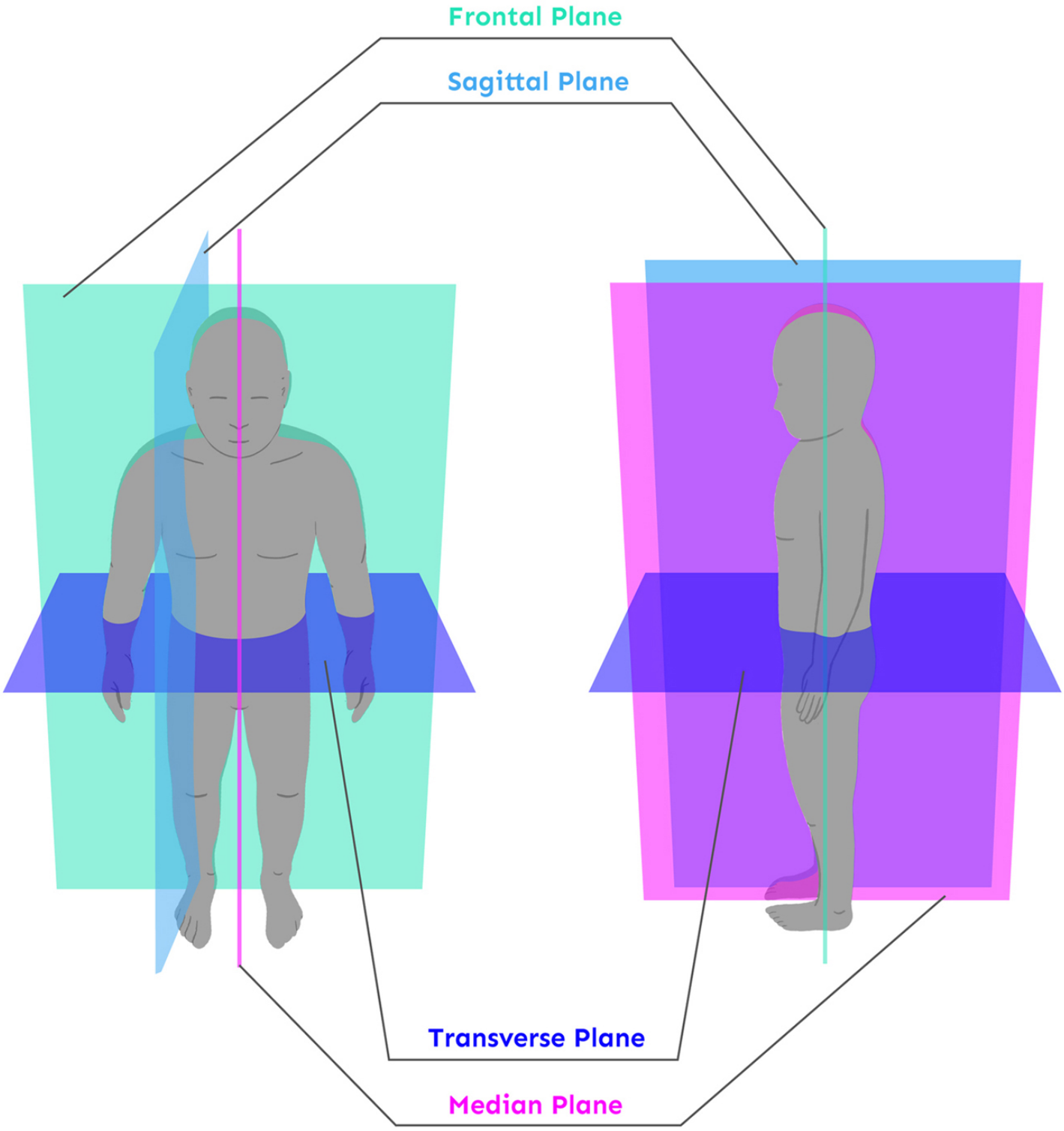
Use this space to create - write, sketch, note-sketch, or in some other way depict information, concepts, and ideas covered in this chapter.

Exodus 35:31
and he has filled him with the Spirit of God, with skill, with intelligence, with knowledge, and with all craftsmanship

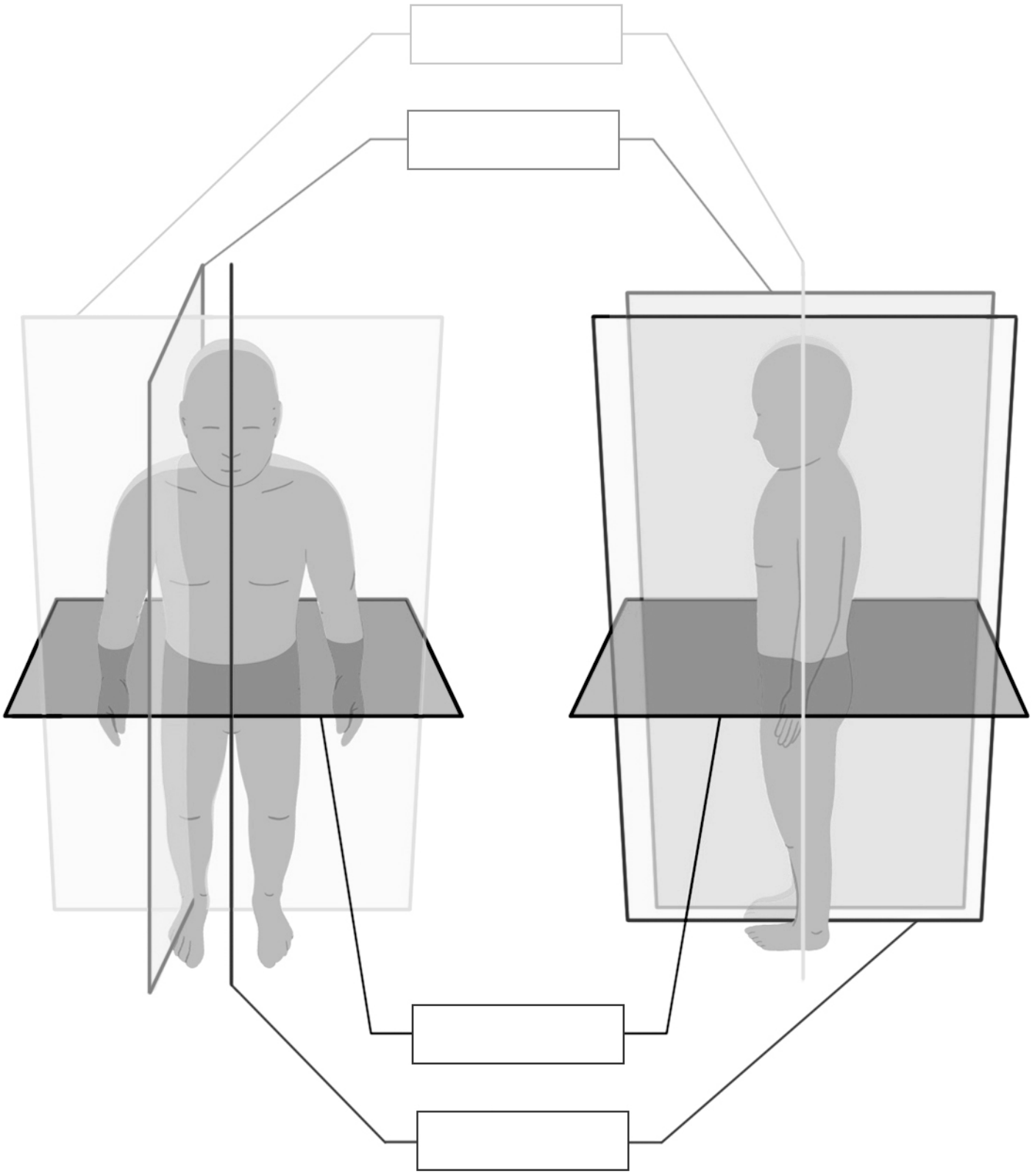
CHAPTER 2

Bones, Muscles, & Training

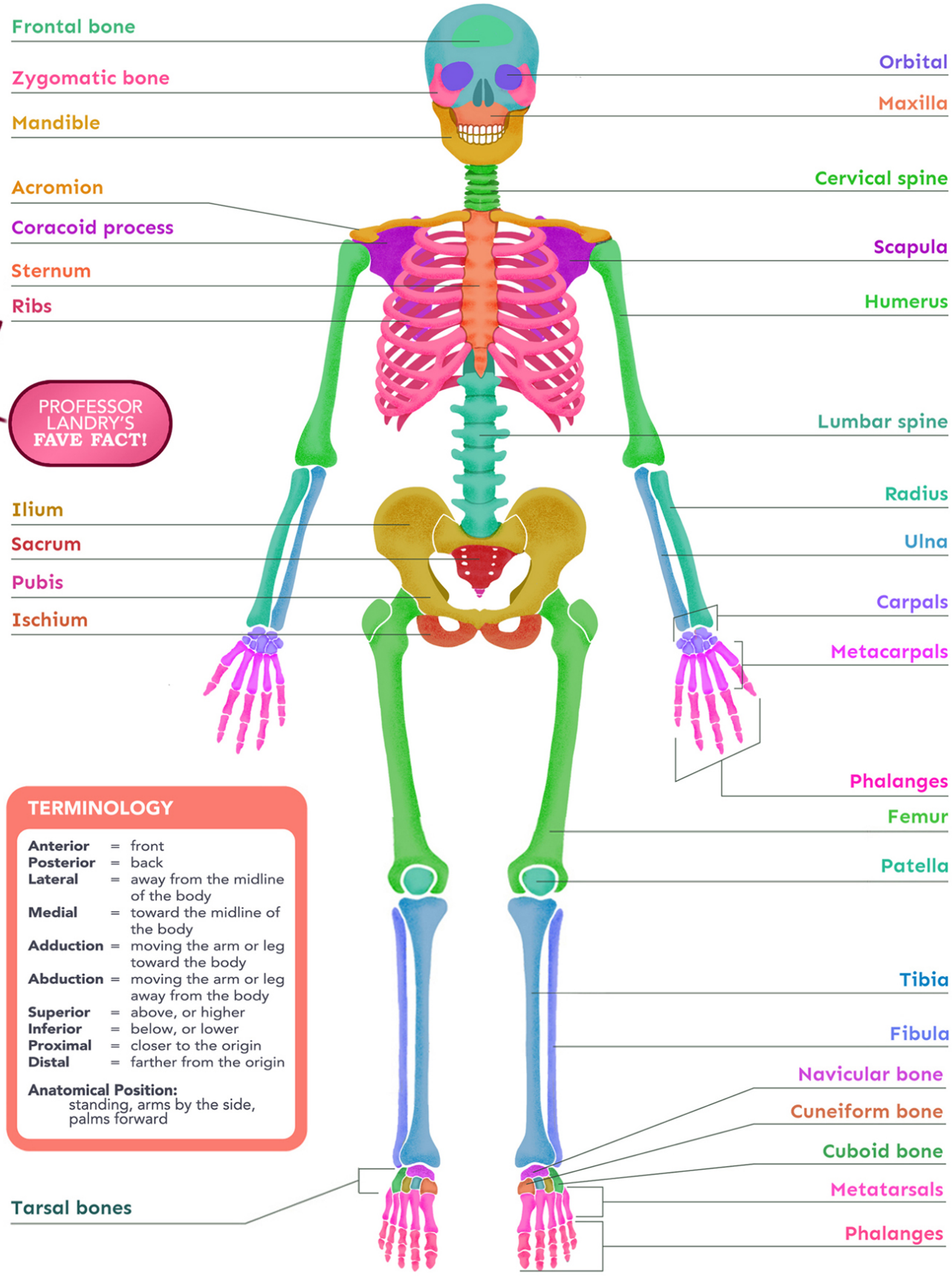
ANATOMICAL PLANES



ANATOMICAL PLANES



Anterior Skeleton



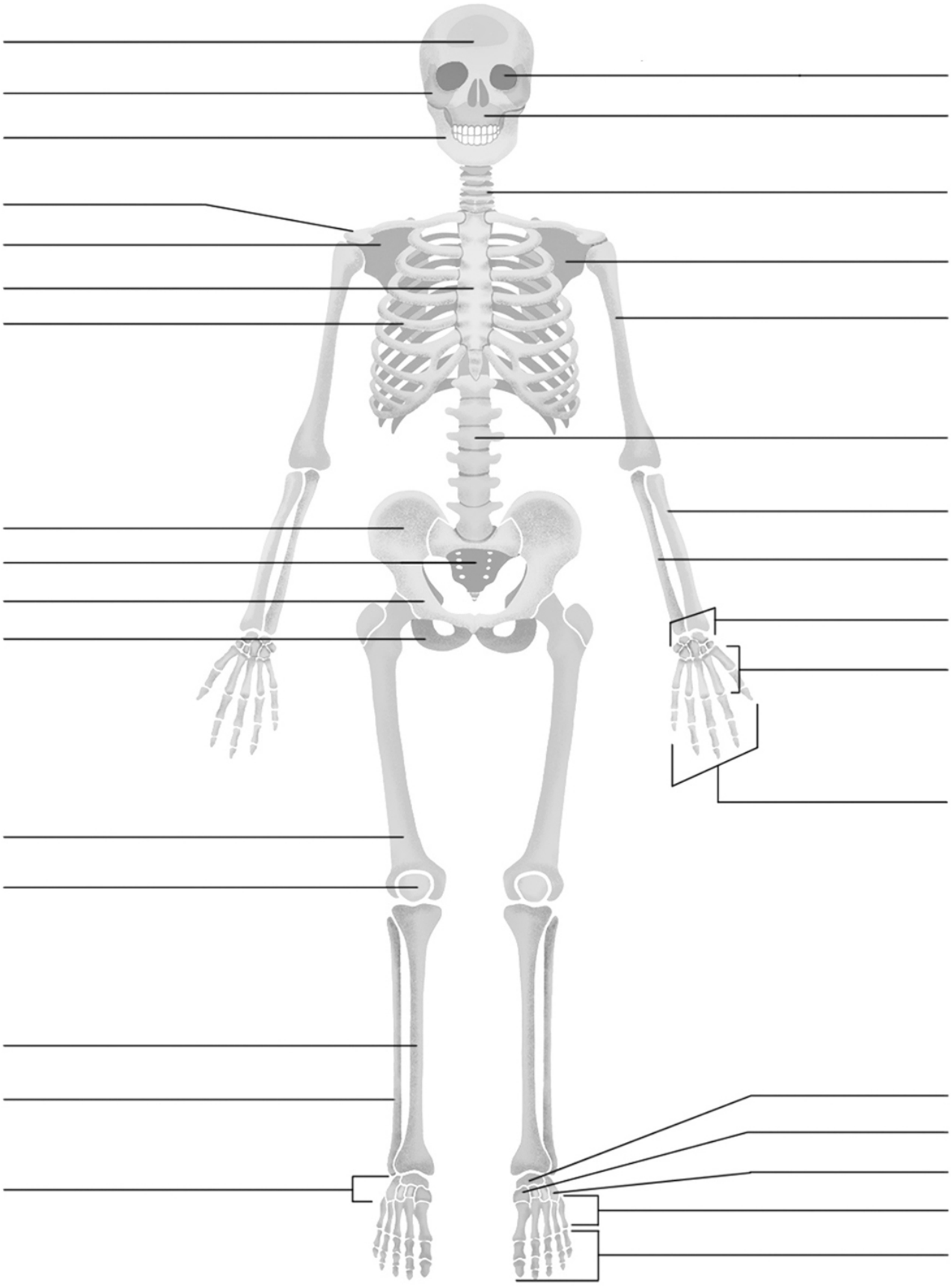
PROFESSOR LANDRY'S **FAVE FACT!**

TERMINOLOGY

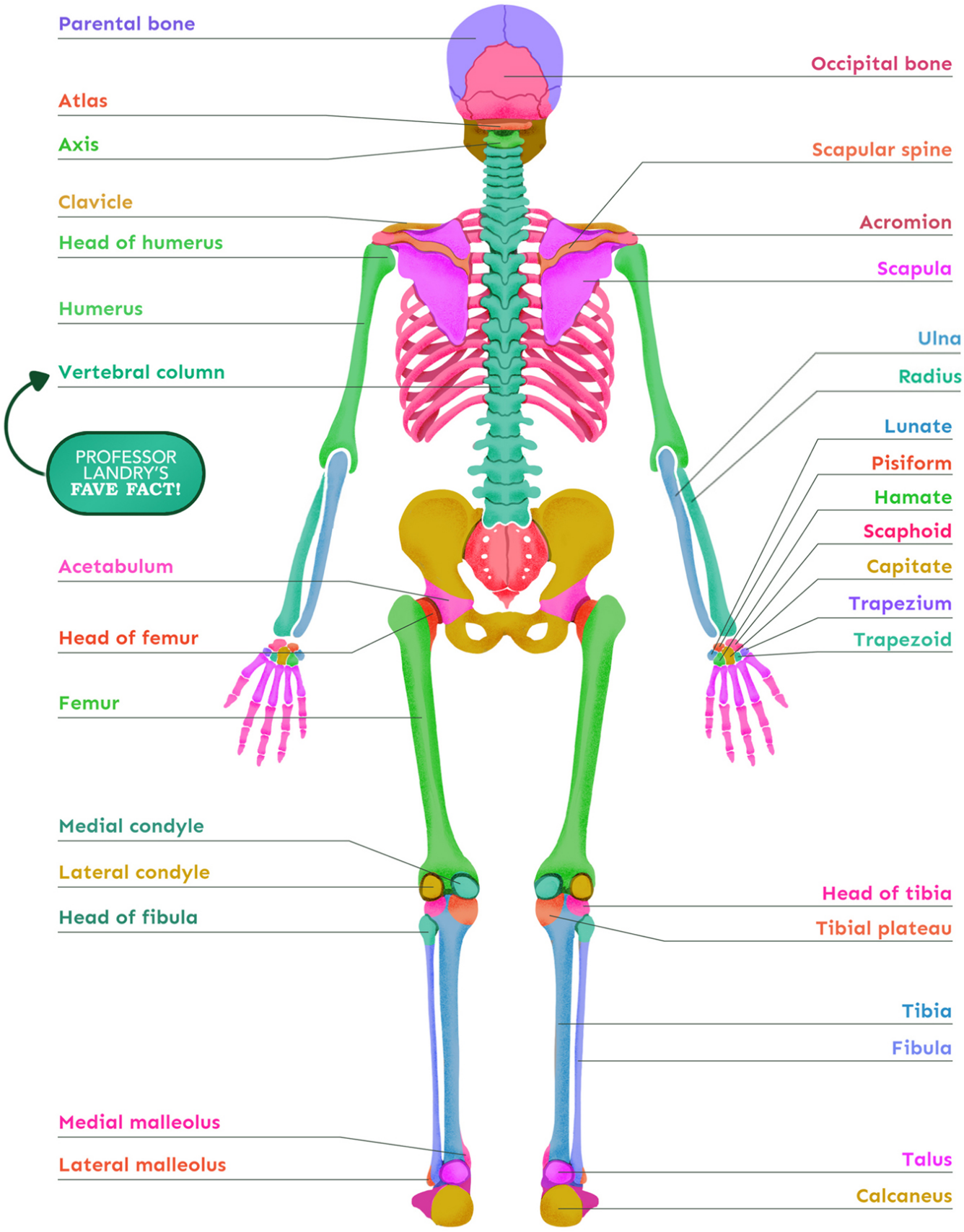
Anterior	=	front
Posterior	=	back
Lateral	=	away from the midline of the body
Medial	=	toward the midline of the body
Adduction	=	moving the arm or leg toward the body
Abduction	=	moving the arm or leg away from the body
Superior	=	above, or higher
Inferior	=	below, or lower
Proximal	=	closer to the origin
Distal	=	farther from the origin

Anatomical Position: standing, arms by the side, palms forward

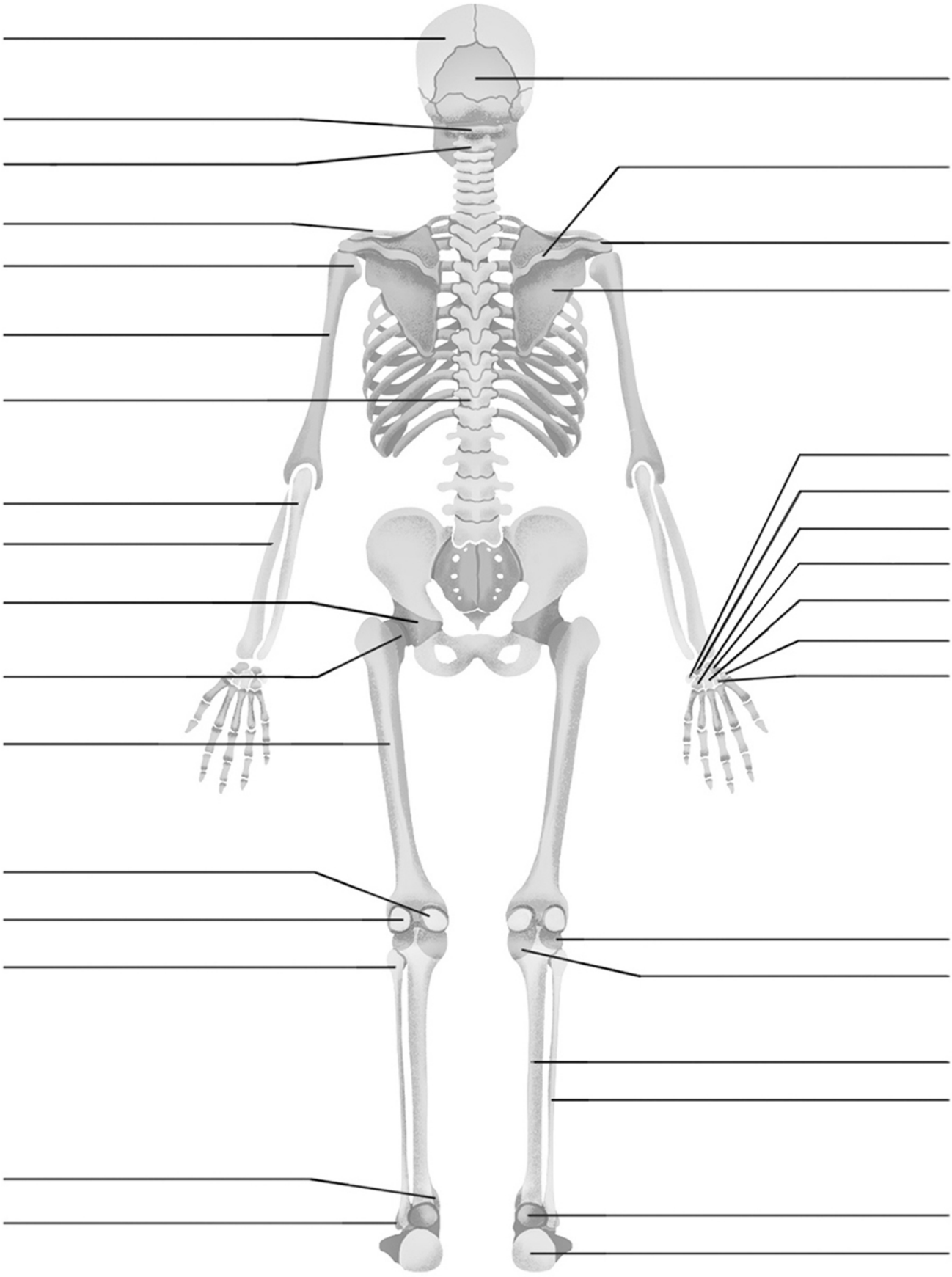
Anterior Skeleton



Posterior Skeleton



Posterior Skeleton



The **Human Muscular** System

PROFESSOR LANDRY'S FAVE FACT!

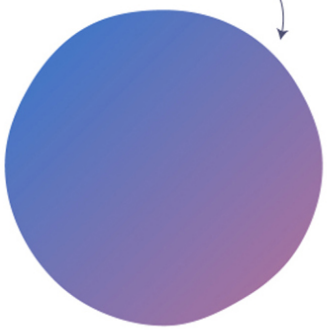
nm = nanometers
= one billionth of a meter
= 0.000000001 meters
= 25,400,000 nm in 1 inch

Virus size (average): **100 nm**

Bacteria size (average): **950 nm**

Human cell (average): **50,000 nm**

Human muscle cell (average): **60,000 nm**



Human hair width (average): **100,000 nm**

COOL MUSCLE FACTS!

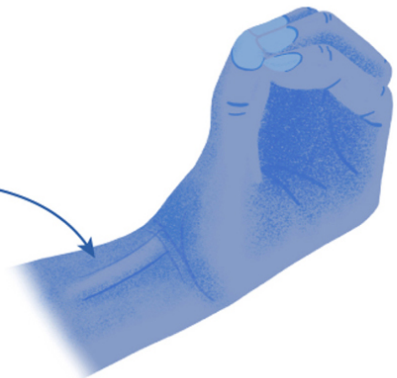
- Humans have over 600 muscles.
- 3 types of muscles:
  - skeletal (most of the muscles in the body)
  - cardiac (heart)
  - smooth (intestines, walls of arteries, etc.).
- "Muscle" come from the Latin "musculus," which means "little mouse"
- Muscles are attached (called origins & insertions) to bones with very strong tendons that mesh into the bone.
- They move the body with incredible coordination and precision.
- They contract (shorten) via a sliding filament mechanism.
- They produce heat that helps maintain normal body temperature (homeostasis).
- They love high energy ATP for energy.
- Glycogen (stored glucose) is stored in the muscle and liver and broken down to glucose when needed
- Glucose, along with oxygen, goes through cellular respiration to produce the high energy molecule that muscles love: ATP!
- Proprioception (muscle sense) allows our brain to know where our muscles are and what they're doing.
- Regular activity (manual work or exercise) increases the muscle's tone (state of slight contraction) and ability to use oxygen to create ATP (improves fitness level and your 5K time). :-)
- Muscle hypertrophy (increase in size) occurs when it has to do "harder" work than it normally does (weight training or manual work that requires heavy lifting).
- The longest muscle cell is about 32 cm (sartorius muscle in the leg) and the shortest is about 0.1 cm (stapedius muscle in the ear).

DO YOU HAVE A PALMARIS LONGUS?

Do you have a palmaris longus? 23% of the population does not.

Here's how to determine if you do: squeeze your fingertips together like this while bending your wrist and look for the palmaris longus tendon.

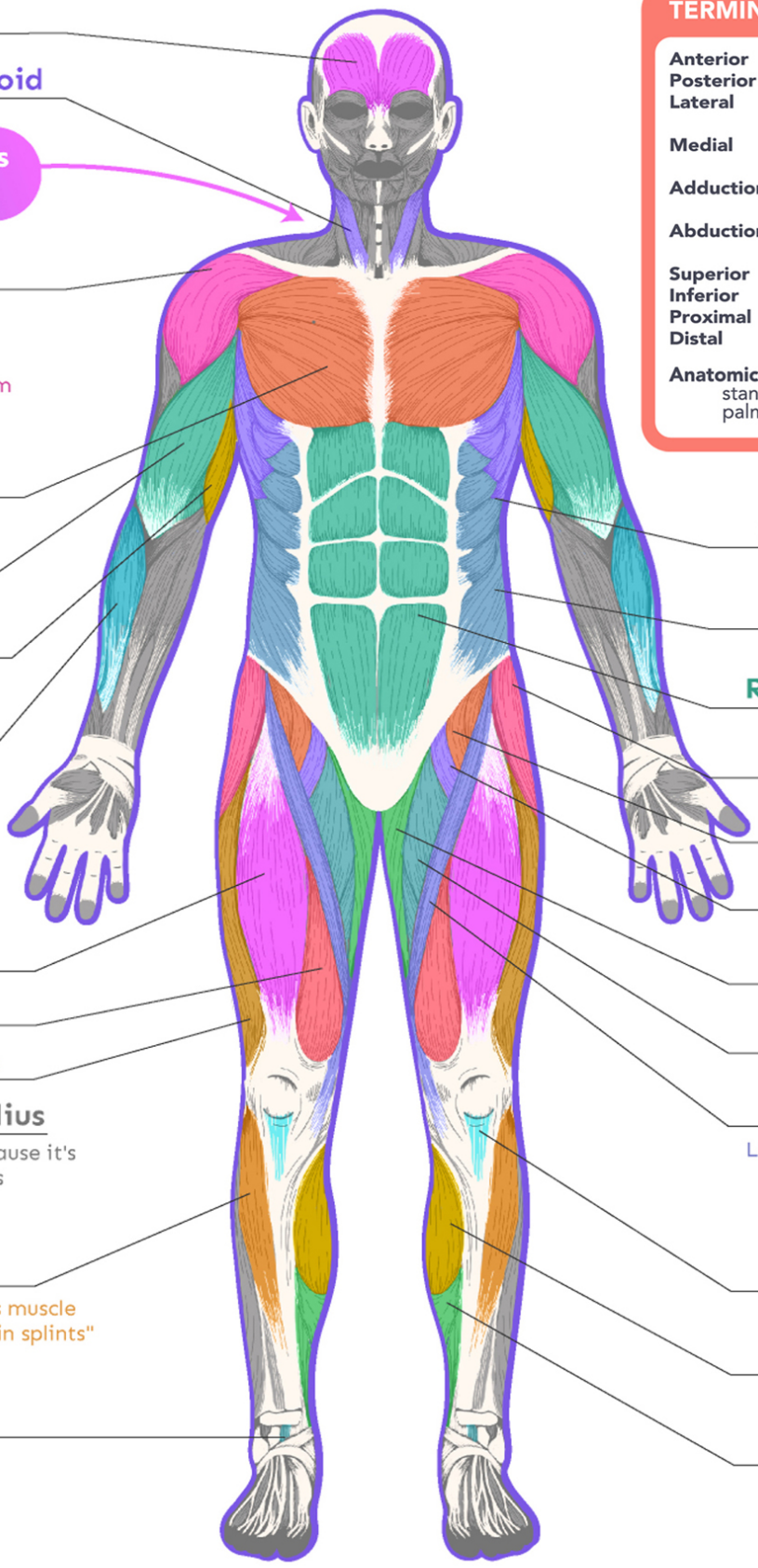
Does not having a palmaris longus affect you negatively? Your grip strength might be slightly decreased, but it's not noticeable.



MUSCLE FIBER TYPES

CHARACTERISTICS	TYPE I	TYPE IIA	TYPE IIX
CONTRACTION TIME	SLOW	FAST	VERY FAST
OXIDATIVE CAPACITY	HIGH	HIGH	LOW
DIAMETER	SMALL	MEDIUM	LARGE
RESISTANCE TO FATIGUE	HIGH	MODERATE	SMALL
GENERATING FORCE	SMALL	MODERATE	VERY HIGH

Anterior Muscles



Frontalis

Sternocleidomastoid

PROFESSOR LANDRY'S FAVE FACT!

Deltoid

Covers all of the shoulder: anterior, middle and posterior. Enables you to move your arms away from your body (abduction).

Pectoralis Major

Biceps Brachii

Triceps Brachii

Brachioradialis

Quadriceps

or "quads" are a group of these four muscles:

- **Rectus Femoris**
- **Vastus Medialis**
- **Vastus Lateralis**
- **Vastus Intermedius**

  which can't be seen because it's below the rectus femoris

Tibialis Anterior

The pain we feel when this muscle becomes sore is called "shin splints"

Extensor Hallicus

TERMINOLOGY

Anterior	=	front
Posterior	=	back
Lateral	=	away from the midline of the body
Medial	=	toward the midline of the body
Adduction	=	moving the arm or leg toward the body
Abduction	=	moving the arm or leg away from the body
Superior	=	above, or higher
Inferior	=	below, or lower
Proximal	=	closer to the origin
Distal	=	farther from the origin

Anatomical Position: standing, arms by the side, palms forward

Serratus Anterior

External Oblique

Rectus Abdominis

Gluteus Medius

Iliopsoas

Pectineus

Gracilis

Adductor Longus

Sartorius

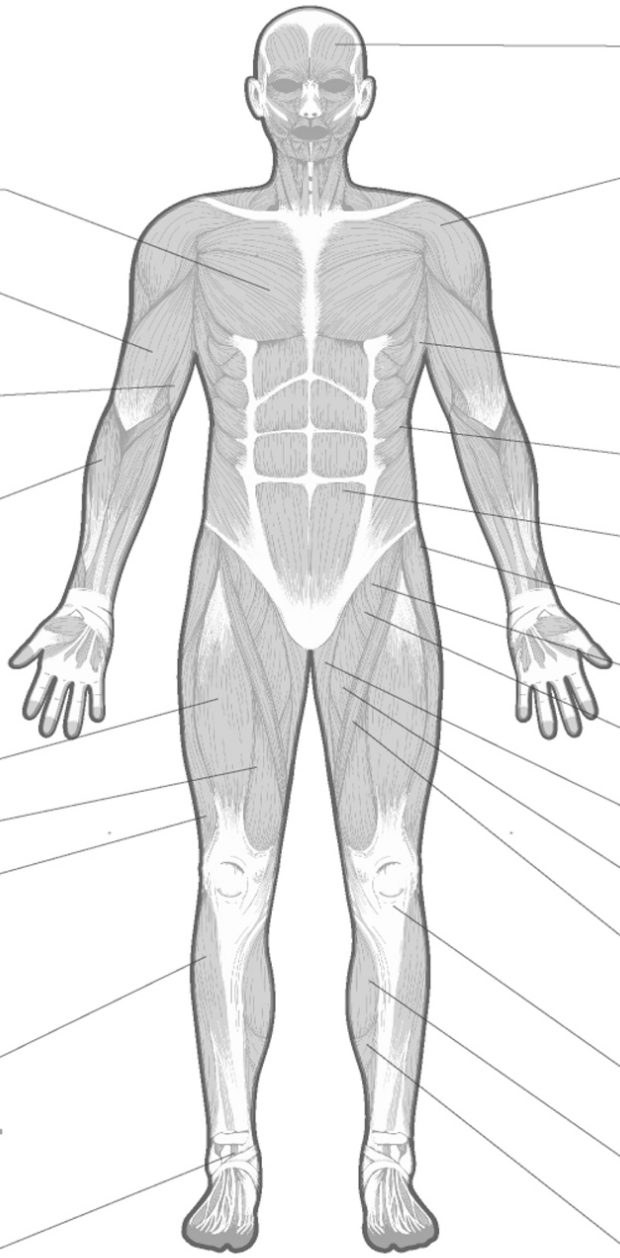
Longest muscle in the body and it's rare in that it crosses other muscles

Patellar Tendon

Gastrocnemius

Soleus

Anterior Muscles



Covers all of the shoulder: anterior, middle and posterior. Enables you to move your arms away from your body (abduction).

or "quads" are a group of these four muscles:

- _____
- _____
- _____
- _____

which can't be seen because it's below the rectus femoris

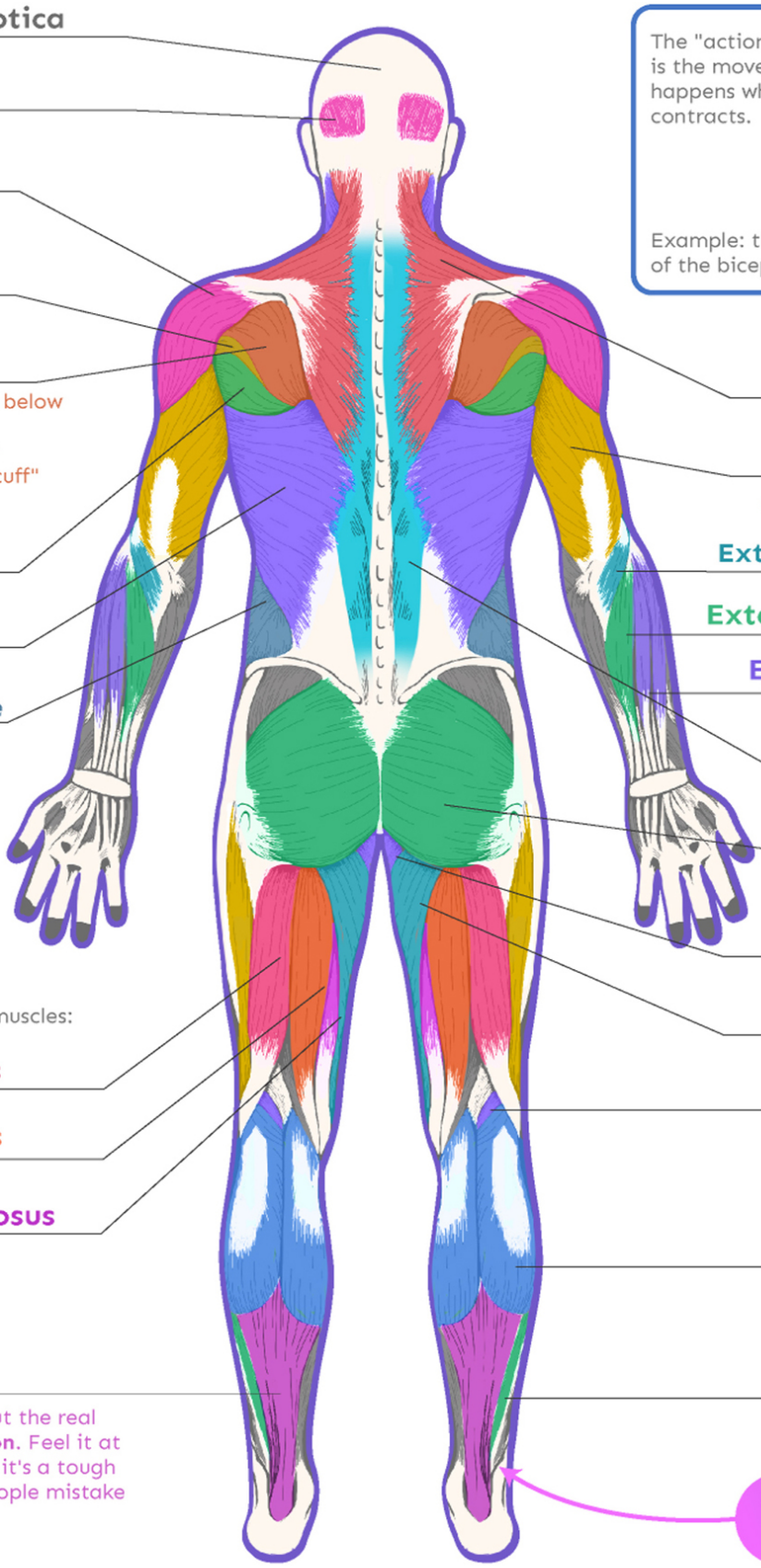
Longest muscle in the body and it's rare in that it crosses other muscles

The pain we feel when this muscle becomes sore is called "shin splints"

True or False

1. **T** **F** The average muscle cell width is 5 nanometers.
2. **T** **F** In anatomical position, the biceps brachii muscle is on the anterior of the body.
3. **T** **F** The "quadriceps" are a group of four muscles on the anterior of the leg.
4. **T** **F** Ligaments attach muscles to bones.
5. **T** **F** Some people do not have a palmaris longus muscle.

Posterior Muscles



Galeus Aponeurotica

Occipitalis

Deltoid

Teres Minor

Infraspinatus

Name indicates that it's below the spine (ridge) of the scapula. One of the four muscles of the "rotator cuff"

Teres Major

Latissimus Dorsi

External Oblique

Hamstrings

A group of these three muscles:

- Biceps Femoris
- Semitendinosis
- Semimembranosus

Achilles Tendon

is the common name, but the real name is **calcaneal tendon**. Feel it at the back of your ankle - it's a tough round tendon - some people mistake it for a bone.

The "action" of a muscle is the movement that happens when it contracts.

Example: the action of the bicep is flexing of the arm.

Trapezius

Triceps Brachii

Action is to extend the arm

Extensor Carpi Radialis

Extensor Carpi Ulnaris

Extensor Digitorum

Sacrospinalis

Gluteus Maximus

Largest muscle in the body

Adductor Magnus

Gracilis

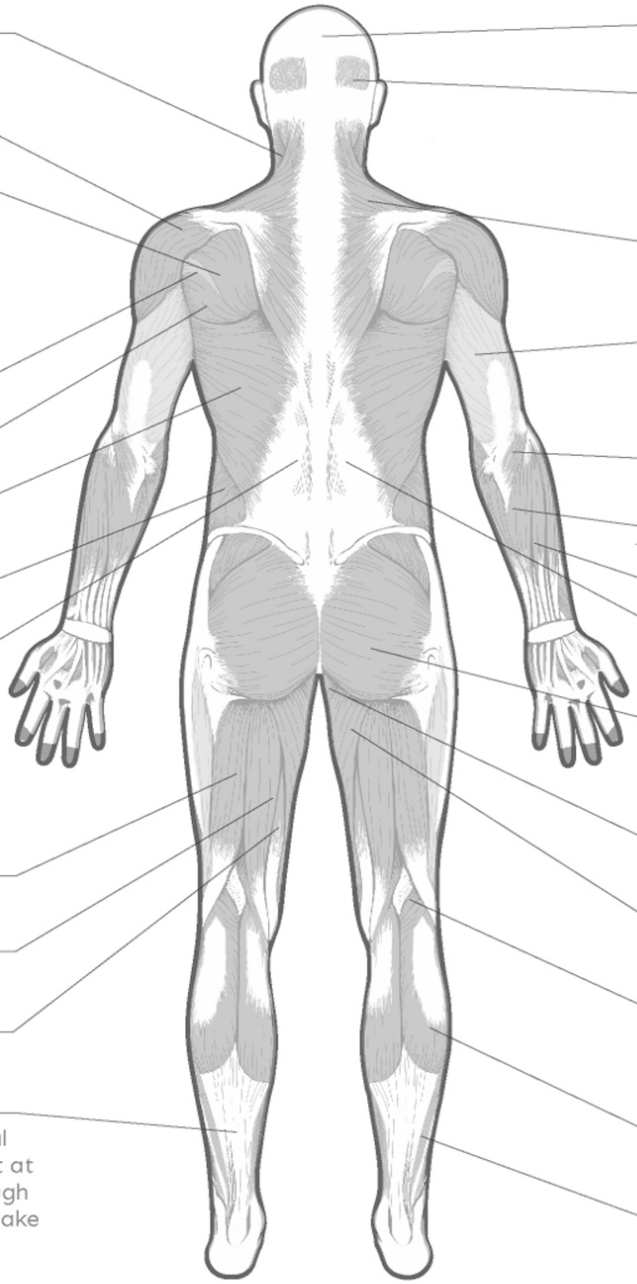
Plantaris

Gastrocnemius

Soleus

PROFESSOR LANDRY'S FAVE FACT!

Posterior Muscles



Name indicates that it's below the spine (ridge) of the scapula. One of the four muscles of the "rotator cuff"

Action is to extend the arm

Largest muscle in the body

A group of these three muscles:

-
-
-

is the common name, but the real name is **calcaneal tendon**. Feel it at the back of your ankle - it's a tough round tendon - some people mistake it for a bone.

True or False

1. **T** **F** Humans have over 900 muscles.
2. **T** **F** Muscles produce heat to help maintain temperature homeostasis.
3. **T** **F** The trapezius muscle is posterior leg muscle.
4. **T** **F** The tendon of the gastrocnemius is the calcaneal tendon.
5. **T** **F** Adducting the leg is moving it toward the midline of the body.

Chapter 2 Worksheet

1. Have you filled in the black and white printables from this chapter?

2. Have you completed your class notes from this week: taken notes on all of this week's class (going back to the class recording if necessary), sketched, and summarized?

3. Have you studied using retrieval practice until you know all of the information? What types of retrieval practice did you use?

4. For 10 minutes, teach someone what we discussed in class — using your notes as little as possible. Who did you teach and what did you teach them?

5. Explain something about this week's lesson that you found most interesting.

6. What is the purpose of bones in humans?

7. What connects bones to bones?

8. Name and describe the parts of the vertebral column as discussed in class.

Chapter 2 Worksheet

9. Name 15 different bones of your choice from the anterior skeleton. Describe where they are located using the directional terms we discussed in class.

10. Name 15 different bones of your choice from the posterior skeleton. Describe where they are located using the directional terms we discussed in class.

Chapter 2 Worksheet

11. List and describe the terms of direction that we discussed in class.

12. How are muscles connected to bones?

13. What is the function of muscles?

14. Describe what a muscle's "action" is, in general.

15. Explain the specific action of five anterior muscles.

16. Explain the specific action of five posterior muscles.

Chapter 2 Worksheet

17. List 10 anterior muscles and describe their location using the directional terms we discussed in class.

18. List 10 posterior muscles and describe their location using the directional terms we discussed in class.

Chapter 2 Worksheet

19. Sketch and label the anterior muscles in the space below.

Chapter 2 Worksheet

20. Sketch and label the posterior muscles in the space below.

Chapter 2 Worksheet

21. Write a 100 - 200 word story below using muscles, terms of direction, and muscle action as we discussed in class. Be creative!

Your **Science Creation** Worksheet

Use this space to create - write, sketch, note-sketch, or in some other way depict information, concepts, and ideas covered in this chapter.

Exodus 35:31
and he has filled him with the Spirit of God, with skill, with intelligence, with knowledge, and with all craftsmanship