

# INDEPENDENT RESEARCH PROJECTS:

## Anatomy PREVIEW

### Overview:

This resource includes everything you need to administer semester-long or yearlong independent research projects in your anatomy class. It is a perfect way to differentiate your instruction by providing more advanced students with this project-based challenge. Teachers can assign students a topic from the list of suggested driving questions, let students pick from the list, or let them design a project around their own question. This resource has all of the support documents you need to bring structure to using a PBL-style assessment over the course of a semester or yearlong class – plus editable versions of all student handouts!

### Project Based Learning:

I have always LOVED so many of the characteristics of PBL (Project Based Learning). I especially love the emphasis on student voice and choice, student autonomy, and the value of the investigative process to create products that communicate an answer to the original essential/driving question. However, this resource isn't 100% true to PBL in that the focus is more on the long-term nature of investigating the topic independently rather than working collaboratively with peers to learn about a unit through the completion of a project. You will see throughout the pages in the resource where I have pulled in my favorite components from PBL to create my vision for these independent research projects, but know that this resource wasn't designed to be 100% PBL. However, I've included helpful hints to make it more fully PBL on **p.14**.

### Why you should use:

I love so many things about projects and specifically PBL, but especially that PBL is student-led, multidisciplinary, and relevant. I love how PBL incorporates student choice, community relevance, and communicating findings of the learning process through multiple products. Why? Because this type of learning engages students and gives them essential practice with critical skills they will use their entire lives, including: researching, synthesizing ideas, asking questions, collaborating, revising, managing time, project planning, making community and cross-curricular connections, varying communication formats, and reflecting. **If you've been looking for a different way to summatively assess your students at the end of the year, or a way to challenge students to see the relevance and interconnectedness of every topic covered in anatomy all year long, this resource is for you.**

### When to use:

These projects are designed to get students to spend the entire time they are in your course making connections between what they are learning in class and what they are researching for their project at home. The projects require a significant amount of student time and research to fully complete them. Because of this, I would introduce the project at the beginning of the year, do regular check ins with students throughout the year, and culminate the year with student presentations of their products. See my suggested pacing guidelines on **p.9-10** for how to implement these projects over the course of a semester or a full school year in order to best meet you and your students' needs.

### How to use:

This is best used as a semester or yearlong independent research project, but can be adapted to be done entirely in class, as a partner or small group project, or as a PBL-style final assessment for your course.

## The process:

The traditional PBL process is as follows:

1. Establish or select a driving question.
2. Design a plan for the project\*.
3. Set a schedule for executing the plan.
4. Work through the plan and monitor progress.
5. Assess the product(s)\*.
6. Evaluate and reflect upon the experience.

\*In PBL, the **project** is defined as the entire learning process to get to the end result, whereas the **product** is defined as the outcome that students actually create to represent their learning. Since this resource is designed to be used over the length of an entire anatomy course, the project covers the entire year (or semester) the course runs, while the products are what will be submitted at the end for assessment.

## Implementation options:

I believe this resource is best implemented over the entire length of the course – whether you are on a semester block schedule or a yearlong schedule. See the mock pacing schedules on **p.9-10**.

## Project components:

Since the project is the process in PBL, the following components will be part of the assessment for the project:

- **Planning** = establishing/selecting a driving question, designing the plan for the project, and setting a schedule for executing the plan.
- **Check ins** = students will complete check in forms on their process ~biweekly, at the end of each unit, and at the halfway point (*end of the first semester if following the yearlong pacing, or end of the first quarter if following the semester long pacing*)
- **Peer Revision** = both in the middle and at the end of the project students will receive peer feedback and be expected to reflect and respond to the feedback.
- **Products** = the culmination of the project will be three products that demonstrate their understanding and ability to answer the initial driving question → a visual product, written product, and oral product.
- **Reflection** = students will complete a final reflection evaluating the overall experience.

## Assessment:

You can assess this however is best for YOU and your students. I use a simple two category grading system of minor (*formative*) and major (*summative*) grades. I weight by points within each category. Based on my grading policy, I would grade each component as the following:

- **Planning** = 50 pt minor grade for completing all planning sheets on **p.7-11** in the student handouts
- **Check ins** = 10 pt minor grade per check in  
See sample paper check ins on **p.12-13** of the student handouts, and a link to the Google Form version on **p.11** of this document.
- **Peer Revision** = 30 pt minor grade per revision/reflection
- **Products** = 100 pt major grade for the written product, 100 pt major grade for the visual and oral products (assessed together)
- **Final Reflection** = 50 pt major grade for the final reflection.

See an example of a point tally for this project on p.13 of this document.

## Materials:

There are no required materials other than the student handouts included in this resource. If you choose to provide your students with additional materials, that is totally up to you!



# PREVIEW

including

# 15 sample driving questions for potential research

**Example of Driving Questions:**

DRIVING QUESTION	NOTES
Which is more in control- your nervous system or your endocrine system?	This is a "debatable" style question. There is scientific on-going research, but the purpose is to get students making a claim and defending it with evidence and reasoning. I love this question because these two systems are interconnected in learning about every body system. Also something I love about debate questions: they use fully searchable on Google since a "right answer" doesn't exist in any capacity.
Which of the four tissue types is the most important in the body?	Another great "debatable" style question. There are covered in my very first anatomy unit. But come up in every other unit afterwards, so one is GREAT topic to explore when looking for students to make connections between units.
What are the effects of obesity on each of the body systems?	I love the idea of this question (and the ones that follow) because it will be really easy for students to break up this project into chunks by studying the impact on each body system as you teach them in class. An entry event could be to have a documentary related to obesity or fat, such as <a href="#">The Truth About Fat by PBS</a> .
What are the effects of eating disorders on each of the body systems?	Similarly to above, this is a great question that brings real world connections to every system you study in your course. Showing students statistics about eating disorders (a great site for <a href="#">anorexia/bulimia can be found here!</a> ) would be an impactful entry event!
What are the effects of aging on each of the body systems?	Whether we live it or not, all of us will be impacted by aging. Nearly all of your students will have a grandparent or grandparent, or someone close to them who is aging. I love this driving question because it also creates an opportunity to extend research into the geriatric movement and the different look being used for prevent aging.
What are the effects of stress (or anxiety, or depression) on each of the body systems?	Stress is now considered to be a <a href="#">physical/medical health issue</a> . You could have students investigate this question with regards to stress, anxiety, or depression. I jumped here all together because all three of these are INCREDIBLY common in our fast-paced society, and one health issue greatly related to our students. I think searching a question like this could be incredibly eye-opening for them.
How does the anatomy of a _____ compare to a human?	I rarely have time to include comparative anatomy in my human anatomy & physiology course, but this question creates the opportunity to investigate that! A great entry event could be an <a href="#">episode of Invasor: Nature's Dinosaurs</a> . My students could pick one organism to compare every system to humans, or pick one system and compare it to multiple organisms/ some system.

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**Example of Driving Questions:**

DRIVING QUESTION	NOTES
How does pregnancy impact each of the body systems?	I have seen many teachers do a "pregnancy project" that split the length of the year, where students "conceive" at the start of the school year and then work through the pregnancy all year. I think that could be super fun, but I also like the idea of students specifically researching how pregnancy of different stages affects different body systems. This could also be a positive question where one investigates the impact on the mother and the other researches the development of each body system in the growing embryo/fetus.
How do high risk pregnancies differ from low risk?	Pregnancy complications seem more common than not. Students could use this driving question to investigate different complications and the implications all different high risk issues such as gestational diabetes, hypertension, genetic, preeclampsia, etc...
Why do we need to get a flu shot every year but not other vaccines?	Students can investigate the history of vaccines and the different types (how they work - why we make some differently than others, etc.)
What are the long-term implications of COVID?	I think this could be a really relevant question for students given our current world. (Specially unique point of interest) would be the long-term loss of smell, taste, experience and when pinpointing that some are developing.
Does holistic medicine really work?	Consider having students investigate this essential oil, crystal and other forms of traditional medicines.
Does using cleaner beauty really make a difference?	Similarly, cleaner beauty products are another current trend. Would be interesting to see if they REALLY make a difference in preventing health issues!
How is biological sex best defined for something like the Olympics where athletes are classified as males and females in their competitive event?	In 2012 I read an article out of ESPN magazine by Samantha M. Shapiro called " <a href="#">Transgender in the Spotlight</a> ". It covers the story of Sarah Beuchemin, the water runner whose Olympic medals were stripped due to a failed gender test (she was found to be a great entry event to introduce this driving question). The article talks about the history of how biological sex has been defined through the Olympics as well as introduces the complications of biological sex classifiers. This is a GREAT & controversial topic, so consider whether or not it is appropriate for your student population, but I think the athletes here and implications on this most famous sporting event in the entire world make this an incredibly fascinating driving question to consider.
Could plant-based diets save the world?	I love how this question connects a modern food to the real struggle of being sustainable. Students can look at the health impact on the body AND the environmental impact!

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**MOCK PACING GUIDE**  
*Yearlong project*

These are marked as MOCK pacing guides for a reason! Use them as a guide, not as law. Do what is best for YOU and your students. Your school schedule may look very unique. Feed everything in the "when" column as "approximately". In actuality, it doesn't matter. This is just to give you some structure for each of your time frames.

Notes: Depending on your school year calendar and student population, you may have the capacity to build in more class time for completing the project. This "flexibility" (if not, no sweat) just follow the guide below. This is designed to be able to be done completely independently.

WHEN	WHAT
Early in year, between finishing your 1 <sup>st</sup> unit and starting your 2 <sup>nd</sup> .	<b>Part one of the process.</b> Use an entry event to increase engagement and introduce the project and driving questions to students.
The next day.	<b>Parts two and three of the process.</b> Create space for students to design a plan and set a personal schedule for the project.
5 times throughout 1 <sup>st</sup> semester	<b>Part four of the process.</b> About every 2-3 weeks, have students at the end of class on Friday submit the progress check-in form (see p.12 of the student handouts).
At the completion of each unit in the 1 <sup>st</sup> semester	<b>Part four of the process.</b> At the end of each unit, have students submit the end of unit check-in form (see p.13 of the student handouts) and return to them so they can keep track of the connections they see in each unit.
At midyear	<b>Part four of the process.</b> Set aside one class period for students to share their work thus far with several peers and to receive feedback. From there they should make revisions to their work.
5 times throughout 2 <sup>nd</sup> semester	<b>Part four of the process.</b> About every 2-3 weeks, have students at the end of class on Friday submit the progress check-in form (see p.12 of the student handouts).
At the completion of each unit in the 2 <sup>nd</sup> semester	<b>Part four of the process.</b> At the end of each unit, have students submit the end of unit check-in form (see p.13 of the student handouts) and return to them so they can keep track of the connections they see in each unit.
At the end of the year	<b>Part six of the process.</b> Students will complete the final written reflection of their experience for submission.

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**MOCK PACING GUIDE**  
*Semester long project*

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Notes: Depending on your school year calendar and student population, you may have the capacity to build in more class time for completing the project. This "flexibility" (if not, no sweat) just follow the guide below. This is designed to be able to be done completely independently.

WHEN	WHAT
Early in year, at the start of week 3 of school.	<b>Part one of the process.</b> Use an entry event to increase engagement and introduce the project and driving questions to students.
The next day	<b>Parts two and three of the process.</b> Create space for students to design a plan and set a personal schedule for the project.
3 times throughout 1 <sup>st</sup> quarter	<b>Part four of the process.</b> About every 2 weeks, have students at the end of class on Friday submit the progress check-in form (see p.12 of the student handouts).
At the completion of each unit in the 1 <sup>st</sup> quarter	<b>Part four of the process.</b> At the end of each unit, have students submit the end of unit check-in form (see p.13 of the student handouts) and return to them so they can keep track of the connections they see in each unit.
At midyear, between 1 <sup>st</sup> and 2 <sup>nd</sup> Q2	<b>Part four of the process.</b> Set aside one class period for students to share their work thus far with several peers and to receive feedback. From there they should make revisions to their work.
3 times throughout 2 <sup>nd</sup> quarter	<b>Part four of the process.</b> About every 2 weeks, have students at the end of class on Friday submit the progress check-in form (see p.12 of the student handouts).
At the completion of each unit in the 2 <sup>nd</sup> quarter	<b>Part four of the process.</b> At the end of each unit, have students submit the end of unit check-in form (see p.13 of the student handouts) and return to them so they can keep track of the connections they see in each unit.
The day after	<b>Part six of the process.</b> Students will complete the final written reflection of their experience for submission.

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# Pacing guides for Yearlong and semester block courses

# PREVIEW

**20** student handouts including rubrics, checklists, planning pages, and **MORE!**

**ANATOMY INDEPENDENT RESEARCH PROJECT**  
**Overview**

**Goal:** To independently complete a research project of your choice, answering a driving question using information gathered from what you learn as we progress throughout the year and from your past research. This project will be the representation of all that you learned in this class at the end of the year, and should be the completion of your journey and the final product you will create to demonstrate your learning.

**Components:**

- Planning process
- Progress Check-ins
- Peer review
- Product (written, visual, or digital)
- Final reflection

**Written Product Requirements:**

- Driving question is answered clearly and in depth. All work is prepared, informed, and accurate.
- Background information necessary to understand the answer to the question is clearly explained.
- Evidence from research is provided to support every claim made.
- Reasoning for each piece of supporting evidence is clear.
- Established connections are made for at least 4 of the units we covered in class.
- Interview with a relevant member of the community is incorporated in a way that supports answering the driving question.
- All research is appropriately cited, both using in-text citations and a works cited page.

**Visual Product Requirements:**

- Content is clear and visually appealing.
- Captions demonstrate an understanding of the question.
- Relevant to the driving question.
- Contributes to further expanding the background information and evidence-based reasoning necessary to answer the question.
- Engages audience, presenting an interest in the answer to the driving question.

**Oral Product Requirements:**

- Delivers to demonstrate a clear understanding.
- Student demonstrates confidence and clarity.
- The visual product is referenced and explained.
- There is clear evidence that the student has a thorough research they found to answer it.
- All information shared is relevant and accurate.

**Assessment:** You will be assessed both on the product and the process. Assessment throughout the process will include progress check-ins, and participation in peer and classroom observations on their product, and receiving and giving assessments of the products will include the written reflection from the experience. There are some:

- Process = 250 pts
- Product = 150 pts
- The written and Visual product will be assessed

**ANATOMY INDEPENDENT RESEARCH PROJECT**  
**Completion Checklist**

Throughout the course of the year you will be expected to complete progress check-ins (ongoing class). In addition, use the following checklist to stay on track with what you need to be doing independently!

- Select a driving question.
- Work through the planning pages.
- Set completion schedule.
- Conduct background research.
- Add to "need to know" list after initial research.
- Make final commitment to driving question.
- Conduct an interview to include as a source in written product.
- Conduct follow up research after interview.
- Outline written product.
- Sketch plan for visual product.
- Write rough draft of written product.
- Provide feedback to peers mid-project.
- Evaluate received peer feedback and make adjustments.
- Make final written product.
- Create visual product.
- Create and practice oral product.
- Present visual and product.
- Provide feedback to peers.
- Write final reflection.
- Submit and CELEBRATE!!

**ANATOMY INDEPENDENT RESEARCH PROJECT**  
**Written Product Rubric**

Criteria	4 (Exceeds Expectations)	3 (Meets Expectations)	2 (Approaches Expectations)	1 (Does Not Meet Expectations)
Background Information	Background information is clearly explained and relevant to the question.	Background information is explained and relevant to the question.	Background information is explained but lacks detail or relevance.	Background information is missing or irrelevant.
Evidence	Evidence is provided to support every claim made.	Evidence is provided to support most claims made.	Evidence is provided but lacks detail or relevance.	Evidence is missing or irrelevant.
Reasoning	Reasoning for each piece of supporting evidence is clear.	Reasoning for each piece of supporting evidence is mostly clear.	Reasoning for each piece of supporting evidence is unclear.	Reasoning for each piece of supporting evidence is missing.
Connections	Established connections are made for at least 4 of the units we covered in class.	Established connections are made for at least 3 of the units we covered in class.	Established connections are made for at least 2 of the units we covered in class.	Established connections are made for at least 1 of the units we covered in class.
Interview	Interview with a relevant member of the community is incorporated in a way that supports answering the driving question.	Interview with a relevant member of the community is incorporated in a way that supports answering the driving question.	Interview with a relevant member of the community is incorporated in a way that supports answering the driving question.	Interview with a relevant member of the community is not incorporated.
Citations	All research is appropriately cited, both using in-text citations and a works cited page.	All research is appropriately cited, both using in-text citations and a works cited page.	All research is appropriately cited, both using in-text citations and a works cited page.	All research is not appropriately cited, both using in-text citations and a works cited page.

**PROGRESS CHECK-IN #01**

The purpose of this check-in is to check in with you and your progress on your project. Please take a few minutes to complete this.

**WINS:** What have you accomplished since your last check-in? Please list at least one thing you did.

**OPPORTUNITIES:** What challenges have you encountered and how did you overcome them?

**PLANS:** What do you plan to accomplish before your next progress check-in? Refer back to your completion checklist and address it as well as what you need to do next!

--- If there are things you need from me to help you complete this, let me know here.

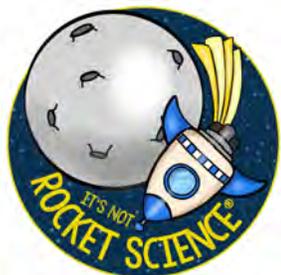
**ANATOMY INDEPENDENT RESEARCH PROJECT**  
**Point Ledger**

Component	Date	Points
Planning Pages		
Progress Check-in #1		
Progress Check-in #2		
Progress Check-in #3		
Progress Check-in #4		
Progress Check-in #5		
End of Unit #1 Check-in		10
End of Unit #2 Check-in		10
End of Unit #3 Check-in		10
Midterm Peer Evaluation and Reflection		30
Progress Check-in #6		10
Progress Check-in #7		10
Progress Check-in #8		10
Progress Check-in #9		10
Progress Check-in #10		10
End of Unit #4 Check-in		10
End of Unit #5 Check-in		10
End of Unit #6 Check-in		10
End of Unit #7 Check-in		10
Final Written Product		100
Final Visual and Oral Products		100
Final Reflection and Peer Evaluation		50
<b>Total Score:</b>		<b>500</b>

**PLUS**

All student handouts are **EDITABLE** to customize for your classes!

## THANK YOU!



I hope you find this resource to be useful to you in your classroom and that your students enjoy it as well!

## WANT TO SHARE YOUR THOUGHTS?

**If you enjoy this resource**, PLEASE leave feedback for me! I'd love to hear specifically what you enjoyed and how you used this in your classroom so that I can continue to create resources that are beneficial to you and your students. Your encouragement and feedback mean so much to me!

**If you have negative feedback**, I would love for you to email me first ([itsnotrocketsciencesstore@gmail.com](mailto:itsnotrocketsciencesstore@gmail.com)) so that I can serve you best on an individual basis to guarantee your satisfaction with my products. I will consider any changes you suggest for the product or product description.

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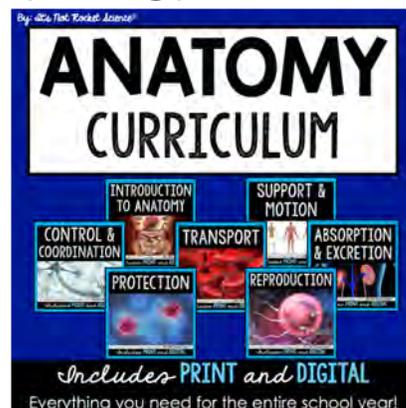
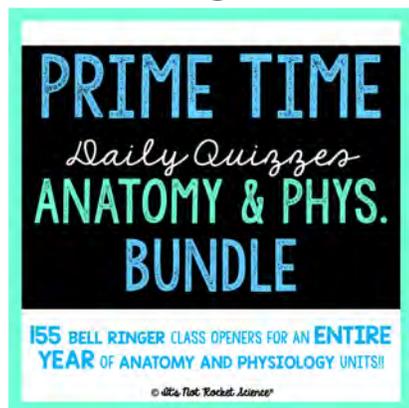
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