

BIOLOGY



Curriculum Map
2016-2017



Science Curriculum Maps
CANYONS SCHOOL DISTRICT
2016-2017

Curriculum Mapping Purpose

Canyons School District's curriculum maps are standards-based maps driven by the Utah Core Standards and implemented using materials adopted by the Canyons' Board of Education. The maps and materials are coordinated within feeder systems (i.e. vertically) and within grade-levels (i.e. horizontally). Student achievement is increased when both teachers and students know where they are going, why they are going there, and what is required of them to get there.

Curriculum Maps are a Tool For:

- **ALIGNMENT:** Provides support and coordination between concepts, skills, standards, curriculum, and assessments
- **COMMUNICATION:** Articulates expectations and learning goals for students
- **PLANNING:** Focuses instructional decisions and targets critical information for instructional tasks
- **COLLABORATION:** Promotes professionalism and fosters dialogue between colleagues about best practices pertaining to sequencing, unit emphasis and length, integration, and review strategies

These maps were collaboratively developed and refined by teacher committees using feedback from classroom teachers, achievement coaches, building administrators, and the office of Evidence-Based Learning. It is with much appreciation that we recognize the many educators that collaborated in the effort to provide these maps for the teachers and students of CSD. Specific individuals that have assisted in the writing and editing of this document include:

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Standards and Units

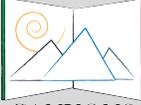
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Canyons School District Academic Framework to Support Effective Instruction

Multi-Tiered System of Supports (MTSS) for Academics and Behavior

RTI Multi-Tiered System of Support	(1) Providing high quality core instruction (and intervention) matched to students' needs	(2) using data over time (i.e. rate of learning, level of performance, fidelity of implementation)	(3) to make important educational decisions.
 CANYONS <small>School District</small> Student Achievement Principles	<ul style="list-style-type: none"> All CSD students and educators are part of ONE proactive educational system. Evidence-based instruction and interventions are aligned with rigorous content standards. 	<ul style="list-style-type: none"> Data are used to guide instructional decisions, and allocate resources. CSD educators use assessments that are reliable, valid, and connected to standards 	<ul style="list-style-type: none"> CSD educators problem solve collaboratively to meet student needs.
	<ul style="list-style-type: none"> Culture centers around building positive relationships, setting high expectations, and committing to every student's success. Ongoing, targeted, quality professional development and coaching supports effective instruction for ALL students. Leadership at all levels is vital. 		

Core Expectations for ALL Teachers in the Classrooms and Common Areas

Standards for Instruction	Evidence-based Instructional Priorities	Time Allocation for Instruction	Teacher Learning Data	Student Performance Data	Collaborative Problem Solving for Improvement
Standards clarify what we want students to learn and do.	Planning, instruction, and assessment techniques to increase student engagement and achievement.	School culture ensures that instructional time is maximized to increase student growth.	Teacher learning and professional growth fostered through public practice and ongoing feedback.	Student academic and behavioral performance is assessed using a variety of reliable and valid methods.	Use data to problem solve and make decisions
Curriculum maps with common pacing guides	Classroom Positive Behavioral Interventions and Supports (PBIS)	Master schedule takes into consideration the learning needs of the student population.	Annual setting of goals and documentation of progress (e.g. CSIP, LANDTrust, CTESS)	Assessment practices:	Problem solving process: identify, analyze, plan, and evaluate
Instructional content aligned with the Utah Core Standards	Explicit Instruction (I, We, Y'all, You)	Scheduling is ensured for:	Supporting teacher growth	<ul style="list-style-type: none"> Inform instruction Provide feedback about learning to students, parents, and teachers Build student efficacy Monitor student achievement and behavioral growth Celebrate teaching and learning successes 	Early warning system for identification of risk (academic, behavior, and attendance)
Scientifically research-based programs	Instructional Hierarchy: Acquisition, Automaticity, Application (AAA)	<ul style="list-style-type: none"> Intervention and skill-based instruction Special Education services English Language Development (ELD) 	Formalized protocols and checklists to monitor and support implementation	<ul style="list-style-type: none"> Monitor student achievement and behavioral growth Celebrate teaching and learning successes 	Timely and consistent review of relevant data by teams (e.g. BLT, IPLC, CST):
Standards-based grades and report cards	Systematic Vocabulary Development	Classroom instructional time is prioritized for instruction of standards	Public practice applications:	Assessment Types:	<ul style="list-style-type: none"> Evaluate effectiveness of academic and behavior instruction for all groups of students using valid and reliable data (student and teacher data) Determine needs for academic and behavior intervention
Cognitive Rigor (Depth of Knowledge – DOK)	Maximizing Opportunities to Respond (OTR)	Individual and team planning time is used to intentionally increase the application of evidence-based instructional priorities and standards for instruction	<ul style="list-style-type: none"> Coaching cycles with peer coaches, teacher specialists, achievement coach, and/or new teacher coach Instructional Professional Learning Communities (IPLCs) Learning walkthroughs and targeted observations Lesson Study Video Analysis 	<ul style="list-style-type: none"> Classroom Assessing Teams and Schoolwide Assessment Districtwide Standards-based Benchmarks Comprehensive Assessments Screening Assessments (DIBELS, SRI, SMI) Specialized Assessments (WIDA, IDEA, eligibility assessment, Phonics surveys) 	
International Society for Technology in Education Standards (ISTE)	Feedback Cycle				
School-wide Positive Behavioral Interventions and Supports (PBIS)	Scaffolded Instruction & Grouping (SIG) Structures				
World-class Instructional Design and Assessment (WIDA)					
Federal and state requirements (IEP, 504, ELs)					

Public Practice and Coaching Supports

INSTRUCTIONAL PRIORITIES

Techniques to Increase Student Achievement and Engagement

Classroom Positive Interventions & Supports (PBIS)

Effect Size: .52

Explicit Instruction (I do, We do, Y'all Do, You do)

Effect Size: .57

Instructional Hierarchy (Acquisition, Automaticity, Application)

Effect Size: .57

Systematic Vocabulary Development

Effect Size: .67

Maximizing Opportunities to Respond (OTR)

Effect Size: .60

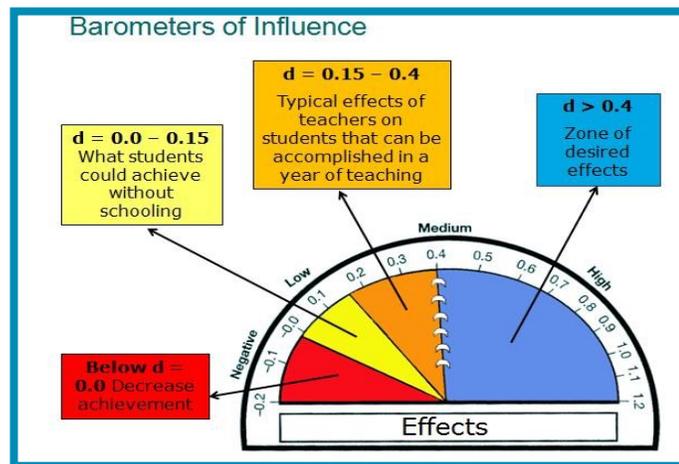
Feedback Cycle

Effect Size: .75

Scaffolded Instruction & Grouping

Effect Size: .49

Our time with students is limited and valuable. Every minute we spend with them should be spent using the practices that are most likely to be successful. This requires us to shift our perspective from looking at instructional practices that work to looking at what instructional practices work BEST.



Works Best?

Meta-analysis offer the strongest evidence base for determining what works best. "A Meta-analysis is a summary, or synthesis of relevant research findings. It looks at all of the individual studies done on a particular topic and summarizes them." (Marzano, 2000). A meta-analysis is simply, a study of studies. Meta-analysis explain the results across studies examined using effect size (ES). Average effects for instruction is 0.20 to 0.40 growth per year (Hattie, 2009). Thus the hinge point for determining what works best is 0.40. Instructional practices above the 0.40 have a high likelihood of increasing learning than those practices below the hinge-point (Hattie, 2009).



INSTRUCTIONAL PRIORITIES

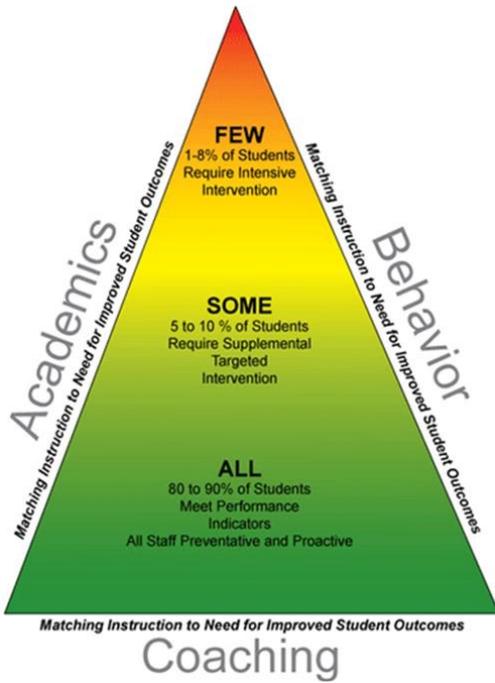
Techniques to increase Student Achievement and Engagement.

Overview

Priority	Critical Actions for Educators
Classroom Positive Behavioral Interventions and Supports (PBIS)	<ul style="list-style-type: none"> *Clearly identify behavior expectations and explicitly teach them to your students. *Implement reinforcement system for appropriate behavior and routinely evaluate the system for effectiveness. *Recognize students for positive behavior. *Systematically correct problem behaviors.
Explicit Instruction (I do, We do, Y'all do, You do)	<ul style="list-style-type: none"> *Give clear, straightforward, and unequivocal directions. *Explain, demonstrate and model. Introduce skills in a specific and logical order. Support this sequence of instruction in your lesson plans. *Break skills down into manageable steps. Review frequently. *Demonstrate the skills for students and give opportunity to practice skills independently.
Instructional Hierarchy: Acquisition, Automaticity, then Application (AAA)	<ul style="list-style-type: none"> *Explicitly teach a skill to students by explaining, demonstrating, and modeling. *Build the skill through practice and use, to gain automaticity. *Provide students with multiple opportunities to apply the skill.
Systematic Vocabulary Development	<ul style="list-style-type: none"> *Explicitly teach critical vocabulary before students are expected to use it in context. *Teach students to say, define, and use critical vocabulary in discreet steps. *Explicitly teach common academic vocabulary across all content areas.
Maximizing Opportunities to Respond (OTR)	<ul style="list-style-type: none"> *Actively engage ALL students in learning; students are active when they are saying, writing, or doing. *Pace instruction to allow for frequent student responses. *Call on a wide variety of students throughout each period.
Feedback Cycle	<ul style="list-style-type: none"> *Provide timely prompts that indicate when students have done something correctly or incorrectly. *Give students the opportunity to use the feedback to continue their learning process. *End feedback with the student performing the skill correctly and receiving positive acknowledgement.
Scaffolded Instruction and Grouping Structures	<ul style="list-style-type: none"> *Present information at various levels of difficulty. *Use data to identify needs and create small groups to target specific skills. *Frequently analyze current data and move students within groups depending on their changing needs.

CLASSROOM PBIS

Effect Size: 0.52



The heart of classroom management is developing routines and environments that promote student success through the active teaching of positive social behaviors.

A well-implemented positive classroom management system will:

- Increase positive behavior in students.
- Help students feel more positive towards their teacher, administrator and school.
- Help students feel safer in school.
- Increase time for academic instruction and decrease teacher time spent correcting problem behaviors.

PBIS, or Positive Behavioral Interventions and Supports, is an evidence-based system that helps define the key components of a well-managed classroom. The key components include:

- Clearly establishing student rules
- Explicitly teaching rules
- Reinforcing positive behaviors and correcting negative behaviors
- Creating a supportive classroom

Critical Actions for Educators

- *Clearly identify behavior expectations and explicitly teach them to students.
- *Implement reinforcement system for appropriate behavior and routinely evaluate the system for effectiveness.
- *Recognize students for positive behavior.
- *Systematically correct problem behaviors.



CLASSROOM PBIS

Effect Size: 0.52

Key Component	Definition
Clearly Establishing Student Rules	<ul style="list-style-type: none"> • Select 3-5 positively stated & easily remembered rules that align with the school wide rules in your building. <ul style="list-style-type: none"> • The school's rules might be: Be Safe, Be Kind, Be Responsible. It is appropriate to adopt these same rules for your classroom, and add one or two additional rules that fit the needs of your setting if necessary. It is important to explicitly describe what these rules look like in your classroom. • Publicly post rules in the classroom in a prominent location. • Determine which routines are needed for your classroom (a routine is a set of skills explicitly taught to students to help them be successful with following the rules). Examples may include: <ul style="list-style-type: none"> • Walking in the hallway • Classroom exit • Starting and ending class • Sharpening pencils • Going to the restroom • Transitioning from one activity to the next • Technology use in the classroom
Explicitly Teaching Rules	<ul style="list-style-type: none"> • Explicitly teach classroom rules and routines to students. <ul style="list-style-type: none"> • Define and model positive examples and non-examples of what the rules look like in your classroom. • Have students model and practice performing the desired behaviors. • Provide positive feedback and corrective feedback as needed during practice of the desired behaviors. • Review and practice the rules with students throughout the school year. <ul style="list-style-type: none"> • Rules should be reviewed more comprehensively at the beginning of each year, after significant breaks in the school schedule (e.g. Thanksgiving, Christmas, Spring), and as needed. • Example Routine <ul style="list-style-type: none"> • Classroom exit: Describe and model the routine to your students, have students practice lining up, and going back to their seats. Make sure that 100% of students demonstrate the behavior correctly. This may require you to practice several times while providing positive and corrective feedback.

CLASSROOM PBIS

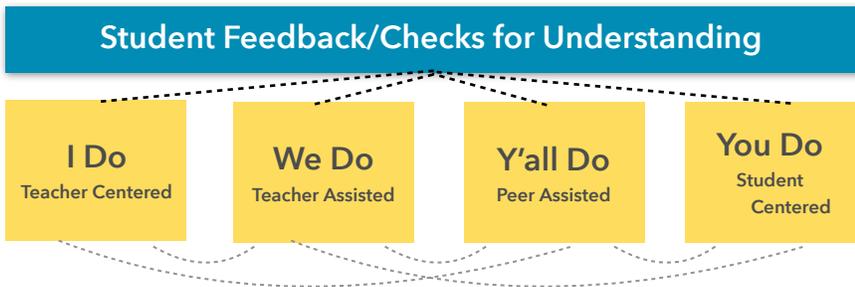
Effect Size: 0.52

Key Component	Definition
<p>Reinforcing Positive Behaviors and Correcting Negative Behaviors</p>	<ul style="list-style-type: none"> It is important to publicly recognize positive behavior, while individually providing corrective feedback when needed. Students should be monitored closely while in the classroom and feedback should be given often. Public positive statements often prompt other students to exhibit the desired behavior. <ul style="list-style-type: none"> Example: "I really like the way Sarah is waiting for instructions. She has her materials ready, and she's sitting quietly at her desk." When correcting negative behavior, provide a precision request to students (whole group) to describe desired behavior. Based on student response, provide positive feedback to the group. If undesired behaviors continue follow-up with a statement of the desired behavior directed to the target student in a private manner as needed. Give the student an opportunity to comply and perform the behavior correctly, and then reward the student with positive feedback. <ul style="list-style-type: none"> Example: "I need everyone to be in their seats, have materials ready, and wait quietly for instructions." Teacher observes Sarah talking during the transition, so he/she approaches Sarah quietly. "Sarah, the rule in our class is to wait quietly for instructions. I need you to show me how you sit quietly for instructions." While Sarah is performing the desired behavior, you might say, "Sarah, I appreciate how you are waiting quietly. Great job."
<p>Creating a Supportive Classroom</p>	<p>Creating a safe and respectful learning environment allows students to feel supported while learning. It is necessary for teachers to find opportunities to establish positive connections with all students. A teacher's daily interactions influence the students' perception of safety and sense of trust. Considerations for creating a supportive classroom include:</p> <ul style="list-style-type: none"> Make personal connections with students Help students feel like they belong Establish clear classroom norms to demonstrate respect for others Create consistent rules, routines, and arrangements (fosters predictability) Weave positive feedback into daily interactions with students and parents Be available for students (e.g. to ask questions, seek guidance) Actively listen Set a positive tone for learning and problem solving Be aware of your personal emotions, assumptions, and biases and how they may impact your interactions with students

EXPLICIT INSTRUCTION

Effect Size: 0.57

Explicit instruction is a systematic method of teaching with emphasis on; proceeding in small steps, checking for student understanding, and achieving active and successful participation by all students.



The model is generally characterized with the following components: I Do, We Do, Y'all Do, and You Do. Teachers use student feedback to determine how to progress through the model. For instance, if students are in the “We Do” phase, and the teacher has determined that students aren’t understanding, they should move back to the “I Do” phase to provide more examples.

Explicit Instruction	
I Do (Modeling)	Demonstrate & Describe Use Think-Alouds Involve Students
We Do (Guided Practice)	Heavily Scaffolded with Prompts <ul style="list-style-type: none"> • Tell them what to do. • Ask them what to do. • Remind them what to do. Continual Checks for Understanding
Y'all Do (Group Practice)	Practice Skill in Small Groups/Partners Continual Checks for Understanding Use Precision Partnering
You Do (Individual Practice)	Monitored Individual Practice Show Mastery of Skill

Critical Actions for Educators

- *Give clear, straightforward, and unequivocal directions.
- *Explain, demonstrate and model. Introduce skills in a specific and logical order. Support this sequence of instruction in your lesson plans.
- *Break skills down into manageable steps. Review frequently.
- *Demonstrate the skills for students and then give the opportunity to practice skills independently.
- * I do, We Do, Y'all Do, You Do.



INSTRUCTIONAL HIERARCHY

Effect Size: 0.57

Critical Actions for Educators

- *Explicitly teach a skill to students by explaining, demonstrating, and modeling.
- *Build the skill through practice and use, to gain automaticity.
- *Provide students with multiple opportunities to apply the skill.

Learners follow predictable stages. To begin, the learner is usually halting and uncertain as she tries to use a new skill. With feedback and a lot of practice, the learner becomes increasingly accurate, then automatic (fluent), and confident in using the skill.

Acquisition, automaticity, and application are progressive stages of the instructional hierarchy. Each stage requires its own set of pedagogical approaches and assessment strategies.

The learning stages, along with the goal of each phase and the teacher and student actions present in each stage are listed in the table below.



Accurate at Skill

- If no, teach skill.
- If yes, move to automaticity.



Automatic at Skill

- If no, teach automaticity.
- If yes, move to application.



Able to Apply Skill

- If no, teach application.
- If yes, move to higher level/concept or repeat cycle with new knowledge.

INSTRUCTIONAL HIERARCHY

Effect Size: 0.57

Learning Stage	Goal	Teacher and Student Actions
<p>Acquisition</p> <ul style="list-style-type: none"> • First learning stage • Teacher feedback to increase accuracy • Typically associated with DOK 1 	<p>The student can perform the skill accurately with little adult support.</p> <p>If goal met proceed to automaticity stage; if not teach skill.</p>	<ul style="list-style-type: none"> • Teacher actively demonstrates target skill • Teacher uses 'think-aloud' strategy-- especially for thinking skills that are otherwise covert • Student has models of correct performance to consult as needed (e.g., correctly completed math problems on board) • Student gets feedback about correct performance • Student receives praise, encouragement for effort • Students take notes, outlines, points
<p>Automaticity</p> <ul style="list-style-type: none"> • Builds habits and fluent skills through repetition and deliberate practice with timely and descriptive feedback • Typically associated with DOK 2 	<p>The student has learned skill well enough to retain, to combine with other skills, and is as fluent as peers.</p> <p>If observed proceed to application; if not continue or move back to acquisition.</p>	<ul style="list-style-type: none"> • Teacher structures learning activities to give student opportunity for active (observable) responding • Student has frequent opportunities to drill (direct repetition of target skill) and practice (blending target skill with other skills to solve problems) • Student gets feedback on fluency and accuracy of performance • Student receives praise, encouragement for increased fluency
<p>Application</p> <ul style="list-style-type: none"> • Applying knowledge or skills to relevant application • Typically associated with DOK 3 & 4 	<p>The student uses the skill across situations and settings solving real life problems.</p> <p>If observed, move to new skills and knowledge or move to a higher level concept; if no observed try again or go back to building automaticity</p>	<ul style="list-style-type: none"> • Teacher structures academic tasks to require that the student use the target skill regularly in assignments. • Student receives encouragement, praise for using skill in new settings, situations • Teacher works with parents to identify tasks that the student can do outside of school to practice target skill • Teacher helps student to articulate the 'big ideas' or core element(s) of target skill that the student can modify to face novel tasks, situations • Encourage student to set own goals for adapting skill to new and challenging situations.

EXPLICIT VOCABULARY

Effect Size: 0.57

Explicit vocabulary instruction is clear, concise vocabulary instruction presenting the meaning and contextual examples of a word through multiple exposures. It is not the traditional procedure of having students copy a list of words, looking up words, copying definitions, or memorizing definitions.

Systematic vocabulary instruction increases reading comprehension, allows for greater access to content material, increases growth in vocabulary knowledge, and supports struggling readers.

Effective vocabulary/academic language instruction comes down to:

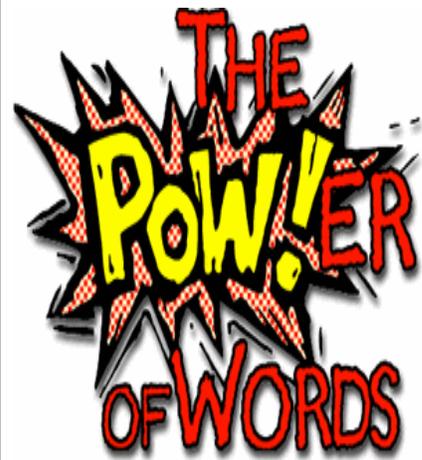
- Connection: Connect the new word to what the student knows, which helps to build the “semantic network” in the brain.
- Use: Academic speaking and writing is constructed as we apply it, not by simply memorizing.

Teacher should explicitly teach words that are:

- Based on essential concepts
- Unknown
- Critical to the future
- Difficult to obtain independently (or through context)

Critical Actions for Educators

- *Explicitly teach critical vocabulary before students are expected to use it in context.
- *Teach students to say, define, and use critical vocabulary in discreet steps.
- *Explicitly teach common academic vocabulary across all content areas.



Basic Instructional Protocol

- | | |
|--|---|
| 1. Introduce the Word | 5. Check students’ understanding |
| 2. Provide Student Friendly Definition of the Word | 6. Deepen students’ understanding |
| 3. Identify Word Parts, Families, and Origin | 7. Check students’ understanding |
| 4. Illustrate word with Examples | 8. Review & Coach Use (possible extensions) |

OPPORTUNITIES TO RESPOND

Effect Size: 0.57

Critical Actions for Educators

- *Actively engage ALL students in learning; students are active of they are saying, writing, or doing.
- *Pace instruction to allow for frequent student responses.
- *Call on a wide variety of students throughout each period.



Maximizing the opportunities to respond in a classroom increases students engagements. Engagement allows for positive interactions between teacher and student, creates opportunities for teachers to provide authentic feedback on learning, and decreases inappropriate student behavior.

Students are engaged through opportunities to respond when they are saying, writing, or doing (Feldman). When tied to learning objectives, these opportunities give the teacher and students feedback on their learning and understanding.

Engagement opportunities can be focused on an individual student or a group of students. Each of these approaches has different purposes. The teacher may choose to use a group OTR to minimize the risk the student feels in responding and to increase engagement for all students. Through group OTRs, students not only receive feedback from the teacher, but their peers as well as they hear and see other student responses. When seeking individual student understanding, teacher may choose to use individual OTRs.

Opportunities to respond can be verbal or non-verbal. Verbal responses help students to summarize and share their thoughts with others while non-verbal responses can increase writing skills or give students the opportunity to move around the room.

Structured Non-Verbal	Structured Verbal	Structured Writing	Structured Reading
<ul style="list-style-type: none"> • Cold Calling (Teacher Chosen) • Cold Calling (Random) • Choral Response • Think Pair Share • Precision Partner • Small Group Discussion 	<ul style="list-style-type: none"> • Hand Signals • Point at Something • 4 Corners • Response Cards • White Boards • Student Response System 	<ul style="list-style-type: none"> • Note-Taking: Cloze, Cornell • Graphic Organizer • Sentence Starter/ Quick Write • White Boards • Summarizing • Technology 	<ul style="list-style-type: none"> • Partner Reading w/ Comprehension Strategy • Choral Reading • Cloze Reading Guide • Model Reading Strategies • Task for each Reading Segment

FEEDBACK

BETWEEN TEACHERS & STUDENTS

Effect Size: 0.75

Feedback lets the learner know whether or not a task was performed correctly, and how it might be improved. Feedback is most effective when it is clear, purposeful, compatible with prior knowledge, immediate, and non-threatening.

Feedback from Students:

Educational research indicates that feedback is one of the most powerful drivers of student achievement. John Hattie’s synthesis of the overall effect size of feedback is very high (ES = .75). He states that feedback from students as to what they understand, when they are not engaged, where they make errors, and when they have misconceptions helps make student learning visible to the teacher.

Feedback to Students:

Positive academic and behavioral feedback, or teacher praise has been statistically correlated with student on-task behavior (Apter, Arnold & Stinson, 2010) and has strong empirical support for both increasing academic and behavioral performance and decreasing problem behaviors (Gable, Hester, Rock & Hughes, 2009). With regard to reprimands and corrective feedback, there is a continued assertion that teachers maintain a ratio of praise to correction at 3:1 or 4:1 (Gable, Hester, Rock, & Hughes, 2009; Stichter, Lewis, & Wittaker, 2009).

Feedback Types:

Critical Actions for Educators

- *Provide timely prompts that indicate when students have done something correctly or incorrectly.
- *Give students the opportunity to use the feedback to continue their learning process.
- *End feedback with the student performing the skill correctly and receiving positive acknowledgement.

Type	Description	Example	Non-Example
Positive	Teacher indicates that a target academic or social behavior is correct.	“Correct! 7 X 4 is 28”	“Johnny, pick up your pencil off the floor please
Corrective	Teacher indicates that a behavior is incorrect.	“That’s not quite right, let me give you another clue . . .”	“Try harder on your math worksheet; I know you can do better.”
Harsh	Teacher shows frustration or is critical of the student.	I can’t believe you still can’t figure this out!	“Let me give you another clue . . .”
Neutral	Teacher redirects the student or describes what she would like the student to do.	“Johnny, turn to page 4 and start reading.”	“Nice work! You really showed justification for your reasons.”

FEEDBACK CYCLE

Effect Size: 0.75

	Example	Non-Example
Corrective Sequence	<ul style="list-style-type: none"> • Teacher provides an opportunity to respond • Student responds incorrectly • Teacher indicates that the response was not correct and provides an opportunity for correction • Student gives correct response • Teacher affirms that response was correct 	<ul style="list-style-type: none"> • Teacher provides an opportunity to respond • Student responds incorrectly • Teacher indicates that the response was not correct but does not provide an opportunity for the student to answer correctly
Expansive Sequence	<ul style="list-style-type: none"> • Teacher provides an opportunity to respond • Student response is a partial response or could be expanded into a higher quality response • Teacher affirms response and provides guidance for expansion/refinement • Student revises or elaborates upon previous response • Teacher acknowledges response as an improvement. 	<ul style="list-style-type: none"> • Teacher provides an opportunity to respond • Student response is a partial response or could be expanded into a higher quality response • Teacher affirms response but does not provide guidance for expansion/refinement
Challenge Sequence	<ul style="list-style-type: none"> • Teacher provides and opportunity to respond • Student response is fully correct • Teacher affirms student response and asks a more difficult question on the same topic as a follow up • Student answers • Teacher responds with positive or corrective feedback 	<ul style="list-style-type: none"> • Teacher provides and opportunity to respond • Student response is fully correct • Teacher affirms student response but does not ask a more difficult question on the same topic as a follow up

SCAFFOLDING & GROUPING

Effect Size: 0.57

Scaffolding is a process in which students are given support until they can apply new skills and strategies independently (Rosenshine & Meister, 1992). When students are learning new or challenging task, they are given more assistance. As they begin to demonstrate task mastery, the assistance or support is decreased gradually in order to shift the responsibility for learning from the teacher to the students. Thus, as the students assume more responsibility for learning, the teacher provides less support.

Structure of the Scaffolded Classroom:

The organization of the scaffolded classroom includes whole group, small group (skill-based or station teaching), partners, and independent work. The scaffolding supports that will be put in place for diverse learners should include interventions for striving and accelerated learners. When using small groups, identify the groups as skill-based or station teaching. Skill-based groups are organized homogeneously based upon the needs of students. Station teaching groups are organized heterogeneously to create diverse groups.

Critical Actions for Educators

- *Present information at various levels of difficulty.
- *Use data to identify needs and create small groups to target specific skills.
- *Frequently analyze current data and move students within groups depending on their changing needs.

Types of Scaffolds

Scaffold	Ways to use Scaffolds in an Instructional Setting
Advance Organizers	Tools used to introduce new content and tasks to help student learn about the topic: Venn diagrams to compare and contrast information; flow charts to illustrate processes; organizational charts to illustrate hierarchies; outlines that represent content; mnemonics to assist recall; statements to situate the task or content; rubrics that provide task expectations.
Checklists	Prepare a list of items required, things to be done, or points to be considered, used as a reminder as the student proceeds through the learning task.
Collaborative Grouping	Having students work in partners or small groups with students who can support/model students who may struggle with content.
Concept and Mind Maps	Maps that show relationships: Partially or completed maps for students to complete; students create their own maps based on their current knowledge of the task or concept.
Cue Cards	Prepared cards given to individual groups of students to assist in their discussion about a particular topic or content area: Vocabulary words to prepare for exams; content-specific stem sentences to complete; formula to associate with a problem; concepts to define.
Examples	Samples, specimens, illustrations, problems, modeling: Real objects; illustrative problems used to represent something. Demonstrate and model how to do something, giving an example of what it should look like.
Explanations	More detailed information to move students along on a task or in their thinking of a concept: Written instructions for a task; verbal explanation of how a process works.

Scaffold	Ways to use Scaffolds in an Instructional Setting
Handouts	Prepared handouts that contain task and content-related information, but with less detail and room for student note taking.
Images and Multimedia	Providing an image or other graphic representation, such as a video, that represents the word(s)/concept(s) being taught in conjunction with the explicit vocabulary routine can help to support students in learning new vocabulary and concepts. Images help provide a non-linguistic representation and allow students to recall the term more readily. This technique can be used with any Reading Street Vocabulary (Amazing Words, Story/Lesson Vocabulary), Math Vocabulary, or Content Vocabulary or concepts.
Manipulatives	Manipulatives, such as markers, toothpicks, blocks, or coins, are used to support hands-on learning and provide concrete models to help students solve problems and develop concepts. The students can manipulate the items to increase their understanding and come to accurate conclusions. May also include virtual manipulatives.
Pair-Share	Pose a problem, students have time to think about it individually, and then they work in pairs to solve the problem and share their ideas with the class. Providing think time increase the quality of the response.
Precision Partnering	Strategically appointed partners with assigned roles.
Previewing Text	Before reading a text, preview the text by providing students with an overview/synopsis of the text. This will allow students to know what to expect when they are reading and give them background knowledge to help them understand the text.
Prompts	A physical or verbal cue to remind—to aid in recall of prior or assumed knowledge. Physical: Body movements such as pointing, nodding the head, eye blinking, foot tapping. Verbal: Words, statements and questions such as "Go," "Stop," "It's right there," "Tell me now," "What toolbar menu item would you press to insert an image?" "Tell me why the character acted that way."
Question Cards	<i>Prepared cards with content and task-specific questions</i> given to individuals or groups of students to ask each other pertinent questions about a particular topic or content area.
Question Stems	<i>Incomplete sentences which students complete:</i> Encourages deep thinking by using higher order "What if" questions.
Realia	Anytime the real object, concept, or phenomena can be presented with the actual object helps to support learners in acquiring new ideas and concepts. For example, when teaching about the three types of rocks, having examples of those types for students to see and touch can help them to make deeper connections.
Rubrics	A rubric is an easily applicable form of authentic assessment. A rubric simply lists a set of criteria, which defines and describes the important components of the work being planned or evaluated.
Sentence Frames	<i>Sentence frames provide an opportunity for students to use key vocabulary while providing a structure</i> that may be higher than what they could produce on their own. For example, if students are to compare two ocean creatures, they might say something like "Whales have lungs, but fish have gills." In the preceding sentence, the simple frame is "_____ have _____, but _____ have _____." Note the sentence can be filled in with any content; this differs from closed sentences that often have only a few possibilities.
Setting & Reviewing Objectives	<i>Providing students with a purpose and intended outcome</i> will help students to know what to focus their attention on and what they should be learning. Having student self-assess their progress towards the objectives at the end of the lesson will provide the teacher with information on their current levels of understanding.
Socratic Seminar	The purpose of a Socratic Seminar is to achieve a deeper understanding about the ideas and values in a text. In the Seminar, participants systematically question and examine issues and principles related to a particular content, and articulate different points-of-view. The group conversation assists participants in constructing meaning through disciplined analysis, interpretation, listening, and participation. Prepare several questions in advance in addition to questions that students may bring to class. Questions should lead participants into the core ideas and values and to the use of the text in their answers. Questions must be open-ended, reflect genuine curiosity, and have no "one-right answer."
Stories	<i>Stories relate complex and abstract material to situations more familiar with students:</i> Recite stories to inspire and motivate learners.
Student Work Exemplars	<i>Providing students with example student work samples can provide models for students to use to support their development of the skill.</i> For example, an anchor paper for a writing assignment of how a sample student responded to the assignment previously will provide an example of what the assignment looks like.
Visual Scaffolds	Pointing to call attention to an object; representational gestures (holding cured hands apart to illustrate roundness; moving rigid hands diagonally upward to illustrate steps or process), diagrams such as charts and graphs; methods of highlighting visual information.

Webb's Depth of Knowledge (DOK)

Webb's Depth of Knowledge (DOK) provides a vocabulary and a frame of reference that connects the type of thinking with the complexity of the task. Using DOK levels offers a common language to understand "rigor," or cognitive demand, in assessments, as well as curricular units, lessons, and tasks. Consequently, teachers need to develop the ability to design questions, tasks and classroom assessments for a greater range of cognitive demand. Most often a scaffolded support is needed to help students organize or break down information. All learners K-12 should experience a variety of DOK levels.

Depth of Knowledge Generalizations:

If there is one correct answer, it is most likely a DOK 1 or DOK 2.

- DOK 1: Either you know it or you don't
- DOK 2: Make connections with known information

If there is more than one answer, requiring supporting evidence, it is a DOK 3 or DOK 4.

- DOK 3: Interpret implied information, provide supporting evidence and reasoning. Explain not just HOW but WHY for each step and decision made
- DOK 4: Includes all of DOK 3 and the use of multiple sources/data/ texts

DOK Level 1: Recall & Reproduction	
Students are to recall or reproduce knowledge and /or skills. Content involves working with facts, terms, details and calculations. Level 1 items have a correct answer with nothing to reason or figure out.	
Teacher Role	Student Role
Questions to direct or focus attention, shows, tells, demonstrates, provides examples, examines, leads, breaks down, defines	Recognizes, responds, remembers, memorizes, restates, absorbs, describes, demonstrates, follows directions, applies routine processes, definitions, and procedures
Possible Task and Products	
<ul style="list-style-type: none"> • Fill in the blank • Quiz • Calculate, compute • Oral reading fluency • Decoding words • Write complete sentences • Document with highlighting/ citing/ annotating sources • Locate and recall quotes • Recite math facts, poems etc. 	<ul style="list-style-type: none"> • Write a list of key words about . . . • Memorize lines • Complete basic calculation tasks (e.g., add, subtract, divide, multiply) • Complete measurement tasks using rulers or thermometers • Read for fact/details or plot • Locate or retrieve information in verbatim form to answer a question
Potential Questions	
Can you recall _____?	Can you select _____?
When did _____ happen?	How would you write _____?
Who was _____?	What might you include on a list about _____?
How can you recognize _____?	Who discovered _____?
What is _____?	What is the formula for _____?
How can you find the meaning of _____?	Can you identify _____?

Hess, 2013. Adapted from A Guide for Using Webb's Depth of Knowledge with Common Core State Standards

Webb's Depth of Knowledge (DOK)

DOK Level 2: Skill/Concept	
Includes the engagement of mental processing beyond recalling, reproducing or locating an answer. This level generally requires students to compare and contrast, cause and effect, classify, or sort items into meaningful categories, describe or explain relationships, provide examples and non-examples.	
Teacher Role	Student Role
Provides questions to differentiate, infer, or check conceptual understanding, models, organizes,/reorganizes, explores, possible options or connections, provides, examples and non-examples	Solves routine problems/tasks involving multiple decisions points and concepts, constructs models to show relationships, demonstrates use of conceptual knowledge, compiles and organizes, illustrates with examples or models and examines.
Possible Tasks and Products	
<ul style="list-style-type: none"> • Timeline • Number line • Graphic organizer • Science logs • Concept Maps • Captioned Story Board 	<ul style="list-style-type: none"> • Write a summary • Explain a series of steps used to find a solution • Sequence of events using a graphic organizer • Explain the meaning of a concept using words, objects and/or visuals • Complex calculations involving decision points • Conduct, collect, and organize data
Potential Questions:	
What other way could you solve/find out ___? What is your prediction and why? How would you organize ___ to show ___? Can you explain how ___ affected ___? How would you apply what you learned to develop ___? How would you compare ___ and contrast ___? How would you classify?	What facts are relevant to show ___? How or why would we use ___? What examples or non-examples can we find? What is the relationship between ___ and ___? How would you summarize? How are ___ alike and different? What do you notice about ___? How would you estimate ___?

Hess, 2013. Adapted from *A Guide for Using Webb's Depth of Knowledge with Common Core State Standards*

Webb's Depth of Knowledge (DOK)

DOK Level 3: Strategic Thinking and Reasoning	
<p>Stating reasons and providing relevant supporting evidence are key markers of DOK 3 tasks. The expectation established for tasks at his level require an in-depth integration of conceptual knowledge and multiple skills to reach a solution or produce a final product. DOK 3 tasks focus on in-depth understanding of one text, one data set, one investigation, or one key source.</p>	
Teacher Roles	Student Role
<p>Questions to probe reasoning and underlying thinking, asks open-ended questions, acts as a resource and coach, provides criteria and examples for making judgments and supporting claims. Encourages multiple approaches and solutions and determines when in depth exploration is appropriate.</p>	<p>Uncovers and selects relevant and credible supporting evidence for analyses, critiques, debates, claims and judgments, plans, initiates questions, disputes, argues, tests ideas/solutions, sustains inquiry into topics or deeper problems, applies to the real world.</p>
Possible Tasks and Products:	
<ul style="list-style-type: none"> • Complex graph • Analyze survey results • Multiple paragraph essay or short story • Fact-based argument • Chart and draw conclusions about data sets • Investigation • Drawing conclusions from text or data sets • Generalize from a set of evidence or data • Justification of the solution to a problem • Debate from a given perspective 	<ul style="list-style-type: none"> • Use a Venn Diagram that shows how two topics from the same source are the same and different • Design a questionnaire to gather information • Survey classmates/industry members to find out what they think about a particular topics • Make a flow chart to show the critical stages. • Participate in a discussion that represents different viewpoints • Write a opinion essay • Convince others with evidence • Solve non-routine problems • Interpret information from a complex graph
Potential Questions	
<p>How is ___ related to ___?</p> <p>What are the possible flaws in ___ ?</p> <p>What is the theme/lesson-learned ___?</p> <p>How would the moral change if ___?</p> <p>What underlying bias is there ___?</p> <p>What inferences will these facts support___?</p> <p>How does the author create tension/suspense___?</p> <p>What is the author’s reasoning for___?</p>	<p>How can you prove that your solution is reasonable?</p> <p>What evidence can you find to support___ ?</p> <p>What ideas justify ___?</p> <p>What conclusions can you draw?</p> <p>What information can you draw on to support your reason for ___?</p> <p>How would you ___ to create a different ___?</p> <p>What is the best answer and why?</p> <p>Can you elaborate on your reason and give examples?</p>

Hess, 2013. Adapted from *A Guide for Using Webb’s Depth of Knowledge with Common Core State Standards*

Webb's Depth of Knowledge (DOK)

DOK Level 4: Extended Thinking	
<p>Stating reasons and providing relevant supporting evidence are key markers of DOK 4 tasks. The expectation established for tasks at this level require an in-depth integration of conceptual knowledge and multiple skills to reach a solution or produce a final product. DOK 4 tasks focus on in-depth understanding of multiple texts, multiple data sets, multiple investigations, or multiple key sources.</p>	
Teacher Roles	Student Role
<p>Questions extend thinking and broaden perspectives; facilitates teaming, collaboration and self-evaluation of students.</p>	<p>Designs, takes risks, researches synthesizing multiple sources, collaborates, plans, organizes, modifies, creates concrete tangible products.</p>
Possible Tasks and Products:	
<ul style="list-style-type: none"> • Presentation—using diverse media formats • Research report synthesizing multiple sources • Essay (informational, narrative or opinion) using multiple sources • Multiple data sources synthesized to develop original graphs • Assessment based on application of the content knowledge 	<ul style="list-style-type: none"> • Applying information from more than one discipline to solve non-routine problems in novel or real-world situations. • Tasks that require making multiple strategic and procedural decisions as new information is processed • Tasks that require multiple roles and collaboration with others. (peer revision, editing of a script) • Tasks that draw evidence from multiple sources to support solutions/conclusions
Potential Questions—all require multiple sources for evidence	
<p>What evidence would you cite to defend the actions of ____?</p> <p>How would you evaluate this author over time?</p> <p>Can you predict the potential benefits and drawbacks of this given situation?</p> <p>What information would you use to support a differing perspective?</p>	<p>What changes would you make to solve or address this major issue/problem _____?</p> <p>Can you propose an alternate solution?</p> <p>Do you agree with the actions, outcomes, or decisions?</p> <p>How would you prove or disprove?</p> <p>Can you assess the value or importance of?</p>

Hess, 2013. Adapted from A Guide for Using Webb's Depth of Knowledge with Common Core State Standards

Table 1: Detailed Descriptors of Depth-of-Knowledge Levels for Science
(K. Hess, Center for Assessment, based on Webb, update 2005)

Level 1 Recall & Reproduction	Level 2 Skills & Concepts	Level 3 Strategic Thinking	Level 4 Extended Thinking
<ul style="list-style-type: none"> a. Recall or recognize a fact, term, definition, simple procedure (such as one step), or property b. Demonstrate a rote response c. Use a well-known formula d. Represent in words or diagrams a scientific concept or relationship e. Provide or recognize a standard scientific representation for simple phenomenon f. Perform a routine procedure, such as measuring length g. Perform a simple science process or a set procedure (like a recipe) h. Perform a clearly defined set of steps i. Identify, calculate, or measure 	<ul style="list-style-type: none"> a. Specify and explain the relationship between facts, terms, properties, or variables b. Describe and explain examples and non-examples of science concepts c. Select a procedure according to specified criteria and perform it d. Formulate a routine problem given data and conditions e. Organize, represent, and compare data f. Make a decision as to how to approach the problem g. Classify, organize, or estimate h. Compare data i. Make observations j. Interpret information from a simple graph k. Collect and display data 	<ul style="list-style-type: none"> a. Interpret information from a complex graph (such as determining features of the graph or aggregating data in the graph) b. Use reasoning, planning, and evidence c. Explain thinking (beyond a simple explanation or using only a word or two to respond) d. Justify a response e. Identify research questions and design investigations for a scientific problem f. Use concepts to solve non-routine problems/more than one possible answer g. Develop a scientific model for a complex situation h. Form conclusions from experimental or observational data i. Complete a multi-step problem that involves planning and reasoning j. Provide an explanation of a principle k. Justify a response when more than one answer is possible l. Cite evidence and develop a logical argument for concepts m. Conduct a designed investigation n. Research and explain a scientific concept o. Explain phenomena in terms of concepts 	<ul style="list-style-type: none"> a. Select or devise approach among many alternatives to solve problem b. Based on provided data from a complex experiment that is novel to the student, deduct the fundamental relationship between several controlled variables. c. Conduct an investigation, from specifying a problem to designing and carrying out an experiment, to analyzing its data and forming conclusions d. Relate ideas <i>within</i> the content area or <i>among</i> content areas e. Develop generalizations of the results obtained and the strategies used and apply them to new problem situations

Hess' Cognitive Rigor Matrix & Curricular Examples: Applying Webb's Depth-of-Knowledge Levels to Bloom's Cognitive Process Dimensions – *Math/Science*

Revised Bloom's Taxonomy	Webb's DOK Level 1 Recall & Reproduction	Webb's DOK Level 2 Skills & Concepts	Webb's DOK Level 3 Strategic Thinking/ Reasoning	Webb's DOK Level 4 Extended Thinking
Remember Retrieve knowledge from long-term memory, recognize, recall, locate, identify	<ul style="list-style-type: none"> Recall, observe, & recognize facts, principles, properties Recall/ identify conversions among representations or numbers (e.g., customary and metric measures) 			
Understand Construct meaning, clarify, paraphrase, represent, translate, illustrate, give examples, classify, categorize, summarize, generalize, infer a logical conclusion (such as from examples given), predict, compare/contrast, match like ideas, explain, construct models	<ul style="list-style-type: none"> Evaluate an expression Locate points on a grid or number on number line Solve a one-step problem Represent math relationships in words, pictures, or symbols Read, write, compare decimals in scientific notation 	<ul style="list-style-type: none"> Specify and explain relationships (e.g., non-examples/examples; cause-effect) Make and record observations Explain steps followed Summarize results or concepts Make basic inferences or logical predictions from data/observations Use models /diagrams to represent or explain mathematical concepts Make and explain estimates 	<ul style="list-style-type: none"> Use concepts to solve <u>non-routine</u> problems Explain, generalize, or connect ideas using <u>supporting evidence</u> Make <u>and justify</u> conjectures Explain thinking when more than one response is possible Explain phenomena in terms of concepts 	<ul style="list-style-type: none"> Relate mathematical or scientific concepts to other content areas, other domains, or other concepts Develop generalizations of the results obtained and the strategies used (from investigation or readings) and apply them to new problem situations
Apply Carry out or use a procedure in a given situation; carry out (apply to a familiar task), or use (apply) to an unfamiliar task	<ul style="list-style-type: none"> Follow simple procedures (recipe-type directions) Calculate, measure, apply a rule (e.g., rounding) Apply algorithm or formula (e.g., area, perimeter) Solve linear equations Make conversions among representations or numbers, or within and between customary and metric measures 	<ul style="list-style-type: none"> Select a procedure according to criteria and perform it Solve routine problem applying multiple concepts or decision points Retrieve information from a table, graph, or figure and use it solve a problem requiring multiple steps Translate between tables, graphs, words, and symbolic notations (e.g., graph data from a table) Construct models given criteria 	<ul style="list-style-type: none"> Design investigation for a specific purpose or research question Conduct a designed investigation Use concepts to solve non-routine problems <u>Use & show reasoning, planning, and evidence</u> Translate between problem & symbolic notation when not a direct translation 	<ul style="list-style-type: none"> Select or devise approach among many alternatives to solve a problem Conduct a project that specifies a problem, identifies solution paths, solves the problem, and reports results
Analyze Break into constituent parts, determine how parts relate, differentiate between relevant-irrelevant, distinguish, focus, select, organize, outline, find coherence, deconstruct	<ul style="list-style-type: none"> Retrieve information from a table or graph to answer a question Identify whether specific information is contained in graphic representations (e.g., table, graph, T-chart, diagram) Identify a pattern/trend 	<ul style="list-style-type: none"> Categorize, classify materials, data, figures based on characteristics Organize or order data Compare/ contrast figures or data Select appropriate graph and organize & display data Interpret data from a simple graph Extend a pattern 	<ul style="list-style-type: none"> Compare information within or across data sets or texts Analyze and <u>draw conclusions from data, citing evidence</u> Generalize a pattern Interpret data from complex graph Analyze similarities/differences between procedures or solutions 	<ul style="list-style-type: none"> Analyze multiple sources of evidence analyze complex/abstract themes Gather, analyze, and evaluate information
Evaluate Make judgments based on criteria, check, detect inconsistencies or fallacies, judge, critique			<ul style="list-style-type: none"> <u>Cite evidence and develop a logical argument</u> for concepts or solutions Describe, compare, and contrast solution methods <u>Verify reasonableness of results</u> 	<ul style="list-style-type: none"> Gather, analyze, & evaluate information to draw conclusions Apply understanding in a novel way, provide argument or justification for the application
Create Reorganize elements into new patterns/structures, generate, hypothesize, design, plan, construct, produce	<ul style="list-style-type: none"> Brainstorm ideas, concepts, or perspectives related to a topic 	<ul style="list-style-type: none"> Generate conjectures or hypotheses based on observations or prior knowledge and experience 	<ul style="list-style-type: none"> Synthesize information within one data set, source, or text Formulate an original problem given a situation Develop a scientific/mathematical model for a complex situation 	<ul style="list-style-type: none"> Synthesize information across multiple sources or texts Design a mathematical model to inform and solve a practical or abstract situation

Utah SAGE Science Blueprints

Biology 45 Scored Items		
Standard	Min	Max
Standard B.1	18%	22%
Standard B.2	18%	22%
Standard B.3	18%	22%
Standard B.4	18%	22%
Standard B.5	18%	22%
ILO 1	22%	27%
ILO 3	22%	27%
ILO 4	22%	27%
ILO 5/6	24%	29%
DOK 1	9%	33%
DOK 2	22%	60%
DOK 3/4	20%	40%

NOTE: The percentage shown represents target aggregate values; individual student experiences will vary based on the adaptive algorithm.

DISCLOSURE: Depth of Knowledge (DOK) is an essential component of the Science instruction. As such, DOK is integrated in all science items throughout the Student Assessment of Growth and Excellence (SAGE) and their respective blueprints. All students will see a variety of DOK and item difficulty on the summative SAGE. For more information about DOK please see: http://static.pdesas.org/content/documents/M1-Slide_22_DOK_Hess_Cognitive_Rigor.pdf

Acronym and Key Term Glossary for Secondary Teachers

- **ACT:** The ACT was designed to measure academic skills required for success in college and university settings. College and universities commonly use results to help determine which students to admit. There are four college readiness benchmark areas: 1) English, 2) Mathematics, 3) Reading, and 4) Science. Student's reaching ACT benchmarks have a 75% or better chance of getting a "C" or higher and a 50% chance or better of getting a "B" or higher in a college course in that subject. The ACT is administered to all 11th graders within the Canyons School District in the spring.
- **BLT:** Building leadership teams are comprised of key members of the school staff and an external coach. Each school's BLT is charged with the following tasks:
 - To identify, plan, and develop the instruction, intervention, and supports for all students to be successful
 - To sustain improvement over time
 - To develop collective capacity for quality instruction (e.g. support all teachers in professional learning and growth)
- **Canvas:** Canvas is a LMS, Learning Management System, (i.e. a software application for the administration, documentation, tracking, reporting and delivery of online learning). Canvas was selected as the LMS for Canyons schools because of its extensive use in Utah institutes of higher learning, along with its ability to increase collaboration among students, teachers, and parents.
- **CBM:** Curriculum-Based Measurement – a brief standardized measurement procedure designed to ascertain a student's overall academic performance in a basic subject area: e.g. reading, spelling, or writing. CBMs were designed to help teachers monitor academic growth over time, so that instruction could be modified and learning rates accelerated.
- **CFA:** Common Formative Assessment – An assessment typically created collaboratively by a team of teachers responsible for the same grade level or course, in order to improve instruction with a current group of students. Common formative assessments are frequently administered throughout the year to identify:
 - Individual students who need additional time and support for learning
 - The teaching strategies most effective in helping students acquire the intended knowledge and skills
 - Program concerns – areas in which students generally are having difficulty achieving the intended standard, and
 - Improvement goals for individual teachers and the team
 - *Dufour (2004). *Learning by Doing*, p. 214

- **CSA:** Common Summative Assessment – An assessment typically created collaboratively by a team of teachers responsible for the same grade level or course in order to evaluate whether or not students reached common standards at the completion of an instruction cycle.
- **CTESS:** Canyons Teacher Effectiveness Support System- In compliance with Senate Bill 64, this is Canyons School District teacher evaluation system that includes documentation of student growth, evidence of instructional quality, and response to stakeholder input.
- **District-Wide Standards-Based Assessment:** These assessments are given in all content areas at key times during the school year. Data from these benchmarks will be used for student growth in compliance with House Bill 201.
- **DLT:** The District Leadership Team supports implementation of the CSD Academic Framework and is comprised of representatives from school and district administration. The DLT is charged with the following:
 - Develop tools necessary for successful scaling-up of CSD Framework (i.e. evidence-based practices)
 - Provide a consistent feedback loop between school leaders and district leaders
 - Provide cascading levels of support to building leaders
 - Implement the district academic plan
- **HMH Math Inventory:** Houghton Mifflin Harcourt math inventory is a research-based, adaptive assessment that measures math abilities and longitudinal progress from Kindergarten through Algebra II
- **IPLC:** Instructional Professional Learning Communities meet regularly to focus on data and instruction to improve student achievement.
- **IPOP:** Instructional Priorities Observation Protocol – The classroom observation tool used for evidence of instructional quality.
- **ISD:** The Instructional Supports Department (commonly known as the curriculum department). This is where you will find the content leads and support for the curriculum.
- **LMS: Learning Management System** - A software application for the administration, documentation, tracking, reporting and delivery of online learning. **Canvas** was selected as the LMS for Canyons schools because of its extensive use in Utah institutes of higher learning, along with its ability to increase collaboration among students, teachers, and parents.

- **MTSS:** Multi-tiered Systems of Support (see Rtl) is practice of providing high quality instruction, using data to make decisions about instruction and intervention for students that is based upon the students' performance, and providing multiple levels of support for both academic and behavioral standards.
- **PBIS:** Positive Behavioral Intervention and Supports is an evidence-based system that helps define the key components of a well-managed classroom.
- **Progress Monitoring:** A procedure that involves frequent measurement of student performance for the purpose of evaluating a student's growth toward a targeted objective. For example, the trajectory of reading growth can be measured with weekly administration of R-CBM.
- **Lexile Scores:** Lexiles can be a measure of text difficulty or of reading proficiency. They range from 0 to 1700. Below is a list of descriptors of Lexile scores by grade level. Students reading in the Proficient and Advanced levels are on track to graduate college and career ready.
- **SEM:** Standard error of measurement is one standard deviation of error around a student's true score.
- **SRI:** Scholastic Reading Inventory is a computer administered reading test that measures inferential and literal reading comprehension skills. Scores are reported in a numeric Lexile scores. Percentile ranks are also available. SRI was designed primarily to match students with books of an appropriate level of difficulty. It measures both literal and inferential comprehension. It is a particularly good assessment for identifying advanced readers. It has a disadvantage of not being as sensitive to growth as are CBM measures, of being subject to student sloughing, and having limited reliability if administered a few number of times.
- **R-CBM:** Reading Curriculum-Based Measurement (R-CBM) also known as Oral Reading Fluency (ORF) and CBM-Read Aloud, this is a one-minute measure which results in two primary numerical scores: number of words read correctly per minute (or correct words per minute, CWPM), and percentage of correctly read words (accuracy rate). This measure is highly correlated with reading comprehension in elementary school but outlives its usefulness once students read at the same rate at which they speak. Maze has been identified as a more appropriate CBM once students are reading grade-level texts at rates above 130 words read correctly per minute, with greater than 97% accuracy.

- **Reliability:** The degree to which a measure is free of error. All tests contain error and it results from characteristics of the test (such as poorly designed questions), characteristics of the test taker (bad day, lack of sleep, misreading questions, anxiety, and lack of effort), and characteristics of the environment (distracting noises, room temperature, and distracting odors).
- **RtI:** “Response to Intervention” (see MTSS) is the practice of (1) providing high-quality instruction/intervention matched to student needs and (2) using learning rate over time and level of performance to (3) make important educational decisions”. (Batsche et al, 2007).
- **Turnitin Revision Assistant:** A core-aligned formative writing tool that gives students immediate feedback on their writing.
- **Universal Screening:** A procedure in which all students are evaluated for the purpose of identifying those students who need more intensive interventions. For example, reading is a critical and foundational academic skill, for which CSD screens in middle school with the SRI.
- **Utah Core Standards:** The standards for teaching and learning adopted by the Utah State Board of Education and implemented by local school districts and charter schools with guidance and support from the Utah State Office of Education.
- **Validity:** The degree to which a test measures what it is intended to measure. Establishing the validity of a measurement procedure involves empirical study of item content, accurate prediction, and alignment with theories about what is being measured.

**Biology Scope & Sequence
2016-2017
Year at a Glance**

Suggested Pacing	2 Weeks	3 Weeks	6 Weeks	9 Weeks	5 Weeks	4 Weeks	3 Weeks
Unit Title	Intro	Chemistry of Life	Cells & Energy	DNA & Genetics	Evolution & Classification	Structure & Function	Ecology
Standard	Nature of Science	II	II	IV	V	III	I
Benchmark							
Essential Questions	<ul style="list-style-type: none"> • What are our classroom routines & procedures? • How do we solve problems using the scientific method? • How is data used to find patterns in nature? 	<ul style="list-style-type: none"> • How do chemical elements, compounds, and macromolecules affect life? 	<ul style="list-style-type: none"> • How are cell structures adapted to their functions? • How do organisms obtain energy? 	<ul style="list-style-type: none"> • How does cellular information pass from one generation to another? 	<ul style="list-style-type: none"> • How does the diversity of living things evolve over time? • How do you find order in diversity? 	<ul style="list-style-type: none"> • How is the function of organ systems related to their structure? 	<ul style="list-style-type: none"> • How do interactions in an ecosystem affect the different components of the ecosystem?
Essential Math Concepts	Graphing & Data Analysis	Ratios	Graphing & Data Analysis	Ratios & Probability	Graphing & Data Analysis	Graphing & Data Analysis	Correlation, Graphing, & Data Analysis
Literacy Standards: Reading	RL 3	RL 3, 4	RL 2, 4	RL 2, 3, 7	RL 5, 6, 9	RL 2, 4	RL 1, 8
Literacy Standards: Writing	WL 4	WL 7, 8	WL 6	WL 2	WL 1, 9, 10	WL 5	WL 4

Biology Scope & Sequence 2016-2017

Biology Unit I: Chemistry of Life		
Essential Questions	Supporting Questions	Key Terms
<ul style="list-style-type: none"> • How do chemical elements, compounds, and macromolecules affect life? 	<ul style="list-style-type: none"> • What are the elements that make up living things? • What functions do the four main macromolecules carry out in living things? • How do water's properties affect its roles in sustaining life? • How do chemicals help life sustaining processes/reactions occur? • What are the different types of bonding? 	<p>Organic, Carbohydrate, Protein, fat, Nucleic acid (DNA, RNA), Lipid, Catalyst, Enzyme, Solvent, Solute, Adhesion, Cohesion, Element, Compound, Molecule, Macromolecule, Activation energy, Ionic bonds, Covalent bonds, Hydrogen bonds, Homeostasis</p>
Science Core Standards		Student Learning Targets
Standards & ILO's	<p>STANDARD II: Students will understand that all organisms are composed of one or more cells that are made of molecules, come from preexisting cells, and perform life functions.</p> <p>Objective 1: Describe the fundamental chemistry of living cells.</p> <ul style="list-style-type: none"> a. List the major chemical elements in cells (i.e., carbon, hydrogen, nitrogen, oxygen, phosphorous, sulfur, trace elements). b. Identify the function of the four major macromolecules (i.e., carbohydrates, proteins, lipids, nucleic acids). c. Explain how the properties of water (e.g., cohesion, adhesion, heat capacity, solvent properties) contribute to maintenance of cells and living organisms. d. Explain the role of enzymes in cell chemistry. 	<ul style="list-style-type: none"> • I can identify the main elements found in all living things. • I can list and describe the reasons why water is important to living organisms and maintaining homeostasis. • I can explain the function and importance of the following macromolecules: Lipids, Nucleic Acids, Carbohydrates and Proteins. • I can explain the roles enzymes play in our bodies.
Math Skills		Math Implementation Ideas

Biology Scope & Sequence 2016-2017

Math	<ul style="list-style-type: none"> • Ratios • Graphing and data analysis 	<ul style="list-style-type: none"> • I can determine ratios of elements in compounds. • I can analyze data and graphs in order to determine energy content of different macromolecules. • I can determine rate of reaction by calculating slope of a line on a graph.
Literacy Standards		Literacy Implementation Ideas
Reading	<p>RL 3: Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p> <p>RL 4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–12 texts and topics.</p>	<ul style="list-style-type: none"> • I can perform an experiment, record and graph data, and analyze results. • I can determine the makeup of compounds and molecules upon reading their formulas.
Writing	<p>WL 8: Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.</p>	<ul style="list-style-type: none"> • I can report on macromolecules and their importance/roles in homeostasis.
Resources: (Labs or other essentials)		
<ul style="list-style-type: none"> • Jello/Pineapple Enzyme Lab https://www.dropbox.com/s/bv9tscyrucligm/Coop%20Chem%20Assessment--Jello%20%26%20Pineapple.doc • Properties of Water Lab • Simulations: http://phet.colorado.edu/en/simulations/category/biology • Murder Meal Lab sciencespot.net/Media/FrnsScience/MurderMeal.pdf 		
Technology/Engineering Connections		
<ul style="list-style-type: none"> • Could make connections to molecular gastronomy Top Chef • Create your own model of a macromolecule 		

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Biology Unit II: Cells & Energy

Biology Unit II: Cells & Energy		
Essential Questions	Supporting Questions	Key Terms
<ul style="list-style-type: none"> • How are cell structures adapted to their functions? • How do organisms obtain energy? 	<ul style="list-style-type: none"> • What are the basic structures and functions of cells? • What are the differences between prokaryotic and eukaryotic cells? • Compare and contrast a plant and animal cell. • How do cells use cell transport to maintain homeostasis? • Compare and contrast photosynthesis and cellular respiration. 	<p>organelles, photosynthesis, respiration, cellular respiration, osmosis, diffusion, active transport, homeostasis, cell theory, organic, carbohydrate, fermentation, protein, fat, nucleic acid, enzyme, chlorophyll, cell membrane, nucleus, cell wall, microorganism, prokaryote, eukaryote</p>
Science Core Standards		Student Learning Targets
<p>Standards & ILO's</p>	<p>Objective 2: Describe the flow of energy and matter in cellular function.</p> <p style="padding-left: 20px;">a. Distinguish between autotrophic and heterotrophic cells.</p> <p style="padding-left: 20px;">b. Illustrate the cycling of matter and the flow of energy through photosynthesis (e.g., by using light energy to combine CO₂ and H₂O to produce oxygen and sugars) and respiration (e.g., by releasing energy from sugar and O₂ to produce CO₂ and H₂O).</p> <p style="padding-left: 20px;">c. Measure the production of one or more of the products of either photosynthesis or respiration.</p> <p>Objective 3: Investigate the structure and function of cells and cell parts.</p> <p style="padding-left: 20px;">a. Explain how cells divide from existing cells.</p> <p style="padding-left: 20px;">b. Describe cell theory and relate the nature of science to the development of cell theory (e.g., built upon previous knowledge, use of increasingly more sophisticated technology).</p> <p style="padding-left: 20px;">c. Describe how the transport of materials in and out of cells enables cells to maintain homeostasis (i.e., osmosis, diffusion, active transport).</p> <p style="padding-left: 20px;">d. Describe the relationship between the organelles in a cell and the functions of that cell.</p> <p style="padding-left: 20px;">e. Experiment with microorganisms and/or plants to investigate</p>	<ul style="list-style-type: none"> • I can explain the three parts of the cell theory and the evidence that supports it. • I can diagram and explain how osmosis, diffusion and active transport maintain homeostasis in a cell. • I can draw the organelles of the cell and describe their functions. • I can compare and contrast photosynthesis & cellular respiration and write their respective equations. • I can describe the similarities and differences of different types of cells.

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	growth and reproduction.	
Math Skills		Math Implementation Ideas
Math	<ul style="list-style-type: none"> • Estimation • Ratios 	<ul style="list-style-type: none"> • I can calculate surface area to volume ratios. • I can estimate cell cells.
Literacy Standards		Literacy Implementation Ideas
Reading	<p>RL 2: Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.</p> <p>RL 4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–12 texts and topics.</p>	<ul style="list-style-type: none"> • I can summarize the history of the cell theory.
Writing	<p>WL 6: Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.</p>	<ul style="list-style-type: none"> • I can compare and contrast photosynthesis & cellular respiration and write their respective equations.
Resources: (Labs or other essentials)		
<ul style="list-style-type: none"> • Agar simulated cell diffusion rate lab • Learn.genetics.utah.edu Cell size lab 		
Technology/Engineering Connections		
<ul style="list-style-type: none"> • Measure the production of one or more of the products of either photosynthesis or respiration. • Experiment with microorganisms and/or plants to investigate growth and reproduction. 		

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Biology Unit III: DNA & Genetics		
Essential Questions	Supporting Questions	Key Terms
<ul style="list-style-type: none"> • How does cellular information pass from one generation to another? 	<ul style="list-style-type: none"> • What does the structure of DNA look like? • How does DNA store and transmit genetic information? • Explain why DNA is considered the universal code for life. • Relate the transmission of genetic information between generations. • Differentiate between different types of inheritance patterns. • Explain how mutations give rise to new phenotypes. 	<p>DNA, Nucleotide, Replication, Protein synthesis, RNA , Transcription, Protein, Amino acid, Translation, Ribosomes, Mitosis, Meiosis</p> <p>Allele, Gamete, Genotype, Heredity, Heterozygous, Homozygous, Dominant, Recessive, Pedigree, Phenotype, Punnett Square, Inheritance patterns, chromosome, gene, genetic engineering.</p>
Science Core Standards		Student Learning Targets
<p>Standards & ILO's</p>	<p>STANDARD IV: Students will understand that genetic information coded in DNA is passed from parents to offspring by sexual and asexual reproduction. The basic structure of DNA is the same in all living things. Changes in DNA may alter genetic expression.</p> <p>Objective 1: Compare sexual and asexual reproduction.</p> <ul style="list-style-type: none"> a. Explain the significance of meiosis and fertilization in genetic variation. b. Compare the advantages/disadvantages of sexual and asexual reproduction to survival of species. c. Formulate, defend, and support a perspective of a bioethical issue related to intentional or unintentional chromosomal mutations. <p>Objective 2: Predict and interpret patterns of inheritance in sexually reproducing organisms.</p> <ul style="list-style-type: none"> a. Explain Mendel's laws of segregation and independent assortment and their role in genetic inheritance. b. Demonstrate possible results of recombination in sexually reproducing organisms using one or two pairs of contrasting traits in the following crosses: dominance/recessive, incomplete dominance, co-dominance, and sex-linked traits. 	<ul style="list-style-type: none"> • I can describe the basic structure of DNA and the process of replication. • I can explain the processes of transcription and translation. • I can explain how the genetic code is universal. • I can use Mendel's laws of segregation and independent assortment. • I can discuss modes of inheritance including: dominant, recessive, co-dominant, incomplete dominance, sex-linked, and multiple allele. • I can explain how DNA/chromosome mutations affect phenotype. • I can analyze how heredity can impact

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	<p>c. Relate Mendelian principles to modern-day practice of plant and animal breeding. d. Analyze bioethical issues and consider the role of science in determining public policy.</p> <p>Objective 3: Explain how the structure and replication of DNA are essential to heredity and protein synthesis.</p> <p>a. Use a model to describe the structure of DNA. b. Explain the importance of DNA replication in cell reproduction. c. Summarize how genetic information encoded in DNA provides instructions for assembling protein molecules. d. Describe how mutations may affect genetic expression and cite examples of mutagens. e. Relate the historical events that lead to our present understanding of DNA to the cumulative nature of science knowledge and technology. f. Research, report, and debate genetic technologies that may improve the quality of life (e.g., genetic engineering, cloning, gene splicing).</p>	human life.
Math Skills		Math Implementation Ideas
Math	<ul style="list-style-type: none"> • Rates • Probability • Frequency • Ratios • Percentage 	<ul style="list-style-type: none"> • Calculate rates of cell division. • Use Punnett squares to determine probability of traits. • Calculate frequency of occurrence of various traits. • Determine expected and actual genotypic and phenotypic ratios. • Calculate mitotic index.
Literacy Standards		Literacy Implementation Ideas
Reading	<p>RL 2: Determine the central ideas or conclusion of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.</p> <p>RL 3: Follow a complex multi-step procedure when carrying out experiments, taking</p>	<ul style="list-style-type: none"> • Correctly perform an experiment based on a given set of procedures. • Symbols to represent words (such as B for dominant and b for recessive)

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	<p>measurement, or performing technical tasks, attending to special cases or exceptions defined in the text.</p> <p>RL 7: Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.</p>	
<p>Writing</p>	<p>WL 2: Write informative/explanatory texts, including the narration of scientific procedures/experiments, or technical processes.</p> <ol style="list-style-type: none"> a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g. headings), graphics (e.g. figures, tables), and multimedia when useful to aiding comprehension b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience’s knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts. d. Use precise language and domain specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers. e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic.) 	<ul style="list-style-type: none"> • Pedigrees – represent text with a drawing •
<p>Resources:(Labs or other essentials)</p>		
<ul style="list-style-type: none"> • Strawberry/cheek cell DNA extraction lab • Translating Sentences • Human traits survey • If they mated (offspring) • Karyotype analysis 		

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Technology/Engineering Connections

- Build a DNA model out of _____.
- Genetic engineering?

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Biology Unit IV: Evolution & Classification		
Essential Questions	Supporting Questions	Key Terms
<ul style="list-style-type: none"> • Define evolution. • What causes evolution? • How do we classify living things? 	<ul style="list-style-type: none"> • What is evolution? • What causes evolution? • What are the differences between natural selection and artificial selection. • Relate reproductive isolation to speciation. • Explain supporting evidence for evolution. 	Evolution, fossil record, geologic record, molecular, homologous, vestigial structures, mutation, recombination, hierarchy, classification scheme, theory, natural selection, adaptation, evidence, inference, speciation, biodiversity, taxonomy, kingdom, virus, protist, fungi, plant, animal, dichotomy
Science Core Standards		Student Learning Targets
Standards & ILO's	<p>STANDARD V: Students will understand that biological diversity is a result of evolutionary processes.</p> <p>Objective 1: Relate principles of evolution to biological diversity.</p> <ul style="list-style-type: none"> a. Describe the effects of environmental factors on natural selection. b. Relate genetic variability to a species' potential for adaptation to a changing environment. c. Relate reproductive isolation to speciation. d. Compare selective breeding to natural selection and relate the differences to agricultural practices. <p>Objective 2: Cite evidence for changes in populations over time and use concepts of evolution to explain these changes.</p> <ul style="list-style-type: none"> a. Cite evidence that supports biological evolution over time (e.g., geologic and fossil records, chemical mechanisms, DNA structural similarities, homologous and vestigial structures). b. Identify the role of mutation and recombination in evolution. c. Relate the nature of science to the historical development of the theory of evolution. d. Distinguish between observations and inferences in making interpretations related to evolution (e.g., observed similarities and differences in the beaks of Galapagos finches leads to the inference that they evolved from a common ancestor; observed similarities and differences in the structures of birds and reptiles leads to the 	<ul style="list-style-type: none"> • I can describe the basic mechanisms for evolution. • I can explain the role of mutation and recombination in evolution. • I can cite evidence that supports the theory of evolution. • I can identify organisms based on a dichotomous key.

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	<p>inference that birds evolved from reptiles).</p> <p>e. Review a scientific article and identify the research methods used to gather evidence that documents the evolution of a species.</p> <p>Objective 3: Classify organisms into a hierarchy of groups based on similarities that reflect their evolutionary relationships.</p> <p>a. Classify organisms using a classification tool such as a key or field guide.</p> <p>b. Generalize criteria used for classification of organisms (e.g., dichotomy, structure, broad to specific).</p> <p>c. Explain how evolutionary relationships are related to classification systems.</p> <p>d. Justify the ongoing changes to classification schemes used in biology.</p>	
Math Skills		Math Implementation Ideas
Math	<ul style="list-style-type: none"> • Graphing • Data Analysis 	<ul style="list-style-type: none"> • I can graph given data. • I can make conclusions based on given data.
Literacy Standards		Student Learning Targets
Reading	<p>RL 5: Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy)</p> <p>RL 6: Analyze the author’s purpose in providing an explanation, describing a procedure, or discussion an experiment in a text, defining the question the author seeks to address.</p> <p>RL 9: Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the finding support or contradict previous explanation or accounts.</p>	<ul style="list-style-type: none"> • I can relate the nature of science to the history of the theory of evolution. • I can distinguish between observations and inferences related to evolution. • I can review a scientific article and identify the research methods used to gather evidence that documents the evolution of a species. • I can classify organisms using a classification tool such as a key or field guide.

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Writing	<p>WL 1: Write arguments focused on discipline-specific content.</p> <ol style="list-style-type: none"> a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience’s knowledge level and concerns. c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented. <p>WL 9: Draw evidence from information texts to support analysis, reflection, and research.</p> <p>WL 10: Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.</p>	<ul style="list-style-type: none"> • I can cite evidence for changes in populations over time and use concepts of evolution to explain these changes.
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Resources:(Labs or other essentials)

- http://anthro.palomar.edu/evolve/evolve_2.htm
- Timeline with appearance of organisms.
- Evolution of *Canis pedatus*
- Evolution a Molecular View
- Fossil Study
- Reconstruction of a Fossil Pterosaur
- Skull Identification
- Comparing Primates
- Survival of the flattest
- Peppered Moths
- Galapagos Slides

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- Galapagos Movie
- Sharks Dichotomous Key
- Junk Drawer Classification
- http://anthro.palomar.edu/evolve/evolve_2.htm

Technology/Engineering Connections

- Justify the ongoing changes to classification schemes used in biology, PCR and gel electrophoresis.

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Biology Unit V: Structure & Function		
Essential Questions	Supporting Questions	Key Terms
<ul style="list-style-type: none"> • How is the function of organ systems related to their structure? 	<ul style="list-style-type: none"> • How does the function of the organ systems support homeostasis? • How do the organ systems of plants relate to the organ systems of animals? • How does the structure of an organ relate to it's function? 	organ, organ system, organism, hormonal modification, stomata, tissue, homeostasis, structure, function
Science Core Standards		Student Learning Targets
Standards & ILO's	<p>STANDARD III: Students will understand the relationship between structure and function of organs and organ systems.</p> <p>Objective 1: Describe the structure and function of organs.</p> <p>a. Diagram and label the structure of the primary components of representative organs in plants and animals (e.g., heart - muscle tissue, valves and chambers; lung - trachea, bronchial, alveoli; leaf - veins, stomata; stem - xylem, phloem, cambium; root - tip, elongation, hairs; skin - layers, sweat glands, oil glands, hair follicles; ovaries - ova, follicles, corpus luteum).</p> <p>b. Describe the function of various organs (e.g. heart, lungs, skin, leaf, stem, root, ovary).</p> <p>c. Relate the structure of organs to the function of organs.</p> <p>d. Compare the structure and function of organs in one organism to the structure and function of organs in another organism.</p> <p>e. Research and report on technological developments related to organs.</p> <p>Objective 2: Describe the relationship between structure and function of organ systems in plants and animals.</p> <p>a. Relate the function of an organ to the function of an organ system.</p> <p>b. Describe the structure and function of various organ systems (i.e., digestion, respiration, circulation, protection and support, nervous) and how these systems</p>	<ul style="list-style-type: none"> • I can compare tissues and organs that perform similar functions in plants and animals. • I can describe the function and main organs of each of the 11 organ systems in humans. • I can explain the role of each organ system in relation to homeostasis. • I can compare and contrast vascular and non-vascular plants .

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	<p>contribute to homeostasis of the organism.</p> <p>c. Examine the relationships of organ systems within an organism (e.g., respiration to circulation, leaves to roots) and describe the relationship of structure to function in the relationship.</p> <p>d. Relate the tissues that make up organs to the structure and function of the organ.</p> <p>e. Compare the structure and function of organ systems in one organism to the structure and function in another organism (e.g., chicken to sheep digestive system; fern to peach reproductive system).</p>	
Math Skills		Math Implementation Ideas
Math	<ul style="list-style-type: none"> • Graphing • Data Analysis 	<ul style="list-style-type: none"> • I can use a graph to represent respiratory volumes.
Literacy Standards		Literacy Implementation Ideas
Reading	<p>RL 2: Determine the central ideas of conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.</p> <p>RL 4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-12 texts and topics.</p>	I can write detailed lab summaries of dissection activities comparing the organ structure of various animals.
Writing	<p>WL 5: Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.</p>	I can write detailed lab summaries of dissection activities comparing the organ structure of various animals.
Resources:(Labs or other essentials)		
<ul style="list-style-type: none"> • Dissection: Comparison of vertebrate vs invertebrate • Leaf Peel Lab: Examining stomata under the microscope • Vernier probe Heart rate, respiration 		

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Technology/Engineering Connections

- Lab grown organs, organ transplantation
- Cancer Treatments

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Biology Unit VI: Ecology

Biology Unit VI: Ecology		
Essential Questions	Supporting Questions	Key Terms
<ul style="list-style-type: none"> • How does energy flow through an ecosystem? • What are the relationships between matter cycles and organisms? • How interactions among organisms and their environment shape ecosystems? 	<ul style="list-style-type: none"> • What are the strategies used by organisms to balance expended energy to energy intake? • What are the processes involved in the carbon, nitrogen, and water cycles? • How do personal choices impact matter cycling? • How do changes in abiotic factors change an ecosystem? 	<p>predator, prey, symbiosis, mutualism, parasitism, commensalism, competition, ecosystem, carbon cycle, water cycle, nitrogen cycle, population diversity, energy pyramid, consumers, producers, limiting factor, decomposers, food chain/web, biotic, abiotic, community, autotrophic, heterotrophic, population, niche, biome</p>
Science Core Standards		Student Learning Targets
Standards & ILO's	<p>STANDARD I: Students will understand that living organisms interact with one another and their environment.</p> <p>Objective 1: Summarize how energy flows through an ecosystem.</p> <ul style="list-style-type: none"> a. Arrange components of a food chain according to energy flow. b. Compare the quantity of energy in the steps of an energy pyramid. c. Describe strategies used by organisms to balance the energy expended to obtain food to the energy gained from the food (e.g., migration to areas of seasonal abundance, switching type of prey based upon availability, hibernation or dormancy). d. Compare the relative energy output expended by an organism in obtaining food to the energy gained from the food (e.g., hummingbird - energy expended hovering at a flower compared to the amount of energy gained from the nectar, coyote - chasing mice to the energy gained from catching one, energy expended in migration of birds to a location with seasonal abundance compared to energy gained by staying in a cold climate with limited food). e. Research food production in various parts of the world (e.g., industrialized societies' greater use of fossil fuel in food production, human health related to food product). 	<ul style="list-style-type: none"> • I can summarize how energy flows through an ecosystem. • I can explain relationships between matter cycles and organisms. • I can describe interactions among organisms and their environment help shape ecosystems.

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	<p>Objective 2: Explain relationships between matter cycles and organisms.</p> <ul style="list-style-type: none"> a. Use diagrams to trace the movement of matter through a cycle (i.e., carbon, oxygen, nitrogen, water) in a variety of biological communities and ecosystems. b. Explain how water is a limiting factor in various ecosystems. c. Distinguish between inference and evidence in a newspaper, magazine, journal, or Internet article that addresses an issue related to human impact on cycles of matter in an ecosystem and determine the bias in the article. d. Evaluate the impact of personal choices in relation to the cycling of matter within an ecosystem (e.g., impact of automobiles on the carbon cycle, impact on landfills of processed and packaged foods). <p>Objective 3: Describe how interactions among organisms and their environment help shape ecosystems.</p> <ul style="list-style-type: none"> a. Categorize relationships among living things according to predator-prey, competition, and symbiosis. b. Formulate and test a hypothesis specific to the effect of changing one variable upon another in a small ecosystem. c. Use data to interpret interactions among biotic and abiotic factors (e.g., pH, temperature, precipitation, populations, diversity) within an ecosystem. d. Investigate an ecosystem using methods of science to gather quantitative and qualitative data that describe the ecosystem in detail. e. Research and evaluate local and global practices that affect ecosystems. 	
Math Skills		Math Implementation Ideas
Math	<ul style="list-style-type: none"> • Correlation • Graphing 	<ul style="list-style-type: none"> • I can investigate an ecosystem and collect data and use graphs to show the relationships between abiotic and biotic factors. • I can interpret population growth graphs.
Literacy Standards		Literacy Implementation Ideas
Reading	<p>RL 1: Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.</p> <p>RL 8: Assess the extent to which the reasoning and evidence in a text support the</p>	<ul style="list-style-type: none"> • I can read a scientific article on ecosystems and be able to distinguish between evidence and inference.

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	author’s claim or a recommendation for solving a scientific or technical problem.	<ul style="list-style-type: none"> • I can research climate change and be able to apply scientific principles and concepts to evaluate relevance of scientific claims. • I can cite examples of how science affects human life and the viability of an ecosystem.
Writing	WL 4: Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	<ul style="list-style-type: none"> • I can report on the abiotic and biotic factors of an ecosystem and the current changes to that ecosystem. • I can explain the impact of science and technology on ecosystems.
Resources:(Labs or other essentials)		
<ul style="list-style-type: none"> • Brine Shrimp Lab • Changing Ecosystems Lab • Biome Infoshare • Ecosystem in a jar. • Winogradsky Columns • The Commons 		
Technology/Engineering Connections		
<ul style="list-style-type: none"> • Research the impact of hydroelectric dams on river ecosystems. • Investigate best design for erosion prevention. • Design a fish ladder. • Design a wildlife corridor • http://climate.nasa.gov/ • http://www.shodor.org/interactivate/activities/RabbitsAndWolves/ • http://www.gracelinks.org/982/energy-use-climate-change • http://www.learner.org/courses/envsci/index.html 		

College and Career Readiness Anchor Standards for Reading

The grades 6–12 standards on the following pages define what students should understand and be able to do by the end of each grade span. They correspond to the College and Career Readiness (CCR) anchor standards below by number. The CCR and grade-specific standards are necessary complements—the former providing broad standards, the latter providing additional specificity—that together define the skills and understandings that all students must demonstrate.

Key Ideas and Details

1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
3. Analyze how and why individuals, events, or ideas develop and interact over the course of a text.

Craft and Structure

4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.
5. Analyze the structure of texts, including how specific sentences, paragraphs, and larger portions of the text (e.g., a section, chapter, scene, or stanza) relate to each other and the whole.
6. Assess how point of view or purpose shapes the content and style of a text.

Integration of Knowledge and Ideas

7. Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words.*
8. Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.
9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.

Range of Reading and Level of Text Complexity

10. Read and comprehend complex literary and informational texts independently and proficiently.

*Please see “Research to Build and Present Knowledge” in Writing for additional standards relevant to gathering, assessing, and applying information from print and digital sources.

Note on range and content of student reading

Reading is critical to building knowledge in history/social studies as well as in science and technical subjects. College and career ready reading in these fields requires an appreciation of the norms and conventions of each discipline, such as the kinds of evidence used in history and science; an understanding of domain-specific words and phrases; an attention to precise details; and the capacity to evaluate intricate arguments, synthesize complex information, and follow detailed descriptions of events and concepts. In history/social studies, for example, students need to be able to analyze, evaluate, and differentiate primary and secondary sources. When reading scientific and technical texts, students need to be able to gain knowledge from challenging texts that often make extensive use of elaborate diagrams and data to convey information and illustrate concepts. Students must be able to read complex informational texts in these fields with independence and confidence because the vast majority of reading in college and workforce training programs will be sophisticated nonfiction. It is important to note that these Reading standards are meant to complement the specific content demands of the disciplines, not replace them.

Reading Standards for Literacy in Science and Technical Subjects 6-12

Grades 6-8 students:	Grades 9-10 students:	Grades 11-12 students:
Key Ideas and Details		
1. Cite specific textual evidence to support analysis of science and technical texts.	1. Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.	1. Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
2. Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.	2. Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.	2. Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.	3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.	3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
Craft and Structure		
4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to <i>grades 6-8 texts and topics</i> .	4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to <i>grades 9-10 texts and topics</i> .	4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to <i>grades 11-12 texts and topics</i> .
5. Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.	5. Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., <i>force, friction, reaction force, energy</i>).	5. Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.	6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.	6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
Integration of Knowledge and Ideas		
7. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).	7. Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.	7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
8. Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.	8. Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.	8. Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
9. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.	9. Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.	9. Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
Range of Reading and Level of Text Complexity		
10. By the end of grade 8, read and comprehend science/technical texts in the grades 6-8 text complexity band independently and proficiently.	10. By the end of grade 10, read and comprehend science/technical texts in the grades 9-10 text complexity band independently and proficiently.	10. By the end of grade 12, read and comprehend science/technical texts in the grades 11-CCR text complexity band independently and proficiently.

College and Career Readiness Anchor Standards for Writing

The grades 6–12 standards on the following pages define what students should understand and be able to do by the end of each grade span. They correspond to the College and Career Readiness (CCR) anchor standards below by number. The CCR and grade-specific standards are necessary complements—the former providing broad standards, the latter providing additional specificity—that together define the skills and understandings that all students must demonstrate.

Text Types and Purposes*

1. Write arguments to support claims in an analysis of substantive topics or texts using valid reasoning and relevant and sufficient evidence.
2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.
3. Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details and well-structured event sequences.

Production and Distribution of Writing

4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.
6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

Research to Build and Present Knowledge

7. Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.
8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.
9. Draw evidence from literary or informational texts to support analysis, reflection, and research.

Range of Writing

10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

Note on range and content of student writing

For students, writing is a key means of asserting and defending claims, showing what they know about a subject, and conveying what they have experienced, imagined, thought, and felt. To be college and career ready writers, students must take task, purpose, and audience into careful consideration, choosing words, information, structures, and formats deliberately. They need to be able to use technology strategically when creating, refining, and collaborating on writing. They have to become adept at gathering information, evaluating sources, and citing material accurately, reporting findings from their research and analysis of sources in a clear and cogent manner. They must have the flexibility, concentration, and fluency to produce high-quality first-draft text under a tight deadline and the capacity to revisit and make improvements to a piece of writing over multiple drafts when circumstances encourage or require it. To meet these goals, students must devote significant time and effort to writing, producing numerous pieces over short and long time frames throughout the year.

*These broad types of writing include many subgenres. See Appendix A for definitions of key writing types.

Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects 6-12

The standards below begin at grade 6; standards for K–5 writing in history/social studies, science, and technical subjects are integrated into the K–5 Writing standards. The CCR anchor standards and high school standards in literacy work in tandem to define college and career readiness expectations—the former providing broad standards, the latter providing additional specificity.

Grades 6–8 students:	Grades 9–10 students:	Grades 11–12 students:
Text Types and Purposes		
<ol style="list-style-type: none"> 1. Write arguments focused on <i>discipline-specific content</i>. <ol style="list-style-type: none"> a. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically. b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources. c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence. d. Establish and maintain a formal style. e. Provide a concluding statement or section that follows from and supports the argument presented. 	<ol style="list-style-type: none"> 1. Write arguments focused on <i>discipline-specific content</i>. <ol style="list-style-type: none"> a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience’s knowledge level and concerns. c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented. 	<ol style="list-style-type: none"> 1. Write arguments focused on <i>discipline-specific content</i>. <ol style="list-style-type: none"> a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience’s knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.

Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects 6-12

Grades 6–8 students:	Grades 9–10 students:	Grades 11–12 students:
Text Types and Purposes (continued)		
<p>2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p> <ol style="list-style-type: none"> Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension. Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts. Use precise language and domain-specific vocabulary to inform about or explain the topic. Establish and maintain a formal style and objective tone. Provide a concluding statement or section that follows from and supports the information or explanation presented. 	<p>2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p> <ol style="list-style-type: none"> Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic). 	<p>2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p> <ol style="list-style-type: none"> Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).
<p>3. (See note; not applicable as a separate requirement)</p>	<p>3. (See note; not applicable as a separate requirement)</p>	<p>3. (See note; not applicable as a separate requirement)</p>

Note: Students' narrative skills continue to grow in these grades. The Standards require that students be able to incorporate narrative elements effectively into arguments and informative/explanatory texts. In history/social studies, students must be able to incorporate narrative accounts into their analyses of individuals or events of historical import. In science and technical subjects, students must be able to write precise enough descriptions of the step-by-step procedures they use in their investigations or technical work that others can replicate them and (possibly) reach the same results.

Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects 6–12

Grades 6–8 students:	Grades 9–10 students:	Grades 11–12 students:
Production and Distribution of Writing		
4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
5. With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.	5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.	5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
6. Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.	6. Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.	6. Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
Research to Build and Present Knowledge		
7. Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.	7. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.	7. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
8. Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.	8. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.	8. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
9. Draw evidence from informational texts to support analysis, reflection, and research.	9. Draw evidence from informational texts to support analysis, reflection, and research.	9. Draw evidence from informational texts to support analysis, reflection, and research.
Range of Writing		
10. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.	10. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.	10. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.



Performance Definitions for the Levels of English Language Proficiency in Grades K-12

At the given level of English language proficiency, English language learners will process, understand, produce, or use:

6 Reaching	<ul style="list-style-type: none"> specialized or technical language reflective of the content areas at grade level a variety of sentence lengths of varying linguistic complexity in extended oral or written discourse as required by the specified grade level oral or written communication in English comparable to English-proficient peers
5 Bridging	<ul style="list-style-type: none"> specialized or technical language of the content areas a variety of sentence lengths of varying linguistic complexity in extended oral or written discourse, including stories, essays, or reports oral or written language approaching comparability to that of English-proficient peers when presented with grade-level material
4 Expanding	<ul style="list-style-type: none"> specific and some technical language of the content areas a variety of sentence lengths of varying linguistic complexity in oral discourse or multiple, related sentences, or paragraphs oral or written language with minimal phonological, syntactic, or semantic errors that do not impede the overall meaning of the communication when presented with oral or written connected discourse with sensory, graphic, or interactive support
3 Developing	<ul style="list-style-type: none"> general and some specific language of the content areas expanded sentences in oral interaction or written paragraphs oral or written language with phonological, syntactic, or semantic errors that may impede the communication, but retain much of its meaning, when presented with oral or written, narrative, or expository descriptions with sensory, graphic, or interactive support
2 Beginning	<ul style="list-style-type: none"> general language related to the content areas phrases or short sentences oral or written language with phonological, syntactic, or semantic errors that often impede the meaning of the communication when presented with one- to multiple-step commands, directions, questions, or a series of statements with sensory, graphic, or interactive support
1 Entering	<ul style="list-style-type: none"> pictorial or graphic representation of the language of the content areas words, phrases, or chunks of language when presented with one-step commands, directions, WH-, choice, or yes/no questions, or statements with sensory, graphic, or interactive support oral language with phonological, syntactic, or semantic errors that often impede meaning when presented with basic oral commands, direct questions, or simple statements with sensory, graphic, or interactive support



Grade Level Cluster Can Do Descriptors

The grade level cluster Can Do Descriptors have been created by teachers, primarily for teachers, who work with English language learners throughout the consortium. During 2007-08, over 900 teachers and administrators participated in refining and validating five grade level clusters of Descriptors from the original document spanning the K-12 spectrum. These Descriptors for the four language domains—listening, speaking, reading, and writing—and five levels of English language proficiency are based on the WIDA English Language Proficiency Standards.

Interpretation of the Can Do Descriptors

To maintain the succinctness of the individual statements, some basic assumptions need to be made in interpreting the Can Do Descriptors.

1. Sensory, graphic, or interactive support are present through language proficiency level 4, Expanding.
2. English language learners can process or produce the **language** associated with the stated language functions.
3. Linguistic complexity, vocabulary usage, and language control increase incrementally as students move from one English language proficiency level to the next.

The Can Do Descriptors are a sampling of the language expectations of English language learners as they travel along the continuum of English language development. Unlike the strands of model performance indicators that scaffold across levels of language proficiency, the Can Do Descriptors function independently within a given level of language proficiency.

Uses for the Can Do Descriptors

The Can Do Descriptors are a resource, in addition to the English language proficiency standards, to use in classrooms with English language learners. As an instructional assessment tool, language teachers may:

- Share the Descriptors with classroom teachers and administrators to describe the second language acquisition process around the levels of English language proficiency
- Provide resource teachers, such as Title I or literacy coaches, additional information about English language learners
- Use to plan with tutors or mentors who work with English language learners
- Develop or co-develop lessons and units of study with differentiated language objectives
- Set language goals with their English language learners*
- Explain to parents students' progress in listening, speaking, reading, and writing*
- Suggest language goals to be incorporated into Individual Education Programs (IEPs) for English language learners with diagnosed disabilities
- Translate English language proficiency test scores (i.e., ACCESS for ELLs®, W-APT™, and WIDA MODEL™) into classroom practice
- Observe and note levels of student performance as a precursor to using WIDA Speaking and Writing Rubrics for formative assessment
- Use the Descriptors to advocate on behalf of English language learners

** For these uses, the Can Do Descriptors are also available in Spanish on pp. 8-11 of this booklet.*



Can Do Descriptors: Grade Level Cluster 9-12

For the given level of English language proficiency and with visual, graphic, or interactive support through Level 4, English language learners can process or produce the **language** needed to:

	Level 1 Entering	Level 2 Beginning	Level 3 Developing	Level 4 Expanding	Level 5 Bridging	Level 6 - Reaching
LISTENING	<ul style="list-style-type: none"> Point to or show basic parts, components, features, characteristics, and properties of objects, organisms, or persons named orally Match everyday oral information to pictures, diagrams, or photographs Group visuals by common traits named orally (e.g., "These are polygons.") Identify resources, places, products, figures from oral statements, and visuals 	<ul style="list-style-type: none"> Match or classify oral descriptions to real-life experiences or visually-represented, content-related examples Sort oral language statements according to time frames Sequence visuals according to oral directions 	<ul style="list-style-type: none"> Evaluate information in social and academic conversations Distinguish main ideas from supporting points in oral, content-related discourse Use learning strategies described orally Categorize content-based examples described orally 	<ul style="list-style-type: none"> Distinguish between multiple meanings of oral words or phrases in social and academic contexts Analyze content-related tasks or assignments based on oral discourse Categorize examples of genres read aloud Compare traits based on visuals and oral descriptions using specific and some technical language 	<ul style="list-style-type: none"> Interpret cause and effect scenarios from oral discourse Make inferences from oral discourse containing satire, sarcasm, or humor Identify and react to subtle differences in speech and register (e.g., hyperbole, satire, comedy) Evaluate intent of speech and act accordingly 	
SPEAKING	<ul style="list-style-type: none"> Answer yes/no or choice questions within context of lessons or personal experiences Provide identifying information about self Name everyday objects and pre-taught vocabulary Repeat words, short phrases, memorized chunks of language 	<ul style="list-style-type: none"> Describe persons, places, events, or objects Ask WH- questions to clarify meaning Give features of content-based material (e.g., time periods) Characterize issues, situations, regions shown in illustrations 	<ul style="list-style-type: none"> Suggest ways to resolve issues or pose solutions Compare/contrast features, traits, characteristics using general and some specific language Sequence processes, cycles, procedures, or events Conduct interviews or gather information through oral interaction Estimate, make predictions or pose hypotheses from models 	<ul style="list-style-type: none"> Take a stance and use evidence to defend it Explain content-related issues and concepts Compare and contrast points of view Analyze and share pros and cons of choices Use and respond to gossip, slang, and idiomatic expressions Use speaking strategies (e.g., circumlocution) 	<ul style="list-style-type: none"> Give multimedia oral presentations on grade-level material Engage in debates on content-related issues using technical language Explain metacognitive strategies for solving problems (e.g., "Tell me how you know it.") Negotiate meaning in pairs or group discussions 	

The Can Do Descriptors work in conjunction with the WIDA Performance Definitions of the English language proficiency standards. The Performance Definitions use three criteria (1. linguistic complexity; 2. vocabulary usage; and 3. language control) to describe the increasing quality and quantity of students' language processing and use across the levels of language proficiency.

Can Do Descriptors: Grade Level Cluster 9-12

For the given level of English language proficiency and with visual, graphic, or interactive support through Level 4, English language learners can process or produce the **language** needed to:

	Level 1 Entering	Level 2 Beginning	Level 3 Developing	Level 4 Expanding	Level 5 Bridging	Level 6 - Reaching
READING	<ul style="list-style-type: none"> Match visual representations to words/phrases Read everyday signs, symbols, schedules, and school-related words/phrases Respond to WH- questions related to illustrated text Use references (e.g., picture dictionaries, bilingual glossaries, technology) 	<ul style="list-style-type: none"> Match data or information with its source or genre (e.g., description of element to its symbol on periodic table) Classify or organize information presented in visuals or graphs Follow multi-step instructions supported by visuals or data Match sentence-level descriptions to visual representations Compare content-related features in visuals and graphics Locate main ideas in a series of related sentences 	<ul style="list-style-type: none"> Apply multiple meanings of words/phrases to social and academic contexts Identify topic sentences or main ideas and details in paragraphs Answer questions about explicit information in texts Differentiate between fact and opinion in text Order paragraphs or sequence information within paragraphs 	<ul style="list-style-type: none"> Compare/contrast authors' points of view, characters, information, or events Interpret visually- or graphically-supported information Infer meaning from text Match cause to effect Evaluate usefulness of data or information supported visually or graphically 	<ul style="list-style-type: none"> Interpret grade-level literature Synthesize grade-level expository text Draw conclusions from different sources of informational text Infer significance of data or information in grade-level material Identify evidence of bias and credibility of source 	
WRITING	<ul style="list-style-type: none"> Label content-related diagrams, pictures from word/phrase banks Provide personal information on forms read orally Produce short answer responses to oral questions with visual support Supply missing words in short sentences 	<ul style="list-style-type: none"> Make content-related lists of words, phrases, or expressions Take notes using graphic organizers or models Formulate yes/no, choice and WH- questions from models Correspond for social purposes (e.g., memos, e-mails, notes) 	<ul style="list-style-type: none"> Complete reports from templates Compose short narrative and expository pieces Outline ideas and details using graphic organizers Compare and reflect on performance against criteria (e.g., rubrics) 	<ul style="list-style-type: none"> Summarize content-related notes from lectures or text Revise work based on narrative or oral feedback Compose narrative and expository text for a variety of purposes Justify or defend ideas and opinions Produce content-related reports 	<ul style="list-style-type: none"> Produce research reports from multiple sources Create original pieces that represent the use of a variety of genres and discourses Critique, peer-edit and make recommendations on others' writing from rubrics Explain, with details, phenomena, processes, procedures 	

The Can Do Descriptors work in conjunction with the WIDA Performance Definitions of the English language proficiency standards. The Performance Definitions use three criteria (1. linguistic complexity; 2. vocabulary usage; and 3. language control) to describe the increasing quality and quantity of students' language processing and use across the levels of language proficiency.

Canyons School District Scientific Practices

Critical Features of Instruction

	Laboratory Skills Use CSD Lab Report Expectations	Mathematical and Computational Skills
SCIENTIFIC PROCESS SKILLS	<p>1. Before a Lab Connect Conceptual Understanding with Experiment (Pre-Lab Activities)</p> <ul style="list-style-type: none"> • Activate Prior Knowledge • Build Background Knowledge • Text Overview/Scavenger Hunt/Surveying the Text • Connecting Visuals to the Surrounding Text • Pre-Lab Readings • Pre-Lab Quiz • Pre-teach Text-Related Vocabulary and Academic Vocabulary (Key Terms) <ul style="list-style-type: none"> ○ Key Terms ○ Academic Vocabulary ○ Text-Specific Vocabulary ○ Derivational/Roots ○ Word Patterns & Word Parts <p>Organize for Success in the Lab</p> <ul style="list-style-type: none"> • Assign & Rotate Lab Group Responsibilities • Write Lab Introduction <ul style="list-style-type: none"> ○ Identify Independent & Dependent Variables ○ Hypotheses & Procedures ○ Discussion of Theories/Concepts • Gallery Walk <p>2. During a Lab</p> <ul style="list-style-type: none"> • Collect data <ul style="list-style-type: none"> ○ Draw Pictures ○ Create Data Tables • Discuss findings with lab groups • Analyze Data • Write Conclusions <p>3. After a Lab</p> <ul style="list-style-type: none"> • Evaluate Student Data & Completed Lab Write Ups • Strategic Cross-Group Partnering (Think-Pair-Share) • Presentations <ul style="list-style-type: none"> ○ Mini Poster Sessions ○ PowerPoints/Prezi ○ Gallery Walk • Reciprocal Teaching • 30 Second Experts 	<p>1. Follow the Explicit Instruction Model</p> <ul style="list-style-type: none"> • I do • We do • You all do • You do <p>2. Teach and practice estimation skills</p> <ul style="list-style-type: none"> • Predict an answer prior to working out a problem • Compare prediction (theoretical) with actual (experimental) answer <p>3. Require units of measurement</p> <ul style="list-style-type: none"> • Always use metric system; measurements are meaningless without units • Scientific notation • Attend to precision, accuracy, and measurement of error <p>4. Analyze data using grade appropriate statistical skills</p> <ul style="list-style-type: none"> • 6th Grade <ul style="list-style-type: none"> ○ Understand that a set of data has a distribution which can be described by its center, spread, and overall shape ○ Display numerical data; (number line, histograms, box plots) ○ Calculate median/mean & interquartile range • 7thGrade <ul style="list-style-type: none"> ○ Make Inferences ○ Importance of Random Sampling ○ Explore variation in estimates or predictions in data sets ○ Use visual representations to compare/contrast numerical data ○ Understand that 1 = 100% ○ Use the results of an experiment to estimate the probability of an event ○ Compare theoretical vs. experimental probability (what is the probability of a family with five children having exactly two boys?) • 8thGrade <ul style="list-style-type: none"> ○ Collect, record and construct a set of vicariate data using a scatter plot ○ Determine whether relationships are linear, or nonlinear using a scatter plot ○ Interpret patterns on a scatter plot. ○ Create a line of best fit with a set of data points ○ Judge how well a trend line fits a set of data points ○ Interpret the meaning of the slopes as a rate of change <p>5. Building Mastery</p> <ul style="list-style-type: none"> • Fluency • Automaticity • Distributed Practice

Critical Features of Instruction

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READING IN SCIENCE	Comprehension General Guidelines for Close Reading:	
	<p>1. Before Reading</p> <ul style="list-style-type: none"> • Select appropriate text • Activate Prior Knowledge • Build Background Knowledge • Think Alouds • Graphic Organizers • Concept Talk • Essential Question • Concept Map (Storyboard) • 30 Second Expert • Quick Write • Text Overview/Scavenger Hunt/Surveying the Text • Connecting Visuals to the Surrounding Text • Predict the Main Idea • Questioning • Agree or Disagree • Pre-teach Text-Related Vocabulary and Academic Vocabulary (Key Terms) <ul style="list-style-type: none"> ○ Key Terms ○ Academic Vocabulary ○ Text-Specific Vocabulary ○ Derivational/Roots ○ Word Patterns & Word Parts <p>2. During Reading</p> <p>Active Reading Strategies Help Students:</p> <ul style="list-style-type: none"> • Summarize • Analyze, Synthesize & Evaluate • Compare & Contrast <p>Active Reading Strategies:</p> <ul style="list-style-type: none"> • Note-taking <ul style="list-style-type: none"> ○ Skeletal Notes ○ Cornell Notes ○ Double-Entry Journal • Vocabulary Strategies <ul style="list-style-type: none"> ○ Read-forward ○ Context Clues ○ Figurative & Connotative Meanings • Annotation <ul style="list-style-type: none"> ○ Marking Text ○ Writing in the Margins ○ Charting the Text • General Strategies <ul style="list-style-type: none"> ○ Cite Textual Evidence ○ Text Features & Structure (how to use a textbook) ○ Using Fix-Up Strategies (SQ3R, Monitor Comprehension, Reading-Reflection Pauses, Stop/Draw) ○ Four Corners 	<ul style="list-style-type: none"> • Graphic Organizers • Collaborative Reading Strategies <ul style="list-style-type: none"> ○ Reciprocal Teaching ○ Interactive Reading Guides ○ Strategic Partnering <p>3. After Reading</p> <ul style="list-style-type: none"> • Assign group work • Cite Textual Evidence • Text Features and Structure • Using Fix-Up Strategies (SQ3R, Monitor Comprehension, Reading-Reflection Pauses, Stop/Draw) • Socratic Seminar • Strategic Partnering (Think-Pair-Share) • Presentations <ul style="list-style-type: none"> • Interviews • Blogs • Wikis • Speech • PowerPoint/Prezi • Cite Textual Evidence • Reciprocal Teaching • 30 Second Expert • Gallery Walk • Learning Logs
TEXT TYPES	Literary Text Fiction Literary Nonfiction Poetry	Informational Text Exposition Argumentation Procedural

Critical Features of Instruction

Student Writing Recorded in Interactive Notebooks/Engineering Journals

WRITING IN SCIENCE	Interactive Notebooks <ul style="list-style-type: none"> • Right Side = Student Input <ul style="list-style-type: none"> ○ Notes from a lecture/guest speaker ○ Text or other source ○ Vocabulary words ○ Video and film notes ○ Procedures ○ Readings ○ Questions and answers ○ Sample problems • Left Side = Student Output <ul style="list-style-type: none"> ○ Brainstorming ○ Student generated concept maps/graphic organizers ○ Student questions ○ Student illustrations ○ Student annotations ○ Student generated poetry/songs/etc. ○ Evidence for own reasoning ○ Student generated data and graphs ○ Student generated analysis Writing ○ Student responses to writing prompts 		Writing Process for Formal Scientific Writing/Sustained Writing	
	Writing to Learn/Demonstrate Knowledge <ul style="list-style-type: none"> • Quick write <ul style="list-style-type: none"> ○ Bell Ringers ○ Starters ○ Exit Tickets • Graphic Organizers (Venn diagram, webbing, KWL, T-chart) • Concept mapping • Anticipation Guide (pre-reading, pre-speaking, pre-listening) • Gallery walk/Carousel • Learning Logs • Summarizing • Cornell Notes • Formal/Informal Lab Reports • Lab Reports • Sentence Starters • Prompts • 5 W's + H • Observation vs. Inference • GIST Summary • Cause and Effect • Timelines • Biographies of scientists/engineer 		1. Before Writing Prewrite (Individual and Collaborative) <ul style="list-style-type: none"> • Choose Audience, Purpose, and Form • Rubric Preview • View and Analyze Student Examples • Reading and Research <ul style="list-style-type: none"> ○ Cornell Notes ○ Outlines ○ Listing & Grouping ○ Graphic Organizers ○ Discussion, Guided Critiques ○ Anticipatory Guide ○ Speculation/Predictions ○ Summarizing • Planning <ul style="list-style-type: none"> ○ Outlining ○ Quick writing ○ Gallery Walk ○ Graphic Organizers ○ Timelines ○ T-charts 2. During Writing Draft (Individual and Collaborative) <ul style="list-style-type: none"> • Whole Class Draft • Small Group Draft • Filling in the outline Reader Response (Individual and Collaborative) <ul style="list-style-type: none"> • Verbal Response • Verbal Response Small Group • Written Response Peer • Pass the paper Edit (Individual and Collaborative) <ul style="list-style-type: none"> • Editing Journal • Expert Group Editing • Pass the paper 3. After Writing Final Draft Publishing (Individual and Collaborative) <ul style="list-style-type: none"> • Self Evaluation and Reflection 	
WRITING TYPES	Argument	Informative/Explanatory	Narrative	
	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence. <i>Use: controversial scientific topics, debate, & socratic seminar</i>	Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content. <i>Use: writing a paragraph to explain data table or chart, explaining a scientific process, summarize an article, writing a research paper</i>	Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences. <i>Use: Turn a timeline of events into a fictional story, RAFT Paper, writing a story/poem/play/song about a scientific concept, etc.</i>	

CSD LAB REPORT EXPECTATIONS

A lab report should be seen as an argument or persuasive document. It should lead your reader through data and analysis to the same conclusions that you reach at the end of your report. To do this, you should present information in a logical and readable manner. Do not assume that your reader knows the procedure, the background concepts or the questions provided in the lab handouts, if one is given to you.

Each lab report should include the following:

Introduction	<p>TITLE Appropriately title your lab as per teacher instruction.</p>
	<p>PURPOSE This section should describe the purpose or the problem and be in paragraph form. It should also include relevant background information and why the lab activity is important.</p>
	<p>VARIABLES An <i>independent variable</i> is the variable that is changed in a scientific experiment to test the effects on the <i>dependent variable</i>.</p>
	<p>HYPOTHESIS To construct a hypothesis, express what you think will be the effect of the independent variable on the dependent variable. This should be a cause and effect statement like the one below: <i>As the independent variable describe how you change it, the dependent variable will describe the effect.</i> Example: As the diameter of a cars tires increase, the maximum speed of the car will decrease.</p>
	<p>PROCEDURE This section should include a short paragraph describing the steps involved in the lab. Steps must be written in sentence form (no lists) and must not contain "we," "I," "us," etc.</p>
Data & Observations	<p>DATA COLLECTION This section should all data collected. In most cases, data should be presented in a table. Make sure that all column headings include units for all data and calculations. Recorded data and calculations should use the appropriate number of significant figures based on the precision of the measurement tools used. Any qualitative (descriptive) observations should be written in complete sentences.</p>
	<p>GRAPHS This section should include a visual representation of the data collected from your experiment. There are many types of graphs that could be used, such as bar graphs, histograms, scatter plots, line graphs, pie charts, etc. Graphs should have an appropriate title, labeled axes, and display an appropriate scale.</p>

Analysis	<p>This section should include finished calculations and answers to lab questions. Be sure to use complete sentences and, in general, make the answers as clear and readable as possible. Assume that your reader does not know what analysis questions are posed in your lab handout. Include enough of the question in your analysis so that your reader knows what you are discussing without having to read the questions.</p>
	<p>CALCULATIONS</p> <p>This section should include the work for your calculations, including equations, units, and appropriate number of significant figures. Your work should be easy to follow and be done in a logical manner. A quick glance at this section by the reader should indicate each step of your calculations. Include at least one sample calculation of each type. Show calculations <u>mathematically instead of in paragraph form.</u></p>
	<p>UNCERTAINTY AND EXPERIMENTAL ERROR (When Appropriate)</p> <p>Observations and experiments involving numerical measurements have some degree of error or uncertainty. When completing the analysis section of your lab, you must bear in mind possible error and limitations of measurement. What tools were used for measurement? How accurate are they? How precisely can they be read? How do your results compare to theory given the limitations of the tools and procedures used? You need to estimate what is a reasonable level of experimental error in your results. In addition to explaining the source of error, you should note how significant each error is. Whenever possible, quantify the effect that the error had on your data or results. There should be evidence of the errors, so state the evidence. Don't list everything the might possibly have gone wrong with the experiment.</p> <p>Numerical methods of estimating error include the following:</p> <p><i>Absolute error</i> is the difference between a measured or observed value and the accepted value. The quantity is normally expressed as a percentage, and is usually called percentage error. It is calculated as follows:</p> $\text{Percentage error} = \frac{\text{accepted value} - \text{measured value}}{\text{accepted value}} \times 100\%$ <p><i>Relative error.</i> Sometimes, if two or more values of the same quantity are measured, it is useful to calculate how close they are to each other by calculating the percentage difference between them. This quantity represents a measure of relative error and is calculated as follows:</p> $\text{Percentage difference} = \frac{\text{difference in measurements}}{\text{average measurement}} \times 100\%$
Conclusion	<p>This section of your lab report is the concluding statement of your argument. It should be written in paragraph formatting and include the following:</p> <ul style="list-style-type: none"> • Restatement of the purpose of the lab • A brief account of what you did and how it came out • State whether hypothesis was correct or incorrect <ul style="list-style-type: none"> ○ Use data from the lab to support your claim ○ Describe relationships that were observed • Discuss problems encountered in the experiment if appropriate • List suggestions for further study

LAB REPORT RUBRIC

Title	1 Point		0 Points	
	Appropriate title included in report.		No title included in report	
Introduction	3 Points	2 Points	1 Point	0 Points
	Introduction is in paragraph form, describes purpose, gives hypothesis, and shares detailed background information (at least 3 pieces).	Introduction is in paragraph form, describes purpose, and gives hypothesis, but does not provide enough background information.	Introduction is in paragraph form and either describes purpose or give hypothesis.	Introduction shares no relevant information or is not in paragraph form.
Procedure	3 Points	2 Points	1 Point	0 Points
	Steps are in paragraph form and written as full sentences (no listing), and there are no "I" statements.	Steps are in paragraph form and written as full sentences (no listing).	Steps are in paragraph form, but some procedures are listed.	Procedure exists entirely in list form, or lacks specificity.
Data	5 Points	3 Points	1 Point	0 Points
	Data tables and graph are included with all aspects labeled; information graphed is relevant, neat, and concise.	Data tables and graphs are included, but have missing labels, or lack of relevance and neatness.	Data table or graph not included.	No table or graphs included.
Analysis	3 Points	2 Points	1 Point	0 Points
	Analysis is in paragraph form and includes detailed and correct description of data (be sure to mention at least three data values); research used to support analyses. Experimental error calculated when appropriate	Analysis is in paragraph form with detailed description of data. Experimental error calculated when appropriate	Analysis is in paragraph form with very little detail in description of data.	Analysis is not in paragraph form or no description of data.
Conclusion	3 Points	2 Points	1 Point	0 Points
	Conclusion is in paragraph form with description of hypothesis result, reasons/explanation why results occurred using data points as evidence	Conclusion is in paragraph form with description of hypothesis results, reason results were occurred doesn't include appropriate data points	Conclusion is in paragraph form with description of hypothesis result included.	No appropriate conclusion given.
Works Cited	1 Point		0 Points	
	Appropriate bibliographical information included with at least 2 sources used.		No bibliographical information included.	