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Teaching Practicum at Forest Grove Middle School
Student Teaching Practicum Portfolio

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Degree of Bachelor of Science

Daniel E. McCarthy
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Approved By:
Professor John A. Goulet: Advisor

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Abstract

Over the course of six months at Forest Grove Middle School in Worcester, MA, in partial fulfillment of the requirements necessary to obtain the Massachusetts Teachers License, over seventy five hours of observation and one hundred and fifty hours of classroom teaching were logged. The following contains information regarding the demographic of the school and the city. The prime means of conveying information to students was through practiced lesson plans that fulfilled the requirements set forth by the Massachusetts Curriculum Frameworks as well as the specific needs understood at the school in question. The response to the experience is detailed in the portfolio.

Chapter 1: Forest Grove Middle School

Forest Grove Middle School, located at 495 Grove Street off of Gold Star Boulevard in Worcester, Massachusetts, is a school that services students in the seventh and eighth grade level. Students are broken up into clusters, roughly one hundred students, and these are broken into classes of about twenty five children. They are assigned a color grouping and an enrichment class based on level of education, among taking English, Mathematics, Social Studies, and Science. The clusters groups rarely interact in the classroom, but the students all seem to know each other well enough. The school is a two story building, where seventh grade is located on one floor and eighth grade is located on the other floor. The floor changes every year because the clusters remain with the same instructors throughout the length of their two years at the school, the common term for which is looping.

Forest Grove is a public middle school, one of four throughout the Worcester area. Due to its status in the middle of the city, it is very representative of an inner city middle school in that there is vast diversity of the students in every classroom. Compared to enrollment in similar schools in the state, where there is a 15.4% rate of Hispanic student enrollment, at Forest Grove, 28% of the students have a Hispanic background. Similarly, Asian and African American Students also attend at a higher rate than at the state level. There are 882 students at the school, and they are divided fairly evenly in terms of gender; there are currently only ten more girls than boys in the school. There is constantly changeover with the students in the building, whether it be between clusters, students coming in from other schools, or students leaving or being kicked out.

The education curriculum is prepared strictly to prepare kids for the MCAS exams, a product of the Massachusetts Education Reform Act of 1993. The reform began with the *Webby vs. Dukakis* case in 1978 where people from the state sued the government in an attempt to have

funding allocated evenly throughout the school districts of the commonwealth. The goal was to equalize spending in an attempt to lessen the gap between education afforded to more privileged children and those children from lower class families, citing each child's right to an education on par with what they will need to succeed in the world.

Eventually, the Supreme Judicial court ruled in favor of the plaintiffs, that Massachusetts had not met its constitutional obligation to provide proper education to all of its students. Governor William Weld signed off on the Act in June of 1993, and it was put into motion. It promised a "public education system of sufficient quality to extend to all children the opportunity to reach their full potential and to lead lives as participants in the political and social life of the commonwealth and as contributors to its economy" (Massachusetts Education Reform Act in Summary). There were two goals set for the reform act, equalizing the funding to each district of the commonwealth, and set high standards to improve the education of students across the board.

It took until the year 2002 for all of the school systems in the commonwealth to reach the status of "adequate" funding, which had been delegated at \$5,500 per student (MERAS). Once the district reached the funding level, they were held accountable for educating students along certain Massachusetts standards of education that were determined by work groups that consisted of teachers, administrators, community representatives, students, and official policymakers. In order to make sure that schools were meeting these standards, the Massachusetts Comprehensive Assessment System was created, better known as MCAS testing. These are the standardized exams for all public schools in Massachusetts, and they cover the curriculum frameworks established by the state for each individual subject. Should students not pass the exam, they will

not be allowed to progress forward into the next grade because they haven't completed the learning requirements to comply with the Massachusetts state standards.

There are multiple strands of standards that the department of education requires its teachers to cover with students: earth and space science, life sciences, physical sciences (chemistry and physics), and technology and engineering. By the end of eighth grade in the science department, students must have learned all of the material necessary to complete the MCAS exam, without which they cannot pass the test. Below is a chart displaying the students grades on the test, last updated September of 2010:

Grades on MCAS Prior to the practicum:

Grade and Subject	Advanced/ Above Proficient		Proficient		Needs Improvement		Warning/ Failing		Students Included	CPI	SGP	Included in SGP
	SCHOOL	STATE	SCHOOL	STATE	SCHOOL	STATE	SCHOOL	STATE				
GRADE 07 - ENGLISH LANGUAGE ARTS	6	11	57	61	25	21	12	7	416	83.6	54	371
GRADE 07 - MATHEMATICS	13	14	38	39	23	27	26	19	416	72.7	55	371
GRADE 08 - ENGLISH LANGUAGE ARTS	11	17	58	61	21	16	10	7	394	86.4	55	339
GRADE 08 - MATHEMATICS	26	22	22	29	25	28	27	21	393	72.4	61	359
GRADE 08 - SCIENCE AND TECHNOLOGY	2	4	28	36	44	41	26	19	387	63.9	N/A	N/A

On the science MCAS, over the last four years, students have been performing extremely poorly. Since the year 2007, there have been at least seventy percent of the students in the Needs Improvement/Failure Warning range of grades. In an attempt to improve MCAS grades across the board, the school adopted a few common practices and teachings. All over the building, you can see signs and posters, and even student wristbands, encouraging use of FORCE, and

acronym for “Focus on Reading Comprehension Every time/Everywhere”. Preaching this in all classrooms and subjects can help students better understand problems on exams so that they can succeed.

Chapter 2: Courses Experienced

Daily Schedule:

A DAY	B DAY	C DAY	D DAY	E DAY
RED	RED	RED	RED	RED
PURPLE	YELLOW	PREP	GREEN	COMMON PLANNING
1 ST WAVE LUNCH	1 ST WAVE LUNCH	1 ST WAVE LUNCH	1 ST WAVE LUNCH	1 ST WAVE LUNCH
YELLOW	PREP	GREEN	COMMON PLANNING	PURPLE
PREP	GREEN	COMMON PLANNING	PURPLE	YELLOW
GREEN	COMMON PLANNING	PURPLE	YELLOW	PREP
COMMON PLANNING	PURPLE	YELLOW	PREP	GREEN

During my time at Forest Grove Middle School, I worked in the science department with eighth grade students. Since the school loops their classes, the same students remain with the same teachers for both seventh and eighth grade. The main goal of the science curriculum is to prepare students with the learning skills needed to pass the Massachusetts Comprehensive Assessment System test. Science is the only subject in middle school in which the MCAS is not offered in both seventh and eighth grade, so this gives the teachers at Forest Grove the flexibility to teach toward the curriculum for the exam in any order they choose. This means that teachers can choose to spend different amounts of time on material they feel should be more focused or less focused, based on how they deem the subject important in terms of the exam.

One theme that I found to be extremely common throughout my experience at Forest Grove was “teaching to the exam”. By this I mean that almost all, if not the entirety of the curriculum was not based on students coming to master material that interested them, or challenge themselves in a particular subject that was difficult, but merely immersing them in a broad enough scope of learning that allowed them at minimum to pass the MCAS. It was this ideal that created the science coursework offered to the middle school students. Each student had to have a rudimentary knowledge in five fields: earth and space science, life science, chemistry, introductory physics, and technology/engineering. The structure of the courses over the course of

the two years follows the key points located in Table 1¹. It is required that students pass science for the year in order to move on to the high school, or they will be sent to summer school to try and pass to move into high school. Should a failure in science be coupled with failure in another course, the students would be held back.

Science Curriculum Frameworks (Table 1):

Earth and Space Science	Biology	Chemistry	Physics	Technology
1. Earth's common physical features can be represented with models and maps	1. Organisms are classified into kingdoms		1. Weight is the amount of gravitational pull on an object and is distinct from mass.	1.1 Appropriate materials for design tasks based on specific properties and characteristics.
2. Layers of the Earth include the lithosphere, mantle, and the core	2. Organisms are composed of cells, and many organisms are single-celled, where one cell must carry out all the basic functions of life	2. Volume and mass are distinct components of density		1.2 Appropriate tools used to hold, lift, carry, fasten, and separate, and their safe and proper uses.
3. Radiation, conduction, and convection transfer heat through the earth's system	3. Plant and animal cells have similarities and differences in their major organelles	3. Appropriate tools and use of significant digits are needed to measure volume and mass		1.3 Safe and proper use of tools and machines needed to construct a prototype.
4. Energy provided by the sun, global patterns of atmospheric movement, and temperature differences among water, land, and atmosphere are related	4. Basic functions of living organisms are carried out in cells	4. Mass is conserved in a closed system.		2.1 Steps of the engineering design process.
5. Movement of the earth's crustal plates causes both slow and rapid changes in the earth's surface	5. Multicellular organisms can be hierarchically organized from cells to tissues to organs to systems to organisms	5. Many elements combine in a multitude of ways to produce compounds that make up living and nonliving things.		2.2 Methods of representing solutions to a design problem.
6. Earth's surface is built up and torn down by natural processes	6. General functions of the major systems of the human body, and the interactions of these systems.	6. Differences between an atom and a molecule.		2.3 The purpose of a prototype.
7. Physical evidence supports theories that the earth has evolved over geologic time	7. Every organism requires a set of instructions that specifies its traits. Heredity is the passage of these instructions from one generation to another.	7. Basic examples of elements and compounds.		2.4 Appropriate materials, tools, and machines to construct a prototype.
8. Gravity is a force that pulls all things toward the center of the Earth. Gravity influences the formation and movement of the planets, stars, and solar system	8. Hereditary information is contained in genes located in the chromosomes of each cell.	8. Differences between mixtures and pure substances.		2.5 Design features and cost limitations affect the construction of a prototype.
9. Lunar and solar	9. Sexual reproduction	9. A substance has a		2.6 The five elements of a

¹ <http://www.doe.mass.edu/frameworks/scitech/1006.pdf> page 104-114 Section on Grade 6-8

eclipses, moon phases, and tides are related to relative positions of the earth, moon, and sun	and asexual reproduction	melting point and a boiling point, both independent of the amount of the sample.		universal systems model.
10. Properties and conditions of objects in the solar system and those on earth	10. Genetic variation and environmental factors are causes of evolution and the diversity of organisms	10. Physical changes and chemical changes.		3.1 Components of a communication system.
11. Earth's tilt and revolution around the sun result in uneven heating, causing the seasons	11. Evidence drawn from multiple sources provides the basis of the theory of evolution.		11. An object's motion can be described by its position, direction of motion, and speed.	3.2 Appropriate tools, machines, and electronic devices used to produce and/or reproduce design solutions.
12. The universe contains many billions of galaxies and each galaxy contains many billions of stars	12. Extinction of species is related to a mismatch of adaptation and environment		12. Distance vs. time graphs for constant speed.	3.3 Communication technologies and systems.
	13. Organisms interact and have different functions within an ecosystem that enable the ecosystem to survive.	13. Kinetic energy is transformed into potential energy & vice versa.	13. Kinetic energy can be transformed into potential energy and vice versa.	3.4 How symbols and icons are used to communicate a message.
	14. Roles & relationships among producers, consumers, and decomposers in the process of energy transfer in a food web	14. Temperature change results from adding or taking away heat energy from a system.	14. Temperature change results from adding or taking away heat energy from a system.	4.1 Manufacturing systems of custom and mass production.
	15. Dead plants and animals are broken down by other living organisms, which contributes to the system as a whole	15. The effect of heat on particle motion during a change in phase.	15. The effect of heat on particle motion during a change in phase.	4.2 Impacts of interchangeable parts, components of mass-produced products, and the use of automation.
	16. Producers use energy from sunlight to make sugars through photosynthesis, which can be used immediately, stored for later use, or used by other organisms.	16. Heat moves in predictable ways, from warmer to cooler objects until reaching equilibrium.	16. Heat moves in predictable ways, moving from warmer to cooler objects until reaching equilibrium.	4.3 Manufacturing organization.
	17. Ecosystems have changed through geologic time in response to various influences			4.4 Basic processes in manufacturing systems.
	18. Biological evolution accounts for species diversity developed over generations.			5.1 Parts of a structure.
				5.2 Three major types of bridges and their appropriate uses.
				5.3 The forces of tension, compression, torsion, bending, and shear affect the performance of bridges.
				5.4 Effects of load and structural shape on bridges.
				6.1 Transportation systems and devices that operate on or in land, air, water, and space.
				6.2 Possible solutions to transportation problems,

				using the universal systems model.
				6.3 Three subsystems of a transportation vehicle or device.
				6.4 Lift, drag, friction, thrust, and gravity in a vehicle or device.
				7.1 Adaptive and assistive devices.
				7.2 Adaptive and assistive bioengineered products.

High school science students are required to take their MCAS exams in their tenth grade year. They are allowed to choose the subject they take their exams in, as some schools have different patterns as to how they teach the science curriculum. For example, some schools may teach chemistry first, while others will focus on physics. Students at the middle school level take an MCAS exam tailored as a survey of all of the subjects they have learned up until this point. A copy of the most recently released MCAS is located in the appendix.

I arrived at the school in the latter half of the eighth grade year, which meant that students had already been exposed to the idea of having a student teacher in the classroom. This meant that the transition into teaching the curriculum was very smooth. According to the journal I kept, when I first started in January, the subject matter at hand was animal adaptations. Specifically, the students were studying the findings of Charles Darwin on the Galapagos Islands as he studied the native finches. They learned information that covered how the different types of finches would have different shaped beaks depending on their main food source; if the birds ate bugs out of knotholes in trees, they would have long slender beaks, but if they ate berries off of bushes, they would have shorter larger beaks. This fits under the scope of life sciences, and specifically, ecology and evolution, located in the biology column, standard ten, from Table 1. In my time there, we also covered material on the human body systems, earthquakes, volcanoes, the rock cycle, weather patterns, and astronomy before hitting a week long review session for the exam.

During this review session, teachers were exposed to a week-long lecture with students from another cluster. Each week we were required to teach a lesson on a predetermined theme related to one of the main five fields of science that had to be covered for the exam. The field we were assigned was life sciences, which meant covering human body systems, heredity, and classification as main topics. Once the exam was over, we had multiple days tacked onto the end of the year due to snow days. Lesson planning still taught to the exam because the science MCAS that was even more important for students to pass than eighth grade was tenth grade. Without passing the tenth grade exam, students could not pass high school.

Since there is so much focus and attention paid to how to best prepare students for this standardized exam, teachers are forced to tailor their lessons towards the students that are behind, as opposed to taking risks and challenging kids that are extremely bright and capable. When I worked with my mentor to learn how to prepare lessons for the classroom, one of the most important facets of creating a lesson was to make sure to match what you were teaching to the students to one of the categories from Table 1. This was specifically to make sure that what you were teaching the students was preparing them for the exam. Many of the lessons that were done involved using the interactive media for the in class textbooks, Bill Nye videos, and BrainPops. As long as this material fit one of the standards for Massachusetts education, essentially preparing for the test, then they were deemed relevant material. Located in Table 2 below are the results for the eighth grade science MCAS that my students took in June 2011, after strictly following the guidelines and structures of how to prepare students for the exam. The results are quite scary, but after conversing with the teacher I worked with, we discovered that about a quarter of the kids who tested proficient were in our cluster. This was extremely encouraging.

Grades for Forest Grove Students on MCAS during Practicum (Table 2):

FOREST GROVE MIDDLE SCHOOL						
http://www.boston.com/news/special/education/mcas/scores11/results/worcester.htm						
Grade/subject	% Advanced	% Proficient	% Needs Improv.	% Warning/Failing	Students tested	Placement overall
8th Science	2	26	44	29	402	316 of 468

Part of what helped me prepare to teach this class was my scientific background throughout school. Going to an engineering school, being a physics major, and constantly being exposed to science made being around the subject fun and interesting to teach to students. However, I constantly found myself relearning subject matter that I had forgotten since eighth grade. I feel like the experience of teaching myself along with the students around me made for a classroom environment that at least for me, felt more connected.

Chapter 3: Course Materials

During the six months spent at Forest Grove Middle School, lesson plans were designed in order to best fit the Massachusetts State Curriculum Frameworks outlined in Chapter 2, as well as the further goals set by Forest Grove. The goal was to prepare students so that they had adequate enough skills to pass the Science MCAS exam. Classroom assignments and lesson plans were often designed on a day to day basis, as the survey of material to be covered was vast and the attention span of kids that age very short. Each lesson plan that was developed included the exact standard framework that was being addressed so that anyone looking at the plan understood the reasoning behind covering the material covered. Also, having the goal of the lesson placed right after the standard covered can help keep educators replicating the lesson keep on track.

Lesson plans that were created did not always follow the exact same format, but most of the general information remained the same; there were sections for materials, goals and objectives, the standard from the curriculum, and a preparation and procedure section. Many of the lessons involved covering the material from the multitude of different science books that were assigned to the kids based on the topic of study. The beginning of class always involved a bell work question, an exercise where students answered a question that was placed on the board in their science notebooks before class got underway. The goal of this was often times to remind students what was covered the day before in class, and hopefully stimulate their learning for the day.

Often times at the end of class, there would be a graded exit question that would gauge what the students learned during that day's class time. Students would be handed a torn piece of paper or an index card and have to answer a question posed by the instructor in order to leave class. It was these beginning and ending questions in class that helps a teacher gain an

understanding of which students were benefiting from the materials and which ones still needed further guidance.

Homework often times involved a set of note taking sheets known as Cornell notes. These notes were highly encouraged by the Forest Grove, and examples of such a style of notes were posted on bulletin boards throughout the school. The way these notes were take were students would fold the paper in thirds and in the left most third would write a question they formed about the chapter. If the subject was learning about lava, the question may be “what are the two types of lava?” On the right two thirds, the student would write the answer to the question that they found in the chapter. For the example given before, the answer would be “the two types of lava are a’ a and pahoehoe”. This type of note taking was also used as a class work exercise that allowed students to work quietly as individuals or in groups should the educators need time to do grading or planning. Assessment was always on a zero to four scale, where a zero was not doing the work and a four was exemplary performance and detail. This scale was often used on most of the homework assignments given. The main purpose of sending students home with note taking assignments was to assure that the students were getting at least the key points out of the reading.

Many times during classroom activities, students were required to watch films on certain aspects of the material to be learned. The goal of this was to provide students with a nice change of pace exercise from the normal routine of in class lecturing. In order to make sure that the students paid close attention and also had written material to use in studying for assessments, students were often required to complete fill in the blank questionnaires about the movie that was created for their benefit. Often times this would involve watching the video the night before and

preparing worksheets. Of the most common used videos were BrainPops, Bill Nye videos, and videos from the assigned books.

Part of the assignments that were created for students to do was a project involving the Human Body Systems. They were to create a PowerPoint presentation that included each of the human body systems. The students were given a reasonable amount of time to finish the assignment, which was given out with a break included in the time, and all performed to the best of their abilities. The main goal of the assignment was to give the students an opportunity to showcase their abilities and the topics they had learned from class in a manner that did not involve a testing environment for an assessment. Students who often struggled on exams but were very smart and organized writers all succeeded greatly on this project, and generally students who completed the project performed well.

Other styles of assignments that were assigned were in class labs. The biggest lab that the students took part in during the year was the frog dissection lab. This lab involved multiple days of preparation and prelab, as well as the required completion of a lab packet for a major assessment grade. The reasoning behind including this lab was to give students a fun activity to take part in, while still following the standards set forth. Copies of all of the mentioned material, among other things, are located in the appendix.

Astronomy Work Sheet

1. Celestial Bodies were the first instruments used for measuring _____. (Time)
2. It takes the moon approximately _____ to go through a cycle. (29 Days)
3. In the mid-1970's the _____ suggests that a celestial body about the size of mars collided with Earth and the pieces that broke off from this formed _____. (collision ring/impact theory)
4. Astronauts experience weightlessness in space and this is called _____. (microgravity)
5. The International Space Station is the _____ man made structure in space.
6. Evidence of _____ on Mars indicates that _____ could once have existed there. (water/life)
7. Rusting of iron minerals in the soil is what gives Mars its color, and its nickname, the _____ planet. (red)
8. Water cannot last long on the surface of Mars because of its _____. (thin atmosphere)
9. The two rovers were named _____ and _____. (Spirit/Opportunity)
10. The largest volcano on Mars is _____ high and is thought to be the largest volcano in the _____. (27 km/Solar System)
11. A _____ is an intense body of gravity that can swallow light. (Black Hole)
12. A star explosion is called a _____. (Supernova)
13. The _____ Space telescope orbits earth once every _____. (Hubble/97 minutes)
14. The crab nebula contains a collapsed star called a _____. (Pulsar)

FOREST GROVE MIDDLE SCHOOL LESSON PLAN

Week of: 4/11/11 Teacher: Angela M. Lamoureux Discipline: Science Grade 8

Weekly Objectives

Content: Life Science MCAS Review Rotation

SWBAT: After this unit, students will be able to:

- Compare and contrast plant and animal cells in regards to organelles and function.
- Recognize that within cells, many of the basic functions of organisms (e.g., extracting energy from food and getting rid of waste) are carried out.
- Describe the hierarchical organization of multicellular organisms from cells to tissues to organs to systems to organisms.
- Identify the general functions of the major systems of the human body.
- Recognize that every organism requires a set of instructions that specifies its traits.
- Compare and contrast asexual and sexual reproduction.

Essential Questions: What are cells? What are the levels of organization? What are the functions of the human body? What is heredity? What is genetics? What is asexual / sexual reproduction?

Strategies and Activities:

- PowerPoint presentations and BrainPops
- Review games
- Hands on activities
- Classroom discussion/challenges/group work
- Test

ASSESSMENT

--Check for withitness during class --Assessment of open response questions --Check for understanding exit questions --Assessment of Lab Activities --Assessment of organization of Science notebook and binder--
Assessment of quiz

FORCE Initiatives

FORCE STRATEGY: Reading Comprehension/Main Idea, Cornell Notes, Bell to Bell Teaching, Bell Work: Vocabulary words, Questions with 1-2 sentence response, lab prep. FORCE Classroom Reading and Writing and Activities: MCAS Open Response questions and academic vocabulary Reading activity: textbook and handouts

DIFFERENTIATED INSTRUCTION: Variety in presentation and time as noted—student assistance and guidance as needed

CONNECTIONS/STANDARDS/Frameworks

MA CURRICULUM FRAMEWORKS/WPS BENCHMARKS:

SKILLS OF INQUIRY (Tools for learning and life-long learning.)

- Classify organisms into the currently recognized kingdoms according to characteristics that they share. Be familiar with organisms from each kingdom.
- Recognize that all organisms are composed of cells, and that many organisms are single-celled (unicellular), e.g., bacteria, yeast. In these single-celled organisms, one cell must carry out all of the basic functions of life.
- Compare and contrast plant and animal cells, including major organelles (cell membrane, cell wall, nucleus, cytoplasm, chloroplasts, mitochondria, vacuoles).
- Recognize that within cells, many of the basic functions of organisms (e.g., extracting energy from food and getting rid of waste) are carried out. The way in which cells function is similar in all living organisms.
- Describe the hierarchical organization of multicellular organisms from cells to tissues to organs to systems to organisms.
- Identify the general functions of the major systems of the human body (digestion, respiration, reproduction, circulation, excretion, protection from disease, and movement, control, and coordination) and describe ways that these systems interact with each other.
- Recognize that every organism requires a set of instructions that specifies its traits. These instructions are stored in the organism's chromosomes. Heredity is the passage of these instructions from one generation to another
- Recognize that producers (plants that contain chlorophyll) use the energy from sunlight to make sugars from carbon dioxide and water through a process called photosynthesis. This food can be used immediately, stored for later use, or used by other organisms.

SCHOOL IMPROVEMENT PLAN:

- Students will learn to answer short answer questions successfully
 - Students will begin to use response notes when working with texts

MCAS Strategies --Reading Comprehension/Main Idea--Cornell Notes --Bell to Bell Teaching --Bell Work --Wrap Ups/Exit Slips --Academic Vocabulary --Writing Across the Curriculum

Instructional Resources

--Prentice Hall Science Explorer Series Text and On-line text/video/handouts Science Quest Moodle Site

Chapter 4: The Students

During time spent at Forest Grove Middle School, it became very apparent that the most challenging aspect of the practicum would be reaching every individual student with the knowledge they need to succeed. Forest Grove is located in a very diverse section of town, populated by a multitude of different cultures and children with different learning needs. It is extremely important for an educator to take into account how all of their students learn, in order to best provide them with the proper learning environment. Classes were separated into groups based on the classes they took, their learning level, and their behavioral attitude. These groups were given a color that identified their class in the schedule so educators would know when particular groups of students were going to be in their classroom.

One very common theme throughout the six months spent at the school was for students to come and go frequently. There was a constant turnover of students in particular classrooms, as students joined and left the school. These changes generally occurred with the group placed together due to learning ability and behavioral issues, and the changes occurred for multiple reasons; students would change clusters due to actual physical fighting with students in their class, some would leave the school to try and find a better environment for graduation, others would attempt to find a better environment in order to graduate, and some would be kicked out of the school all together. This class was referred to as the green group and often required special consideration for lesson planning due to their inability to follow directions and sustain focus on simple tasks for longer than ten minutes.

In order to maintain flow in the classroom and account for the high mobility rate of students in the city, educators do not change streams of thought to account for new or leaving students. It is extremely important to assimilate new students as quickly as possible into the

structure of the classroom, without interrupting the students who are already in established learning roles. For this reason, it is important in the beginning of the year to establish behavioral rules and guidelines and create a structure for what classroom periods are going to be like. If there is put in place a system that every student understands, it should be easy for new students to see how the classroom operates.

Another consistent factor in the class room was frequent absences by students. There were multiple children in the classroom that showed up only three or four days of the week due to circumstances that may have been out of their control or lack of family support for education. It is extremely difficult to keep these students up to speed on the topics being covered, as there is so much information crammed into the end of the year that missing a day could be detrimental to the learning process. In order to allow for these students to keep up, make up work was always offered to cover the material and maintain good scholastic standing in the school. School policy is that should students miss too many days of school, they will be held back, but this is often overlooked if there are extenuating circumstances because of the community the school is located in.

Purple:

The group designated as the purple group was universally known by the teachers and students in the cluster to be the honors level class in the group. They were very capable students and for their extracurricular class they took reading. Reading was an important class for this group because even though the majority of the classroom was very intelligent, their level of reading comprehension was diminished due to the fact that for some of the class, English was a second language. Some of the brightest students in that classroom had moved to America from

another country. Students in this classroom were very adept learners and could definitely handle the material being presented to them on a daily basis.

The one area this some students in this group struggled with was behavior, at least initially in the work for the practicum. These students understood that they were the honors level classroom, and also came to a quick conclusion that having a student teacher in the classroom meant that they could get away with whatever they wanted. From research and student inquiry, it became apparent that the previous student teacher that came before me, at least in the students' eyes, had not attempted to make a personal connection with them, and merely yelled at them whenever they attempted to let out pent up energy. There were two separate occasions that come to mind, where discipline was necessary in this classroom.

The first was a minor incident. A few of the male students in the classroom who very typically were distracted from lessons by general horseplay and sarcastic comments had been causing disruptions for extended periods of time. When eventually confronted, the students were held after class and had it explained to them that, even during class time, there was an appropriate time and place for talking out and commenting on material in an attempt to be humorous, but in the middle serious lecture time was not one of them. In order to maintain a friendly yet professional relationship with students, it is important to not attempt to completely cut them off from what their inherent behaviors are, but to channel them into appropriate times and places. From that point forward, efforts were made to point out to these students when certain comments were made whether they were in good or poor taste. This allowed for the students to still retain some of their individuality, but not interrupt class and maintain respect for the educator.

The second occasion was a much more serious venture. The math instructor was going to be out for the period he had the purple group, so there was need for an instructor to maintain order and educate the kids on a subject that fit the standards of the school. The task became a review for the science MCAS exam that was to be held in a few months, and the students did not take well to the review work. They were boisterous, loud, extremely rude, and made education impossible in that time period. This was only the third class period experienced with this room at the time of the lesson, and they had not lived up to expectation set forth by other teachers and their peers and the honors level classroom. When the students arrived in the science classroom later that day, they had a very demanding homework assignment in front of them.

All but five students, who were singled out in order to make an example for other students on how to behave in a classroom setting, were assigned to write a one page paper on what respect means, following instructions, and how MCAS success is important for future success. On repeated occasions before this incident, the classroom had been chastised for their inability to display respect, not only to their superiors, but to their peers as well, and this assignment was used as an example of what needs to happen if the classroom is going to run efficiently. Following the completion of this assignment, there were only minor problems with this classroom, and once under control, turned out to be one of the best classroom experiences of the practicum.

Red:

The red classroom was the homeroom period, so they met at the same time every day, first block. The challenge this presented was getting students organized and ready for class every day because many of them had plenty of energy and were looking to share stories with their friends about what happened the night before. This group took AVID as their extra class, which

stands for Advancement Via Individual Determination. At the middle school level, this program helps kids prepare for the college preparatory classes at the high school level, but encourages them to take more difficult classes than they could imagine they were capable of, such as Algebra or a Foreign Language course. These students had the conception that they were the third level class of the four colors.

Having been exposed to this group on a consistent basis in homeroom periods, the opportunity to have more individual relationships with the students was present. This allowed for a greater understanding of how each individual student learned and operated in the classroom, which helps an educator greatly in designing lesson plans that can affect all of the students in the classroom. These students were all very bright kids, with low self efficacy due to their classroom placement and struggles in the science field. It was extremely important as an educator to create challenging exercises, but simple enough that the students can accomplish them on their own. There were never too many major issues with this classroom, and though it was tough to keep them focused at all times, the quality of work and effort was consistent.

Yellow:

The yellow classroom was understood to be the level right below the honors students in the purple group. Half of this class took reading with the purple group as their extra course, and the other half took Spanish. These kids were generally the most respectful classroom day in and day out. Some of the students in this room could absolutely have been in the purple group, but their lack of necessity to take the reading course placed them in the yellow group. Day in and day out, the majority of the students in this class presented a level of respect and effort that was not experienced from the other classrooms, and absolute pleasure to have experienced as a student teacher. There were definitely some days where these students would get rambunctious,

same as all other adolescents, but they were always easier than others to reign in and get refocused on the topic at hand.

Much like the purple group, these students could handle higher level cognitive learning tasks and were many in the classroom were active learners and most would take very well to assigned work. The entire class was not perfect though, as there were some students who were misplaced, and this classroom contained a few of the students who were prone to frequent absences throughout the year. This made it difficult to keep them up to speed with the rest of the students, and the constant conundrum for educators was present, do you slow the class down to let those behind keep up at the expense of those who are ahead, or do you challenge the students who are ahead at the risk of losing those kids that are behind?

Due to the focus of the school on the goal of every student passing the science MCAS, the choice most often became to make sure that those who were behind. This meant that make up work was always an option for students, and was often accepted right up until the last day of the quarter. It was on the students to get this work done, as it would be impossible for an educator to hunt down every student who was missing work every time it was not completed. Experiences with this classroom were by far the most laid back and fun because there were a good number of students in the room who genuinely wanted to learn, and almost the entire classroom understood how to have a casual but professional relationship with their teacher, which allowed for fun lighthearted discussion with a high level respect between the students and the instructors.

Green:

This was the most difficult group to educate out of the four classroom structures. These students were routinely absent, constantly inattentive, uncharacteristically rude for children that age, and on a very low level of cognitive thinking. There were a few bright students in this

classroom, which compared to the rest of their room, were leaps and bounds ahead of the pack. The only downside with these students was their complete lack of effort, which led to them being the same level as their peers. The atmosphere of commotion in the classroom at all times certainly did not promote active learning, and made teaching extremely difficult.

These students were generally not trusted with expensive classroom material, or even to be able to do simple tasks on their own. Group work was almost certainly out of the question, as unguided learning was never an option due to their inability to complete simple tasks without becoming distracted. To most of these kids, school was an unnecessary formality, and most of them had already been held back at least a year. These students needed special preparation for, and lesson plans had to be slowed down and broken up into extremely guided points.

It was not always terrible with these students though. There were some lessons where students in this classroom behaved better than other classes. If structured well enough, these students could absolutely complete tasks given to them. One strategy that was determined was for one of the teachers in the classroom to handle the lesson, while the other walked around the room and tried to keep individuals on task and motivated. The problem was, science was almost always after their elective period, which could vary between music, or gym, or another similar course, and this often got them riled up to the point where the first ten minutes of class would be wasted trying to get them to settle down. Students were also consistently late getting to class from the elective period, which meant about fifteen minutes of the class was wasted without educating the kids.

Part of the practicum experience included a month long MCAS review session where for a week at a time, educators would have the students from another cluster to review a particular subject with. Being able to meet every student in the grade that attended the school was one that

few student teachers get to have, and it was certainly a signature experience to be noted. Students in the other clusters were generally better behaved and at a high level of learning than the students taught for most of the project, which made that month extremely easier to deal with. Also, having a lesson plan already created for this review session made keeping the students under control much easier. Much of this month was spent with both teachers in the classroom because of the unfamiliarity with the behavioral patterns of students that were coming in. A copy of the lesson plan for this review session is located at the end of the chapter.

Following MCAS, the students virtually checked out of school all together and assumed they were done. After so much focus on the students passing the science MCAS, having that over made it seem like work was over, which in turn, added difficulty to keeping students on task and learning. Since the standards were designed to focus the students on the standardized exam, once it was over, everything on the standards had to have been covered, but material cannot be covered in the classroom unless it fits the standards. This made for an interesting final month of the school year as students lost interest and motivation. This was an extremely unique experience that most student teachers do not get to have, and has provided a fantastic learning experience in adapting to teaching a new group of students on a weekly basis.

Chapter 5: Assessment

Exams and Quizzes:

While covering a unit, students were often assessed on the material they managed to retain over the course of a lesson. This would often be in the form of quizzes during the material, with a unit test at the end. Quizzes could range from a short five question assessment written on a half sheet of paper at the end of class to a full page quiz given with advance notice for studying purposes. Questions were often those deemed most relevant to Science MCAS questions that would be asked of the students when they took the exam.

Formatting of assessments would change each time one was given, but they consistently contained the same types of questions: short answers, multiple choice, and open response. Many of the tests would have solely multiple choice questions, but since some students struggled with this form of testing, other methods of assessment had to be created to account for this. Written quizzes were often given out at the end of class as graded exit questions to help accommodate students who struggle with multiple choice.

The third major form of assessment was project work. This gave students the ability to display what kind of work they could produce. Also graded for assessment was lab work. Major labs given to the students allowed them to complete hands-on activities while still engaging in a learning experience. Sample exams, quizzes, the rubric for the major project, and labs are located on the following pages. Please find more examples in the appendix section.

Human Body PowerPoint Project

Objective: To create a PowerPoint presentation that will review the main functions of the Human Body

Process: You will be creating a presentation that will include information on the following topics related to the human body:

- Body Organization and Homeostasis
- The Skeletal System
- The Muscular System
- The Skin
- The Digestive System
- The Cardiovascular System
- The Respiratory System
- The Excretory System
- The Immune System
- The Nervous System
- The Endocrine System
- The Reproductive System

Each of these slides (or series of slides) must include the important parts of each system and a description of their processes. You can be creative with how you show the different systems in your presentation. You will be going in depth on the reproductive system in your health class so it is not important to fully describe this system. Just mention its importance to the human body. Try and set your presentation to a theme, such as a comic strip character introducing the systems or a news team discussing the human body.

Should you not have access to a computer, or do not feel comfortable with the PowerPoint program, you are welcome to create a Human Body Pamphlet. This would be a creative booklet designed for a museum that is doing an exhibit on the human body and would like to give customers something to bring home with them to explain to them what they had learned. There should be at least one page devoted to each section of the human body and it should look like a booklet or pamphlet.

An Example of slide Information:

Digestive system, followed by a list of each of the important organs, like the stomach and intestines, each of which should have an explanation about their job. Appropriate pictures are optional but encouraged.

Egg Drop Lab

Title

Purpose :

Background information

A discussion of the physics issues involved in the drop, including a discussion of the forces and energy changes during the fall and during impact.

Your background should include information covered in class on the lab prep day.

Materials:

Make a list of the materials YOU used and how many of each

Procedure:

1. Describe in step by step directions how to build your vehicle with measurements
2. Include a drawing of your vehicle with vehicle dimensions

Data record all data in the following data table

Mass of vehicle _____

Time Drop 1 _____

Drop 2 _____

Drop 3 _____

Distance dropped _____

Speed of each drop

Drop 1 _____

Drop 2 _____

Drop 3 _____

MATERIALS

The Materials will be given in individual group boxes. These will be the only materials you will receive. It is your job to construct a egg drop vehicle as a team that fits within the materials you are given

RULES

A raw egg will be provided the day of the drop. Plastic eggs (appropriately weighted) will be used for the test drops. **NO OTHER MATERIALS MAY BE USED.**

THE CHALLENGE

Using sound principles of physics (to help insure the survival of your egg and your vehicle) you will design and build an egg drop vehicle. The goal is to have the egg survive 3 successive drops. Minor repairs with tape may be made between drops.

HOW POINTS WILL BE EARNED

MASS

SPEED

Construction

Survival Drop 1

Drop 2

Drop 3

Mass: between 0-100 grams, lower mass greater the points

Speed: Slower the speed, more points and consistency between drops

Construction: Neatness, soundness, design rationale, and size (smaller more points)

Survival: breakage = 0 point no breakage = 1 point

Chapter 6: Conclusion

Working for Forest Grove Middle School provided great insight into the job of being an educator; working as a teacher is an extremely demanding process. While the licensing process requires only seventy five hours of observation and one hundred and fifty hours of in class teaching, many more hours go into those areas, as well as countless hours lesson planning, grading, and designing course curriculum that do not get factored in. Learning how to become accustomed to this work load was a challenging experience.

One of the most difficult parts of the teaching practicum was changing a daily routine to fit the needs of a middle school schedule. At the same time as the practicum, I was handling a full course load, which meant that it was necessary to stay roughly two months after the close of school to complete the necessary time required for the practicum because taking classes got in the way of in class experiences. Often times being sent home with work on top of the homework required by a rigorous college schedule was extremely stressful. Coupled with the early mornings required to work in a public school, the semester was tough. This practicum is a good measure of a student's dedication to becoming a teacher because unless the student is especially devoted to teaching, completing the required tasks seems more and more like a job than a lifestyle.

From people in my own life who are educators, I have learned some powerful lessons. One which stuck was that being a teacher is like acting. No matter what is going on outside of the classroom, it is important to always maintain the same demeanor in the classroom. Children are very good at determining when teachers are vulnerable, so it is imperative that educators maintain an upbeat but stern attitude to command the respect of the entire classroom.

There are a few particular moments that stand out to me personally as successes in the classroom. The first was outlined earlier in Chapter 4, the incident involving the purple class in

which they were required to do an extra homework assignment on respect. I feel like the decision to make this an assignment really earned me the respect of the room and led to a much simpler year in terms of handling behavioral issues because they understood that I was ready to back up threats with consequences.

Another moment that made me extremely proud and confident as an educator was a private session I had with one of my students from the red class. She had unbelievable test anxiety, to the point where she would get so nervous that it would affect her ability to translate her intelligence into the exam. Judging by her work on written assignments, which was close to the top of her class on all occasions, there was no way she should be getting fifty percent or lower on her exams with her intelligence. So I had her sit down with me during one lunch period to go over test taking strategies that I had found effective over my schooling career right before an exam to be given the next day. She responded by scoring a ninety six percent on an all multiple choice test, which boosted her confidence extremely. She managed to do well for the rest of the year, which was an encouraging experience as an educator.

The final challenge that I felt was a signature moment of my practicum was having taught every eighth grader in the building at some point. The most challenging part of this was connecting to each and every one of the students that came through quickly enough that they would take the lesson plan seriously and actually get some learning out of the process. I personally believe that the fastest way to get students to connect to you as an educator at any level is to learn their names. Having had eight years of experience teaching tennis at a summer camp where kids expect you to know their name after the first day really helped me hone the skills to be able to get to know any student I have by name and face. Once a student feels like

you are committed to them as an educator, I feel like they become more committed to you as students.

One of the major problems I experienced throughout the practicum was walking the green class through all of the lessons because they proved time and time again that they were incapable of discipline in the classroom when left on their own to get assignments done. I also noticed that since these students were desensitized to punishment from the school, threats of going to the principal's office held virtually no weight. Even the school struggles with the amount of calls they get for students being sent to the office.

I remember in particular one moment where I was having a distinct argument with a student that led me to kicking them out of my classroom. The student adamantly refused to leave, so I called the office for assistance, to which they said they would send someone down right away to deal with this particular student. This never happened, which was extremely frustrating because it left me threat with absolutely no backbone and made the student feel like he had won against the teacher, which does not help classroom management and morale. It is extremely important, no matter the circumstance, for the higher offices of power to stand behind their teachers in situations like this so there can be fewer instances that require their intervention.

One of my major goals in conduction of the practicum was to get eighth grade students interested in math and science because it seemed like for students that age, anything that was difficult caused them to be disinterested. A challenge faced during this process was reteaching myself materials I had forgotten or had been added to the curriculum since I had gone through middle school, while still maintaining the front that I knew everything that I was teaching to the students. This goes back to the point about how educating is similar to acting.

This practicum has been an unbelievable experience for me, and even though I do not plan on jumping immediately into middle school education, or for that matter education in general, it has provided me with valuable experience and lessons learned for when I choose to pursue my goal of education at the secondary level. Having gone through the steps of being an educator at the professional level, I feel like I have developed as a student and will be able to take all of the skills learned and experience gained into the work force.

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March Madness Exam

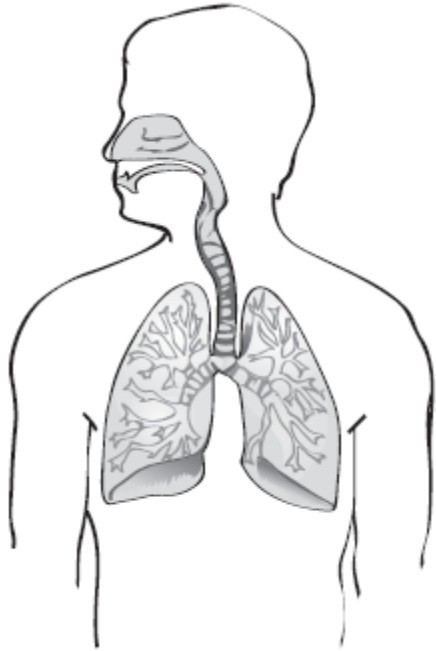
1. Substances enter any plant or animal cell by passing through which of the following structures?
 - A. nucleus
 - B. cell membrane
 - C. vacuole
 - D. chloroplast

2. Comparing the skeletons of which of the following fish would **best** show the evolution of a fish species?
 - A. a male fish and a female fish that could produce offspring
 - B. the same fish just before it received a cut and after it healed
 - C. a fish that lived recently and a fish that lived a long time ago
 - D. the same fish just after it hatched and when it was full-grown

3. How is a skin cell from a mouse similar to an amoeba?
 - A. Both need energy.
 - B. Both have cell walls.
 - C. Both move with pseudopodia.
 - D. Both consume carbon dioxide.

4. The cows in a rancher's herd of cattle have been selectively bred to produce milk. Which of the following will cause the next generation of cows to receive the trait for producing large quantities of milk?
 - A. nutrients in the cows' food
 - B. essential minerals in the cows' water
 - C. electrical impulses in the cows' brains
 - D. information in the cows' chromosomes

5. The diagram below shows a major system of the human body.



Which of the following **best** describes the function of this system?

- A. absorbing nutrients from food
- B. protecting the body from infection
- C. exchanging gases with the environment
- D. responding to stimuli in the environment

6. The diagrams below represent forms of reproduction. In which form of reproduction will the offspring differ **most** from the parent?

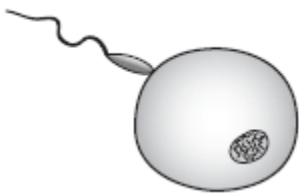
A.



B.



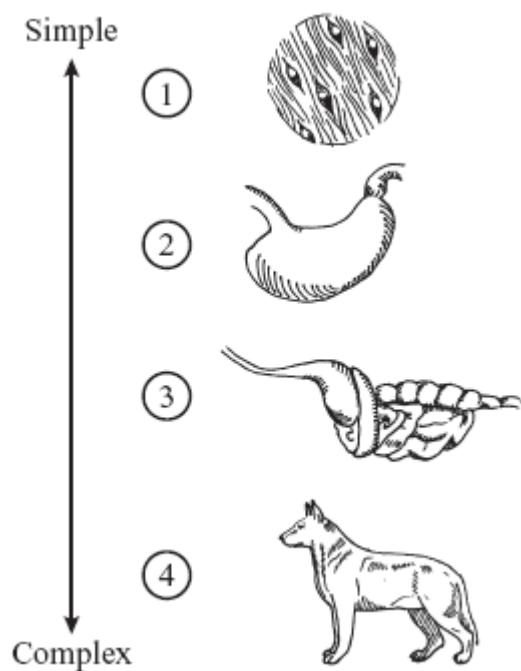
C.



D.



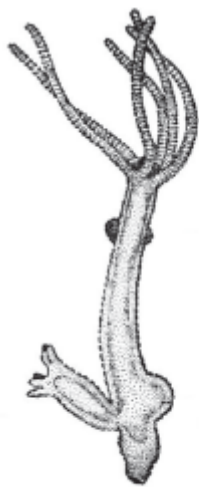
7. The numbered drawings below show the organization within a multicellular organism from simple to complex.



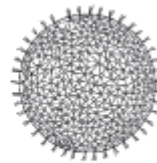
Which of these numbered drawings represents a tissue?

- A. 1
- B. 2
- C. 3
- D. 4

8. The organisms shown below are both found in aquatic environments.



Hydra



Volvox

Which of the following is common to both of these organisms?

- A. They contain blood.
- B. They contain nerves.
- C. They are both producers of food.
- D. They are both composed of cells.

9. Which of the following **best** describes the purpose of the chromosomes in the nucleus of a cell?

- A. to store the genetic instructions needed to specify traits
- B. to release energy by breaking down food molecules
- C. to transport nutrients into and out of the cell
- D. to protect the cells from microorganisms

10. Which of the following structures is **not** present in animal cells?

- A. cell membrane
- B. cell wall
- C. mitochondrion
- D. nucleus

11. Which of the following is the **primary** advantage of sexual reproduction when compared to asexual reproduction?

- A. There is a greater number of offspring.
- B. There is more food available to offspring.
- C. There is greater genetic variety in offspring.
- D. There is a longer development time for offspring.

12. Which of the following **best** describes the number of chromosomes in a normal human liver cell?

- A. 23 pairs of chromosomes
- B. 46 different types of chromosomes
- C. 46 male chromosomes and 46 female chromosomes
- D. 23 original chromosomes and 23 duplicate chromosomes

13. In the human body, which system functions **primarily** to defend the body against disease?

- A. digestive
- B. immune
- C. nervous
- D. respiratory

14. The terms gas exchange, diaphragm, and inhale are **most** closely associated with which system in the human body?

- A. circulatory
- B. digestive
- C. excretory
- D. respiratory

15. What are the basic structural units of living organisms?

- A. cells
- B. nuclei
- C. organs
- D. tissues

16. The diagram below shows the chromosomes from a cell after they were photographed under a microscope.



Which of the following questions may **best** be answered by studying an organism's chromosomes?

- A. What sex is the organism?
- B. Is the organism endangered?
- C. Where is the organism's ecosystem?
- D. How does the organism obtain its food?

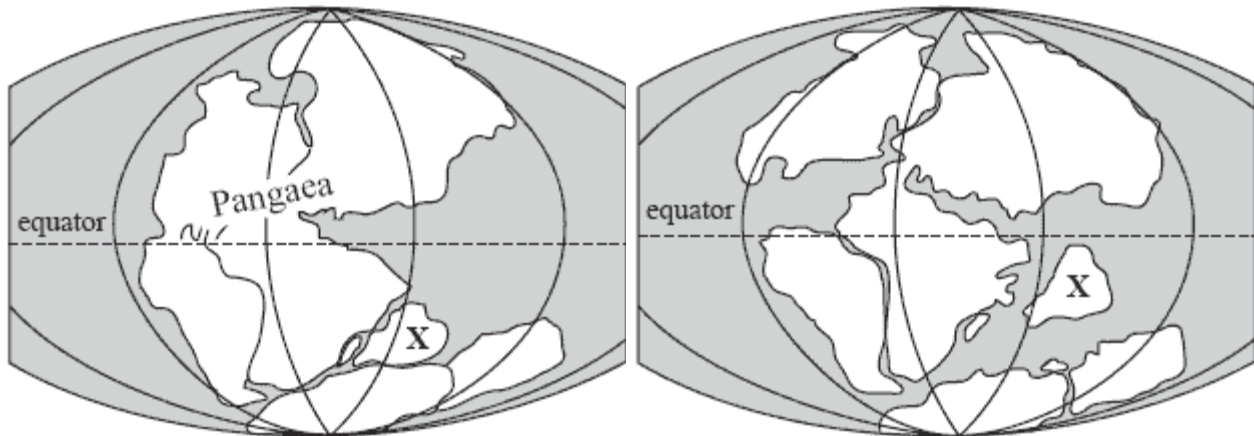
17. The illustration below shows three types of unicellular organisms commonly found in pond water.



Based on the illustration, which of the following can be used to separate these organisms into three different groups?

- A. length of lifespan
- B. number of offspring
- C. presence of a nucleus
- D. method of movement

18. About 300 million years ago, the land of Earth was in a single mass known as Pangaea, as shown in Figure A. About 150 million years ago, Pangaea broke up into the land masses shown in Figure B.



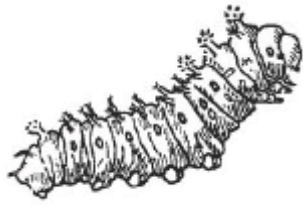
300 million years ago
Figure A

150 million years ago
Figure B

Based on the diagrams, which of the following were **more likely** to survive on continent X after the breakup of Pangaea than before it broke apart?

- A. organisms that lived in fresh water
- B. organisms that required warm conditions
- C. organisms that hibernated for long periods
- D. organisms that traveled great distances during migrations

19 The following diagram shows a caterpillar, mold, and a fern.



Caterpillar



Mold



Fern

What do these organisms have in common?

- A. They are made of cells.
- B. They produce their own food.
- C. They decompose other organisms.
- D. They are disease-causing organisms.

20. *Spirogyra* are green algae that can reproduce sexually. Which of the following features identifies reproduction in *Spirogyra* as sexual reproduction?

- A. The cells of parent algae have nuclei.
- B. Each offspring contains chloroplasts.
- C. Several offspring may be produced at once.
- D. Genetic material is contributed by two parent cells.

21. While hiking through Granville State Forest, a student finds an unusual plant-like organism that appears to lack chlorophyll. When the student examines a sample using a microscope, he sees many cells with cell walls and no chloroplasts.

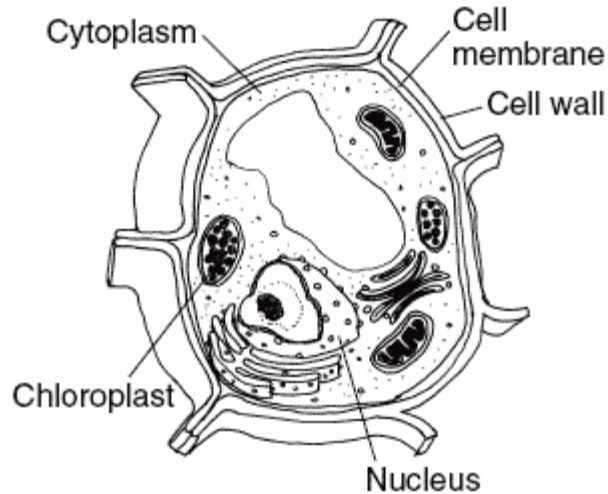
This organism is **most likely** a member of what Kingdom?

- A. Animalia
- B. Eubacteria
- C. Fungi
- D. Protista

22. Which cellular organelle uses oxygen and glucose to provide energy to the cell?

- A. mitochondrion
- B. nucleus
- C. ribosome
- D. vacuole

23. The diagram below shows a cell.



Where would this cell **most likely** be found?

- A. Bark
- B. Frog
- C. leaf
- D. mushroom

24. In Labrador retrievers, black coat color is dominant over golden-yellow color. If a pure black Lab (with black parents) and a pure yellow Lab have a litter of puppies, what color will the puppies' coats be?

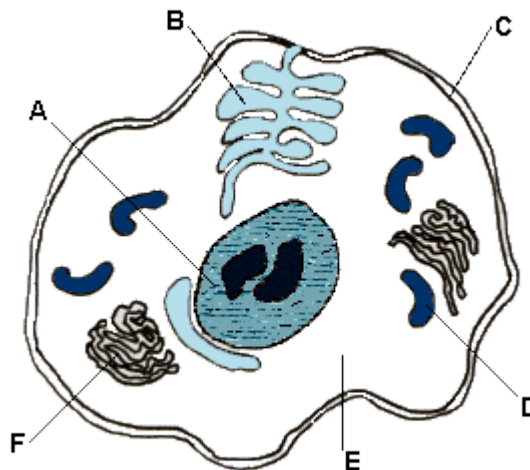
- A. all black
- B. all golden-yellow
- C. some black, some yellow
- D. grayish yellow

25. Which statement best explains the relationship between respiration and energy?

- A. Using oxygen, respiration releases the energy stored in food.
- B. In respiration, plants use light energy to produce food.
- C. Respiration stores energy in the bodies of animals.
- D. In respiration, plants give off oxygen and water vapor into the air.

26. Which of the cell structures in the eukaryotic cell depicted here process food and release energy to the cell?

- A. nucleus, structure A
- B. membrane, structure B
- C. golgi body, structure E
- D. mitochondrion, structure D



27.

Use the information below to answer the question.

Given the following:

Y = yellow seeds R = round seeds

y = green seeds r = wrinkled seeds

Yellow (Y) is dominant to green (y)

Round (R) is dominant to wrinkled (r).

The genotype of a yellow round seed could be represented as

A. YYrr

B. YyRr

C. YyRR

D. Yyrr

28. Which of these cells does not enclose genetic material in a nucleus?

- A. bacterial cell
- B. animal cell
- C. plant cell
- D. battery cell

29. Which of these traits is NOT something that a person can inherit from his or her parents?

- A. a tendency to be short or tall
- B. the ability to speak Spanish
- C. curly hair
- D. blue eyes

30. At one stage in their life cycle, plants and animals create new organisms like themselves. This stage is called

- A. development.
- B. reproduction.
- C. decomposition.
- D. photosynthesis.

31. The puppies in a litter are
- A. exactly like each other.
 - B. exactly like the mother dog.
 - C. like both parents in some ways.
 - D. exactly like both their parents.

32. Which is the correct order from smallest to largest levels of organization in living things?

- A. cells, organs, tissues, organ system, organism
- B. cells, tissues, organs, organ system, organism
- C. tissue, organ system, organs, cells, organism
- D. organism, organ system, organs, tissues, cells

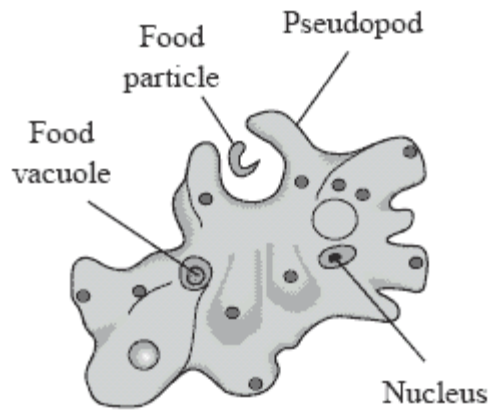
33. This is a picture of a _____.



- A. bone cell
- B. nerve cell
- C. blood cell
- D. muscle cell

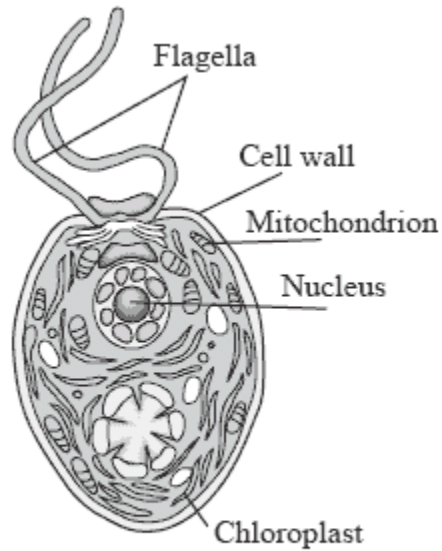
The diagrams below show an *Amoeba* and a *Chlamydomonas*.

Diagram A



Amoeba 0 100 μm

Diagram B



Chlamydomonas 0 5 μm

Both organisms can be seen only with a microscope. Since these are one-celled organisms, each cell must be able to carry out all important life functions, such as moving from place to place and getting food.

- Compare the ways these two organisms move. Be sure to include information from the diagrams in your answer.
- Compare the ways these two organisms obtain nutrients. Be sure to include information from the diagrams in your answer.

Lesson plan for Friday April 15th, 2011

Engineering and Technology

1. Standard to be covered
 - a. 3.1: Identify and explain the components of a communication system, i.e., source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination.
2. Goal
 - a. To teach kids the basics of radio frequencies through an interactive activity
3. Materials
 - a. Multiple Index Cards
 - b. Slips of paper
 - c. A simple code
 - d. Writing Utensils
 - e. String
 - f. Hole punch
4. Preparation
 - a. Create multiple flash cards for each vocabulary word listed above. On the back side of the cards, list the definition of each, and the job the students have to do during the activity.
 - b. Assign students randomly to different jobs and have them gather in a group location
 - c. Assignments for the positions
 - i. Source (4)
 1. These students are going to write a science related message that they want to send across the room without talking
 - ii. Encoder (4)
 1. These students are going to take the message and transfer it into the code that has been given to them
 - iii. Transmitter (4)
 1. These students are going to be picking up and delivering messages throughout the room
 - iv. Receiver (4)
 1. These students will take the message and hand it off to the decoder
 - v. Decoder (4)
 1. These students decipher the message back into English
 - vi. Storage (4)
 1. This student will hold the decoders' messages that they have deciphered for at least one minute before allowing access to retrievers
 - vii. Retrieval (4)
 1. These students will be on hand to retrieve the message from storage
 - viii. Destination (4)
 1. These students are given the final message and relaying it to the instructor
5. Procedure
 - a. We will start with a few BrainPOPs about satellites and radar to introduce the systems involved
 - b. Then we will assign students positions to take part in the activity
 - c. After a few times, we can change up the jobs for the kids
 - d. We can wrap up the activity with the 2005 Spring release Science and Technology/Engineering Question 39 Open Response

Lesson Plan for Monday January 31, 2011

Learning Objectives:

- Students will explore different kinds of transportation methods used in the current day
- Students will practice engineering techniques such as:
 - Refining a design
 - Observing other ideas
 - Trial and error
 - Building on successes

Massachusetts Learning Standards:

- **08.SC.TE.01** Identify and compare examples of transportation systems and devices that operate on land, air, water and space.

Background Information:

There are many types of transportation in the world for people to get around. It is important to understand what students know about transportation in the world before starting the exercise. Students have a general idea of what type of transportation systems are involved in travelling to a destination, so it is important to draw out of them.

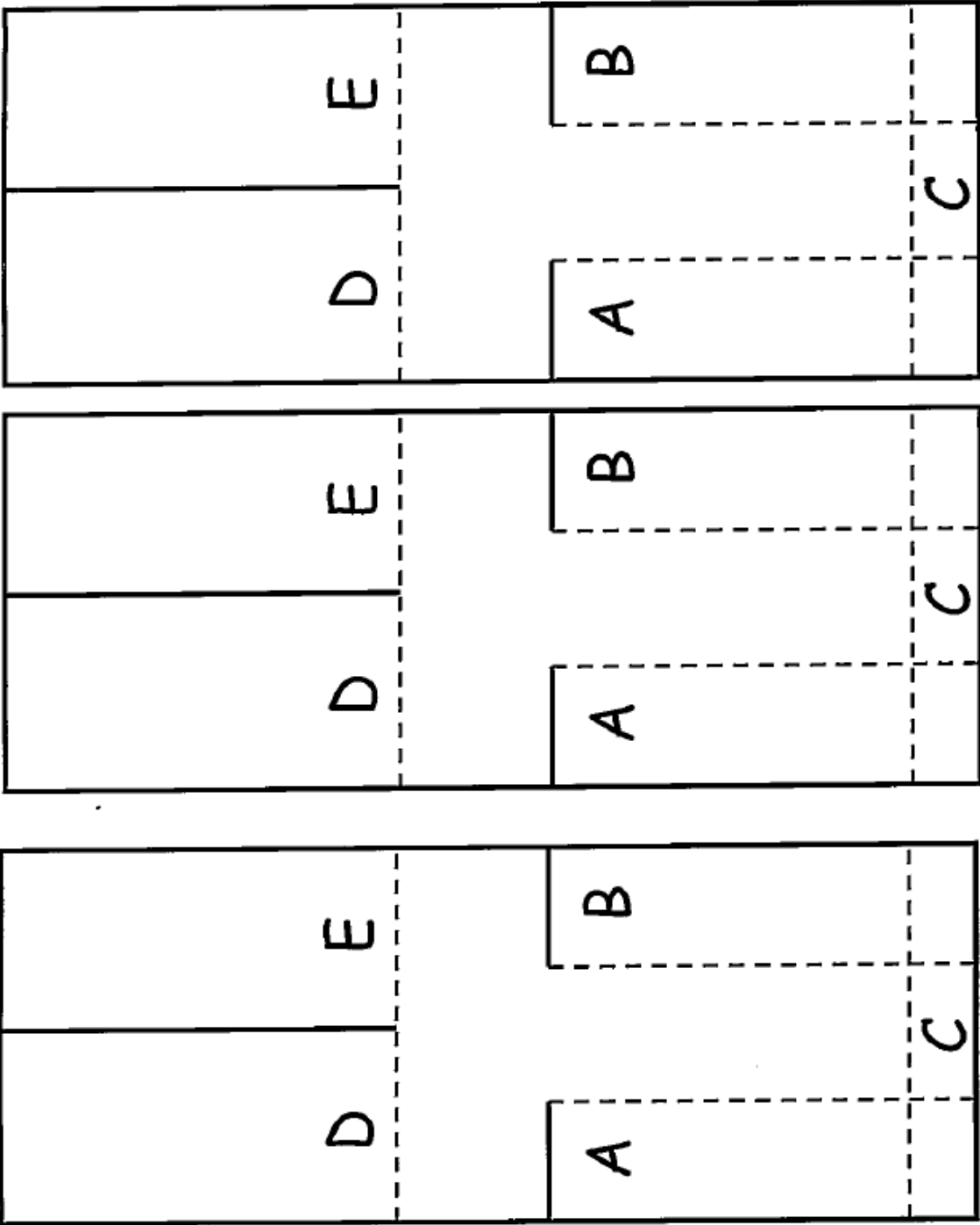
Materials:

Paper, pencils, Helicopter template, scissors, paper clips (optional)

Procedure:

1. Give kids each a sheet of paper and pencil.
2. Ask them to draw a picture for random scenarios
 - a. Travel from the northern part of your city to the southern
 - b. Travel from Boston to California
 - c. Travel from Falmouth to Nantucket
 - d. Travel to your neighbor's house
 - e. Travel to school
 - f. Structure for crossing a large gap
 - g. Bottom floor to top floor
 - h. Travel after breaking your leg
3. Now move onto the helicopter template
 - a. Cut along the solid lines, fold over A and B and fold up C. Have students guess what will happen when dropped. Write it down.
 - b. Now write down what did happen.
 - c. Fold D one way and E the other way. How will this affect the paper copter?
 - d. Have the students drop it and explain what did happen.
4. Now have them create two of their own copters with the intent of one dropping to the floor as fast as possible and one dropping as slow as possible. Have them write down why they did what they did to each copter.
5. After a few trials with the fast dropping one, allow the students to make minor adjustments to their copter and explain why they made the changes they did. Test them again to observe changes.
6. After trials with the slow copter, have students make minor adjustments again and explain why they made the changes they did.
7. By experimenting with different shapes and weights of the different copters, students now have a general understanding of how the experimental engineering process would go.

Helicopter Template



Massachusetts Middle School Science Standards

Earth and Space Science	Biology	Chemistry	Physics	Technology
1. Earth's common physical features can be represented with models and maps	1. Organisms are classified into kingdoms		1. Weight is the amount of gravitational pull on an object and is distinct from mass.	1.1 Appropriate materials for design tasks based on specific properties and characteristics.
2. Layers of the Earth include the lithosphere, mantle, and the core	2. Organisms are composed of cells, and many organisms are single-celled, where one cell must carry out all the basic functions of life	2. Volume and mass are distinct components of density		1.2 Appropriate tools used to hold, lift, carry, fasten, and separate, and their safe and proper uses.
3. Radiation, conduction, and convection transfer heat through the earth's system	3. Plant and animal cells have similarities and differences in their major organelles	3. Appropriate tools and use of significant digits are needed to measure volume and mass		1.3 Safe and proper use of tools and machines needed to construct a prototype.
4. Energy provided by the sun, global patterns of atmospheric movement, and temperature differences among water, land, and atmosphere are related	4. Basic functions of living organisms are carried out in cells	4. Mass is conserved in a closed system.		2.1 Steps of the engineering design process.
5. Movement of the earth's crustal plates causes both slow and rapid changes in the earth's surface	5. Multicellular organisms can be hierarchically organized from cells to tissues to organs to systems to organisms	5. Many elements combine in a multitude of ways to produce compounds that make up living and nonliving things.		2.2 Methods of representing solutions to a design problem.
6. Earth's surface is built up and torn down by natural processes	6. General functions of the major systems of the human body, and the interactions of these systems.	6. Differences between an atom and a molecule.		2.3 The purpose of a prototype.
7. Physical evidence supports theories that the earth has evolved over geologic time	7. Every organism requires a set of instructions that specifies its traits. Heredity is the passage of these instructions from one generation to another.	7. Basic examples of elements and compounds.		2.4 Appropriate materials, tools, and machines to construct a prototype.
8. Gravity is a force that pulls all things toward the center of the Earth. Gravity influences the formation and movement of the planets, stars, and solar system	8. Hereditary information is contained in genes located in the chromosomes of each cell.	8. Differences between mixtures and pure substances.		2.5 Design features and cost limitations affect the construction of a prototype.
9. Lunar and solar eclipses, moon phases, and tides are related to relative positions of the earth, moon, and sun	9. Sexual reproduction and asexual reproduction	9. A substance has a melting point and a boiling point, both independent of the amount of the sample.		2.6 The five elements of a universal systems model.
10. Properties and conditions of objects in the solar system and those on earth	10. Genetic variation and environmental factors are causes of evolution and the diversity of organisms	10. Physical changes and chemical changes.		3.1 Components of a communication system.
11. Earth's tilt and revolution around the sun result in uneven heating, causing the seasons	11. Evidence drawn from multiple sources provides the basis of the theory of evolution.		11. An object's motion can be described by its position, direction of motion, and speed.	3.2 Appropriate tools, machines, and electronic devices used to produce and/or reproduce design solutions.
12. The universe contains many billions of galaxies and each galaxy contains many billions of stars	12. Extinction of species is related to a mismatch of adaptation and environment		12. Distance vs. time graphs for constant speed.	3.3 Communication technologies and systems.

	13. Organisms interact and have different functions within an ecosystem that enable the ecosystem to survive.	13. Kinetic energy is transformed into potential energy & vice versa.	13. Kinetic energy can be transformed into potential energy and vice versa.	3.4 How symbols and icons are used to communicate a message.
	14. Roles & relationships among producers, consumers, and decomposers in the process of energy transfer in a food web	14. Temperature change results from adding or taking away heat energy from a system.	14. Temperature change results from adding or taking away heat energy from a system.	4.1 Manufacturing systems of custom and mass production.
	15. Dead plants and animals are broken down by other living organisms, which contributes to the system as a whole	15. The effect of heat on particle motion during a change in phase.	15. The effect of heat on particle motion during a change in phase.	4.2 Impacts of interchangeable parts, components of mass-produced products, and the use of automation.
	16. Producers use energy from sunlight to make sugars through photosynthesis, which can be used immediately, stored for later use, or used by other organisms.	16. Heat moves in predictable ways, from warmer to cooler objects until reaching equilibrium.	16. Heat moves in predictable ways, moving from warmer to cooler objects until reaching equilibrium.	4.3 Manufacturing organization.
	17. Ecosystems have changed through geologic time in response to various influences			4.4 Basic processes in manufacturing systems.
	18. Biological evolution accounts for species diversity developed over generations.			5.1 Parts of a structure.
				5.2 Three major types of bridges and their appropriate uses.
				5.3 The forces of tension, compression, torsion, bending, and shear affect the performance of bridges.
				5.4 Effects of load and structural shape on bridges.
				6.1 Transportation systems and devices that operate on or in land, air, water, and space.
				6.2 Possible solutions to transportation problems, using the universal systems model.
				6.3 Three subsystems of a transportation vehicle or device.
				6.4 Lift, drag, friction, thrust, and gravity in a vehicle or device.
				7.1 Adaptive and assistive devices.
				7.2 Adaptive and assistive bioengineered products.

IQP Journal

January 17th – came in to observe the classes today. I took attendance in homeroom to get to know the names of the kids. Helped Mrs. Lamoureux with secretarial things.

January 19th – took a class for an exercise today. We split up into groups and studied particular sections of a review chapter to prepare for an exam. Then each group went to the front of the room to go over what they believed were the highlights of the section they studied. Had to tell the students I was disappointed in behavior after the first day I had been with them.

January 24th – took green group today and tried to go over the chapter with them to study for a test. They have some major behavior issues, and they tend to talk out, a lot. There was an incident with a student at the very end of class that prompted Mrs. Lamoureux to step in.

January 25th – two hour delay today. Observed classes.

January 26th – did a lab on bird beak adaptations. Helped out with all of the secretarial duties involved in running a lab. Was sent home to grade labs. Most of them were very good.

January 28th – administered tests all day. The students seemed receptive to the exams. Not too difficult 25 questions with a free open response at the end. I graded all the open responses. It was interesting to see what kids wrote for the assignment knowing it was just a completion assignment.

January 31st – most of the cluster students went to Worcester Voc. for the morning, so I got to design a lesson plan for six kids. Extremely successful two hours of student teaching. Kids were engaged and enjoyed themselves for the full length of time. Even I lost track of time as it was going on. At first I was a little worried about how to time manage because my lesson seemed like it was going too quickly, but a few minor improvisations managed to extend the lesson. Then I took green class later in the day, and we handed back the exams and the labs they did and went over them. Mrs. Lamoureux took the class room to start my exercise with them and do some preparatory work for the coming unit. I walked around the class and tried to individually get some kids who were distracted to stay on task. I managed to reach some kids, so we decided that from now on, while I am in green, I am going to try and walk around the room and draw some focus out of the off task kids. This will hopefully drive them to succeed and pass a little more. I have the task to change the green class seating chart as I see fit to control the chaos in the room. Looking forward to another snow day...

February 7th – Saw red and yellow today. In the red group, Mrs. Lamoureux handed out all the new books to students. There is a lot of paperwork involved in handing out books to kids to make sure that they all come back at the end, or specific students are held responsible for losing them. I think it is interesting that the books are separated into sections as opposed to one book where if the kids lose the section it costs way less to replace the one section book. The bell work was to list and briefly describe the function of each body systems. The students could use the new books to help them describe it. We followed up by reading the section out loud to the students. Mrs. Lamoureux tried to focus on explaining to students when there was an important piece that could be used for Cornell notes, which are due tomorrow. For yellow, everything was the same except most of the books were already assigned to students. We fixed the sound on the projector so we had the website read to the children and had them answer the questions brought up by the program. She focused on the levels of organization and

different kinds of tissues. I was given some sample MCAS responses that the students completed to grade at home.

February 8th – Today the students watched a movie on the human body. They were required to watch the movie without taking notes as a method of trying to retain information in their brains instead of just blobbing everything down on paper without memorizing it. After the fact, they were required to write down a few things about the movie that are different than in the chapter they were supposed to have studied the night before. The homework for the classes is to study page nine for a quiz tomorrow that will require the students to define the body systems and their functions.

February 9th – the students began class with a quiz on the body systems. There was a stark, noticeable contrast between those students who studied and those who did not. The homework for tonight is on the skeletal system, where the students will read and review pages 12-19 and write Cornell Notes on the homework. After the quiz, she told every student to pick up all of their books and hold them out in front of them for about 15 seconds. They were to write down how their body responded. Next she had them balance their science books on their heads and walk around the room, practicing balance. What body systems helped you to accomplish this task? Then the activity for the day was to identify two sheets of bones that were handed out. The end goal will be to cut them out and fasten them together with brass fasteners. Students will use their books to label the different bones with the 18 different bone pieces brought to attention by the sheet she handed out.

February 10th – Today students entered the classroom and they had an immediate quiz on the homework from the night before. Just a quick quiz on five major functions of the skeletal system. We followed up by continuing the skeleton building and bone labeling lab that we started yesterday. A real important thing to note here is time management planning when trying to plan out a class lesson like this. If there is any amount of minor significant time wasted, and the period can potentially run over. It was good that we had a prep period right after the first class so that they could stay an extra five minutes to all get situated and complete their skeletons. A few students stayed after for a few extra minutes to help clean up any scraps that were left behind. It is always important to start each classroom lesson off in the same manner that you started the last classroom, and that includes a clean learning environment. I also handed out a PowerPoint project outline to the students that I designed myself. The due date is going to be March 1st, a Tuesday after their break is over. The homework is to read pages 20-23 and do Cornell notes. They will have a small quiz on this tomorrow and a larger Bone quiz on Monday where they will have to memorize the bones from the skeleton exercise and label them on a graph.

February 11th – Today, students came in and completed the bell work to list two injuries to the skeletal system that can happen. The class went by as we reviewed section 1.2 and 1.3 from the book on the skeletal system and diagnosing injuries to the skeletal system. As we went along, there were appropriate stoppage time for stories and questions about the chapters. If there was time left over, students were allowed to study for their bone quiz Monday. Groups who did not complete the skeleton exercise completed that for the period.

February 28th – The bell work for the students today was to write down what the respiratory system it. Then we gave them a brief overview of some of the questions we had received about the projects that are due tomorrow. Some kids clearly understood the project and had a fifty point presentation, while others clearly got lost and were up in the mid to high hundreds. Then we addressed the moodle site, where posted were a bunch of brain pop videos, a few of which we watched with them. We then

approached the chapter in the book on the immune system and did a brief overview. Following this we did a brief exercise on reactions where the students, paired in teams of two, dropped meter sticks while the partner attempted to catch the falling stick between their thumb and forefinger. They then recorded theirs' and their partner's scores in their notebook.

March 1st – we collected the powerpoint assignments from the students. This took up most of the period while they did Cornell notes for the rest.

March 2nd – today I got to teach all of the classes. For the first ten minutes of each class, I presented a powerpoint I designed on the endocrine and reproductive systems. Following this, we played the body systems jeopardy game with the kids. Surprisingly, the classroom that handled this exercise the best was the green class. I had to chastise the yellow and purple group for their inability to behave in a classroom setting with an interactive exercise. At the end, I had each group write out a paragraph on how the endocrine system interacts with other systems in the body. This was not a graded assignment, except for with the purple group, where there were three students who adamantly refused to do the assignment. For this group, I gave all the other students a four on engrade, and those three a zero.

March 14th and 15th – back from spring break. We have moved on to earth science. I am observing most of the two days.

March 16th – Got to teach the whole day. We had the online book read aloud the chapter to the kids, and they had to finish a worksheet. Not too many behavioral problems.

March 17th – had the kids watch a bill nye video on earthquakes today. They had to complete a work sheet, which we went over the answers for. We then went over a bunch of brain pops that had to do with natural disasters. The exit questions I made up differently for every class, but one that was consistent was what is subduction because I did not think the kids quite got an important concept.

March 18th – Students watched another bill nye video on volcanoes. They had another work sheet to complete, and were then given a summary packet to write Cornell notes on for homework, which they could start during the period.

March 21st – Today students received a packet on the rock cycle and were instructed to complete it during class. I walked around the room and helped out sparingly while they were working, but it was really encouraged for them to finish the work on their own. Then we went over the answers about half way through the period. After going over the answers, we gave out a physical versus chemical changes review sheet to help them better understand concepts from previous years.

March 22nd – Today I ran an exercise with students watching a bill nye video on the rock cycle. They were required to fill out a sheet on the cycle while they were watching the film. This was a great reinforcement of the material learned yesterday, and the students responded well to it. During the day, because the seventh graders were taking MCAS, one of the groups could not go upstairs, so I ran coverage of their classroom and we were going to review for the science MCAS. This class was the high honors class, and I have had plenty of problems with them thinking they are running the room. After consulting my mentor, it was decided that all but five of the students, who had been singled out for their continued positive behavior, would have to write a one page typed essay on respect, which I had continued to try and explain to them, following instructions, and why preparation for MCAS is important

for future success. The paper had specific instructions on how it should be written and it will be interesting to see if the students can manage to handle this.

March 23rd – today I ran a review for the exam tomorrow. MCAS got pushed to Friday because of the impending snowstorm tomorrow (in march...), so our test is now tomorrow. This went well enough, as it was a power point slide that emphasized answers for questions that will be on the exam. I also helped a student with some anti anxiety methods for when taking an exam during her lunch period

March 24th – today was a unit exam. The day was spent administering tests. The student I helped the day before responded by getting a 96 on her test.

March 28th – I spent today observing as Mrs. Lamoureux taught the class. She was being observed by the department head, who paid her the ultimate compliment by leaving mid lecture and wondering why she even bothered coming in the first place.

March 30th – today we showed the kids a lab with a heat lamp over two different beakers of materials, one filled with sand and the other with water. We had them hypothesize what would happen when the light was turned on over the materials. While the lab was running, the kids watched a bill nye movie on winds and did a worksheet. Following the video we went over the process of the lab and what their conclusions were. I had recorded the results during the video and recorded separate results for every class. There was good participation in this activity.

March 31st – today the kids watched a bill nye video on climate change and filled in a work sheet. I worked with them on some climate lessons as well, reading some chapters from the book.

April 1st – assembly that was supposed to be early morning got pushed to the afternoon, so we adjusted our class schedule. We were watching the Prentice Hall chapter summary video on weather. I created a three question quiz for each classroom that was different. We continued to collect the MCAS questions homework that was assigned Wednesday. There is another of a similar assignment due Monday.

April 4th – over the weekend, I watched an introductory film on astronomy before we had the kids watch it. I designed a worksheet for the kids to do during a movie, and took a vote from the classes whether they would like to have this sheet count as a quiz. The unanimous decision was yes, so I graded it on a 36 point scale and added the grades. These “quizzes” managed to give almost every kid a one point boost to their grade, which put kids over the bubble of getting a higher grade. For the green class, I made the sheet a 100 point test grade, and almost the whole room responded brilliantly. There was intent focus with most of the kids, and the results managed to pull some kids from failure in the class on the last week before grades closed. It was extremely positive to see, for the most part, the whole room trying their hardest to keep up.

April 5th – today I watched as Mrs. Lamoureux presented a powerpoint we worked on. It was very interesting, because for the classes who could handle it, she handed out cards randomly with topics on them. As she finished slides, she would have whoever had the card with that topic give a brief summary of what just happened. This was a fantastic way to get the entire room involved in the discussion and have kids who don’t normally speak up share with the room. This way it was easier to encourage kids that they were indeed intelligent enough to share with everyone else. It definitely helped that the topic

was interesting, at least I thought so. Tonight I have to prepare to get the powerpoint done tomorrow. It is going to be quite interesting managing to get in as many slides as she wants to get done.

April 6th 7th and 8th – I covered the rest of the powerpoint on astronomy with multiple brainpops and breaks in lecture for videos. Students completed quizzes each day for grade boosts. I got to input the final grades for students for the quarter. This was a very enlightening experience as I got to decide how to increase kids' grades based on performance, merit, and behavior in the classroom. I passed a few kids who were failing based on their significant improvement in the classroom.

April 11th – Today was the beginning of MCAS Madness, where the students from other clusters began coming around to do a workshop with all of the science teachers in the eighth grade. We introduced ourselves to the kids and gave them the rules and expectations of the classroom. These mainly involved etiquette and stressing respect to others in the classroom. We handed out a bunch of index cards that had different pictures of living and non-living things on them and had the kids identify what each was. In the class I taught, I had them identify their names before answering so that I could know all of the kids' names. I feel like knowing names is the best way to show kids that you care about what is happening in your classroom and that their presence means something to you. Following this, we had them identify what they believed identified a living thing. Then there was a cell structure and cell specialization BrainPOP followed by a cells powerpoint that included a worksheet to be done the next day. We ended class with the cell theory rap, and had students read the song aloud. The homework was to color in the cell worksheets.

April 12th – today we started with a specialized cells powerpoint. Then we did levels of organization and homeostasis followed by a powerpoint on the human body systems. There were some pretty good BrainPoPs on this section. Since it was only a four day workshop this week, we jammed two together. We did a lot of work with genetics and heredity, and studying a bit on Gregor Mendel, followed by a simulation of Norn Genetics.

April 13th – Today, we went over the homework assigned on heredity, and did a lab about hornimonsters. Each student was to take labeled popsicle sticks and determine the offspring phenotypes of coupled monsters based on their genotypes. There was a worksheet accompanying this lab that the students did as we went along. Following this, we went over the different types of reproduction: Sexual v. Asexual.

April 14th – Testing day

April 15th – My lesson on technology and engineering: how radio waves work. See lesson plan for more details.

April 25th - 29th – Week two of the science work shop. These kids were a little tougher to control, but seemed to respond to the more powerful male presence than the presence of Mrs. Lamoureux. Interesting dynamic between the students and myself. It has certainly been an adventure trying to get to know the kids in only a week worth of time.

May 2nd - 6th – Week three of the science work shop. We have our kids this week.

May 9th/11th/13th – Fourth week of the science workshop. Hot scholars cluster this week. We only have them Monday, Wednesday, and Friday, which means it will be difficult to teach four days of material in only two days before the test. It definitely went well though. These kids are for the most part extremely well behaved. Science MCAS are next week. I wish the kids luck in their endeavors.

Dates following this were not added to the journal, though there were hours conducted in the classroom. Post MCAS exam, the necessity to maintain this journal lessened.

Notes for PQP (Chapter 1)

1) the Massachusetts Education Reform Act of 1993

2) the Curriculum Frameworks, as they apply to your particular area (middle school Science)

3) the MCAS exam, esp the Science portion

4) the demographics (social, economic) of Forest Grove Middle School, part of the Worcester Public Schools

5) MCAS performance of Forest Grove.

Massachusetts Education Reform Act of 1993

- Change began with *Webby v. Dukakis*, where the general public sued the state because they were not spending equal amounts of money on education in different districts of the Commonwealth. The goal was that if money was spread equally, the disparity in academic performance in the state would decrease, which would in turn, grant all children in the educational system the same set of important skills needed to succeed as an adult.
- “In brief, the plaintiffs ask the court to rule that the state has an obligation to adequately educate every child but has failed to do so. Plaintiffs also asked the court to issue some ‘basic guidelines’ that would force the state to set educational goals, spend the money to fulfill those goals and ensure accountability.” – Boston Globe 1992
- Eventually, the Supreme Court ruled that Mass had failed to live up to its own constitution to provide adequate education to all students.
- The Massachusetts Business Alliance for Education produced a document known as “Every Child is a Winner” which would eventually become the guidelines for the reform act.
- The Goals
 - “Equalize funding among districts to level the playing field”
 - “Improve all student performance to succeed with high set standards”
- How to reach these goals?
 - Increase state spending on education
 - Create a set of curriculum frameworks which would hold high expectations for students
 - Create a means for assessing students’ performance in subjects covered in the curriculum
- Funding
 - \$5,500 per pupil – took until 2002 for every district to reach the funding levels
- Frameworks
 - Created by work groups that consisted of individuals who have a vested interest in the education system: teachers, administrators, policymakers, students, and community and business representatives. These were then approved by the department of Education.
- Assessments
 - So far there is only one mandatory assessment tool, and that is the Massachusetts Comprehensive Assessment System, or the MCAS. If a student does not pass the exam, they may not graduate from high school. The test can help identify the weakness of students or an entire school system by the score results. If a school has consistent failure in a subject, the department of education is responsible for providing support to fix the problem.

Curriculum Frameworks for Middle School Science

- The last time the curriculum was adjusted was in October of 2006
- The curriculum covers major topics including
 - The Purpose and Nature of Science and Technology/Engineering
 - Inquiry, Experimentation, and Design in the Classroom
 - Grades 6-8 must learn lab safety because of the expanded arsenal of tools at their disposal in the classroom situation
 - Experimental expectations of a middle school student
 - Formulate a testable hypothesis.
 - Design and conduct an experiment specifying variables to be changed, controlled, and measured.
 - Select appropriate tools and technology (e.g., calculators, computers, thermometers, meter sticks, balances, graduated cylinders, and microscopes), and make quantitative observations.
 - Present and explain data and findings using multiple representations, including tables, graphs, mathematical and physical models, and demonstrations.
 - Draw conclusions based on data or evidence presented in tables or graphs, and make inferences based on patterns or trends in the data.
 - Communicate procedures and results using appropriate science and technology terminology.
 - Offer explanations of procedures, and critique and revise them.
- Guiding Principles:
 - A comprehensive science and technology/engineering education program enrolls all students from PreK through grade 12
 - In grades 6-8, students should have a full year of science study every year. Students should also have one year of technology/engineering education on top of this in order to grasp technological needs for their post-education
 - An effective science and technology/engineering program builds students' understanding of the fundamental concepts of each domain of science, and their understanding of the connections across these domains and to basic concepts in technology/engineering
 - In middle school, faculty may choose either a discipline based or integrated approach in science.
 - Science and technology/engineering are integrally related to mathematics
 - An effective program in science and technology/engineering addresses students' prior knowledge and misconceptions
 - Investigation, experimentation, and problem solving are central to science and technology/engineering education
 - An effective science and technology/engineering program builds upon and develops students' literacy skills and knowledge
 - Students learn best in an environment that conveys high academic expectations for all students
 - Assessment in science and technology/engineering serves to inform student learning, guide instruction, and evaluate student progress

- An effective program in science and technology/engineering gives students opportunities to collaborate in scientific and technological endeavors and communicate their ideas
- A coherent science and technology/engineering program requires district-wide planning and on-going support for implementation
- Science and technology/engineering learning standards
 - Earth and Space Science
 - Students gain sophistication and experience in using models, satellite images, and maps to represent and interpret processes and features. In the early part of this grade span, students continue to investigate geological materials' properties and methods of origin. As their experiments become more quantitative, students should begin to recognize that many of the earth's natural events occur because of processes such as heat transfer. Students in these grades should recognize the interacting nature of the earth's four major systems: the geosphere, hydrosphere, atmosphere, and biosphere. They should begin to see how the earth's movement affects both the living and nonliving components of the world. Attention shifts from the properties of particular objects toward an understanding of the place of the earth in the solar system and changes in the earth's composition and topography over time. Middle school students grapple with the importance and methods of obtaining direct and indirect evidence to support current thinking. They recognize that new technologies and observations change our explanations about how things in the natural world behave.
 - Learning standards for grades 6–8 fall under the following five subtopics: *Mapping the Earth*; *Earth's Structure*; *Heat Transfer in the Earth System*; *Earth's History*; and *The Earth in the Solar System*.
 - Mapping the Earth
 - Earth's Structure
 - Heat Transfer in the Earth System
 - Earth's History
 - Earth in the Solar System
 - Life Science
 - In **grades 6–8**, the emphasis changes from observation and description of individual organisms to the development of a more connected view of biological systems. Students in these grades begin to study biology at the microscopic level, without delving into the biochemistry of cells. They learn that organisms are composed of cells and that some organisms are unicellular and must therefore carry out all of the necessary processes for life within that single cell. Other organisms, including human beings, are multicellular, with cells working together. Students should observe that the cells of a multicellular organism can be physically very different from each other, and should relate that fact to the specific role that each cell has in the organism (specialization). For example, cells of the eye or the skin or the tongue look different and do different things. Students in these grades also examine the hierarchical organization of multicellular organisms and the roles and relationships that organisms occupy in an ecosystem. As is outlined in the *National Science Education Standards*, students in grades 6–8 should be exposed in a general way to the systems of the human body, but are not expected to develop a detailed

understanding at this grade level. They should develop the understanding that the human body has organs, each of which has a specific function of its own, and that these organs together create systems that interact with each other to maintain life. At the macroscopic level, students focus on the interactions that occur within ecosystems. They explore the interdependence of living things, specifically the dependence of life on photosynthetic organisms such as plants, which in turn depend upon the sun as their source of energy. Students use mathematics to calculate rates of growth, derive averages and ranges, and represent data graphically to describe and interpret ecological concepts. Learning standards for grades 6–8 fall under the following eight subtopics: *Classification of Organisms; Structure and Function of Cells; Systems in Living Things; Reproduction and Heredity; Evolution and Biodiversity; Living Things and Their Environment; Energy and Living Things; and Changes in Ecosystems Over Time.*

- Classification of Organisms
 - Structure and Function of Cells
 - Systems in Living Things
 - Reproduction and Heredity
 - Evolution and Biodiversity
 - Living Things and their Environment
 - Energy and Living Things
 - Changes in Ecosystems over Time
- Physical Sciences (Chemistry and Physics)
 - In **grades 6–8**, students still need concrete, physical-world experiences to help them develop concepts associated with motion, mass, volume, and energy. As they learn to make accurate measurements using a variety of instruments, their experiments become more quantitative and their physical models more precise. Students in these grades are able to graph one measurement in relation to another, such as temperature change over time. They may collect data by using microcomputer- or calculator-based laboratories (MBL or CBL), and can learn to make sense immediately of graphical and other abstract representations essential to scientific understanding. Learning standards for grades 6–8 fall under the following five subtopics: *Properties of Matter; Elements, Compounds, and Mixtures; Motion of Objects; Forms of Energy; and Heat Energy.*
 - Properties of Matter
 - Elements, Compounds, and Mixtures
 - Motion of Objects
 - Forms of Energy
 - Heat Energy
- Technology/Engineering
 - In **grades 6–8**, students pursue engineering questions and technological solutions that emphasize research and problem solving. They identify and understand the five elements of a technology system (goal, inputs, processes, outputs, and feedback). They acquire basic safety skills in the use of hand tools, power tools, and machines. They explore engineering design; materials, tools, and machines; and communication, manufacturing, construction, transportation, and bioengineering technologies. Starting in grades 6–8 and

extending through grade 10, the topics of power and energy are incorporated into the study of most areas of technology. Grades 6–8 students use knowledge acquired in their mathematics and science curricula to understand engineering. They achieve a more advanced level of skill in engineering design by learning to conceptualize a problem, design prototypes in three dimensions, and use hand and power tools to construct their prototypes, test their prototypes, and make modifications as necessary. The culmination of the engineering design experience is the development and delivery of an engineering presentation. Because of the hands-on, active nature of the technology/engineering environment, it is strongly recommended that it be taught by teachers who are certified in technology education, and who are very familiar with the safe use of tools and machines. Learning standards for grades 6–8 fall under the following seven subtopics: *Materials, Tools, and Machines; Engineering Design; Communication Technologies; Manufacturing Technologies; Construction Technologies; Transportation Technologies; and Bioengineering Technologies.*

- Steps of the Engineering design process
 - Materials, Tools, and Machines
 - Engineering Design
 - Communication technologies
 - Manufacturing technologies
 - Construction technologies
 - Transportation technologies
 - Bioengineering technologies

<http://www.doe.mass.edu/frameworks/scitech/1006.pdf>

Middle School MCAS Exam For Science

Endocrine/Reproductive System Powerpoint

Endocrine System

Chemical Controls



- The **Endocrine System** produces chemicals that control many of the body's daily activities
 - It also regulates long-term changes such as growth and development of the human body



- Endocrine glands produce and release chemicals directly into the blood stream
 - These are known as **hormones** – chemicals that act like messengers and can start, stop, slow down, or speed up any of the body's processes



Major Endocrine System Glands

HYPOTHALAMUS

PITUITARY

THYROID

PARATHYROID

ADRENAL

THYMUS

PANCREAS

The Reproductive System

Continuing Life

- The **Reproductive System** is different in males and females

- For males, its job is to produce **sperm**, the male reproductive cell, and the **testosterone hormone**, which controls the development of male physical characteristics



- For females, its job is to produce **eggs**, the female reproductive cell, and the **estrogen hormone**, which handles development of female specific traits. It also is responsible for nourishing a developing baby until birth



LESSON | What is the rock cycle?

12

January, February, March, April, . . . You name the next nine. What about spring, summer, . . . ? Which three go next? Months and seasons occur in cycles. A cycle is a series of events that happen over and over.

Nature has many kinds of cycles. The rise and fall of the tides is a cycle that occurs twice each day. Oxygen and carbon dioxide move through the environment in a cycle.

Another natural cycle is the rock cycle. You have learned that there are three classes of rocks: igneous, sedimentary, and metamorphic. However, rocks do not remain in the same form forever. They are constantly changing. In fact, any rock can change to another kind of rock. For example:

- Igneous and sedimentary rocks may be changed to metamorphic rock by great heat and pressure.
- Igneous, metamorphic, and sedimentary rocks can be exposed to the earth's surface. The forces of the weather then break them into fragments. The fragments may then form new sedimentary rock.

All kinds of rocks may become buried where temperatures are so high they melt into magma. In time, the magma can cool and harden into igneous rock.

The endless change of the rocks from one form to another is called the rock cycle. You can see a diagram of the rock cycle in Figure A on the next page. Notice that rock changes need not take place in any special order. The two-way arrows show that the changes can take place in any order.

Geologists believe that since the earth began about 4½-5 billion years ago, its crust has undergone several rock cycles.

THE ROCK CYCLE

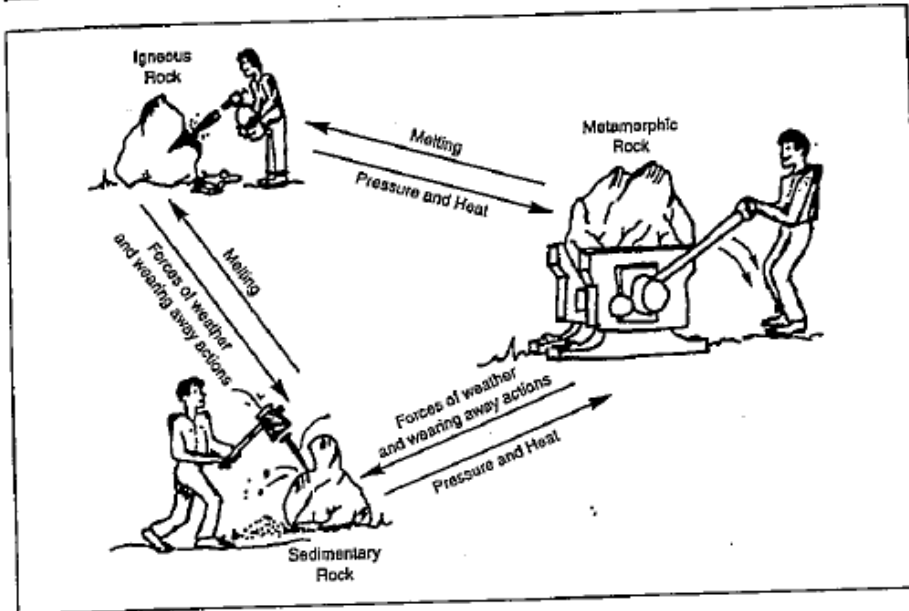


Figure A

Use Figure A to identify the cause or causes for each of the rock changes listed below.

	Change	Cause (or Causes)
1.	Igneous to sedimentary	
2.	Sedimentary to metamorphic	
3.	Sedimentary to igneous	
4.	Metamorphic to igneous	
5.	Igneous to metamorphic	
6.	Metamorphic to sedimentary	

INTERPRETING ROCK CYCLES

Figure A shows the basic rock cycle. However, rock changes are rarely that cut-and-dry. Usually there are in-between steps and shortcuts.

Figures B, C, D, and E show enlarged parts of the rock cycle as it might actually happen. Each diagram shows one or more possible routes. Each route is shown by an arrow.

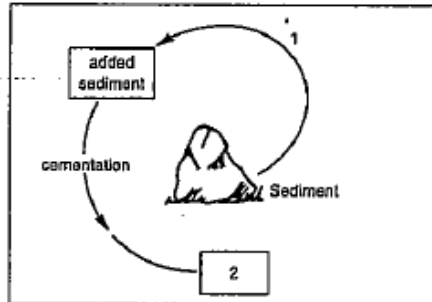


Figure B

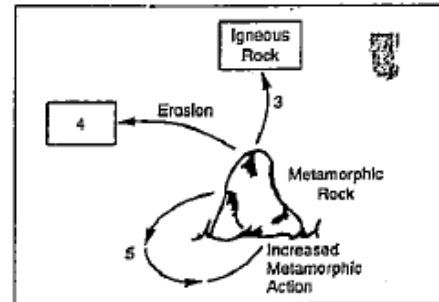


Figure C

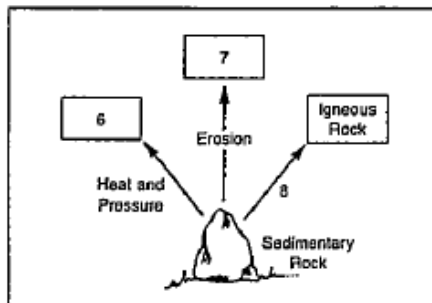


Figure D

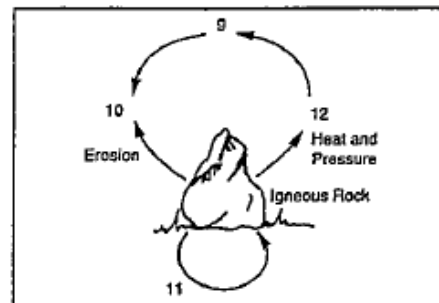


Figure E

Fill in the missing term that best describes each number in the diagrams. Choose from the following terms:

heat and pressure
metamorphic rock
erosion

melting and hardening
sediment
sedimentary rock

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

7. _____
8. _____
9. _____
10. _____
11. _____
12. _____

FILL IN THE BLANK

Complete each statement using a term or terms from the list below. Write your answers in the spaces provided.

rocks
order
sedimentary

rock cycle
metamorphic
fragments

magma
igneous

1. There are three classes of _____.
2. Molten rock material is called _____.
3. Rock formed from rock fragments is called _____ rock.
4. Rock formed from molten minerals is called _____ rock.
5. Rock formed as a result of heat and pressure is called _____ rock.
6. Erosion can break rock into _____.
7. The unending change of rocks from one form to another is called the _____.
8. Rock changes can happen in any _____.

TRUE OR FALSE

In the space provided, write "true" if the sentence is true. Write "false" if the sentence is false.

- _____ 1. Weathering changes metamorphic rock to sediments.
- _____ 2. Magma cools to form sedimentary rock.
- _____ 3. Rocks have been changing since the beginning of the earth.
- _____ 4. Rocks are always changing.
- _____ 5. An increase in temperature will always change an igneous or sedimentary rock to a metamorphic rock.
- _____ 6. Igneous rock can only change into sedimentary rock.
- _____ 7. Some rocks contain materials that were once part of every rock type.
- _____ 8. Heat and pressure change sedimentary rock into igneous rock.

Two Kinds of Changes

Name _____

Physical and Chemical Change

Two Kinds of Changes

Physical Change

A **physical change** occurs when the appearance of a substance changes, but chemically the substance is the same. The individual molecules do not change, and no new matter is formed. During some physical changes, matter simply changes from one state to another. Evaporating, melting, freezing, and sublimating are examples of physical changes in which matter changes from one state to another. During **evaporation**, a substance changes from a liquid to a gas. When a substance **melts**, it changes from solid to liquid. A substance that **freezes** changes from a liquid to a solid. During **sublimation**, a substance changes from a solid directly to a gas.

There are other types of physical changes. During some physical changes, an object's size or shape is altered. A physical change also occurs when substances are mixed and something dissolves.

Chemical Change

Chemical change occurs when a chemical reaction takes place. The substances produced during a chemical reaction are different from the original substances. Energy is involved in all chemical reactions. Here are some signs that a chemical reaction has taken place:

- A solid precipitate forms at the bottom of a test tube.
- Heat or light is produced.
- A gas is produced.
- A color change occurs.

Examine the list of changes below. Write *C* before each chemical change.

Write *P* before each physical change.

1. ____ erosion of a riverbed by water
2. ____ leaves changing color
3. ____ carving a statue out of marble
4. ____ sanding a piece of wood
5. ____ ice cream melting
6. ____ fireworks exploding
7. ____ baking a cake
8. ____ chocolate melting
9. ____ a flashbulb flashes
10. ____ vinegar is mixed with baking soda
11. ____ cooking waffles
12. ____ lighting a match
13. ____ mothballs disappear over time
14. ____ plants undergo photosynthesis
15. ____ a red mark appears after a bee sting
16. ____ a drop of hydrochloric acid on marble produces carbon dioxide gas

Bill Nye Wind Worksheet

52

Bill Nye Wind Worksheet

Name: Key Period: _____

1. Wind is caused by the heat of the sun and the rotation of the Earth.
2. The balloon swelled because warm air takes up more space and shrinks because cold air takes up less space.
(more or less)
- 3) Warm air rises from the toaster.
- 4) Cold air sinks as seen with the opening of the freezer door.
- 5) What causes the weather? wind
- 6) What does hail start out as? raindrops
- 7) The Largest hail stone was 760 grams and 44 centimeters around.
- 8) Why do stars not twinkle much in the winter?
air does not rise as much
- 9) A barometer is used to measure air pressure in the atmosphere.
10. The root **baro** means pressure/weight.
11. A high barometric pressure the weather is Sunny.
12. A low barometric pressure means the weather is Stormy.
13. Westerly winds – the wind moves west to east.
14. Air rises at the equator and sinks at the poles.
15. What other planets in our solar system have wind?
_____, _____, _____
16. What does erode mean? to wear away
17. At a wind farm they harvest wind.
18. No wind = no change in weather such as in caves.

Venus
Mars
Jupiter
Uranus
Neptune
Saturn

Video Quiz


April 1st, 2011

Weather ^{Video} Quiz Questions

Red

- What is the layer of the atmosphere where all weather occurs?
 - Troposphere
- As altitude _____, air pressure and temperature _____
- How are most ~~can~~ global winds powered? sun

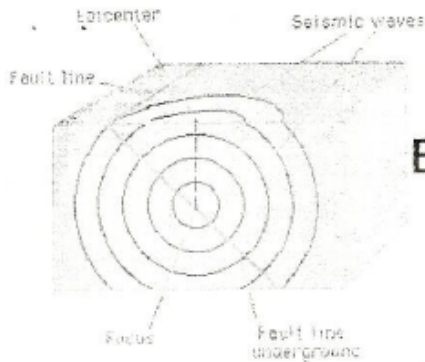
Purple

- Draw a picture of the updraft used by the glider pilot.

- What is the area of low wind near the equator called? doldrums
- What caused major extinctions of three animal species? ~~major climate changes~~
end of ice age

Yellow

- What are the two most abundant gases in the atmosphere?
Nitrogen, oxygen.
- What is the effect called which turns the winds due to the Earth's rotation? Coriolis Effect.
- What is the ring around the center of a hurricane called? eye wall.

Bill Nye Earthquake Notes



Name KEY

Bill Nye Earthquake Notes

1. Every year there are THOUSANDS of earthquakes all around the world.
2. The reason we have earthquakes is because the Earth's surface is really pretty flexible.
3. Earth's surface is floating on magma or molten rock.
4. Earth's surface is broken into tectonic plates.
5. As the plates move, the plate movement causes cracks, and the cracks are called FAULTS.
6. The faults can store ENERGY like a spring.
7. When energy stored in the plates is released, sometimes we get an EARTHQUAKE.
8. Scientists measure movement of Earth's surface with seismometer.
9. Movement of lava makes small EARTHQUAKES happen.
10. A normal earthquake is stored up energy that gets released as the rocks or ground break.
11. The EPICENTER is the center of the earthquake.
12. The Richter Scale is a way to compare the size of one earthquake with the size of another.
13. An earthquake of magnitude 3 has 100 times the ground motion of a magnitude 1, and it has a lot more energy.

Forces in the Earth's Crust

Name KEY Date _____ Class 14

Earthquakes • Review and Reinforce

Forces in Earth's Crust

Understanding Main Ideas

Use the diagrams below to answer items 1-3.

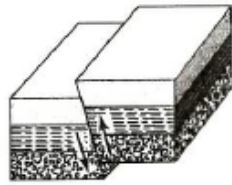


Diagram A

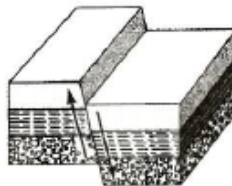


Diagram B

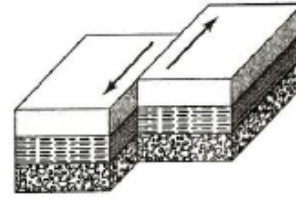


Diagram C

1. Diagram **A**
 - a. Type of Fault: Normal
 - b. Stress Force: Tension
 - c. Movement Along Fault: The hanging wall slides downward
2. Diagram **B**
 - a. Type of Fault: Reverse
 - b. Stress Force: Compression
 - c. Movement Along Fault: The hanging wall slides up over the footwall.
3. Diagram **C**
 - a. Type of Fault: Strike-slip
 - b. Stress Force: Shearing
 - c. Movement Along Fault: Rocks slip past each other

Building Vocabulary

Write a definition for each of these words. Use the back of this sheet if you need more space.

4. shearing Stress that pushes a mass of rock in two opposite directions.
5. hanging wall Block of rock that lies above.
6. syncline Rock that bends downwards to form a valley
7. footwall Rock that lies below
8. stress A force that acts on a rock to change its shape or volume
9. anticline Fold of rock that bends up into an arch
10. plateau a large area of flat land elevated high above sea level

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The Theory of Plate Tectonics

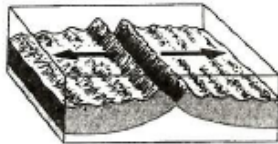
Name KEY Date _____ Class 113

Plate Tectonics • Review and Reinforce

The Theory of Plate Tectonics

Understanding Main Ideas

Label each figure by writing the type of plate boundary it shows.



1. DIVERGENT



2. CONVERGENT



3. TRANSFORM

Answer the following questions on a separate sheet of paper.

- Describe what happens when a. two plates carrying oceanic crust collide, b. two plates carrying continental crust collide, and c. a plate carrying oceanic crust collides with a plate carrying continental crust.
- Explain what force caused the movement of the continents from one supercontinent to their present positions.

The movement of convection currents in the mantle is the major force that causes plate tectonics.

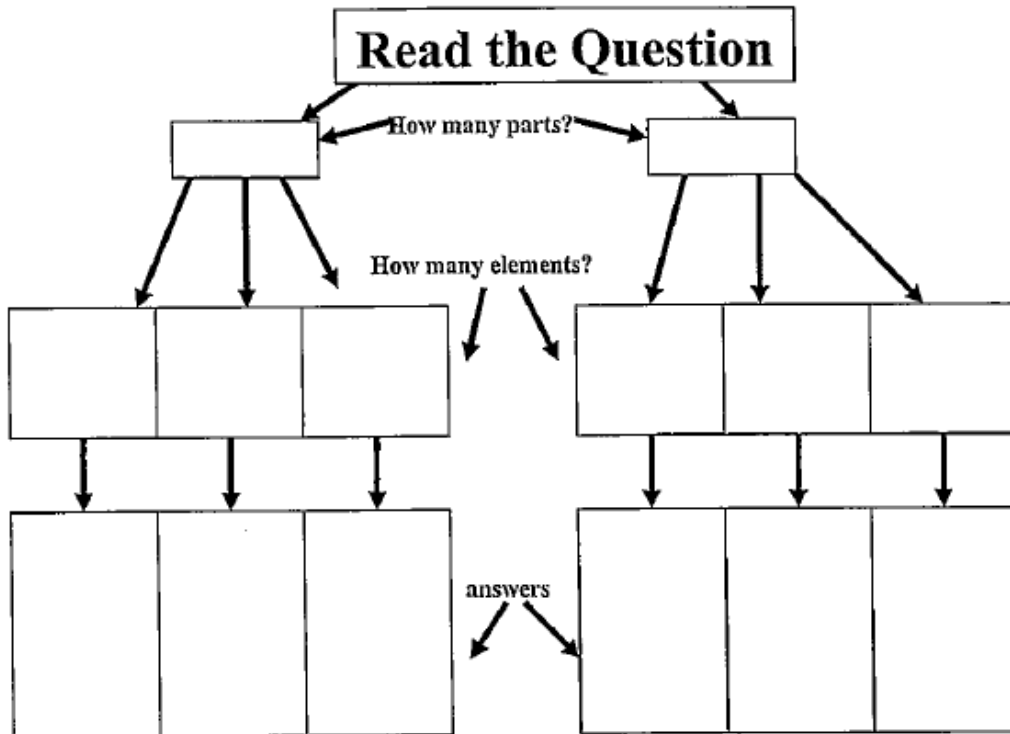
- the plate that is more dense sinks under the other plate*
- the oceanic crust goes through subduction and slips under the continental plate*
- neither sinks and mountain ranges are formed*

Building Vocabulary

Fill in the blank to complete each statement.

- A scientific THEORY is a well-tested concept that explains a wide range of observations.
- Breaks in Earth's crust where rocks have slipped past each other are called FAULTS.
- The lithosphere is broken into separate sections called PLATES.
- A(n) RIFT VALLEY is a deep valley on land that forms along a divergent boundary.
- The geological theory that states that pieces of Earth's crust are in constant, slow motion is called PLATE TECTONICS.

How to Approach Answering an Open Response Question



Parts= A & B

Element: remember an element is an item that needs to be answered

Principles of Effective Teaching and Descriptors

Massachusetts Department of Education 2001

I. CURRENCY IN THE CURRICULUM

A. The teacher is up to date regarding curriculum content

1. Demonstrates a working knowledge of the core curriculum of the teacher's assignment.
2. Frames curriculum around essential questions in the discipline that provide opportunities for reasoning, logic, analysis and synthesis when planning units, lessons, and assessments.
3. Keeps current in the field and applies knowledge to the instructional program.
4. Contributes to the ongoing evaluation of the curriculum.

II. EFFECTIVE PLANNING AND ASSESSMENT OF CURRICULUM AND INSTRUCTION

A. The teacher plans instruction effectively.

1. Has a personal vision of committed, confident learners and uses that vision to guide learning goals, expectations, and standards for student work.
2. Sets short-term and year-long goals for curricular units which derive from unifying themes of fundamental importance to students' present or future lives.
3. Identifies individual and group needs and plans appropriate strategies, including those that involve the use of up-to-date technologies, to meet those needs.
4. Uses materials and resources, including technologies, that are appropriately matched to curricular goals and to students' needs and learning styles.
5. Frames curriculum around students' own prior knowledge and experience and identifies prerequisite skills, concepts, and vocabulary that are important for students to know in order to be successful at a task.

*prepared by John Holly
jholly@schooladministrators.com*

1

6. Seeks out and collaborates with school-based specialists, resource personnel, including technology specialists, and administrators to better design curricula or instructional modifications to meet the special learning needs of students and support all students to learn and apply a challenging core curriculum.

7. Plans engaging ways to introduce each unit of study.

8. Plans frequent instructional opportunities where students are interacting with ideas, materials, teachers and one another.

9. Designs curriculum experiences in which students take increasing responsibility for their own learning.

10. Integrates the teaching of reading, listening, writing, speaking, viewing and the use of appropriate learning tools (e.g., calculators, computers, etc.) within the discipline.

B. The teacher plans assessment of student learning effectively.

1. Determines specific and challenging standards for student learning.

2. Develops and uses authentic assessment which describes a student's learning process as well as his/her learning achievements.

3. Incorporates time for individual and interactive reflection including response journals, debriefings and group discussions.

C. The teacher monitors students' understanding of the curriculum effectively and adjusts instruction, materials, or assessments when appropriate.

1. Regularly uses a variety of formal and informal authentic assessments of students' achievement and progress for instructional revisions and decision-making.

2. Implements evaluation procedures which appropriately assess the objectives taught.

3. Communicates student progress to parents, students and staff members in a timely fashion using a range of information including portfolios, anecdotal records and other artifacts.

4. Prepares and maintains accurate and efficient record-keeping systems of the quality and quantity of student work.

5. Uses individual and group data appropriately; maintains confidentiality concerning individual student data and achievement.

*prepared by John Holly
jholly@schooladministrators.com*

III. EFFECTIVE MANAGEMENT OF CLASSROOM ENVIRONMENT

A. The teacher creates an environment that is positive for student learning and involvement.

- 1. Implements instructional opportunities where students are interacting with ideas, materials, teachers and one another.**
- 2. Implements curriculum experiences in which students take increasing responsibility for their own learning.**
- 3. Demonstrates an openness to student challenges about information and ideas.**
- 4. Uses classroom time and classroom space to promote optimal learning.**
- 5. Understands principles and patterns of child growth and development and uses this knowledge in working with students.**
- 6. Establishes classroom procedures that maintain a high level of students' time-on-task and that ensure smooth transitions from one activity to another.**

B. The teacher maintains appropriate standards of behavior, mutual respect and safety.

- 1. Maintains systematic approach to discipline by establishing and administering a consistent and fair set of rules supporting appropriate expectations.**
- 2. Manages routines effectively.**
- 3. Maintains appropriate professional boundaries with students.**
- 4. Serves as a positive role model for students.**

IV. EFFECTIVE INSTRUCTION

A. The teacher makes learning goals clear to students.

- 1. Makes connections between concepts taught and students' prior knowledge and experiences.**
- 2. Regularly checks for students' understanding of content and concepts and progress on skills.**

3. Identifies confusions and misconceptions as indicated by student responses and regular assessment strategies. Remediates, reteaches, or extends teaching to meet individual and/or group need.

4. Communicates clearly in writing and speaking, using precise language.

5. Understands and shows students the relevance of the subject to life-long learning.

B. The teacher uses appropriate instructional techniques.

1. Uses a variety of teaching strategies, including cooperative, peer and project-based learning; audio-visual presentations, lecture, discussions and inquiry, practice and application; and the teaching of others.

2. Provides options for students to demonstrate competency and mastery of new material, including written work, plays, art work, oratory, visual presentations, exhibitions and portfolios.

3. Uses a variety of appropriate materials in order to reinforce and extend skills, accommodate learning styles and match instructional objectives.

4. Causes students to become cognitively active in summarizing important learnings and integrating them with prior knowledge.

5. Demonstrates working knowledge of current research on optimum means for learning a particular discipline.

C. The teacher uses appropriate questioning techniques.

1. Uses a variety of questioning techniques, including those which encourage and guide critical and independent thinking and the development of ideas.

2. Presents information recognizing multiple points of view; encourages students to assess the accuracy of information presented.

D. The teacher evaluates, tries innovative-approaches, and refines instructional strategies, including the effective use of technologies, to increase student learning and confidence to learn.

1. Regularly tries innovative approaches to improve instructional practices.

2. Continually evaluates, tries innovative approaches and refines instructional strategies, including the effective use of technologies, to increase student learning and confidence about learning.

3. Assesses instructional strategies in authentic ways by comparing intended and actual learning outcomes.

V. PROMOTION OF HIGH STANDARDS AND EXPECTATIONS FOR STUDENT ACHIEVEMENT

A. The teacher communicates learning goals and high standards and expectations to students.

1. Regularly communicates objectives or learning outcomes to students.

2. Regularly provides feedback to students on their progress on goals and objectives.

3. Communicates standards, expectations and guidelines regarding quality and quantity of students' work, work procedures and interpersonal behavior to students and parents.

4. Responds to students' answers and work so as to keep students open, thinking, and willing to take risks and to persevere with challenging tasks.

5. Models the skills, attitudes, values and processes central to the subject being taught.

B. The teacher promotes confidence and perseverance in the student that stimulate increased personal student responsibility for achieving the goals of the curriculum.

1. Uses prompt feedback and student goal setting in order to increase student motivation and ownership of learning.

2. Develops and supports students' awareness of themselves as learners and their ability to overcome self-doubts associated with learning and take risks.

3. Nurtures students' eagerness to do challenging work and provides incentive, interest and support for students to take responsibility to complete such tasks successfully.

4. Acts on the belief that all students can learn and that virtually all can master a challenging core curriculum with appropriate modifications of instruction.

*prepared by John Holly
jholly@schooladministrators.com*

5. Encourages and supports students to believe that effort is a key to high achievement and acknowledges and values student work, study and inquiry.

6. Regularly identifies students needing extra help and secures student cooperation and participation in extra help sessions.

7. Identifies students who are not meeting expectations and develops a plan that designates the teacher's and the student's responsibilities regarding learning.

8. Demonstrates attitudes of fairness, courtesy and respect that encourage students' active participation and commitment to learning.

9. Builds positive relationships with students and parents to enhance students' abilities to learn effectively.

10. Recognizes and responds appropriately when an individual student is having social and/or emotional difficulties which interfere with learning and/or participation in class.

VI. PROMOTION OF EQUITY AND APPRECIATION OF DIVERSITY

A. The teacher strives to ensure equitable opportunities for student learning.

1. Provides opportunities to include all students in the full range of academic programs and activities and extra-curricular activities.

2. Addresses the needs of diverse student populations by applying and adapting constitutional and statutory laws, state regulations and Board of Education policies and guidelines.

B. The teacher demonstrates appreciation for and sensitivity to the diversity among individuals.

1. Demonstrates sensitivity to differences in abilities, modes of contribution, and social and cultural backgrounds.

2. Develops and implements educational and organizational strategies that are effective in meeting the needs of a diverse student body.

3. Functions effectively in a multi-lingual, multi-cultural and economically diverse society.

VII. FULFILLMENT OF PROFESSIONAL RESPONSIBILITIES

A. The teacher is constructive and cooperative in interactions with parents and receptive to their contributions.

1. Keeps parents informed of student's progress and works with them, in culturally appropriate ways, to aid in the total development of the student.

2. Maintains professional boundaries with parents.

B. The teacher shares responsibility for accomplishing the goals and priorities of his/her grade/team/department, building and school district.

1. Maintains professional boundaries with colleagues.

2. Works constructively with others to identify school problems and suggest possible solutions.

3. Works collaboratively with other staff in planning and implementing interdisciplinary curriculum, instruction and other school programs and shares expertise and new ideas with colleagues.

4. Participates in student or school activities.

5. Cooperates with other teachers about students' overall work load.

C. The teacher is a reflective and continuous learner.

1. Reflects about and acts on what students need to know and be able to do and about what the teacher can do to foster learning.

2. Uses available resources to analyze, expand, and refine professional knowledge and skills; resources can include professional organizations, academic course work, school-based staff, administrative and community resources, and other colleagues.

3. Participates in activities that demonstrate a commitment to the teaching profession.

4. Seeks out information in order to grow and improve as a professional.

5. Is receptive to suggestions for growth and improvement.

Sample Student Work

Example Quiz

1 The 4 Forces of Flight is thrust, lift, drag, pull

2 Species

3 Bacteria and orchid

4 Temperate forest; We have four seasons

5 The law of conservation of mass says that things can't just appear or disappear.

6 Electrons, protons, neutrons.

7 solid, liquid, gas

Egg Drop Lab

100

June 13, 2011

Title: Egg Drop Lab

Purpose: The purpose of the lab was to construct a vehicle that will protect an egg from a high drop.

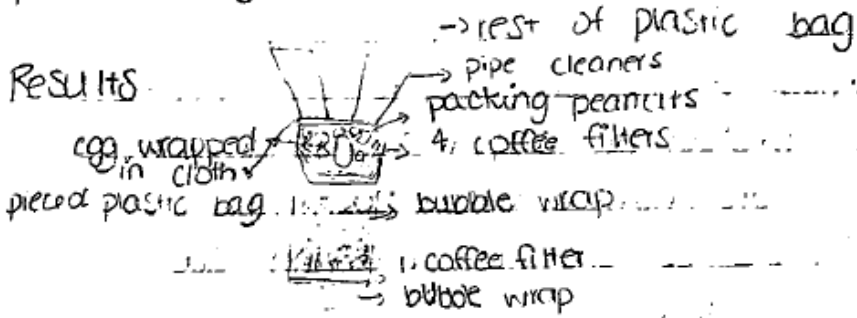
Materials: card board, bubble wrap, packing peanuts, pipe cleaners, coffee filters, masking tape, plastic bag, scissors, cloth.

Procedure:

1. Tape the 3 cardboard pieces together to make a triangular shape.
2. Tape bubble wrap and 1 coffee filter to the bottom of the structure. This will make the vehicle have a cushioned fall.
3. Tape 4 coffee filters to the top of the structure.
4. Put the rest of the bubble wrap in between the bottom and top coffee filters.
5. Wrap the egg with the blue cloth.
6. Put the egg in top of the 4 coffee filters.
7. Surround the egg with the packing peanuts.
8. Cut part of the plastic bag and tape it on top of the structure. This will cover the egg.
9. make holes in the structure and put the 4 pipe cleaners in.

10 Tie the pipe cleaners to the rest of the plastic bag. This will serve as a parachute.

RESULTS



Mass: 111.9 grams Height: 12 feet

Yes, the structure protected the egg. It was a success.

Conclusion: The "vehicle" was definitely a success. The structure was dropped from a 12 ft height and the egg did not break. It was very protected from the cloth and packing peanuts. The impact of the fall did not do any damages to the egg because the bottom of the vehicle was cushioned by bubble wrap. If anything should be changed, it should be the size of the plastic bag (the parachute). It should have been larger so that it could trap more air. This would have made the fall slower.

Cornell Notes

4

<p>Class Notes Note key points, supporting details and background information that ensure complete understanding. Topic: _____</p>	<p>Name: _____ Class: <u>yellow</u> Date: <u>June 9 2011</u></p>
<p>Questions/Main Ideas:</p>	<p>Notes:</p>
What are frogs from?	Frogs are from the class Amphibia.
What is the class Amphibia?	They live some of their adult lives on land but they must return to the water to reproduce.
How are their eggs fertilized?	Their eggs are fertilized in the water.
Where are the frog's nostrils?	On the outside of the frog's head.
What is the tympani?	The tympani are the frog's eardrums.
How many eyelids do frogs have?	Frogs have a total of three eyelids.
What are the names of the eyelids?	The third is the nictitating membrane, then that eyelid is clear.
How many vomerine teeth are there?	There are two vomerine teeth located on the roof of the mouth.
Where is the pharynx located?	The pharynx is located behind the tongue.
What is the pharynx?	The pharynx is a rather word used for throat.
Reflection/Summary:	

<p>Class Notes Note key points, supporting details and background information that ensure complete understanding. Topic:</p>	<p>Name: _____ Class: yellow Date: 6-9-11</p>
<p>Questions/Main Ideas:</p>	<p>Notes:</p>
<p>What is one opening in the pharynx?</p>	<p>The esophagus is a tiny hole located in the pharynx.</p>
<p>Where is food swallowed into?</p>	<p>Food is swallowed into something called the glottis.</p>
<p>What is the larynx?</p>	<p>Air enters the larynx or the voice box.</p>
<p>What are Eustachian tubes?</p>	<p>Eustachian tubes connect the pharynx to the ear so the frog can hear.</p>
<p>What is bile?</p>	<p>Bile is a digestive juice.</p>
<p>What is pancreatic juice?</p>	<p>A juice from the pancreas that flows with the bile.</p>
<p>The circulatory consists of what?</p>	<p>heart, blood vessels and blood.</p>
<p>What is the atria?</p>	<p>The atria is the receiving chamber of the heart.</p>
<p>What are veins?</p>	<p>Veins are vessels that carry blood.</p>
<p>What is the spinal cord enclosed by?</p>	<p>The spinal cord is enclosed by the back bone.</p>
<p>Reflection/Summary: The frog has many different systems and parts. It also has organs similar to humans.</p>	

Frog Dissection Lab

FROG DISSECTION

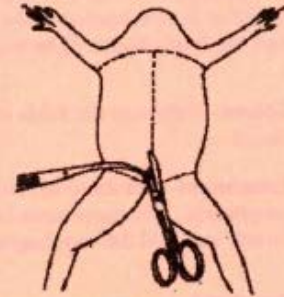


NAME _____

Dissection Instructions

1. Place the frog in the dissecting pan ventral side up.
2. Use scissors to lift the abdominal muscles away from the body cavity. Cut along the midline of the body from the pelvic to the pectoral girdle.
3. Make transverse (horizontal) cuts near the arms and legs.
4. Lift the flaps of the body wall and pin back.

*If your specimen is a female, the body may be filled with eggs and an enlarged ovary. You may need to remove these eggs to view the organs.



Locate each of the organs below. Check the box to indicate that you found the organs.

Fat Bodies --Spaghetti shaped structures that have a bright orange or yellow color, if you have a particularly fat frog, these fat bodies may need to be removed to see the other structures. Usually they are located just on the inside of the abdominal wall.

Peritoneum A spider web like membrane that covers many of the organs, you may have to carefully peel it off to get a clear view

Liver--The largest structure of the the body cavity. This brown colored organ is composed of three parts or lobes. The **right lobe**, the **left anterior lobe**, and the **left posterior lobe**. The liver is not primarily an organ of digestion, it does secrete a digestive juice called bile. Bile is needed for the proper digestion of fats.

Heart - at the top of the liver, the heart is a triangular structure. The **left and right atrium** can be found at the top of the heart. A single **ventricle** located at the bottom of the heart. The large vessel extending from the heart is the **conus arteriosus**.

Lungs - Locate the lungs by looking underneath and behind the heart and liver. They are two spongy organs.

Gall bladder--Lift the lobes of the liver, there will be a small green sac under the liver. This is the gall bladder, which stores bile. (hint: it kind of looks like a booger)

Stomach--Curving from underneath the liver is the stomach. The stomach is the first major site of chemical digestion. Frogs swallow their meals whole. Follow the stomach to where it turns into the small intestine. The **pyloric sphincter valve** regulates the exit of digested food from the stomach to the small intestine.

Small Intestine--Leading from the stomach. The first straight portion of the small intestine is called **duodenum**, the curled portion is the **ileum**. The ileum is held together by a membrane called the **mesentery**. Note the blood vessels running through the mesentery, they will carry absorbed nutrients away from the intestine. Absorption of digested nutrients occurs in the small intestine.

Large Intestine--As you follow the small intestine down, it will widen into the large intestine. The large intestine is also known as the **cloaca** in the frog. The cloaca is the last stop before wastes, sperm, or urine exit the frog's body. (The word "cloaca" means sewer)

Spleen--Return to the folds of the mesentery, this dark red spherical object serves as a holding area for blood.

Esophagus--Return to the stomach and follow it upward, where it gets smaller is the beginning of the esophagus. The esophagus is the tube that leads from the frog's mouth to the stomach. Open the frog's mouth and find the esophagus, poke your probe into it and see where it leads.

STOP! If you have not located each of the organs above, do not continue on to the next sections!

Removal of the Stomach: Cut the stomach out of the frog and open it up. You may find what remains of the frog's last meal in there. Look at the texture of the stomach on the inside.

What did you find in the stomach?

Measuring the Small intestine: Remove the small intestine from the body cavity and carefully separate the **mesentery** from it. Stretch the small intestine out and measure it. Now measure your frog. Record the measurements below in centimeters.

Frog length: _____ cm

Intestine length _____ cm

Post Lab Questions

1. The membrane holds the coils of the small intestine together:

mesentery ✓

2. This organ is found under the liver, it stores bile:

gall bladder ✓

3. Name the 3 lobes of the liver:

right lobe, left anterior lobe, left posterior lobe ✓

4. The organ that is the first major site of chemical digestion:

stomach ✓

5. Eggs, sperm, urine and wastes all empty into this structure:

large intestine X cloaca

6. The small intestine leads to the: large intestine ✓

7. The esophagus leads to the: stomach ✓

8. Yellowish structures that serve as an energy reserve:

fat bodies ✓

9. The first part of the small intestine (straight part): duodenum ✓

10. After food passes through the stomach it enters the:

small intestine ✓

11. A spiderweb like membrane that covers the organs:

peritoneum ✓

12. Regulates the exit of partially digested food from the stomach:

pyloric sphincter valve ✓

13. The large intestine leads to the cloaca X

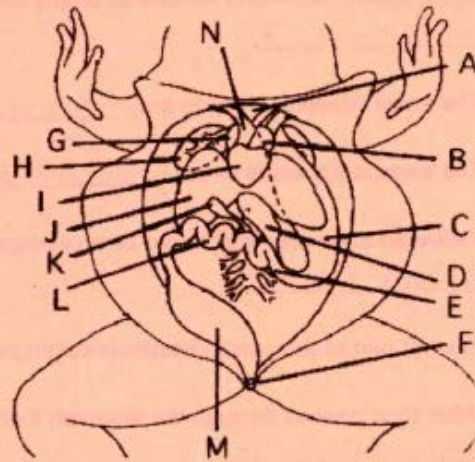
14. Organ found within the mesentery that stores blood:

spleen ✓

15. The largest organ in the body cavity: liver ✓

Label the Diagram

- A. _____ X
- B. gall bladder X
- C. stomach ✓
- D. spleen X
- E. pancreas X
- F. cloaca ✓
- G. fat bodies X
- H. glottis X
- I. heart X
- J. lungs X
- K. liver X
- L. small intestine ✓
- M. large intestine ✓
- N. esophagus X



Frog External Anatomy

1. Observe the dorsal and ventral sides of the frog.

How do they differ in color?

Dorsal side color dark green/black spots

Ventral side color light green

2. Examine the hind legs.

How many toes are present? 5 Are the toes webbed? yes



3. Examine the forelegs.

How many toes are present? 4 Are the toes webbed? no

4. Use a ruler to measure your frog, measure from the tip of the head to the end of the frog's backbone (do not include the legs in your measurement). Compare the length of your frog to other frogs only other at your table

Your Frog (cm)	Frog 2	Frog 3	Frog 4	Frog 5	Average Length
<u>6 cm</u>					

5. Locate the frog's eyes, the nictitating membrane is a clear membrane that attached to the bottom of the eye. Use tweezers to carefully remove the nictitating membrane. You may also remove the eyeball.

What color is the nictitating membrane? yellow/green

What color is the eyeball? green/yellow

6. Just behind the eyes on the frog's head is a circular structure called the tympanic membrane. The tympanic membrane is used for hearing. Measure the diameter (distance across the circle) of the tympanic membrane.

Diameter of tympanic membrane 0.6 cm

7. Feel the frog's skin. Is it scaly or is it slimy? smooth/slimy

Anatomy of the Frog's Mouth

Procedure: Pry the frog's mouth open and use scissors to cut the angles of the frog's jaws open. Cut deeply enough so that the frog's mouth opens wide enough to view the structures inside.

1. Locate the tongue. Play with the tongue. Does it attach to the front or the back of the

2

mouth? slit (You may remove the tongue)

2. In the center of the mouth, toward the back is a single round opening. This is the esophagus. This tube leads to the stomach. Use a probe to poke into the esophagus.

3. Close to the angles of the jaw are two openings, one on each side. These are the Eustachian tubes. They are used to equalize pressure in the inner ear while the frog is swimming.

Insert a probe into the Eustachian tube. To what structure does the Eustachian tube attach?

tympanic membrane

4. Just behind the tongue, and before you reach the esophagus is a slit like opening. (You may need to use your probe to get it to open up). This slit is the glottis, and it is the opening to the lungs. The frog breathes and vocalizes with the glottis.

5. The frog has two sets of teeth. The vomarine teeth are found on the roof of the mouth. The maxillary teeth are found around the edge of the mouth. Both are used for holding prey, frogs swallow their meals whole and do NOT chew.

6. On the roof of the mouth, you will find two tiny openings, if you put your probe into those openings, you will find they exit on the outside of the frog. These are the nostrils.

*Draw the frogs mouth. Label each of the structures underlined above.

Complete the chart below

Structure	Function	Location
Vomarine teeth	holding prey	Roof of the mouth
Eustachian tubes	Used to equalize pressure	The two sides of the jaw
Nictitating Membrane	protect the eye	Attached to the bottom of the eye
Tympanic Membrane	used for hearing	Just behind the eyes of the frog
Esophagus	passes food to the stomach	Center of the mouth
Glottis	Air passage to the lung	Found just caudal to the tongue
Tongue	Used to store prey	Attached to the anterior end of the mouth

LESSON 1 | What are traits?

Well done.

It is easy to recognize an elephant. An elephant is very large and has a long trunk. A giraffe is easy to recognize too—by its long neck.

The elephant's trunk and the giraffe's neck are examples of **traits**. Traits are characteristics that living things have. They help us to identify living things.

Scientists have divided living things into groups according to traits. All members of a group have certain traits that are the same. For example, all birds have feathers. All mammals have some hair. All giraffes have long necks. And all elephants are large and have long trunks.

Organisms within a group may share certain traits, but no two are exactly alike. There are always individual differences. We call these differences individual traits.

Take the elephant for example. All elephants are large, but some are larger than others. All giraffes have long necks, but some giraffes have longer necks than others.

All humans share certain traits. However, no two people are exactly alike—not even identical twins. There are always individual differences.

Individual differences enable us to identify different members of the same group.

Think of your friends, for example. You know one from another by their individual traits. They include differences in size, hair type and coloring, skin coloring, and shape of face. How many other human traits can you name?

IDENTIFYING TRAITS



Humans and frogs are alike in some ways. They share certain traits. For example:

- Both humans and frogs are living things. Therefore, both carry out the life processes.
- Both humans and frogs are animals.
- Both humans and frogs are vertebrates. They have backbones.

Figure A

But humans and frogs are different from one another too—very different. We can tell humans from frogs by the traits they do not share.

Fifteen traits are listed below and on the next page. Some are human traits. Some are traits that frogs have.

Study each trait. Does it belong to humans or does it belong to frogs? Write Human next to each human trait. Write Frog next to each frog trait.

1. some hair covering human
2. external fertilization Frog
3. internal fertilization Human
4. embryos develop outside the female's body Frog
5. females can nurse their young Human
6. give birth to live young Human
7. live entire life on land human
8. live early part of life in water and adult life on land Frog
9. breathe by lungs only human
10. breathe through gills in early life Frog
11. adults breathe by lungs or through skin Frog
12. stand on two legs human

13. stand on four legs Frog
14. eat mostly insects Frog
15. eat meat and plants human

Now answer these questions.

16. Do all humans have the traits you have listed as "Human"? No
17. Do all frogs have the traits you have listed as "Frog"? No
18. The traits you have listed are all group traits.
group, individual
19. Are all frogs exactly alike? No
20. Are all humans exactly alike? No

DEFINING INDIVIDUALS BY INDIVIDUAL TRAITS

Look at Figure B and then answer the questions.

John, Jim, and Tom are humans. They are about the same age. They have all the traits that humans share. Yet, they are different from one another.

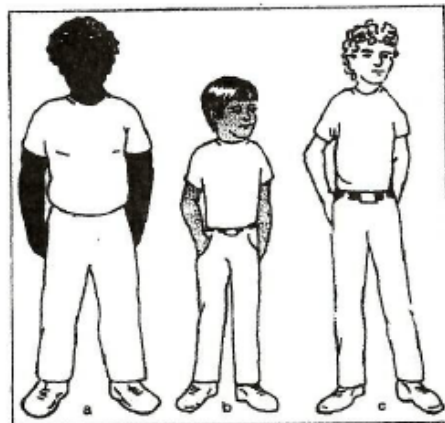


Figure B

- John is short and thin. He has light-brown skin and dark straight hair.
- Jim is tall and heavy. He has dark-brown skin and dark curly hair.
- Tom is tall and thin. He has fair skin and light curly hair.

1. Identify by letter.

- a) Which one is John? B
b) Which one is Jim? A
c) Which one is Tom? C

2. a) Do all humans have hair? yes
b) Hair is a human trait.
is, is not

c) Do all humans have the same color hair? no

d) Do all humans have curly hair? no

e) Do all humans have straight hair? no

3. What kind of trait is hair color and type? individual
individual, group

4. At a given age, is every person the same height? no

5. Are some people taller than average? yes

6. Are some people shorter than average? yes

7. Difference in height is what kind of trait? individual
individual, group

Figure C shows two pea pods and their peas. Both are the same age.

8. Are the peas of these pods exactly the same? no

9. What difference do you notice in the skins of the peas?

One is wrinkled and one is not

10. What kind of difference is this? individual
individual, group



Figure C

FILL IN THE BLANK

Complete each statement using a term or terms from the list below. Write your answers in the spaces provided.

group
traits
humans
living things

the same
individual traits
individual

plants
exactly
identified

1. The characteristics a living thing has are called traits.
2. Living things are identified by their traits.
3. Scientists group living things according to their traits.
4. Members of a group have certain traits that are the same.
5. No two living things are exactly the same.
6. Differences among individuals of the same group are called individual trait.
7. Having a spinal cord, internal fertilization and embryo development are group traits of humans.
8. Individual differences enable us to identify different members of the same group.
9. Having cell walls and making their own food are group traits of plants.
10. Wrinkled skin or smooth skin are individual traits of peas.

MATCHING

Match each term in Column A with its description in Column B. Write the correct letter in the space provided.

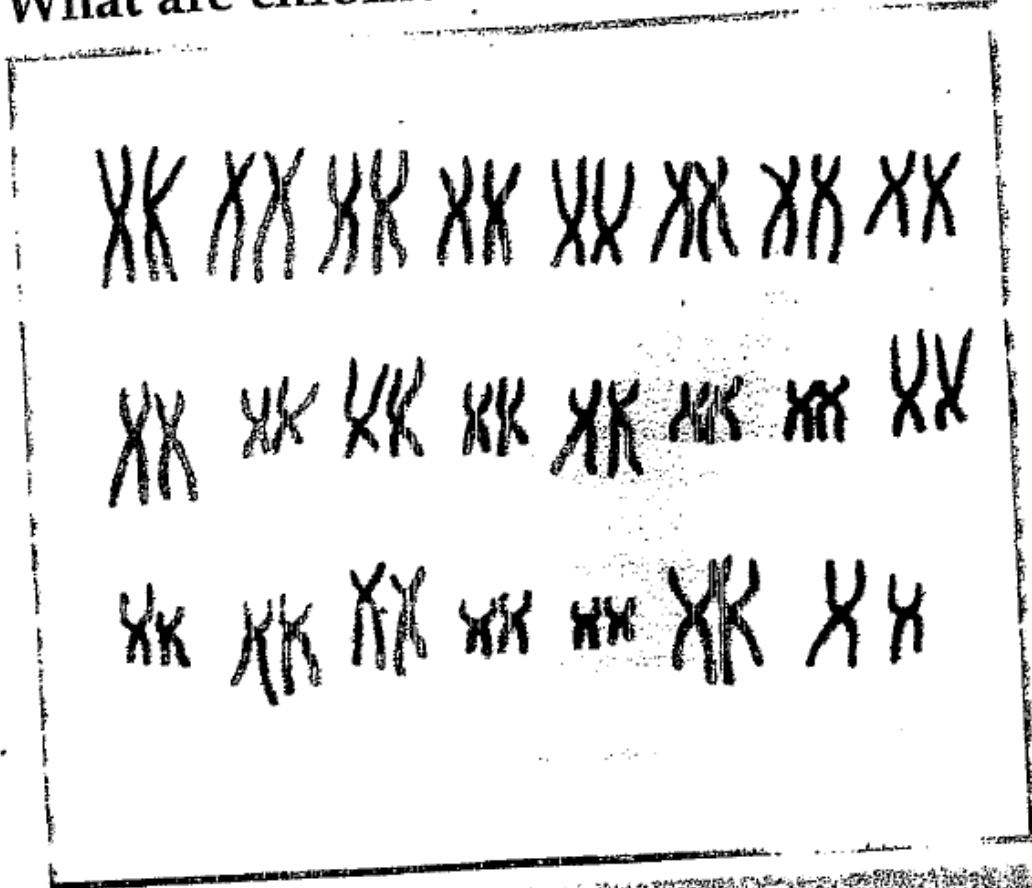
Column A

- D 1. traits
- A 2. green leaves
- E 3. number of green leaves
- C 4. hair
- B 5. hair texture

Column B

- a) group trait of apple trees
- b) individual human trait
- c) human group trait
- d) characteristics
- e) individual trait of apple trees

What are chromosomes?



KEY TERMS:

chromosome: threadlike structures in the nucleus of a cell that control heredity

gene: part of a chromosome that controls inherited traits

gamete: sex cell

genetics: study of heredity

LESSON | What are chromosomes?

2

"Mary has her mother's eyes." "Tom is built just like his father." How often have you heard remarks like these?

All people resemble their parents in some ways. They have similar traits. . . . And it is no accident. Many traits are passed on from parents to offspring. We say they are inherited. How are they inherited? The answer is found in the cell nucleus.

The nucleus has tiny bodies called chromosomes [KROH-muh-sohms]. Most are rod-shaped. In body cells, chromosomes are found in pairs. Body cells are all the cells except sperm and egg cells.

Each kind of organism has a specific number of chromosomes. For example, every body cell of a fruit fly has 8 chromosomes (4 pairs); a human has 46 (23 pairs); a garden pea has 14 (7 pairs).

Along each chromosome there are many dark bands. Each band is a small part of a chromosome called a gene. There are many, many genes, at least one million in every nucleus. Genes determine the traits of an organism.

There are genes for height, genes for nose size and shape, genes for the color of hair, skin, and eyes. In fact, there are genes for most traits any individual has. Some genes even affect traits like voice, intelligence, and behavior. Genes also control the life processes of your cells.

In both asexual and sexual reproduction, chromosomes (and genes) are passed from parents to offspring. During asexual reproduction, each daughter cell receives chromosomes from a single parent cell. The daughter cell is an exact copy of the parent. Some organisms and the body cells of all organisms reproduce asexually.

During sexual reproduction, an offspring receives chromosomes from each parent cell. The chromosomes in gametes, or sex cells, are not paired. A sperm or an egg cell has only half the number of chromosomes as a body cell. When fertilization takes place, the sperm cell and the egg cell unite. Together, their chromosomes add up to the full number of chromosomes found in body cells. The fertilized egg, or zygote, has chromosomes from both of its parents. It also has traits from both parents.

CHROMOSOMES AND GENES

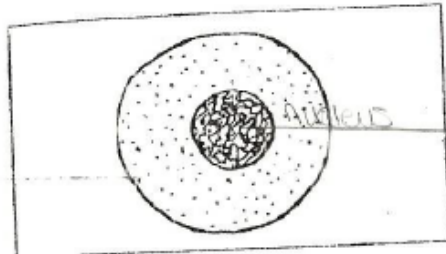


Figure A

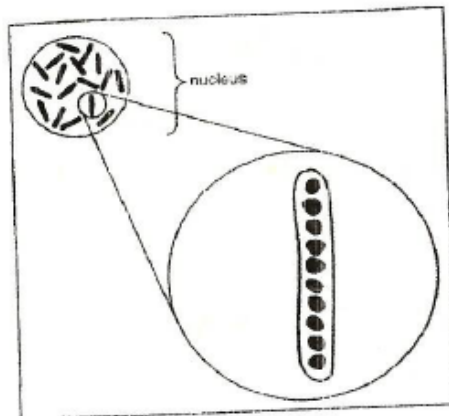


Figure B

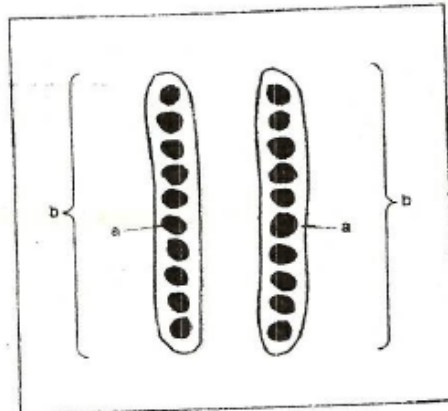


Figure C

Every cell has a nucleus.

1. Figure A shows an animal cell.

- a) Draw a line to the nucleus.
- b) Label it "nucleus."

2. A nucleus contains tiny rod-shaped bodies. What are they called?

Chromosomes

3. A chromosome is made up of even smaller bodies. What are they called?

genes

4. Figure C shows a pair of chromosomes and their genes.

a) The chromosomes are labeled

B

b) Two genes are labeled A

5. Why are genes important?

They control inheritance traits



Figure D Human chromosomes

Figure D shows what actual human chromosomes look like.

- Every body cell of a particular organism has the same chromosomes.
- No two individuals that reproduce sexually have the same chromosomes.

You have trillions of body cells. Each cell has the same chromosomes. No one else in the world has the same chromosomes. There is no "duplicate" of you—anywhere!

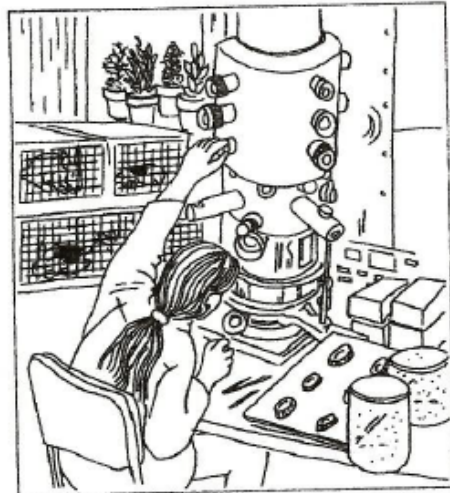


Figure E

The study of traits and how they are passed on is called genetics [juh-NET-iks].

- All living things have traits.
- All living things have genes.
- Only living things have genes.

Genes contain the "plans" for the traits an organism has.

What are genes made of? Scientists have discovered that genes are made of a complicated compound called DNA. DNA stands for deoxyribonucleic [dee-oks-ee-ry-boh-noo-KLEE-ik] acid. Try to pronounce it.

WILL IN THE BLANK

Complete each statement using a term or terms from the list below. Write your answers in the spaces provided. Some words may be used more than once.

genes
pairs
inherited

46
genetics
traits

specific
23
chromosomes

1. The characteristics an individual has are called traits.
2. Traits are passed down from parents to offspring. Another way of saying this is "traits are inherited."
3. The study of heredity is called genetic.
4. The nucleus has tiny rod-shaped bodies called chromosomes.
5. A chromosome is made up of a chain of genes.
6. Genes determine the traits of an individual.
7. Every organism has a specific number of chromosomes.
8. In body cells, chromosomes are found in pairs.
9. Each of your body cells has 23 pairs of chromosomes.
This is a total of 46 single chromosomes.
10. A human sperm or egg has 23 single chromosomes.

MATCHING

Match each term in Column A with its description in Column B. Write the correct letter in the space provided.

Column A	Column B
<u>D</u> 1. genes	a) compound that makes up genes
<u>B</u> 2. chromosomes	b) made up of many genes
<u>A</u> 3. DNA	c) have unpaired chromosomes
<u>E</u> 4. body cells	d) pass on traits
<u>C</u> 5. gametes	e) have paired chromosomes

WHAT DO THE PICTURES SHOW?

The pictures below show how chromosomes are passed from parent to offspring during asexual and sexual reproduction. Study Figures F and G. Then answer the questions.

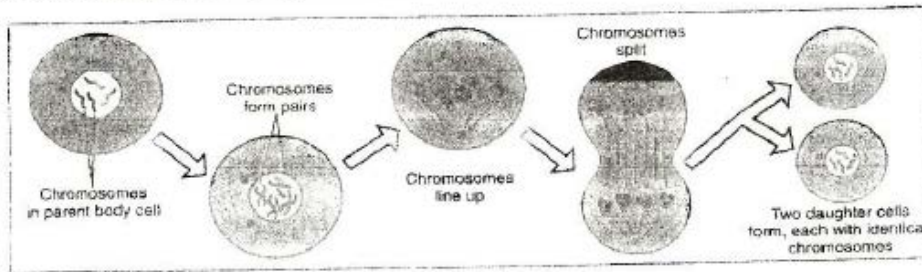


Figure F Asexual reproduction

1. How many chromosomes does the parent cell in Figure F have? 4
2. How many chromosomes does each daughter cell have? 4
3. In Figure F, how do the parent cell's chromosomes compare to the daughter cell's chromosomes? They are the same number
4. Which Figure shows how body cells reproduce? F
5. a. In Figure G, how many chromosomes does each sperm cell contain? 4
 b. How many chromosomes does each egg cell contain? 4

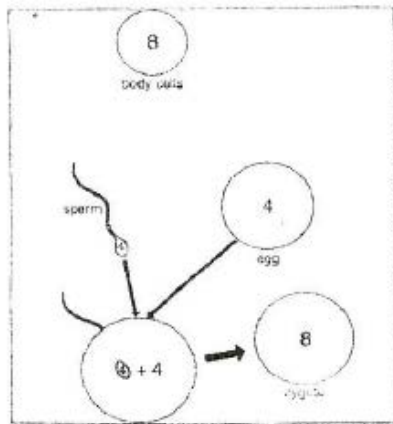


Figure G Sexual reproduction

6. Gametes have half the number of chromosomes as body cells.
half, twice
7. Fertilization produces a single cell. What is it called? zygote
8. How many chromosomes does the zygote in Figure G have? 8
9. How many chromosomes will each body cell of the organism have? 8
10. The offspring will have traits of both the mother and father. Why? Because they get half genes from the mom and half from the dad

NUMBER, PLEASE!

Fill in the missing number of chromosomes.

	Organism	Chromosomes in each body cell	Chromosomes in each sperm or egg
1.	Human	46	23
2.	Horse	60	30
3.	Housefly	12	6
4.	Dog	78	39
5.	Grasshopper	14	7
6.	Mosquito	6	3
7.	Chicken	18	9
8.	Apple	34	17
9.	Spinach	12	6
10.	Lily	24	12

11. A gamete has half the number of chromosomes that a body cell has.
half, twice
12. How many pairs of chromosomes are there in each body cell of the following?
- | | |
|----------------------|----------------------|
| a) horse <u>30</u> | d) lily <u>12</u> |
| b) mosquito <u>3</u> | e) human <u>23</u> |
| c) spinach <u>6</u> | f) housefly <u>6</u> |

WORD SCRAMBLE

Below are several scrambled words you have used in this Lesson. Unscramble the words and write your answers in the spaces provided.

- NEEG
- HERINIT
- NEGITECS
- EEMAG
- CHOMEOSORM

gene

inherit

genetics

gamete

chromosome

TRUE OR FALSE

In the space provided, write "true" if the sentence is true. Write "false" if the sentence is false.

- True 1. Traits are the characteristics of living things.
- False 2. Only animals have traits.
- False 3. Traits are passed on from offspring to parents.
- True 4. Traits are passed on by genes.
- False 5. A cell has only a few genes.
- False 6. Only animals have genes.
- True 7. Different genes control different traits.
- True 8. Genes form chromosomes.
- False 9. Every organism has the same number of chromosomes.
- True 10. Body cells have paired chromosomes.
- False 11. Gametes have paired chromosomes.
- False 12. A body cell and a sex cell have the same number of chromosomes.
- True 13. Gametes have half the number of chromosomes of body cells.
- False 14. A human body cell has a total of 23 chromosomes.
- True 15. A human gamete has 23 single chromosomes.

REACHING OUT

Which organism would more closely resemble its parent, one produced by asexual reproduction, or one produced by sexual reproduction? Why? Asexual because it will be an exact replication.

LESSON | What are dominant 3 | and recessive traits?

Tom has dark hair, just like his parents. Sally's hair is dark too, just like her father. Her mother's hair, however, is blonde.

It is easy to understand why Tom's hair is dark. Both of his parents have dark hair. How about Sally? Why is her hair dark? Why not blonde?

This kind of question was first answered in the mid 1800s by Gregor Mendel, an Austrian monk. Mendel often is called the "Father of Genetics." Mendel observed inherited traits. He wondered why certain traits found in parents show up in their offspring, while other traits do not.

To find the answer, Mendel experimented with pea plants. He observed certain traits such as tallness and shortness, color, and the smoothness of the seed coverings. His experiments led to the Principles of Genetics. These principles hold true for all organisms that reproduce sexually.

One of the principles of genetics is called the Law of Dominance. The Law of Dominance states:

1. An organism receives two genes for each trait, one from each parent.
2. One of the genes may be stronger than the other. The trait of the stronger gene is expressed, or shows up. The gene that shows up is called the dominant [DOM-uh-nunt] gene. The "hidden" gene is called the recessive [ri-SES-iv] gene for that trait.

If an offspring receives two of the same gene (either two recessive or two dominant), the offspring will inherit that trait. There is no other possibility.

However, suppose an organism has one dominant gene and one recessive gene for a certain trait. The organism will have the trait of the dominant gene. The recessive gene will be "hidden."

Let's look at Sally again. Sally has genes for dark hair and for light hair. The gene for dark hair is dominant over the gene for light hair. That is why Sally's hair is dark.

It is interesting to note that a trait that is dominant for one kind of organism may be recessive in another organism.

KEY TERMS

dominant gene: stronger gene that always shows itself

recessive gene: weaker gene that is hidden when the dominant gene is present

pure: having two like genes

hybrid: having two unlike genes

UNDERSTANDING MENDEL'S EXPERIMENTS

What You Need to Know:

Organisms that have two of the same genes for a certain trait are called **pure**.

A pure organism may have two dominant genes or two recessive genes. For example, a pea plant may have two genes for tallness or two genes for shortness. In pea plants, the gene for tallness is dominant.

Organisms that have two unlike genes for a certain trait are called **hybrid** [HY-brid]. A pea plant that has one gene for tallness and one gene for shortness is a hybrid.

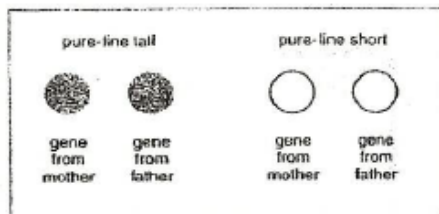


Figure A

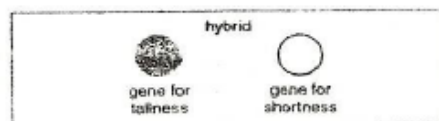


Figure B

No organism has all dominant or all recessive genes.

An organism may be pure in certain traits and hybrid in others. Figures C through F show some of Mendel's experiments with pea plants. Study the figures and answer the questions with each.

Circle the letter of the phrase that completes each sentence best. Fill in the answer blanks for the other sentences.

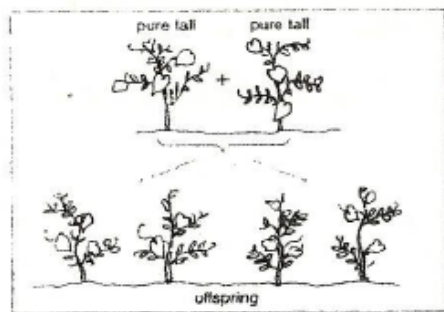


Figure C Mendel cross-pollinated two pure tall pea plants.

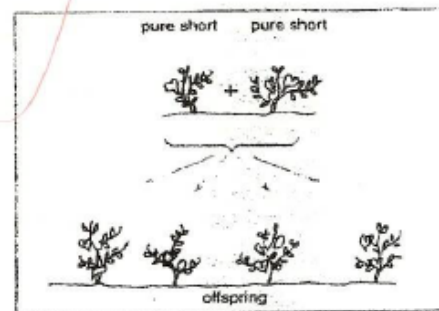


Figure D Mendel crossed two pure short pea plants.

- Offspring of pure tall pea plants are
 - only tall.
 - only short.
 - tall and short.
- Offspring of pure short pea plants are
 - only tall.
 - only short.
 - tall and short.

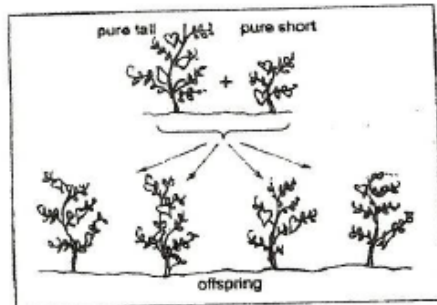


Figure E Mendel crossed a pure tall with a pure short.

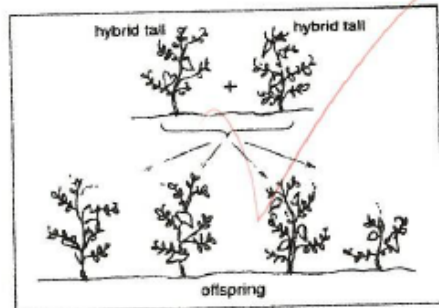


Figure F Mendel crossed hybrid plants.

3. Offspring of pure tall pea plants and pure short plants are

- a) only tall.
- b) only short.
- c) short and tall.

4. We see that in pea plants, Tallness is dominant over shortness.

5. The offspring now carry genes of height from both parents. They are

- a) genes only for tallness.
- b) genes only for shortness.
- c) genes for tallness and shortness.

6. The offspring are hybrids.

7. Refer to Figure F. Offspring of hybrid-tall pea plants are

- a) only tall.
- b) only short.
- c) short and tall.

8. a) Which is the dominant trait? Tall
- b) Does the dominant trait show up in every offspring? no

Look at Figure F.

9. a) Which trait is recessive? short
- b) Is the recessive trait always hidden? no
- c) How many plants are tall? 3
- d) How many plants are short? 1

10. Complete the fractions in these sentences:

When you cross hybrids, the dominant trait shows up $\frac{3}{4}$ of the time.

The recessive trait shows up $\frac{1}{4}$ of the time.

DOMINANT AND RECESSIVE TRAITS IN HUMANS

How many traits do you recognize in yourself?

Dominant	Recessive
brown eyes	blue eyes
very curly hair	wavy hair
wavy hair	straight hair
freckles	no freckles
nearsightedness	normal eyesight
long eyelashes	short eyelashes
large ears	small ears
dimpled cheeks	no dimples

PREDICTING HUMAN TRAITS

Now use the information from the chart above to fill in the chart below. The first example has been done for you.

	Mother	Father	Offspring	Dominant or Recessive?	Hybrid or Pure?
1.	normal eyes	nearsighted	nearsighted	dominant	hybrid
2.	straight hair	straight hair	straight hair	recessive	pure
3.	long eyelashes	short eyelashes	long eyelashes	dominant	hybrid
4.	no freckles	no freckles	no freckles	recessive	pure
5.	no dimples	dimples	dimples	dominant	hybrid
6.	blue eyes	brown eyes	brown eyes	dominant	hybrid
7.	large ears	large ears	large ears	dominant	pure
8.	wavy hair	very curly hair	curly	dominant	hybrid

Now answer these questions.

9. How many offspring in the chart will be pure recessive for a trait? 2
10. Why will the recessive genes show up? _____

FILL IN THE BLANKS

Complete each statement using a term or terms from the list below. Write your answers in the spaces provided. Some words may be used more than once.

hybrid
recessive
pea plants

Gregor Mendel
genes
are the same

dominant
pure
two

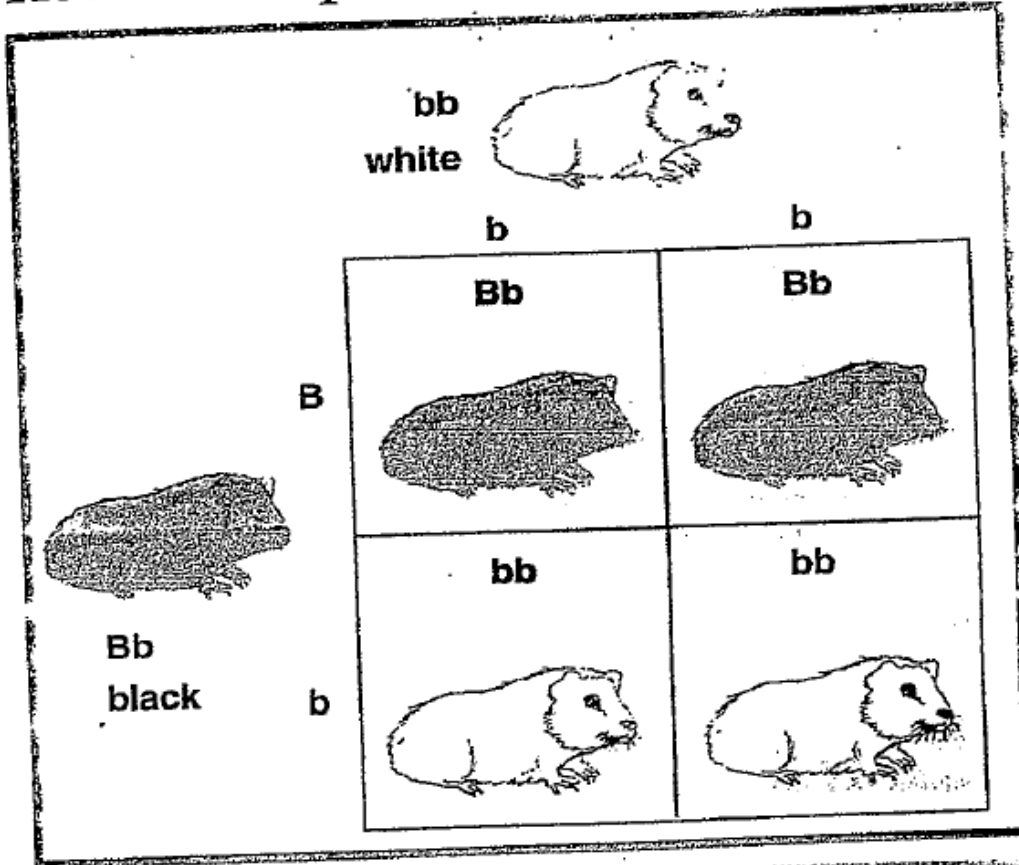
1. A pioneer in the study of heredity was Gregor Mendel.
2. Mendel studied heredity by experimenting with pea plants.
3. Traits are controlled by genes.
4. In organisms that reproduce sexually, every trait has genes from two parents.
5. The "stronger" of the two traits which show up in an organism is called the dominant trait.
6. The "weaker" of the two traits is called the recessive trait.
7. No organism has all dominant or all recessive genes.
8. An organism whose genes for a trait are the same is called pure for that trait.
9. An organism whose genes for a trait are not the same is called hybrid for that trait.
10. An offspring will definitely inherit a trait if both its genes for that trait are the same.

MATCHING

Match each term in Column A with its description in Column B. Write the correct letter in the space provided.

Column A	Column B
<u>B</u> 1. dominant trait	a) has mixed genes for a given trait
<u>F</u> 2. recessive trait	b) shows up in offspring
<u>D</u> 3. pure	c) a dominant trait in pea plants
<u>A</u> 4. hybrid	d) has two like genes for a given trait
<u>C</u> 5. tallness	e) may remain "hidden"

How can we predict heredity?



KEY TERM

Punnett square: chart used to show possible gene combinations

LESSON 4 | How can we predict heredity?

Meet Mr. and Mrs. Jones:



Tom has two of the same genes for hair color. He is pure for dark hair.

Susan has one dominant gene for dark hair and one recessive gene for blonde hair. She is hybrid.

How can we predict what color hair their children will have? It's easy! We can use a special chart called a **Punnett square**. A Punnett square is a chart used to show possible gene combinations. The steps here show you how to use a Punnett square.

1. Draw a box with four squares in it.
2. Write the genes from the father across the top of the chart. A dominant gene always marked with a capital letter "D" stands for dark hair. Both of Tom's genes for hair color are represented by D.
3. Write the genes from the mother down the side of the chart. A recessive gene is always marked with a lower case letter. Susan is hybrid dark for hair color. One gene is marked D. The other gene is the recessive gene for blond hair. The symbol for this gene is d.
4. Now fill in each box with a gene from the father and a gene from the mother. Each box now shows the different combination of genes that can show up in the offspring.

male gametes

	D	D
D	DD	DD
d	Dd	Dd

female gametes

	D	D
D	DD	DD
d	Dd	Dd

MORE ABOUT PUNNETT SQUARES

Look again at the Punnett square on page 22. What do the letters in the box tell us?

- The possible gene combinations are DD, DD, Dd, and Dd.
- Each combination has a dominant gene for dark hair.
- Therefore all of Tom and Susan's children will have dark hair.

If Tom and Susan have four children, the Punnett square predicts that



● ●
DD



● ●
DD

... two, or 1/2, will be pure for dark hair.



● ○
Dd



● ○
Dd

... and two, or 1/2, will be hybrid for dark hair.

Remember, there are only two possibilities: pure dark and hybrid dark. And you cannot tell by looking at the children which ones are pure and which ones are hybrid for dark hair.

Which gene combinations will turn up in a child? It's a matter of chance.

PREDICTING HEREDITY IN PEA PLANTS

When Mendel did his experiments with pea plants he found that some peas had a smooth covering. Others were wrinkled.



Figure A Smooth peas are dominant (S).



Figure B Wrinkled peas are recessive (s).

PREDICTING HUMAN TRAITS



Figure G

Gary and Tina are married. They are planning a family. What will their children look like? Try some more Punnett squares to find out.

Gary is hybrid for curly hair (Cc). Tina is pure for straight hair (cc).

C = dominant curly
c = recessive straight

Gary is hybrid for dark hair (Dd). Tina is pure for blonde hair (dd).

D = dominant dark
d = recessive blonde

Both Gary and Tina are hybrid for brown eyes (Bb).

B = dominant brown
b = recessive blue

Complete the Punnett square for each trait. Then answer the questions.

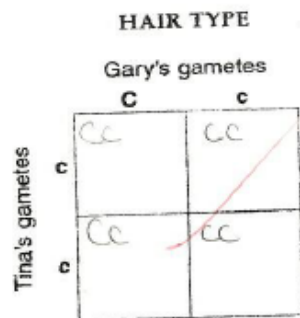


Figure H

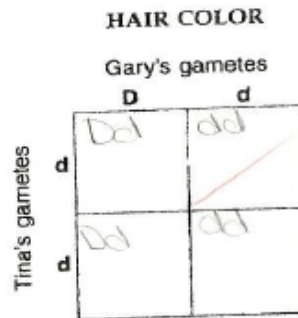


Figure I

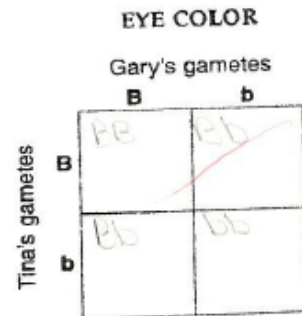


Figure J

1. How many offspring will have curly hair? 2
2. How many offspring will have straight hair? 2
3. How many offspring will be pure for curly hair? none
4. How many offspring will be pure for straight hair? 0

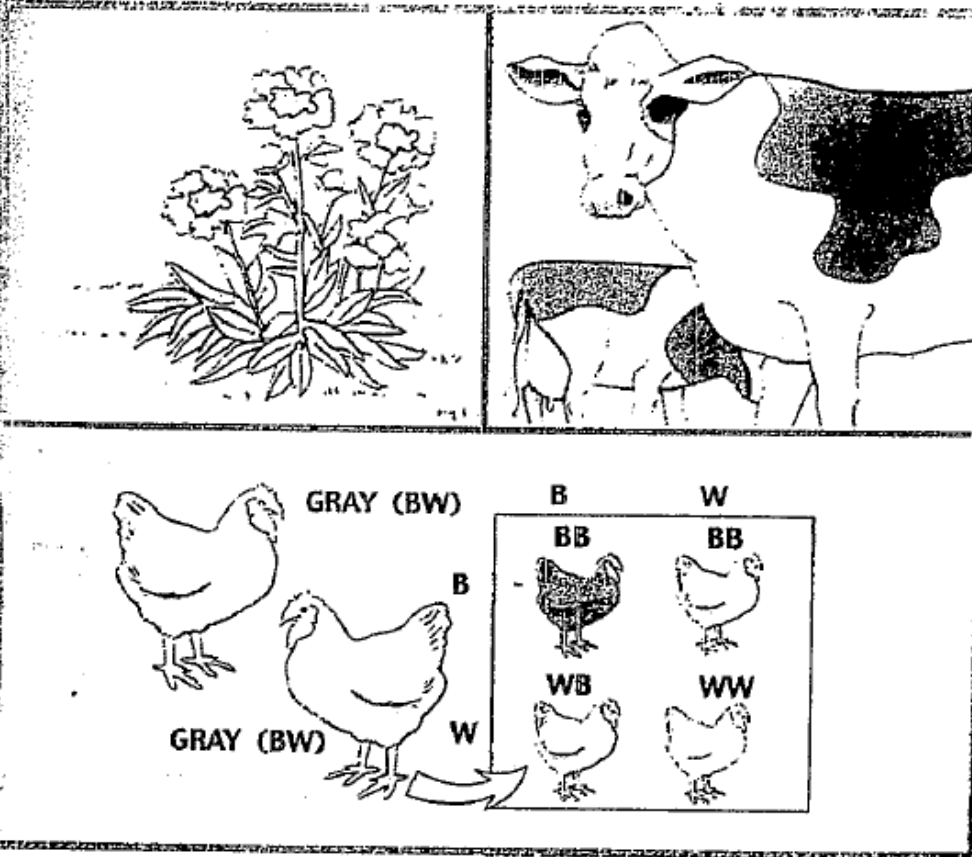
5. How many will be hybrid for curly hair? 2
6. How many offspring will have dark hair? 2
7. How many offspring will have blonde hair? 2
8. How many offspring will be pure for dark hair? none
9. How many will be pure for blonde hair? 2
10. How many will be hybrid for dark hair? 2
11. How many offspring will have brown eyes? 3
12. How many offspring will have blue eyes? 1
13. How many will be pure for brown eyes? 2
14. How many will be pure for blue eyes? 1
15. How many will be hybrid for brown eyes? 2

Match

Match each term in Column A with its description in Column B. Write the correct letter in the space provided.

Column A	Column B
<u> E </u> 1. Punnett square	a) represented by a lower case letter
<u> C </u> 2. dominant gene	b) male gametes
<u> O </u> 3. egg cells	c) represented by a capital letter
<u> P </u> 4. sperm cells	d) female gametes
<u> A </u> 5. recessive gene	e) used to show gene combinations

What is incomplete dominance?



KEY TERMS

incomplete dominance: blending of traits carried by two or more different genes

blending: combination of genes in which a mixture of both traits shows

LESSON 5 | What is incomplete dominance?

In most games, there is a stronger team and a weaker team. Usually, the stronger team wins. Some games end in ties. This shows that the teams were equally matched.

Heredity is sometimes like this. Most traits have a stronger, dominant gene, and a weaker, recessive gene. The dominant gene usually "wins." The dominant trait shows up in the offspring. The recessive trait stays "hidden."

Not all genes, however, are completely dominant or completely recessive. The genes of certain traits are equally strong. Neither trait is dominant. We say there is **incomplete dominance**. In cases of incomplete dominance, genes combine and a mixture of both traits shows up. This kind of gene combination is called **blending**.

Three good examples of incomplete dominance are found in the colors of four-o'clock flowers, shorthorn cattle, and Andalusian [an-duh-LEW-zhun] fowl.

Four-o'clock flowers Four-o'clock flowers are usually red or white. Red and white are equally strong traits. Neither color is dominant. When a pure red (RR) crosses with a pure white (WW), the colors blend. The offspring have pink flowers (RW).

Shorthorn cattle In cattle, if one parent is pure red (RR) and the other parent is pure white (WW), the offspring will be pink—a blend of red and white (RW). The "blended" calf is called a **roan calf**.

Andalusian fowl Some of these chickens have genes for black feathers. Others have genes for white feathers. Neither of these genes is dominant. The offspring of pure black and pure white Andalusians are gray. Gray is a blend of black and white.

Many genes in humans also show incomplete dominance. They include genes for most hair and eye colors.

UNDERSTANDING BLENDING

Figures A, B, and C show three examples of incomplete dominance.

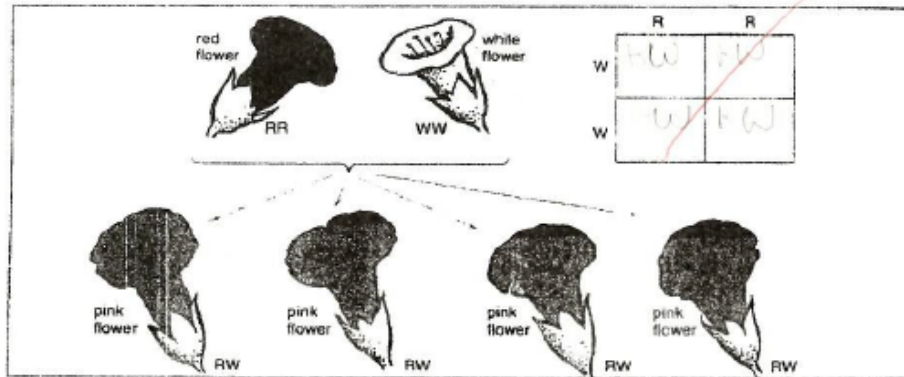


Figure A The crossing of pure red (RR) and pure white (WW) four-o'clock flowers.

- Fill in the Punnett square in Figure A.
- The offspring of crossed pure red and pure white four-o'clock flowers are
 - only red.
 - only white.
 - only pink.
 - both red and white.
- In four-o'clock flowers,
 - red is dominant over white.
 - white is dominant over red.
 - neither red nor white is dominant.
 - pink is dominant over red.
- Pink is a blend of which two colors? Red and white.
- Blended four-o'clock flowers have
 - only genes for the color white.
 - only genes for the color red.
 - genes for both red and white.
 - only pink genes.
- Blended four-o'clock flowers are hybrids.
pure, hybrids

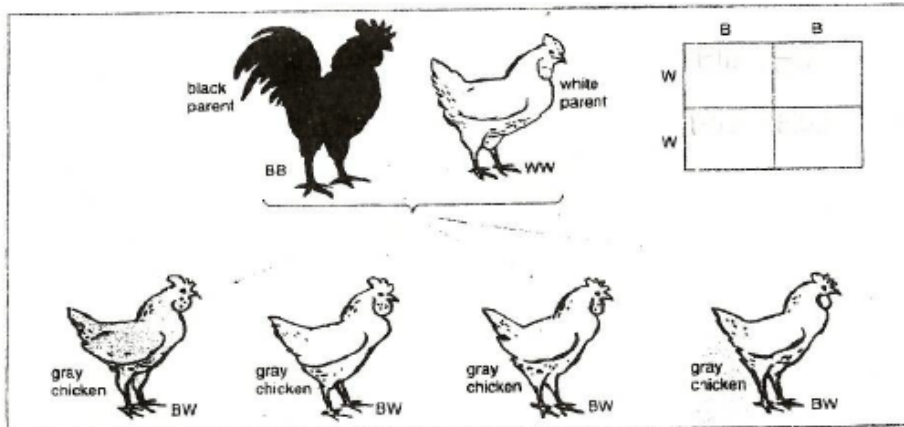


Figure B The crossing of pure black (BB) and pure white (WW) Andalusian chickens.

7. Complete the Punnett square in Figure B.
8. The offspring of crossed pure black and pure white Andalusian chickens are
- a) only white.
 - b) only black.
 - c) a blend of black and white.
 - d) black and white.
9. In Andalusian chickens,
- a) black is dominant over white.
 - b) white is dominant over black.
 - c) neither black nor white is dominant.
 - d) both black and white are dominant.
10. What color are the offspring of black and white chickens?
gray
11. Gray is a blend of which two colors? black and white
12. Blended Andalusian fowl have
- a) only genes for the color black.
 - b) only genes for the color white.
 - c) genes for both black and white.
 - d) only gray genes.
13. Blended Andalusian fowl are hybrids
pure, hybrids

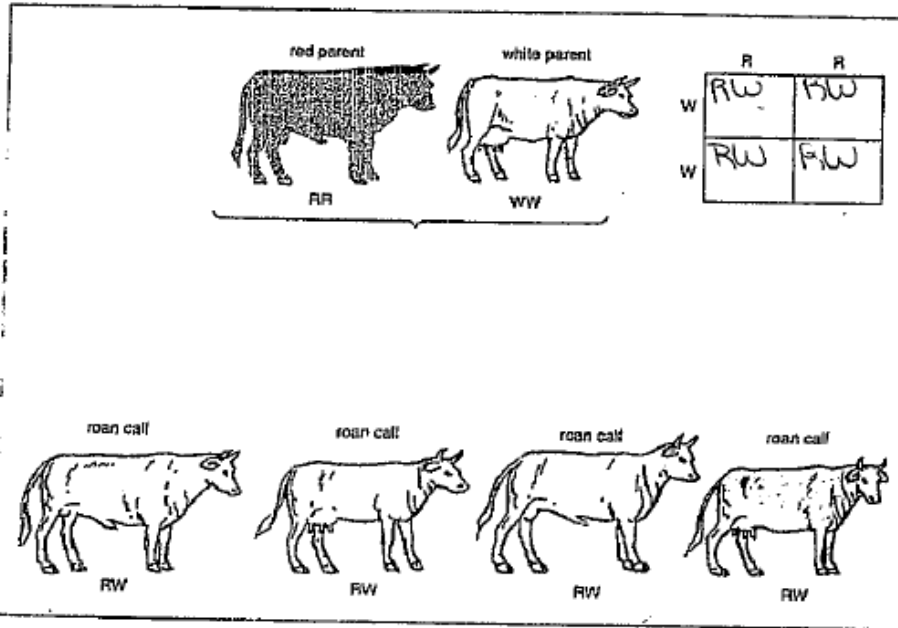


Figure C The crossing of pure red (RR) and pure white (WW) shorthorn cattle.

14. Complete the Punnett square in Figure C.

15. The offspring of crossed pure red and pure white shorthorn cattle are
- a) only red.
 - b) only white.
 - c) a blend of red and white.
 - d) red and white.

16. In shorthorn cattle,

- a) red is dominant over white.
- b) white is dominant over red.
- c) there is incomplete dominance of red and white colors.
- d) white is recessive to red.

17. What are red and white blended cattle called? roan calf

18. Roans have

- a) only genes for the color white.
- b) only genes for the color red.
- c) genes for both white and red.
- d) only dominant genes.

19. Roans are hybrids
pure, hybrids

Fill in the Blank

Complete each statement using a term or terms from the list below. Write your answers in the spaces provided. Some words may be used more than once.

blending
roan calf
recessive
white
dominant

red
eye
pink four-o'clock flower
incomplete dominance
hair

pure
hybrid
strong

1. A "hidden trait" is called a recessive trait.
2. Not all genes are completely recessive nor completely dominant. Some are equally strong.
3. An individual that has only dominant or recessive genes for a trait is pure for that trait.
4. An individual that has both dominant and recessive genes for a trait is hybrid for that trait.
5. A condition where the genes for a given trait are equally strong is called incomplete dominance.
6. A combination of genes in which a mixture of both traits shows up is called blending.
7. Two examples of offspring of incomplete dominance are pink four-o'clock flower and the roan calf.
8. In four-o'clock flowers and roan cattle, neither the color red nor the color white is dominant.
9. Incomplete dominance produces offspring with two different genes for the given trait.
10. Examples of incomplete dominance in humans are found in skin and hair color.

MATCHING

Match each term in Column A with its description in Column B. Write the correct letter in the space provided.

	Column A	Column B
<u>D</u>	1. RR	a) recessive pure
<u>F</u>	2. Rr	b) control heredity
<u>A</u>	3. rr	c) blends traits
<u>C</u>	4. incomplete dominance	d) dominant pure
<u>E</u>	5. genes	e) hybrid

Complete the Punnett square for feather color in chickens.

B = black feathers

W = white feathers

BW = gray feathers

	W	W
B	WB	WB
B	WB	WB

- Are the parents in this cross pure or hybrids? pure
- What color are the parents? black + white
- Will all of the offspring produced by this cross be hybrids? yes
- What colors will the offspring be? gray
- Why is neither gene in this cross represented by a lower case letter? Neither color is a recessive trait.

WORD SCRAMBLE

Below are several scrambled words you have used in this Lesson. Unscramble the words and write your answers in the spaces provided.

- TOMANDIN Dominant
- SEERVICES recessive
- DLEBN blend
- RAITI trait
- DHSYIRB Hybrids

SCIENCE EXTRA

Condor Care



They are described as ugly by some and beautiful by others. But despite their looks, California Condors have fought off the threat of extinction.

Of course, the condors have had some help. The first sign that the condors were in danger came in 1939. Scientists noticed that the number of California Condors was going down. Too many condors were dying for the wrong reasons. Some birds were being shot. Others were being poisoned by chemicals used on crops. Still others were dying because their habitat was being destroyed.

By 1967, only about 50-60 birds were left in the wild. This placed the condor on the first Endangered Species List. Numbers continued to go down, to 25-35 birds by 1980. Then the birds reached their lowest number, 9, in 1985.

The San Diego and Los Angeles Zoos get most of the credit for saving the condors. Both zoos were quick to set up special breeding and foster-parenting programs. In 1981, a special breeding area was built at San Diego Zoo's Wild Animal Park. It was called the "Condorminium." It was

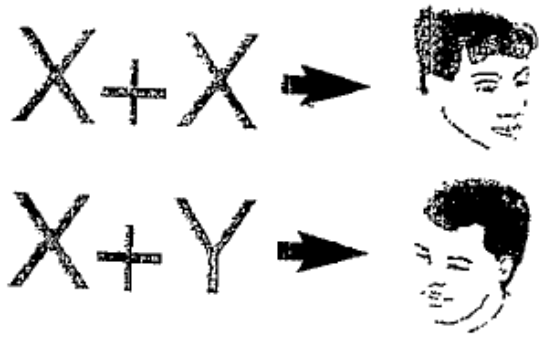
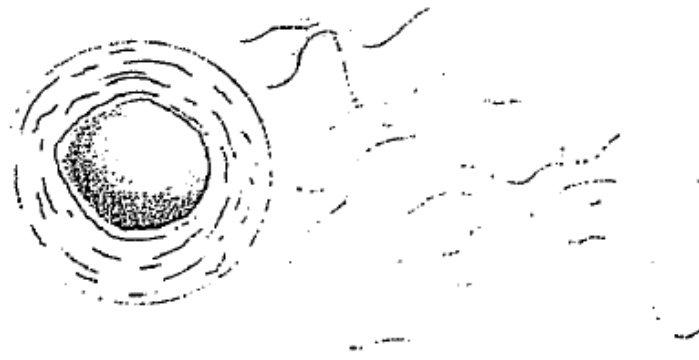
here that chicks were successfully fed by lifelike hand puppets. These are not ordinary puppets. They are made to look like the neck and head of a mother condor.

A new chick is never allowed to see humans. This is because the chicks will "imprint" (form a strong attachment) on whatever they see early in life. A chick must seek the company of condors, not humans, to live.

Puppet feeding begins on day three of the chick's life. The keeper uses the hand puppet to feed chopped food to the chick. The puppet is even used to teach the chick how to eat. For the first 28 days, only the condor puppet feeds the chick. The puppet also interacts with and parents the chick. Then the chick is transferred to an outdoor enclosure where it can grow and develop.

The "Condorminium" has been helping to save condors for almost 20 years. Since the program began, California Condors have been set free in California and the Grand Canyon. Today, there are about 120 condors living both in the wild and in captivity.

How is sex determined?



KEY TERM

sex chromosomes: X and Y chromosomes

LESSON | How is sex determined?

6

Will the baby be a boy or a girl? Every expectant parent asks this question. Well, the possibilities are even—50 percent for a boy, 50 percent for a girl. It depends entirely upon chance.

A single family may have more girls than boys, or more boys than girls. The population on the whole is just about even—half male and half female. Let us find out why.

Look at the 23 pairs of human chromosomes below.



Chromosomes from a body cell of a human male

Notice that each chromosome in a pair is the same size and shape—except for the last pair. In a male, the chromosomes in the last pair are different. The larger is called the X chromosome. The smaller is the Y chromosome. X and Y chromosomes are the sex chromosomes. They determine the sex of most organisms.

- A male cell has one X chromosome and one Y chromosome (XY).
- A female cell has two X chromosomes (XX).

What determines the sex of an offspring? The next page tells the story. We will use the fruit fly as an example.

HOW MALE GAMETES DETERMINE SEX

A fruit fly body cell has eight chromosomes (four pairs). Two of these (one pair) are sex chromosomes. Special body cells produce gametes, or sex cells, by the process of meiosis. Meiosis is a special kind of cell division.

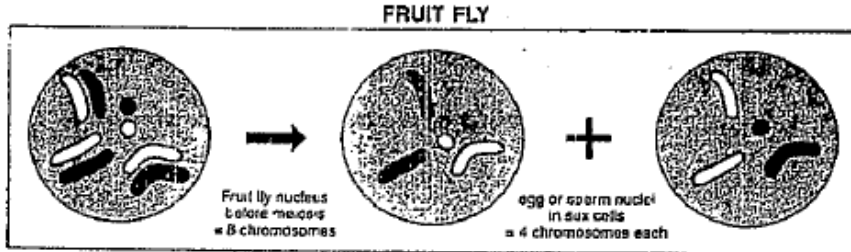


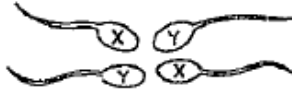
Figure A

In a male, meiosis produces four sperm cells from one body cell. During meiosis, each sperm cell receives only one sex chromosome from a pair. In a female, meiosis produces one usable egg cell and three unusable cells from one body cell. During meiosis, each egg cell receives one sex chromosome from a pair.

Gamete chromosomes are not paired. They are single chromosomes. A gamete, then, has half the number of chromosomes of a body cell. Count them in Figure A.

Look at the sex chromosome of each gamete.

- An egg has an X chromosome only.
- A sperm may have an X or a Y chromosome; 50 percent have an X chromosome; 50 percent have a Y chromosome.



Now here is where chance comes in.

- If an X sperm fertilizes an egg (X + X), the offspring will be a female (XX)



- If a Y sperm fertilizes an egg (Y + X), the offspring will be a male (XY).



As a result, offspring inherit their sex from their father. Since half of sperm carry the X chromosome and half carry the Y chromosome, over a large number of births, half will be female and half will be male.

Male or female? The chances are 50-50. See for yourself in Figure B.

	X SPERM	Y
X	XX	XY
EGGS		
X	XX	XY

Figure B

XX = female — 50 percent
 XY = male — 50 percent

Sperm have tails and are able to swim. Millions of sperm may swim toward the same egg, but only one can fertilize it.

Will it be an X sperm or a Y sperm? It depends upon chance:

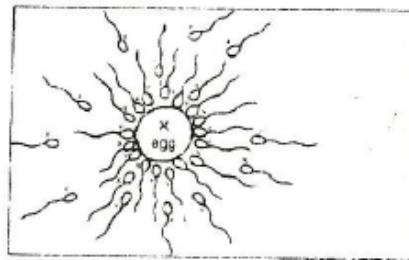


Figure C

1. If an X sperm fertilizes the egg, the offspring will be a girl
male, female
2. If a Y sperm fertilizes the egg, the offspring will be a boy
male, female

Study the human sex chromosomes shown. Then, in the space provided, identify whether a child with these sex chromosomes is a male child or a female child.

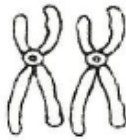


Figure D

3. Female



Figure E

4. Male

5. Explain your answers. Two X chromosomes are female, and an X/Y chromosome is a boy

Fill in the blanks

Complete each statement using a term or terms from the list below. Write your answers in the spaces provided. Some words may be used more than once.

- | | | |
|-----------------|-------------|---------------|
| of one female Y | X half male | gametes 50-50 |
|-----------------|-------------|---------------|

- There are two kinds of sex chromosomes. They are called male and female.
- A female body cell has only X sex chromosomes.
- A male body cell has both X and Y sex chromosomes.
- Meiosis produces gametes.
- A gamete has half the number of chromosomes found in a body cell.
- Eggs have only half sex chromosomes.
- Sperm have either _____ or _____ sex chromosomes.
- Which will fertilize an egg, an X sperm or a Y sperm? It depends entirely upon chance. The odds are 50-50.
- The fertilization of an egg by an X sperm produces a female offspring.
- The fertilization of an egg by a Y sperm produces a male offspring.

Match

Match each term in Column A with its description in Column B. Write the correct letter in the space provided.

- | Column A | Column B |
|---------------------------------|--------------------------|
| <u>P</u> 1. X and Y chromosomes | a) XY |
| <u>F</u> 2. male | b) sex chromosomes |
| <u>M</u> 3. meiosis | c) XX |
| <u>S</u> 4. sperm | d) special cell division |
| <u>O</u> 5. female | e) male gamete |

TRUE OR FALSE

In the space provided, write "true" if the sentence is true. Write "false" if the sentence is false.

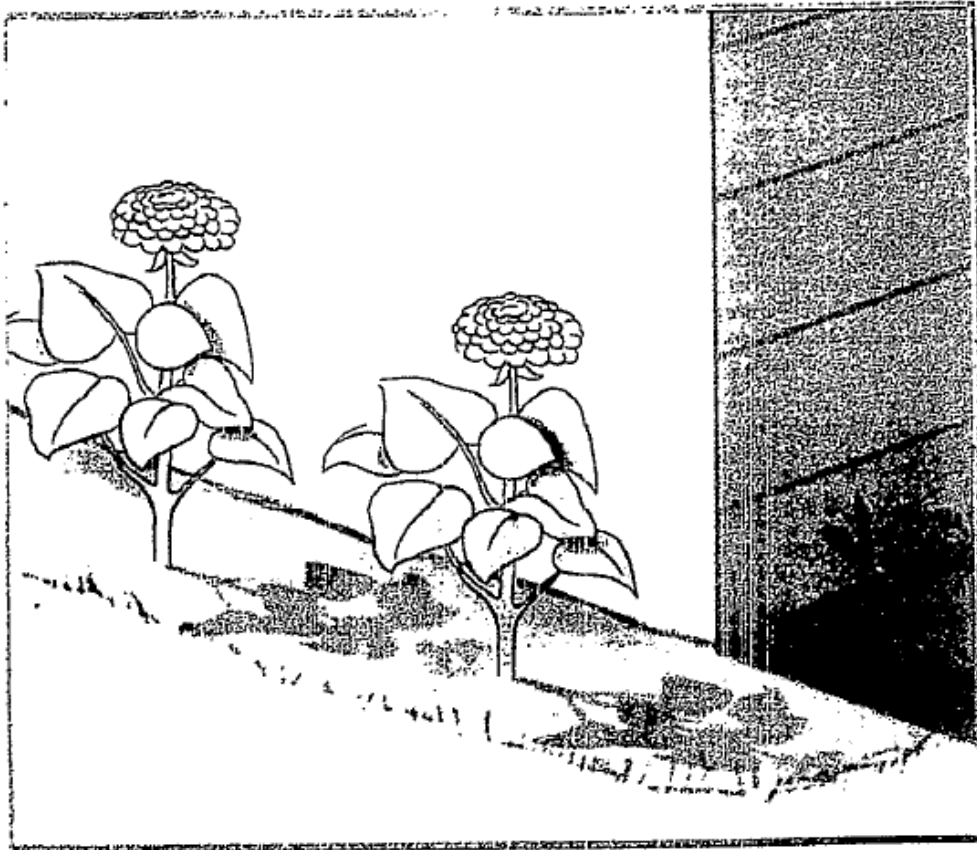
- True 1. A body cell has paired chromosomes.
- True 2. A gamete has paired chromosomes.
- True 3. An egg has only a Y sex chromosome.
- True 4. A sperm can have either an X or a Y sex chromosome.
- True 5. An X chromosome looks the same as a Y chromosome.
- True 6. Many sperm fertilize one egg.
- True 7. Fertilization by an X sperm produces a female.
- True 8. Fertilization by a Y sperm produces a male.
- True 9. Humans have 22 pairs of chromosomes.
- True 10. About the same number of male and female organisms are born.

FORM A (2017)

Flip a coin 100 times. Count how many times it lands on heads, and how many times it lands on tails.

- How many times did it land on heads? 62
- How many times did it land on tails? 38
- Is it about 50-50? Yes
- Is flipping a coin a chance event? Yes
- What other chance event did you learn about in this lesson? child is completely orange brown if diploid and the sperm is on X or Y chromosome

How does the environment affect traits?



WHAT DO THE PICTURES SHOW?

Traits need a proper environment to develop properly.

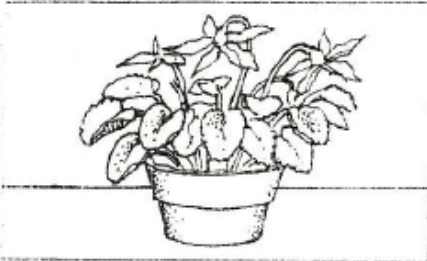


Figure A

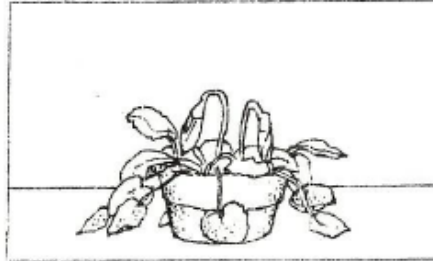


Figure B

1. In which figure do you see a plant that grew in a good environment? Figure A
2. How can you tell? Because it's standing straight up.
3. In which figure do you see a plant that grew in a poor environment? B
4. How can you tell? It is falling over and droopy.

These two rats were born in the same litter. One ate a poor diet; the other ate a diet rich in nutrients.

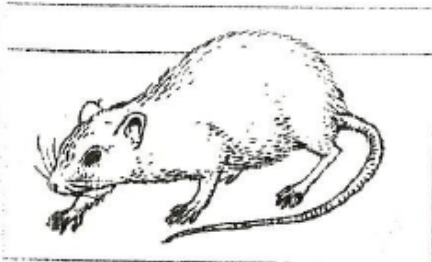


Figure C

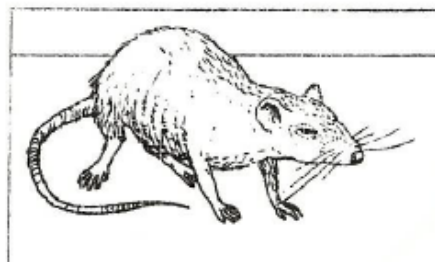


Figure D

5. Is diet part of a living thing's environment? Yes
6. Which figure shows the rat that ate a poor diet? Figure D
7. How do you know? The rat is thin.
8. Which figure shows the rat that ate a good diet? _____

9. How do you know? _____

10. In your own words, what does environment mean? An environment is a place where an animal can live safely and have the things it needs to survive.

Many traits are not inherited. These traits are called acquired traits.

Here are some examples of acquired traits.



Figure E Some people develop strong muscles by exercising



Figure F Some people learn to speak multiple languages.

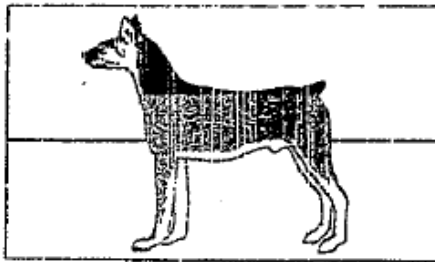


Figure G The tails of some dogs are cut off at birth.



Figure H Trees near the tops of mountains do not grow tall partly because of low temperatures.

WHAT DO YOU THINK?

Can acquired traits be passed on to an offspring? In other words, can acquired traits be inherited? Answer this question yourself.

1. If parents develop strong muscles by exercising, will their children inherit strong muscles? no
(yes, no)
2. Suppose you have learned to speak a new language? Will your children be born with this ability? no
(yes, no)
3. Suppose the dog in Figure 6 has puppies. Will they be born without tails? no
4. Conclusion: Acquired traits are not inherited.
(are, are not)
5. What kind of traits do you think are inherited? traits that are inherited are things like eye color, hair, skin color.

1. IN THE BOX

Complete each statement using a term or terms from the list below. Write your answers in the spaces provided. Some words may be used more than once.

living
acquired
genes

traits
nonliving -
good

inherited
environment

1. The characteristics of an individual are called traits.
2. Inherited traits are passed on to offspring by genes.
3. Some traits develop properly only in a proper environment.
4. The environment includes all the living and nonliving things surrounding an organism.
5. Traits that are not inherited are called acquired traits.
6. Acquired traits are not inherited.
7. Traits develop best in a good environment.
8. We cannot change our traits.
9. A trait that is not carried by genes is an acquired trait.
10. Air, water, food, and temperature are all parts of the environment.

MATCHING

Match each term in Column A with its description in Column B. Write the correct letter in the space provided.

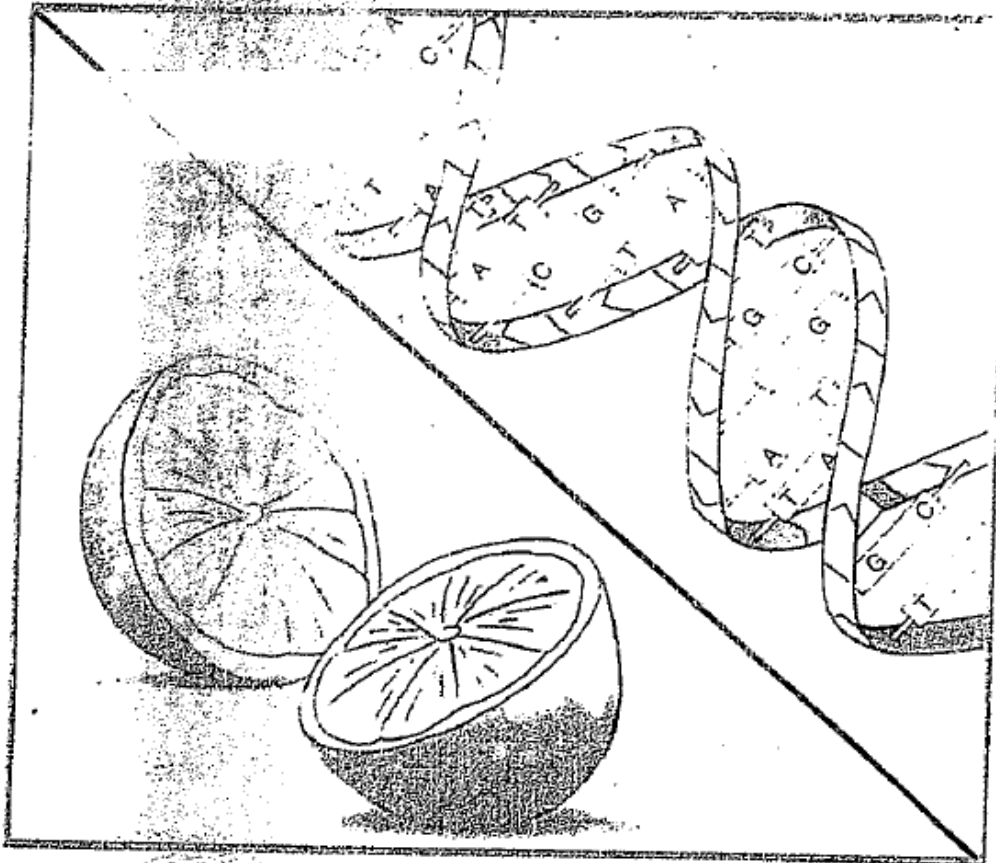
	Column A	Column B
<u>A</u>	1. acquired traits	a) not inherited
<u>C</u>	2. environment	b) genes
<u>D</u>	3. proper environment	c) everything surrounding an individual
<u>B</u>	4. carriers of inherited traits	d) best for developing traits
<u>F</u>	5. trait	e) any characteristic of a living thing

TRUE OR FALSE

In the space provided, write "true" if the sentence is true. Write "false" if the sentence is false.

- False 1. Every trait is carried by genes.
- False 2. Every trait is inherited.
- True 3. A trait that is not carried by genes is an acquired trait.
- False 4. Offspring inherit the acquired traits of their parents.
- True 5. Environment affects how traits develop.
- False 6. Traits develop best in a poor environment.
- True 7. We can control part of our environment.
- False 8. You can inherit genes for facts you learn.
- True 9. Exercise can make strong muscles even stronger.
- False 10. Extra-strong muscles developed by exercise can be inherited.

What is genetic engineering?



KEY TERMS

genetic engineering: methods used to produce new forms of DNA

gene splicing: moving a section of DNA from the genes of one organism to the genes of another organism

cloning: production of organisms with identical genes

LESSON 1 What is genetic engineering?

Have you ever seen a supermouse? Supermouse is not a character in a cartoon. It is the nickname given to a mouse produced by researchers. Supermouse is twice the size of a normal mouse. It is the result of a new technology called genetic engineering [juh-NET-ik en-juh-NEER-ing]. In genetic engineering, scientists work with individual genes.

In Lesson 2, you learned that genes are made up of a complex substance called DNA. Genetic engineering is a process by which new forms of DNA are made.

One method of genetic engineering is called gene splicing [SPLYS-ing]. Gene splicing is the process by which pieces of DNA from the genes of one organism are transferred to another organism. This process does not involve cutting apart genes with tiny instruments. Instead, it makes use of chemicals that break or combine pieces of DNA in precise ways.

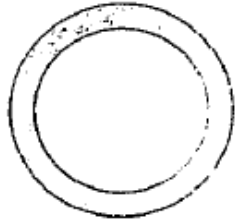
Gene splicing takes place in three steps. Look at Figures A through D on the next page as you read about these steps.

1. A DNA chain is opened up.
2. New genes from another organism are added, or spliced, into the DNA.
3. The DNA chain is closed.

Once the genes are transferred, they become part of the receiving organism's genes. As a result, the trait carried by the genes is passed on to future generations.

Genetic engineering can help produce useful plants and animals. It can also help solve many health problems. However, this process might also produce new microorganisms that cause diseases that we cannot control. To prevent such disasters, scientists and lawmakers are working together to establish rules and safeguards.

GENE SPLICING



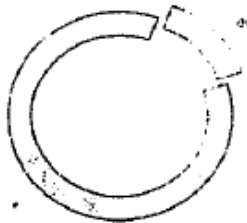
A ring of DNA.

Figure A



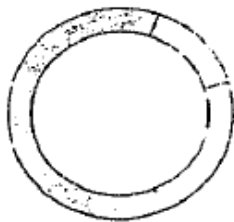
The DNA chain is opened up.

Figure B



A new strand of DNA, or gene, is added into the ring of DNA.

Figure C



The DNA chain is closed.

Figure D

BENEFITS OF GENETIC ENGINEERING

Through genetic engineering, scientists have been able to splice human genes into DNA of bacteria. The bacteria can then produce substances that otherwise could only be made by the human body. Here are some substances produced by bacteria through genetic engineering.

INSULIN [In-suh-lin] Insulin is needed by people with diabetes [dy-uh-BEE]. Insulin controls the level of sugar in your blood.

HUMAN GROWTH HORMONE Human growth hormone controls growth. It is given to children who do not make enough of their own growth hormone. This helps children grow properly.

INTERFERON [in-tur-FEER-ahn] Interferon helps your body fight disease. It is used by scientists in cancer research.

Scientists also hope that someday genetic engineering can be used to correct some genetic disorders. They may be able to add normal genes to cells that have abnormal genes or missing a gene completely.

In the space provided, write "true" if the sentence is true. Write "false" if the sentence is false.

- True 1. Once genes are transferred during gene splicing, they become part of the receiving organism's genes.
- False 2. Genetic engineering is an old technology.
- False 3. Insulin controls growth.
- True 4. New forms of DNA are made in genetic engineering.
- True 5. Genes are made up of DNA.
- True 6. Interferon controls the level of sugar in the blood.
- True 7. A chain of DNA is opened up during gene splicing.
- True 8. Some children do not produce enough human growth hormone.
- True 9. Closing a chain of DNA is the first step of gene splicing.
- True 10. Bacteria are used in genetic engineering.

OTHER GENETIC METHODS

Scientists have other ways to change the genes of organisms besides genetic engineering. Have you ever eaten a seedless orange? Seedless oranges are produced by cloning. Cloning is the production of organisms with identical genes. Clones are produced by asexual reproduction.

The first seedless orange tree was the result of a mutation [myoo-TAY-shun]. A mutation is a sudden change in genes. A mutation is an accident. It can cause new inherited traits.

Most mutations occur in nature.

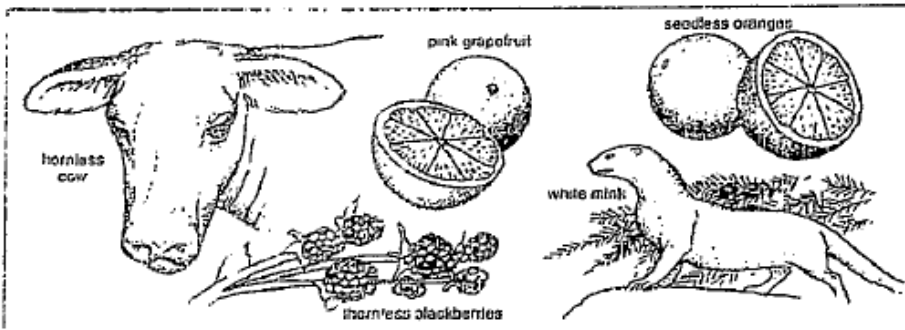


Figure E Some familiar mutations

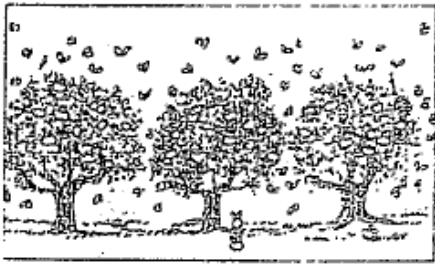


Figure F The Mediterranean fruit fly damages fruit.

Scientists can also cause mutations in the laboratory with radiation.

Some male insect pests, like the Mediterranean fruit fly, are given radiation. The radiation causes many changes in the genes. The genes become damaged. With damaged genes, the male flies are sterile.

When the flies mate, no offspring are produced. The insect population is reduced. This is a way of reducing insect pests without harmful chemicals.

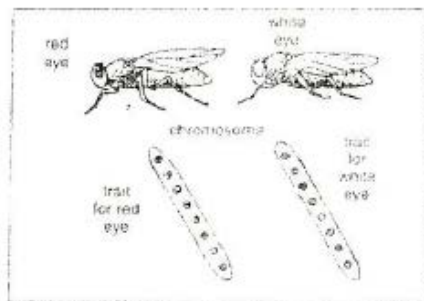


Figure G White eyes is a mutation trait in fruit flies.

Mutations also help scientists make a "map" of the chromosomes of the fruit fly.

A chromosome map shows which part of the chromosome controls which trait.

Match each term in Column A with its description in Column B. Write the correct letter in the space provided.

Column A	Column B
1. mutation	a) production of organisms with identical genes
2. chromosome map	b) can damage genes
3. radiation	c) result of mutation
4. cloning	d) shows which part of the chromosome controls a trait
5. seedless orange	e) sudden change in genes

RECOMBINANT DNA

Pieces of DNA that contain DNA from a different organism are called recombinant DNA. Why do you think this is a good name?

It is a good name because it is a combination of two different DNA molecules.



The Commonwealth of Massachusetts
Department of Education

350 Main Street, Malden, Massachusetts 02148-5023 Telephone: (781) 338-3000
Preservice Performance Assessment for Practicum or Practicum Equivalent
Professional Standards for Teachers: See 603 CMR 7.08.

Part I - To be completed by the applicant. Practicum: Practicum Equivalent:

1. Legal Name: (print) Daniel McCarthy 2. SSN: 015-74-1071
 3. Address: 1 Cobh Terrace, Walpole, MA 02081
 4. Sponsoring Organization: WPI Program & Level: Initial
 5. Practicum/Equivalent Course Number: IQP Credit Hours: 10
 Course Title: Teaching Practicum
 6. Practicum/Equivalent Site: Forest Grove Middle School 7. Grade Levels of Students: 8
 8. Total number of practicum hours: 225 Number of hours assumed full responsibility in the role: 150
 9. Other Massachusetts licenses held if any: _____
 10. Have any components of the approved program been waived (see Regulations 7.03(1)(b)): Yes No

Part II - To be completed by the Program Supervisor

Name: (print) _____ Position/Title: _____
 The Applicant completed a practicum/equivalent designed by the Sponsoring organization as partial preparation for the following license:
 Applicant's License Field: _____ Grade Level: _____

Part III - To be completed by the Supervising Practitioner

Name: (print) Angela Lamoureux Position: Science Teacher
 School System: Worcester Public Schools License: Initial (# yrs. experience): - or Professional: 12 years
 Massachusetts License #: 360548 Field(s): General Science

Part IV - Initial 1, 2, and 3.

1. Initial meeting held at which the Professional Standards and the procedures for evaluation were explained to the Applicant.
 Date: _____ Applicant: DEM Program Supervisor: J.G. Supervising Practitioner: ang
 2. Meeting held midway through the practicum at which the Applicant's progress toward the Professional Standards was discussed.
 Date: _____ Applicant: DEM Program Supervisor: J.G. Supervising Practitioner: ang
 3. Final meeting held to complete evaluation and to allow Applicant an opportunity to raise questions and make comments.
 Date: 6/13/11 Applicant: DEM Program Supervisor: J.G. Supervising Practitioner: ang

Part V

Candidate has successfully completed the Preservice Performance Assessment (Sections: 7.03(2)(a)(4) & 7.04(2)(b)(4)(b)) Yes: No:

Program Supervisor (sign): [Signature] Date: 6/13/11
 Supervising Practitioner (sign): [Signature] Date: 6/13/11
 Mediator (if necessary: see 7.04(4))(sign): _____ Date: _____

Preservice Performance Assessment for Practicum or Practicum Equivalent
 Professional Standards for Teachers: See 603 CMR 7.08

Please use this assessment in conjunction with the Preservice Performance Assessment Guidelines: the rating scale is described on page 4; evaluation questions relating to the standards are pages 5 - 12, and license-specific questions per standard B2c are pages 13-44.

Standard A - Plans Curriculum and Instruction	
Indicators	Evidence
<p>1. Draws on content standards of the relevant curriculum frameworks to plan sequential units of study, individual lessons, and learning activities that make learning cumulative and advance students' level of content knowledge. (Specify Curriculum Framework title, learning standards, and concept and skills used [attach list if necessary]).</p>	<ul style="list-style-type: none"> - Daily, Weekly, Unit Plans - MCAS Prep - Labs, Activities, Assignments
<p>2. Draws on results of formal and informal assessments as well as knowledge of human development to identify teaching strategies and learning activities appropriate to the specific discipline, age, level of English language proficiency, and range of cognitive levels being taught.</p>	<ul style="list-style-type: none"> - Assessment of tests, quizzes, projects, labwork
<p>3. Identifies appropriate reading materials, other resources, and writing activities for promoting further learning by the full range of students within the classroom.</p>	<ul style="list-style-type: none"> - Lessons, tests, labs, activities modified based on MCAS + MAP Scores
<p>4. Identifies prerequisite skills, concepts, and vocabulary needed for the learning activities and design lessons that strengthen student reading and writing skills.</p>	<ul style="list-style-type: none"> - ELL materials and concept maps - Created labs and activities to enhance/use material from MCAS + WAS Frameworks
<p>5. Plans lessons with clear objectives and relevant measurable outcomes.</p>	<ul style="list-style-type: none"> - Established objectives/expected outcomes prior to, during + throughout units
<p>6. Draws on resources from colleagues, families, and the community to enhance learning.</p>	<ul style="list-style-type: none"> - Attended Cluster + Parent meetings
<p>7. Incorporates appropriate technology and media in lesson planning.</p>	<ul style="list-style-type: none"> - Technology via Powerpoint, Moodle
<p>8. Uses information in Individualized Education Programs (IEPs) to plan strategies for integrating students with disabilities into general education classrooms.</p>	<ul style="list-style-type: none"> - Engrade, MAP Testing

Rating:	Explanation of Rating for Standard A - Plans Curriculum and Instruction
3	Met all standards of planning curriculum and instruction

Rating Scale: 1=Does Not Meet the Standard; 2=Meets the Standard; 3=Exceeds the Standard; NA=Not Applicable

Candidate's Name: Daniel McCarthy License: Middle School General Science 5-8
 Program Supervisor (Initial): Dg. Date: 6/13/11
 Supervising Practitioner (Initial): Amg Date: 6/13/11

Preservice Performance Assessment for Practicum or Practicum Equivalent
Professional Standards for Teachers: See 603 CMR 7.08

Standard B – Delivers Effective Instruction	
Indicators	Evidence
<p>1. Communicates high standards and expectations when <u>beginning the lesson.</u></p> <p>a) Makes learning objectives clear to students. b) Communicates clearly in writing and speaking. c) Uses engaging ways to begin a new unit of study or lesson. d) Builds on students' prior knowledge and experience.</p> <p>2. Communicates high standards and expectations when <u>carrying out the lesson.</u></p> <p>a) Uses a balanced approach to teaching skills and concepts of elementary reading and writing. b) Employs a variety of content-based and content-oriented teaching techniques from more teacher-directed strategies such as direct instruction, practice, and Socratic dialogue, to less teacher-directed approaches such as discussion, problem solving, cooperative learning, and research projects (among others). c) Demonstrates an adequate knowledge of and approach to the academic content of lessons. (See license-specific questions in Guidelines, pp. 13-44) d) Employs a variety of reading and writing strategies for addressing learning objectives. e) Uses questioning to stimulate thinking and encourages all students to respond. f) Uses instructional technology appropriately. g) Employs appropriate sheltered English or subject matter strategies for English learners.</p> <p>3. Communicates high standards and expectations when <u>extending and completing the lesson.</u></p> <p>a) Assigns homework or practice that furthers student learning and checks it. b) Provides regular and frequent feedback to students on their progress. c) Provides many and varied opportunities for students to achieve competence.</p> <p>4. Communicates high standards and expectations when <u>evaluating student learning.</u></p> <p>a) Accurately measures student achievement of, and progress toward, the learning objectives with a variety of formal and informal assessments, and uses results to plan further instruction. b) Translates evaluations of student work into records that accurately convey the level of student achievement to students, parents or guardians, and school personnel.</p>	<p>- Daily objectives + agenda</p> <p>- Instructions/Content presented via multimedia</p> <p>- Lab/Inquiry activities</p> <p>- Communicates and discusses goals with students</p> <p>- Use of students' prior-knowledge</p> <p>- Student discussion, exploration, research activities</p> <p>- Use of mCAS + NPS Guidelines in lesson planning and activities</p> <p>- Cornell Notes, Lab Reports, Reading Comprehension activities</p> <p>- Bell work, Exit Slips, "withitness" checks/dipsticking</p> <p>- Powerpoint presentations, Science Quest site, video clips</p> <p>- ELL concept maps/materials</p> <p>- Daily assignments/long term projects with verbal/written feedback</p> <p>- Assessment of interest, tests, lab reports, presentations, Unit exams, mCAS open response questions</p> <p>- Evaluations: progress reports, online grading, parent/cluster meetings, data analysis</p>

Rating:	Explanation of Rating for Standard B – Delivers Effective Instruction
3	Shows evidence of effectively delivering instruction and has the skills to further develop same.

Rating Scale: 1=Does Not Meet the Standard; 2=Meets the Standard; 3=Exceeds the Standard; NA=Not Applicable.

Candidate's Name: Daniel McCarthy License: _____

Program Supervisor (Initial): J.G. Date: 6/13/11

Supervising Practitioner (Initial): J. Day Date: 6/13/11

Preservice Performance Assessment for Practicum or Practicum Equivalent
 Professional Standards for Teachers: See 603 CMR 7.08

Standard C – Manages Classroom Climate and Operation	
Indicators	Evidence
1. Creates an environment that is conducive to learning.	- Engages students in lessons Follows WPS rules / Respectful of students - Room set-up conducive to learning models, bulletin boards, seating - Clearly defines expectations and enforces that all WPS rules are followed - Guides and redirects students as needed
2. Creates a physical environment appropriate to a range of learning activities.	
3. Maintains appropriate standards of behavior, mutual respect, and safety.	
4. Manages classroom routines and procedures without loss of significant instructional time.	

Rating:	Explanation of Rating for Standard C – Manages Classroom Climate and Operation
3	Manages classroom climate and operation for optimal learning and has skills to further develop same.

Rating Scale: 1=Does Not Meet the Standard; 2=Meets the Standard; 3=Exceeds the Standard; NA=Not Applicable.

Standard D – Promotes Equity	
Indicators	Evidence
1. Encourages all students to believe that effort is a key to achievement.	- Engaging Lessons - Supports students' organization and study skills - Encourages and guides students to work to their highest potential - Instruction planned to meet all students' needs for optimal student success - Science Content / Ethical issues explored
2. Works to promote achievement by all students without exception.	
3. Assesses the significance of student differences in home experiences, background knowledge, learning skills, learning pace, and proficiency in the English language for learning the curriculum at hand and uses professional judgment to determine if instructional adjustments are necessary.	
4. Helps all students to understand American civic culture, its underlying ideals, founding political principles and political institutions, and to see themselves as members of a local, state, national, and international civic community.	

Rating:	Explanation of Rating for Standard D – Promotes Equity
3	Promotes equity in all aspects

Rating Scale: 1=Does Not Meet the Standard; 2=Meets the Standard; 3=Exceeds the Standard; NA=Not Applicable.

Candidate's Name: Daniel McCarthy License: _____
 Program Supervisor (initial): JG Date: 4/13/11
 Supervising Practitioner (initial): AW Date: 6/13/11

Preservice Performance Assessment for Practicum or Practicum Equivalent
Professional Standards for Teachers: See 603 CMR 7.08

Standard E – Meets Professional Responsibilities	
Indicators	Evidence
<p>1. Understands his or her legal and moral responsibilities.</p> <p>2. Conveys knowledge of and enthusiasm for his/her academic discipline to students.</p> <p>3. Maintains interest in current theory, research, and developments in the academic discipline and exercises judgment in accepting implications or findings as valid for application in classroom practice.</p> <p>4. Collaborates with colleagues to improve instruction, assessment, and student achievement.</p> <p>5. Works actively to involve parents in their child's academic activities and performance, and communicates clearly with them.</p> <p>6. Reflects critically upon his or her teaching experience, identifies areas for further professional development as part of a professional development plan that is linked to grade level, school, and district goals, and is receptive to suggestions for growth.</p> <p>7. Understands legal and ethical issues as they apply to responsible and acceptable use of the Internet and other resources.</p>	<p>- Aware of legal and moral responsibilities and adheres to same</p> <p>- Creates/organizes lessons to engage students</p> <p>- College courses directly relate to application of research in classroom teaching</p> <p>- Cluster Meetings, Field Trips Parent meetings</p> <p>- Parent communication via notes, progress reports, engrade, meetings</p> <p>- Reflection in discussions w/ supervising practitioner, daily journal entries</p> <p>- Understands and adheres to legal issues</p>
<p>Rating: 3</p>	<p>Explanation of Rating for Standard E – Meets Professional Responsibilities</p> <p>Successfully meets professional responsibilities</p>

Rating Scale: 1=Does Not Meet the Standard; 2=Meets the Standard; 3=Exceeds the Standard; NA=Not Applicable.

Candidate's Name: _____ License: _____

Program Supervisor (initial): Ag Date: 6/15/11

Supervising Practitioner (initial): ang Date: 6/13/11

Preservice Performance Assessment for Practicum or Practicum Equivalent
Professional Standards for Teachers: See 603 CMR 7.03

Summary Decision for Preservice Performance Assessment

Teacher candidate's *Preservice Performance Assessment* in the practicum or practicum equivalent meets the Professional Standards for Teachers: Yes or No .

Candidate (sign): *Dan McCarthy* License: _____
 Program Supervisor (sign): *John Galant* Date: 6/13/11
 Supervising Practitioner (sign): *Douglas...* Date: 6/13/11

Standard	Rating (from pp. 2-5)
(a) Plans Curriculum	3
(b) Delivers Effective Instruction	3
(c) Manages Classroom Climate	3
(d) Promotes Equity	3
(e) Meets Professional Responsibilities	2

Rating Scale: 1=Does Not Meet the Standard; 2=Meets the Standard; 3=Exceeds the Standard; NA=Not Applicable.

Summary Comments (integrated assessment of performance):
 Mr. McCarthy has successfully met the requirements for the Preservice Performance Practicum. He has effectively planned and carried out instruction that engages students and promotes academic success. Mr. McCarthy has the skills to further develop instruction and classroom management. He creates a classroom environment that promotes equity, safety, and learning for optimal students' success. Dan took the extra time to "know" the students. This really made a difference to their success in the classroom. Dan worked with students to overcome challenges such as test anxiety, peer issues, etc... Dan shows signs of a true leader-- taking charge of situations as they came up in the classroom. Dan has a positive approach to teaching. Dan deals with problems in a calm manner. Dan has made wonderful progress in his teaching practicum.

The sponsoring organization should maintain this assessment record as part of its candidate's permanent file. Copies do not have to be sent to the Department of Education.