W. J. Keenan High School

AdvancED STEM Indicator

6.6: Students use technology resources to conduct research, demonstrate creative and critical thinking, and communicate and work collaboratively.

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- ACCELERATE Curriculum Overview
- Lesson plans demonstrating use of virtual environments for labs and game-based learning in biology.
- Student work samples from virtual lab in Biology I.
- Edmodo Screenshots demonstrating student use of technology resources to submit and converse electronically

Curriculum Overview REV 01-21-14

ACCELERATE
South Carolina's Engineering LaunchPad

Taught by qualified GSSM or university faculty:
Honors Courses (blue)
Dual Enrollment Courses (green)

	10 FALL	10 SPRING	11 FALL	11 SPRING	12 FALL	12 SPRING
MATH	**Honors Pre-Calculus for Engineers**	**Honors Pre-Calculus for Engineers**	**Calculus for Engineers 1**	**Calculus for Engineers 2**	**Calculus for Engineers 3**	**Calculus for Engineers 4 (Multivar. Calculus)**
SCIENCE	Chemistry I*	Chemistry I*	**Chemistry for Engineers 1**	**Chemistry for Engineers 2**	AP Physics C**	AP Physics C**
ENGINEERING	**Honors Pre-Engineering**	**Honors Pre-Engineering**	**Engineering 101**	**Engineering 102**	**Engineering Design and Modeling**	**Honors Senior Project**
COMPUTER SCIENCE					**Computer Science 101 for Engineers**	**Computer Science 102 for Engineers**
ENGLISH/LANG ARTS	English II*	English II*	**English Composition 1**	**English Composition 2**	**Honors Persuasive Literature & Comm**	**Honors Persuasive Literature & Comm**

Consult your Guidance Counselor for all other graduation requirements.

Completion of Algebra II is a prerequisite for enrollment in Accelerate.

* Prior to the beginning of 11th grade, students should complete:
- Biology I
- Chemistry I
- Geometry
- English II

** AP Physics C is a prerequisite for many sophomore-level college engineering courses and is strongly recommended.

Standard High School Graduation Requirements

Standard Credit Units (1 year = 1 credit)

Math	4
Science (incl biology)	3
Computer Science	1
English/Language Arts	4
Foreign Language	1
US History	1
Government/Economics	1
Other Social Studies	1
Phys Ed/ROTC	1
Electives	7
Total	**24**

Teacher: Kirstin Bullington Subject: Biology

Date: 3/3/14-3/07/14 Grade: 9

	Monday	Tuesday	Wednesday	Thursday	Friday
Content Standard(s)	Standard B-4: The student will demonstrate an understanding of the molecular basis of heredity. B-4.5 Summarize the characteristics of the phases of meiosis I and II. B-4.6 Predict inherited traits by using the principles of Mendelian genetics (including segregation, independent assortment, and dominance). B-4.7 Summarize the chromosome theory of inheritance and relate that theory to Gregor Mendel's principles of genetics. B-4.8 Compare the consequences of mutations in body cells with those in gametes. .				
Learning Objective(s) ***Learning Target(s)/Indicators/Essential Question(s)***	• Identify traits as homozygous, heterozygous, dominant, or recessive • Infer the possible genotypes and phenotypes of offspring; • Illustrate monohybrid and dihybrid crosses; • Summarize the Mendelian concepts of independent assortment, segregation and dominance. •Compare the genotypes and phenotypes of offspring to their parents				
Essential Question(s)	➢ What is the significance of crossing-over in Prophase I? ➢ What is the difference between genotype and phenotype? ➢ How does a Punnett square demonstrate Mendel's laws of dominance and segregation? ➢ How does a dihybrid cross demonstrate Mendel's law of Independent Assortment? ➢ Why are linked genes an exception to Mendel's law of Independent Assortment?				
Materials/Resources ***Essential for students to successfully complete task(s)/Activity***	LCD Projector, Smartboard, Document Camera, Supplemental Materials, Textbooks, Word Wall, and Print Materials Computer, Internet Resources/Interactive Websites, and Smartboard Activities				
Relevance/Rationale ***Enduring Understanding/Real-World Connections***	DNA and its replication mechanism are the basis for heredity and instructions for all living things. Understanding how DNA is inherited from each parent is essential to understanding genetic disorders and family health history.				
Anticipated Student Misconceptions	Students struggle with meiosis in that the process reduces the number of chromosomes. Students generally think that you can inherit "more" genes from one parent or the other based on who you look most like.				

Learning Experiences (Use content instructional frameworks) ***How will students be engaged in the topic? Differentiation?***	**MONDAY** • Students and teacher will discuss catalyst. • Students will take benchmark on DNA and meiosis. (USATestPrep) • Students not taking the benchmark will complete guided reading of major concepts and vocabulary of genetics, so that when reviewed the following day, students will be familiar with the many terms introduced at once. • Students will switch from computers to guided reading.	**TUESDAY** • Students and teacher will discuss catalyst. • **Mendel's Peas- case study for selective breeding http://evo-ed.com/Pages/Peas/index.html** Students will examine the round vs. wrinkled trait of Mendel's pea plants (what causes the wrinkling- review of biochemistry and osmosis; teacher will introduce Punnett squares through this case study. • **The Selective Farmer: Students will apply Mendel's laws of**	**WEDNESDAY** • Students and teacher will discuss catalyst. • Students will take quiz on monohybrid crosses and genetics terminology. • If necessary, students will complete Selective Farmer activity. • Students will continue to explore Mendel's peas in terms of looking at two traits at once. • Teacher will demonstrate dihybrid crosses as evidence of the Law of Independent Assortment • Students will	**THURSDAY** • Students and teacher will discuss catalyst • Students will take quiz on dihybrid crosses. • **Virtual lab: Snurfle Genetics 2: Diversity- students will explore the association between linked genes and exceptions to Mendelian genetics.** • **Students will complete "Dragon Genetics" activity at desk to also grasp the idea of linked genes on the same chromosome as an exception to Mendelian genetics.**	**FRIDAY** • (Sub plans- some students and teacher to USC science center for Human Genetic Variation lab) • Students will practice monohybrid and dihybrid crosses to make sure they understand the principles of Mendelian genetics.

		inheritance to experiment with what crosses produce the most wrinkled peas using an online simulation. Students will justify why their planting plan is superior through virtual experimentation.	practice dihybrid crosses through guinea pig genetics.		
Response to Intervention (RtI) **What interventions will be provided at each tier?**	Peer Tutoring, One on One with teacher, Tiered questioning; review as needed based on catalyst response, Check for Understanding (CFU), Differentiated Learning, Cooperative Learning, Activities, Small Group Instruction, Web-based Tutorial Activities, Inquiry-based Activities, Graphic Organizers, Homework and Practice				
Criteria for Success ***What does success look like? How will you/students know if they have successfully met outcomes?***	Checking for Understanding to ensure that the students understand the learning objectives. (See Checking For Understanding) USA Test Prep Common Assessments: B-5: Evolution Practice[s] KOFUROKEFA B-4: Heredity[s] TUZAHODEZO Cell Cycle Practice -duplicate[s] DALEYEBASU B-3: Energy -duplicate[s] JOXENAFERO B-2 Benchmark: Cells -duplicate[s] NAGOBECOSA Biochemistry Retest -duplicate -duplicate[s] HERAFOPOKA Ecology Practice for EOC -duplicate[S] ZODUMEMURA				
Checking For Understanding ***What questions will I ask?***	➢ What is the significance of crossing over? ➢ What is the source of all variation? ➢ How can a child have a different phenotype than either of his parents? ➢ What do people mean when they say a trait "skips generations?"				

	➢				
Closure	Review EQ/Ticket out the door/EOC like questions/Chart/Concept map/Class Discussions, Quiz				
Lesson Reflection(s) ***What will I use to reflect on this lesson?***	Answers to catalyst, EQ, and engagement in lesson.	Answers to catalyst, EQ, and engagement in lesson.	Answers to catalyst, EQ, and engagement in lesson.	Answers to catalyst, EQ, and engagement in lesson.	Student results compared to others in PLT

Teacher: Kirstin Bullington Subject: Biology

Date: 3/24/14-3/28/14 Grade: 9

	Monday	Tuesday	Wednesday	Thursday	Friday
Content Standard(s)	Standard B-5: The student will demonstrate an understanding of biological evolution and the diversity of life B-5.1 Summarize the process of natural selection. B-5.2 Explain how genetic processes result in the continuity of life-forms over time. B-5.3 Explain how diversity within a species increases the chances of its survival. B-5.4 Explain how genetic variability and environmental factors lead to biological evolution.				
Learning Objective(s) ***Learning Target(s)/Indicators/Essential Question(s)***	• Infer the fate of a particular species given a scenario of environmental change • Compare microevolution and macroevolution; • Explain how changes in the environment may result in the appearance or disappearance of particular traits. • Exemplify how genetic variability results in the continuity of life-forms; • Compare the results of sexual and asexual reproduction; • Summarize how sexual and asexual reproduction ensure that genetic material is passed to offspring allowing for the continuity of life-forms				
Essential Question(s)	➢ What "microbe" had the greatest survival rate? Why? ➢ How do the four principles of natural selection apply to the finches, beans, and peppered moths? ➢ Why is genetic variation essential in humans and other species? ➢ What are the advantages and disadvantages of sexual and asexual reproduction?				
Materials/Resources ***Essential for students to successfully complete task(s)/Activity***	LCD Projector, Smartboard, Document Camera, Supplemental Materials, Textbooks, Word Wall, and Print Materials Computer, Internet Resources/Interactive Websites, and Smartboard Activities				
Relevance/Rationale ***Enduring Understanding/Real-World Connections***	"Without evolution, nothing in biology makes sense." The framework for how species change over time in response to their environment, and the inherent need for genetic diversity in order to survive, lies at the heart of this unit.				
Anticipated Student Misconceptions	Students may mistakenly think that an organism can choose to change to better adapt to its environment (not natural selection); society has many misconceptions as to what evolution actually says (evolution does not suggest that humans came from monkeys, for example). Evolution is a theory that is grounded in considerable evidence.				

Learning Experiences (Use content instructional frameworks) ***How will students be engaged in the topic? Differentiation?***	**MONDAY** • Students and teacher will discuss catalyst (Reading Hawaiian finches story). • As students complete their reading, they will work in groups of four to learn about natural selection through inquiry. Students will count how many beans fall through the holes and develop graphs to represent the various birth and death rates of the "species" of beans. • Students will complete graphs and conclusionsfor homework.	**TUESDAY** • Students and teacher will discuss catalyst (relating to yesterday's lab). • Teacher will walk students through the four principles of natural selection, drawing on the lab from the day before. • Students will create Frayer models of each of the four principles within their groups, drawing on their lab experiences. • **Peppered moth activity:** Students will simulate robins eating peppered	**WEDNESDAY** • Students and teacher will discuss catalyst. • "Alike and Not the Same"- students will take an inventory of human traits and examine the diversity, both genetic and otherwise, found in the class population and beyond. • Students will collect data and draw conclusions about genetic variation, and its importance in the survival of a species. Teacher will facilitate whole-class discussion.	**THURSDAY** • Students and teacher will discuss catalyst • **Students and teacher will look at genetic processes over time, and the advantages and disadvantages of sexual and asexual reproduction in terms of survival.** • Literacy connection: Students will read and evaluate pre-AP reading on sexual reproduction, determining exactly when the recombination of alleles is an advantage.	**FRIDAY** • (Sub plans- teacher to PLTW ongoing training) • Students will complete guided reading of various evolution principles for reinforcement. •

		moths in both original lichen forests and polluted ones.				
Response to Intervention (RtI) **What interventions will be provided at each tier?**	Peer Tutoring, One on One with teacher, Tiered questioning; review as needed based on catalyst response, Check for Understanding (CFU), Differentiated Learning, Cooperative Learning, Activities, Small Group Instruction, Web-based Tutorial Activities, Inquiry-based Activities, Graphic Organizers, Homework and Practice					
Criteria for Success ***What does success look like? How will you/students know if they have successfully met outcomes?***	Checking for Understanding to ensure that the students understand the learning objectives. (See Checking For Understanding) USA Test Prep Common Assessments: B-5: Evolution Practice[s] KOFUROKEFA B-4: Heredity[s] TUZAHODEZO Cell Cycle Practice -duplicate[s] DALEYEBASU B-3: Energy -duplicate[s] JOXENAFERO B-2 Benchmark: Cells -duplicate[s] NAGOBECOSA Biochemistry Retest -duplicate -duplicate[s] HERAFOPOKA Ecology Practice for EOC -duplicate[S] ZODUMEMURA					
Checking For Understanding ***What questions will I ask?***	➢ What "microbe" had the greatest survival rate? Why? ➢ How do the four principles of natural selection apply to the finches, beans, and peppered moths? ➢ Why is genetic variation essential in humans and other species? ➢ What are the advantages and disadvantages of sexual and asexual reproduction?					
Closure	Review EQ/Ticket out the door/EOC like questions/Chart/Concept map/Class Discussions, Quiz					
Lesson Reflection(s) ***What will I use to reflect on this lesson?***	Answers to catalyst, EQ, and engagement in lesson.	Answers to catalyst, EQ, and engagement in lesson.	Answers to catalyst, EQ, and engagement in lesson.	Answers to catalyst, EQ, and engagement in lesson.	Student results compared to others in PLT	

Kamiah B-3
02773629

The Selective Farmer: Claim, Evidence, and Reasoning Using Mendel's peas

Name Kamiah [redacted] Block 4th Date 3/10/14

+ 42/50 = 84%

REVIEW: Answer the following questions based on your prior knowledge:

1. What are the two pea shapes that Mendel studied?

   round, wrinkled

2. What are the possible **genotypes** for each of the phenotypes listed above?

   RR, Rr, rr

3. Explain how differences in the genotype result in different phenotypes- think back to protein synthesis...

   Genotype is the genetic for the phenotype and phenotype is the traits of Dance

   how do you go from a gene (DNA) to a protein?

   -1

In this simulation, you are going to be a pea farmer in three different situations:

1. Planting round peas only.
2. Planting both round and wrinkled peas.
3. Planting wrinkled peas only.

Farmers use something called **selective breeding** (artificial selection): they only replant the phenotype that they want to have.

PROBLEM: Assuming you were a farmer and could weed out wrinkled peas or round peas, would it be easier to create a permanent monoculture of round peas or a permanent monoculture of wrinkled peas?

CLAIM: Write a hypothesis in which you predict which type of peas you will be able to select for the fastest. Make sure you include a justification with your hypothesis why you selected the phenotype that you did:

Because it has to be a genetic mutation for it to be wrinkled peas

-2 Your hypothesis shold be a prediction: For example: wrinkled peas will be easier to create as a monoculture because the recessive parents can only have recessive offspring

EVIDENCE:

1. In order to collect data as evidence to support or refute your hypothesis, go to http://evo-ed.com/Pages/Peas/Farming/Farming.html (The Selective Farmer website under class Resources)
2. Read the background information and click on "Select for Round"
3. There are 48 pea plants as part of your first planting- click on "Show peas" to see their genotypes and phenotypes.
4. Record the correct numbers of genotypes and phenotypes in the table on the other side.
5. Select "Harvest" then replant, recording the numbers of each genotype and phenotype.
6. Continue harvesting and recording until all of your peas are the same **phenotype.**
7. Record the number of generations it took to create a monoculture (all phenotypes the same).
8. Go back to the start of the simulation and repeat steps #2-7, first for "Select for Wrinkled," then "No Selection"

Kamiah B-3

02773629

EVIDENCE continued:

Experiment 1: Select for Round Data:

Generation	RR present	Rr (or rR) present	rr present	# of round present	# of wrinkled present
F1	13	21	14	34	14
F2	24	20	2	46	2
F3	30	16	2	46	2
F4	35	13	8	48	0
F5					
F6					

# of generations until monoculture established: 4

Experiment 2: Select for Wrinkled Data:

Generation	RR present	Rr (or rR) present	rr present	# of round present	# of wrinkled present
F1	15	20	13	35	13
F2	0	0	48	0	48
F3					
F4					
F5					
F6					

# of generations until monoculture established:

Experiment 3: No selection:

Generation	RR present	Rr (or rR) present	rr present	# of round present	# of wrinkled present
F1	14	21	13	35	13
F2	12	22	14	34	14
F3	12	27	9	39	9
F4	12	24	12	36	12
F5	13	21	14	34	14
F6	8	27	13	35	13

REASONING: Answer the following questions in complete sentences. You may use a separate piece of paper if necessary.

1. Why aren't you asked how many generations it takes to establish a monoculture in the third experiment (no selection)? That would take forever, there no real selection. Exactly

Kamiah [redacted]

Kamiah B-3
02773629

2. Take a closer look at the line graphs generated to the right of your pea fields- if you click on each data point, you will see the percentage of the phenotype, genotype, and allele frequencies for each generation. Why are the percentages different for the same generation (think about the differences between allele, genotype, and phenotype)?

Allele are one. So they are more genotype are two. So they are less and phenotype is physical. I think you have the general idea. There are two alleles, three genotypes posible, & 2 phenotype

3. If the only goal is to establish a monoculture of peas, what is the fastest method of doing so? Explain in terms of Mendel's principle of dominance (Use Punnett squares to help illustrate your written explanation).

Wrinkled peas was the fastest.

	r	r
r	rr	rr
r	rr	rr

RR:0 Rr:0 rr:4
2:peas

-1 So why did it only take two generations

4. When might a farmer choose a slower method of establishing a monoculture? In other words, what other factors might he or she need to consider?

genotype, knows what exact type or peas he protein?

How might protein be involved? If round peas had more proteins, would that change what the farmer plants? Maybe

-2 please explain your ideas more thoroughly.

5. The advantage of this simulation is that you didn't have to wait weeks in between generations of pea plants to determine the phenotype of each pea plant. Think about what you know about the relationship between genes, proteins, and traits- how could a modern farmer predict the phenotype of peas before the peas appear?

RR and rr you have to substract 48 from the answer you had added from.

-2 How have you predicted phenotype with Punnett Square?

John A-3 08773629

The Selective Farmer: Claim, Evidence, and Reasoning Using Mendel's peas

Name John [redacted] Block 4th Date 03/06/14 39/50 = 78%

John, I need you to review your work in such a way that your answers do not reflect what you know.

REVIEW: Answer the following questions based on your prior knowledge:

1. What are the two pea shapes that Mendel studied?
   ~ Round
   ~ Wrinkled
2. What are the possible **genotypes** for each of the phenotypes listed above?
   -1 Round or wrinkled peas
   Genotypes are the two alleles of an individual
3. Explain how differences in the genotype result in different phenotypes- think back to protein synthesis...
   If you have different
   -2 ?

In this simulation, you are going to be a pea farmer in three different situations:

1. Planting round peas only.
2. Planting both round and wrinkled peas.
3. Planting wrinkled peas only.

Farmers use something called **selective breeding** (artificial selection): they only replant the phenotype that they want to have.

PROBLEM: Assuming you were a farmer and could weed out wrinkled peas or round peas, would it be easier to create a permanent monoculture of round peas or a permanent monoculture of wrinkled peas?

CLAIM: Write a hypothesis in which you predict which type of peas you will be able to select for the fastest. Make sure you include a justification with your hypothesis why you selected the phenotype that you did:

I think the farmer should choose the round peas because it produces fewer ... the genotype ... mutation ...

What are you basing this on?

EVIDENCE:

1. In order to collect data as evidence to support or refute your hypothesis, go to http://evo-ed.com/Pages/Peas/Farming/Farming.html (The Selective Farmer website under class Resources)
2. Read the background information and click on "Select for Round"
3. There are 48 pea plants as part of your first planting- click on "Show peas" to see their genotypes and phenotypes.
4. Record the correct numbers of genotypes and phenotypes in the table on the other side.
5. Select "Harvest" then replant, recording the numbers of each genotype and phenotype.
6. Continue harvesting and recording until all of your peas are the same **phenotype.**
7. Record the number of generations it took to create a monoculture (all phenotypes the same).
8. Go back to the start of the simulation and repeat steps #2-7, first for "Select for Wrinkled," then "No Selection"

John A-3
02713689

EVIDENCE continued:

Experiment 1: Select for Round Data:

Generation	RR present	Rr (or rR) present	rr present	# of round present	# of wrinkled present
F1	13	21	14		
F2	26	20	2	41	22
F3	30	16	2	46	2
F4	35	13	0	48	0
F5					
F6					

# of generations until monoculture established:

Experiment 2: Select for Wrinkled Data:

Generation	RR present	Rr (or rR) present	rr present	# of round present	# of wrinkled present
F1	15	20	13	35	13
F2			48		48
F3	14	21	13		
F4					
F5					
F6					

48 - 13 = 35

# of generations until monoculture established:

14 + 13 = 27

48 - 27 = 21

Experiment 3: No selection:

Generation	RR present	Rr (or rR) present	rr present	# of round present	# of wrinkled present
F1	11	28	9	37	9
F2	12	24	12	36	12
F3	28	11	9	39	9
F4	13	31	5	43	5
F5	16	25	7	41	7
F6	20	19	9		9

REASONING: Answer the following questions in complete sentences. You may use a separate piece of paper if necessary.

1. Why aren't you asked how many generations it takes to establish a monoculture in the third experiment (no selection)?

Because it's an experiment in which you choose things at random and get what it pick. So no monoculture will be established.

Complete however during [illegible]

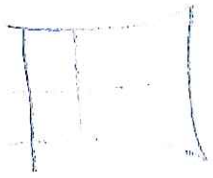
John [redacted] John A-3 02773629

2. Take a closer look at the line graphs generated to the right of your pea fields- if you click on each data point, you will see the percentage of the phenotype, genotype, and allele frequencies for each generation. Why are the percentages different for the same generation (think about the differences between allele, genotype, and phenotype)?

Because allele, genotype, and phenotype is all different. They can't have the same percentages in the different rounds. How are they different?

3. If the only goal is to establish a monoculture of peas, what is the fastest method of doing so? Explain in terms of Mendel's principle of dominance (Use Punnett squares to help illustrate your written explanation).

Having all the same pea plant will help alot. If you plant the same seeds you get exactly what you plant.



Yes, but what phenotype leads to a monoculture the fastest?

-2

4. When might a farmer choose a slower method of establishing a monoculture? In other words, what other factors might he or she need to consider?

- When he has more than enough,
- The could consider, if he needs it
- in the or slower, (when he needs it)
- The amount he harvest

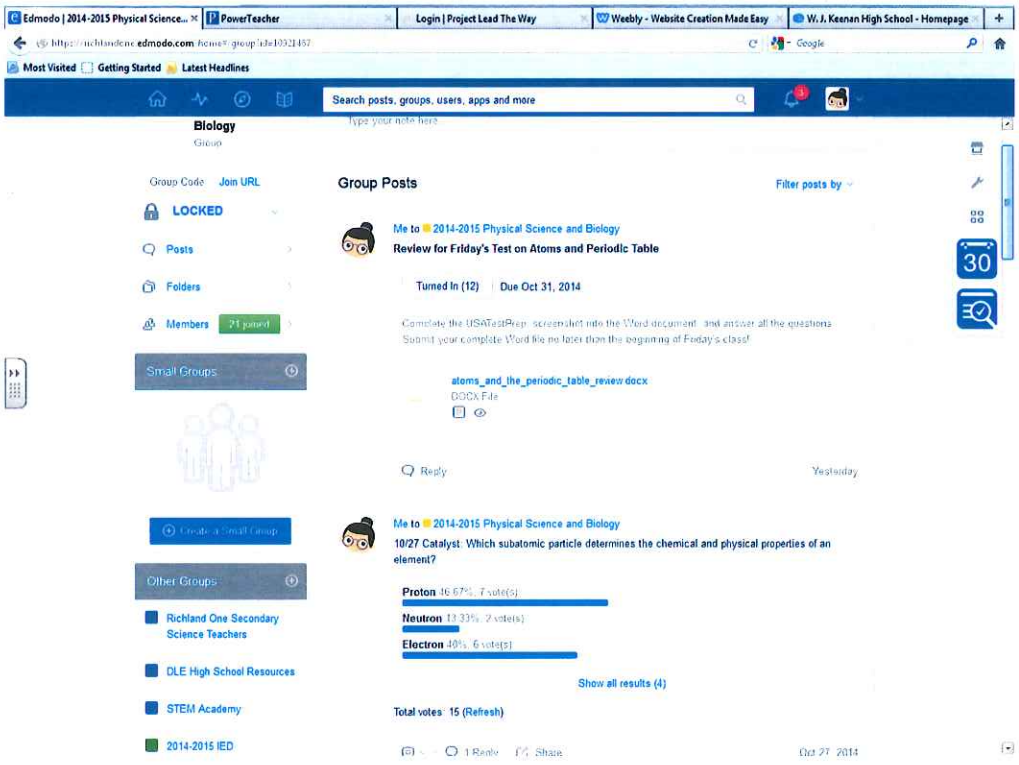
-2

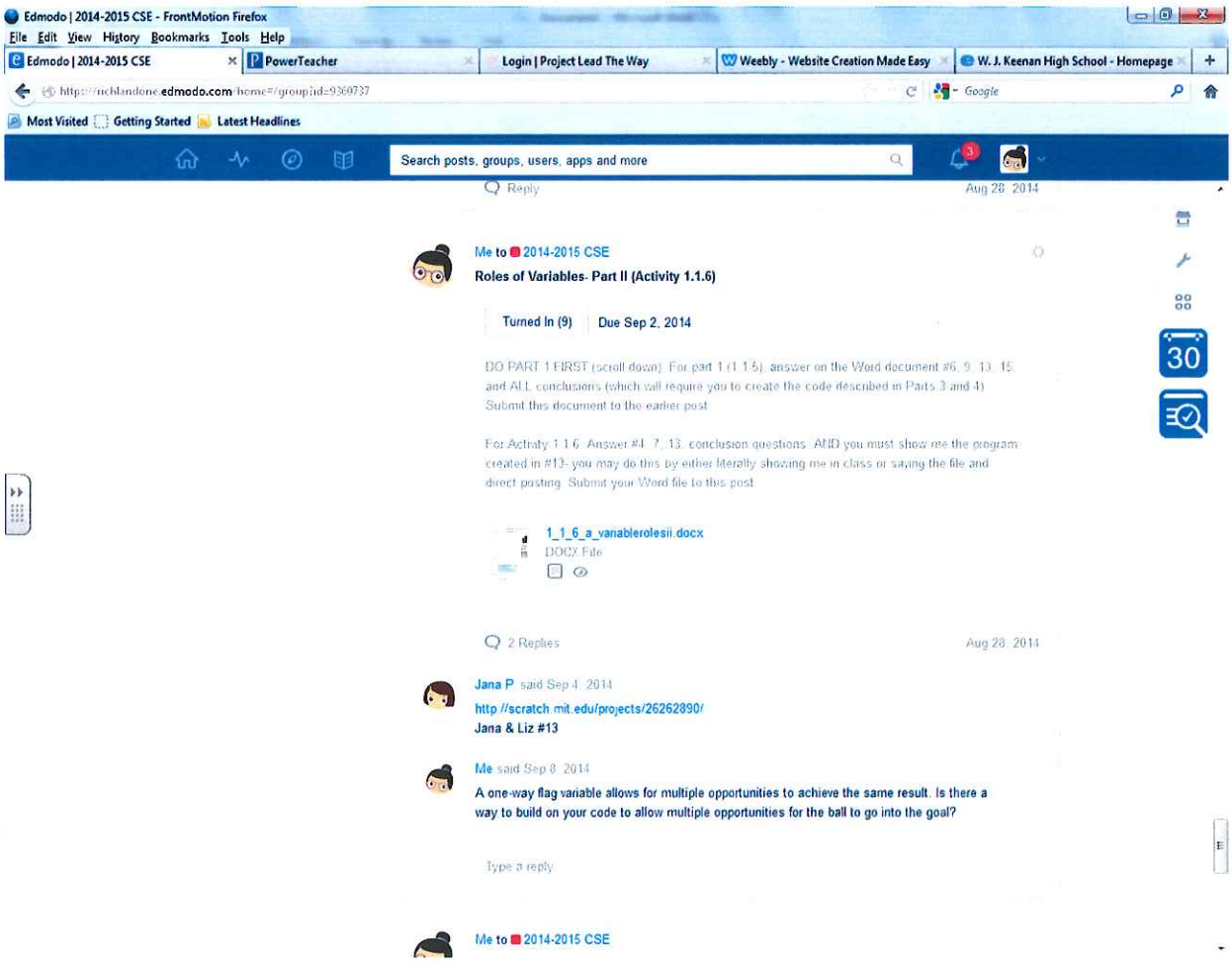
5. The advantage of this simulation is that you didn't have to wait weeks in between generations of pea plants to determine the phenotype of each pea plant. Think about what you know about the relationship between genes, proteins, and traits- how could a modern farmer predict the phenotype of peas before the peas appear?

The modern farmer could look at the former pea plants and see how they appeared. Knowing which type of pea plant occurs will help the farmers prediction

But the ancient farmer could look a phenotype as well... what other information might a modern farmer have in terms of genes?

Use of Edmodo to distribute and submit assignments electronically





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Me to 2014-2015 Biotechnical Engineering, 2014-2015 CSE, 2014-2015 IED

Website for Messenger information (satellite around Mercury)

MESSENGER Web Site

messenger.jhuapl.edu

Reply Share Oct 8, 2014

Me to 2014-2015 IED

Product Innovation Presentation

Turned In (8) Due Oct 9, 2014

You will work in pairs to research the history and innovations of one product from those listed- be sure to get your topic approved before beginning your research! You may use either PowerPoint or Prezi to do this presentation. TURN IN your work from today from both persons' accounts so that you both have a copy to work with. Presentations are due by the end of class on Thursday- we will present to the rest of your class on Monday. Be sure to read carefully what is to be included and to review the rubric so you are aware of how to earn all of your points on this assig... Show Full Post

1_9_a_designinnovation.docx

DOCx File

1_9_a_ru_designinnovationrubric.docx

DOCx File

Reply Oct 7, 2014

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- Keenan Technology Proficiency
- 2013-2014 Biotechnical Engineering
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Me to 2014-2015 CSE

Activity 1.3.2: Python Variables and Functions

Turned In (8) Due Oct 29, 2014

After we review variable roles in class, you will complete this activity AS DIRECTED by logging your session and submitting your program file, not the Word file. Type the answers to the questions as strings in your logged session. Answer the conclusion questions in your engineering notebook (be sure to label as Activity 1.3.2 Python Variables and Functions. (Note although the instructions refer to paired program, which you are welcome to do, each person is responsible for turning in their own logged session)

1_3_2_a_functions.docx

DOCx File

1_3_2_pythonbasics_1.pptx

PPTX File

Show 1 more attachments

Reply Oct 26, 2014

Me to 2014-2015 CSE

Activity 1.2.4: Analyzing an App

Turned In (8) Due Oct 20, 2014

This one has lots of source files- enjoy!

bounceball.aia

AIA File