



# ST[EMpower]



SCIENCE, TECHNOLOGY,  
ENGINEERING, AND MATH  
COLORADO STATE UNIVERSITY  
EXTENSION

## 2020 Colorado Academic Standards Aligned: Welcome Fall Colors and the Science of Quaking Aspens

### 2018 Colorado Academic Standards

The newly adopted Colorado Academic Science Standards 2020 have vastly changed the approach you need to take in your science lessons. You do have a partner in Colorado State University Extension.

Colorado State University is a land-grant university. CSU came into existence as part of Lincoln and Morrill's dream to make a great college education available to every American.

### Colorado State University Extension Mission Statement

*Empower Coloradans to address important and emerging community issues using dynamic, science-based educational resources.*

### Colorado State University Extension Vision Statement

*CSU Extension is highly valued for inclusive, impactful community engagement in support of our land grant university mission.*

CSU Extension is in almost every county in Colorado. The 4-H agents throughout the state are amazing people (I have the honor and privilege working with them). They have resources that can help you through this transition in your classroom.

ST[EMpower] articles are written monthly for 4-H members from September through May. The activities are directed towards an 8-14 year old 4-H member. They are strong in science. You will need to modify them to meet your students' learning abilities. You can simplify them for younger students, or increase the complexity for older students. Read the standards (pages 4-9) and focus the lesson on those concepts. I am happy to help you develop them into more age appropriate lessons. My contact information is in the yellow side-bar to the right.

I write an educator newsletter once a quarter (October, January, and April) with lessons developed specifically for K-5th grades that provide a strong foundation in the standard addressed. Ask your county extension 4-H Youth Development agent for a copy. You can find your county agent here:

<http://extension.colostate.edu/docs/staffres/persdir.pdf>

## 2020 Colorado Science Standards

The 2020 Colorado Academic Science Standards have not adopted the Next Generation of Science Standards, however they have moved closer towards them. As a result, the Colorado science standards are vastly different.

For example, in the 2010 Academic Science Standards, Third Grade had 3 Science Standards, one in Physical Science, one in Life Science, and one in Earth Systems Science. That has tripled in the 2020 science standards. Third Grade now has 9 science standards: two in Physical Science, five in Life Science, and two in Earth Space Science.

You have until 2020 to meet the new standards.

**We are here to help!**

### Dr. Barbara J. Shaw STEM K12 Specialist Colorado State University Extension Western Region

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<http://STEMpower.extension.colostate.edu/>

<http://tra.extension.colostate.edu/stem-resources/>

Colorado State University Extension 4-H programs are available to all without discrimination.

# School Districts: Develop a Cadre of K-5 Science Experts!

## **INSTRUCTORS:**

### **Dr. Barbara J. Shaw**

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### **Your School District STEM or Science Specialist**

### **COORDINATOR: Your County Extension 4-H Agent or County Extension Director**

The course is taught as a collaboration among your school district (or districts), the local CSU County Extension Office, and the CSU Western Region STEM K12 Specialist.

Cost to course participants:

- \$122 for 2 CSU Online graduate credits
- Books (1 set of resource books approximately \$120 which can be shared)

Cost to School District:

- Classroom sites
- Internet link for online

For more Information:

Dr. Shaw  
Mobile: 360-513-7916  
Email:  
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Example syllabus available.

## **School Districts: Develop a cadre of elementary teacher science experts to support the move towards the newly revised 2020 Science Standards.**

**WHO:** Education Leaders (your teachers) to develop engaging, interactive, science curricula that exceeds the 2020 Colorado Academic Science Standards for your School District.

**WHAT:** Train an expert team of a minimum of two STEM teachers (one PreK-2 and the other 3-5 grades) who will develop a strong science program exceeding the newly adopted Colorado Department of Education Academic Science Standards.

**WHEN:** Throughout the 2018-19 school year, working around your teaching schedule.

**WHERE:** Your County and online.

**HOW:** Through one-on-one mentoring and formal course lecturing, in addition to primary literature and Smithsonian scientific concept books.

**WHY:** Develop leadership skills for your career with guided mentoring to utilize the best practices teaching science to elementary students, building the framework they need for their futures.

## **ABOUT THE INSTRUCTOR:**

**Dr. Barbara J. Shaw**, Colorado State University Western Region STEM Specialist, earned her Ph.D. in biology from Portland State University and taught for the Department of Geology, Department of Biology, School of Education, and University Studies as adjunct faculty. She worked over 40 years in science education, providing professional development to ~15,000 teachers and taught ~75,000 students from pre-K to graduate college students. Her research centers on the evolution and locomotion of tree and ground sloths, armadillos, anteaters, and glyptodonts, and how K-12 students understand and use scientific process. She was an NSF Fellow, NSF honoree, received Sigma Xi Award for research, the prestigious Colbert Award in paleontology, teaching awards at Portland State University, NAE4-HA Denise Miller National 4-H Innovator Award, National Achievement in Service Award, and several regional and state 4-H awards.

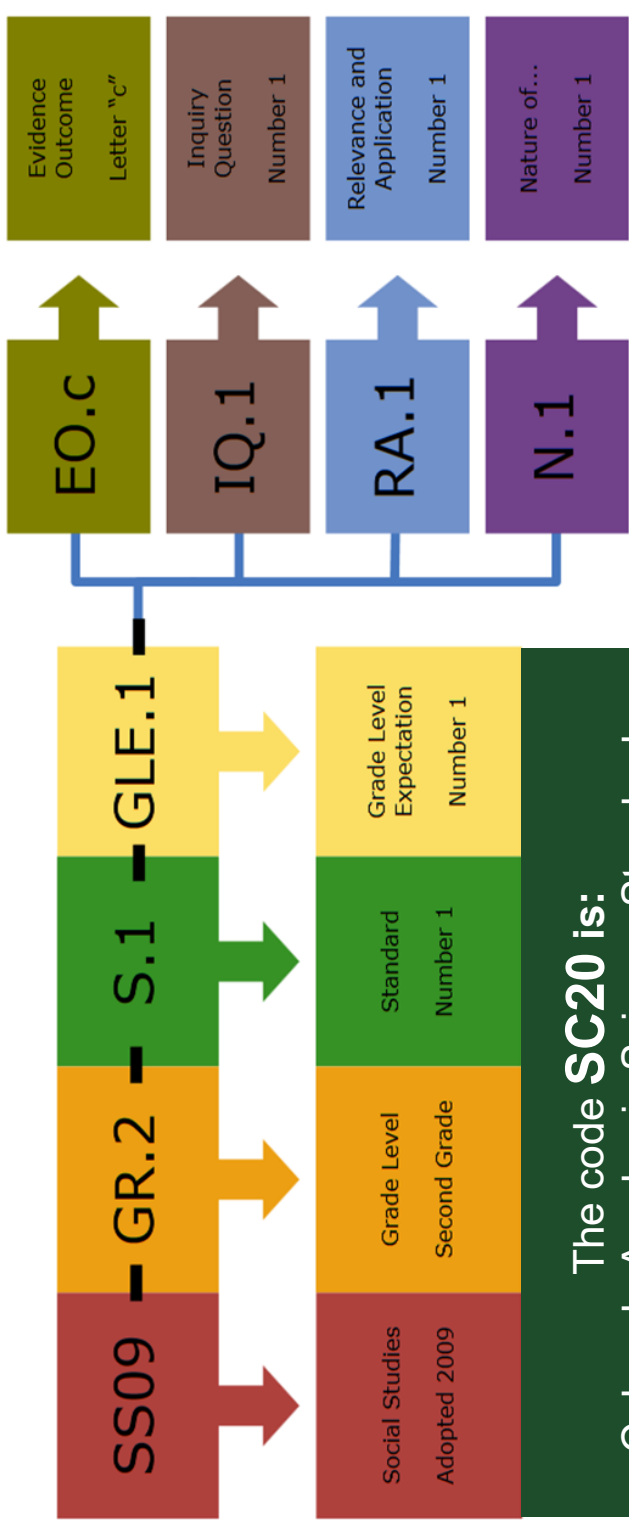
## Colorado Academic Standards Reference System

STANDARDS TEMPLATE

### Content Area Abbreviations

- DA09 Dance
- DT09 Drama and Theatre Arts
- CH09 Comprehensive Health
- PE09 Physical Education
- MA10 Mathematics
- MU09 Music
- RWC10 Reading, Writing and Communicating
- SC09 Science
- SS09 Social Studies
- VA09 Visual Arts
- WL09 World Languages

|   |  |
|---|--|
| Content Area:   |  |
| Standard:   |  |
| Prepared Graduates:   |  |
| High School and Grade Level Expectations Concepts and skills students master: |  |
| Evidence Outcomes   | 21 <sup>st</sup> Century Skills and Readiness Competencies |
| Students can:   | Inquiry Questions:   |
|   | Relevance and Application:                                 |
|   | Nature of the Discipline:                                  |



The code **SC20** is:  
**Colorado Academic Science Standards**  
**for 2020 Adopted 2018**

# Supplemental Information

| Kindergarten  |   |  |  |  |
|---|---|--|--|--|
| Grades  | GR.K-S.1-GLE.2  | GR.K-S.2-GLE.1   | GR.K-S.3-GLE.1   | GR.K-S.3-GLE.2   |
| <b>SC20 - Activity</b>  | <b>GR.K-S.1-GLE.2</b>                                   | <b>GR.K-S.2-GLE.1</b>  | <b>GR.K-S.3-GLE.1</b>  | <b>GR.K-S.3-GLE.2</b>  |
| If the cell is filled, the lesson meets part or all of the standard. The lessons are written for 11-13 year olds, but can be adapted to younger or older students. Any comments indicate a focus for the lesson to meet the standard. | Sunlight affects the Earth's surface.                   | To live and grow, animals obtain food they need from plants or other animals, and plants need water and light. | Patterns are observed when measuring the local weather, including how humans and other organisms impact their environment. | Plants and animals meet their needs in their habitats and impact one another; people can prepare for severe weather. |
| <b>Adopt a Tree</b>   | Light filtered through leaves and when the tree is bare |  | Discuss growth during drought and wet years  | How does your tree survive severe weather  |
| <b>What Makes a Tree a Tree?</b>  |   |  |  |  |
| <b>Anatomy of a Tree—Stems</b>  |   | How plants use the water for their needs   | What is the purpose of branches? The trunk?  | What happens to branches in high winds?  |
| <b>Xylem</b>  |   | How plants use the water for their needs   | Examine tree trunk cuts for broad and narrow growth  |  |
| <b>Anatomy of a Tree—Roots</b>  |   | How plants use the water and use light to make food  | How do the roots help the tree anchor in weather   | In dry years with fires, how does this tree survive?   |
| <b>Anatomy of a Tree—Leaves</b>   | Experiment with covering some leaves                    | How plants use the water and use light to make food  | Discuss how weather influences the tree  | How do trees lose water? How can they control that?  |
| <b>Phloem</b>   |   | How plants use and move the food made for their needs  |  | Where do trees store food? How do they use the food?   |
| <b>Photosynthesis</b>   | Without sunlight, the tree could not make leaves, etc.  | How plants use air and water to make their food with light   | Discuss how weather influences photosynthesis  | What is the impact on photosynthesis?  |
| <b>Out and About</b>  | Discussion and observations about light and shadows     | Discussion about light to make food (photosynthesis)   |  |  |
| <b>Changing Foliage Citizen Science Project</b>   |   |  |  |  |
| <b>Adopt a Tree—Your Data Analysis</b>  |   |  |  |  |

# Supplemental Information

|   | First   | Second   | Third  |
|---|---|--|--|
| <b>SC20 - Activity</b>  | <b>GR.1-S.2-GLE.1</b>   | <b>GR.2-S.2-GLE.1</b>  | <b>GR.3-S.2-GLE.1</b>  |
| If the cell is filled, the lesson meets part or all of the standard. The lessons are written for 11-13 year olds, but can be adapted to younger or older students. Any comments indicate a focus for the lesson to meet the standard. | All organisms have external parts that they use to perform daily functions. | Plants depend on water and light to grow and on animals for pollination or to move their seeds around. | Different organisms vary in how they look and function because they have different inherited information; the environment also affects the traits that an organism develops. |
| <b>Adopt a Tree</b>   |   |  |  |
| <b>What Makes a Tree a Tree?</b>  |   |  |  |
| <b>Anatomy of a Tree—Stems</b>  |   |  |  |
| <b>Xylem</b>  | External supports<br>internal structures                                    |  |  |
| <b>Anatomy of a Tree—Roots</b>  |   |  |  |
| <b>Anatomy of a Tree—Leaves</b>   |   |  |  |
| <b>Phloem</b>   | External supports<br>internal structures                                    |  |  |
| <b>Photosynthesis</b>   |   |  |  |
| <b>Out and About</b>  |   |  |  |
| <b>Changing Foliage Citizen Science Project</b>   |   |  |  |
| <b>Adopt a Tree—Your Data Analysis</b>  |   |  |  |

# Supplemental Information

| SC20 - Activity   | Fourth   |   | Fifth   |  |  |
|---|--|---|---|--|--|
|   | GR.4-S.2-GLE.1   | GR.5-S.1-GLE.4  | GR.5-S.2-GLE.1  | GR.5-S.2-GLE.2   |  |
| If the cell is filled, the lesson meets part or all of the standard. The lessons are written for 11-13 year olds, but can be adapted to younger or older students. Any comments indicate a focus for the lesson to meet the standard. | Organisms have both internal and external structures that serve various functions. | The energy released from food was once energy from the sun. | Plants acquire their material from growth chiefly from air and water. | Matter cycles between air and soil and among plants, animals and microbes as these organisms live and die. |  |
| Adopt a Tree  |  |   |   |  |  |
| What Makes a Tree a Tree?   |  |   |   |  |  |
| Anatomy of a Tree—Stems   |  |   |   |  |  |
| Xylem   |  |   |   |  |  |
| Anatomy of a Tree—Roots   |  |   |   |  |  |
| Anatomy of a Tree—Leaves  |  |   |   |  |  |
| Phloem  |  |   |   |  |  |
| Photosynthesis  |  |   |   |  |  |
| Out and About   |  |   |   |  |  |
| Changing Foliage Citizen Science Project  |  |   |   |  |  |
| Adopt a Tree—Your Data Analysis   |  |   |   |  |  |



# Supplemental Information

|   |  | Middle School   |  |  |  |
|---|--|---|--|--|--|
| SC20 - Activity   | GR.MS-S.2-GLE.1  | GR.MS-S.2-GLE.2   | GR.MS-S.2-GLE.3  | GR.MS-S.2-GLE.5  |  |
| If the cell is filled, the lesson meets part or all of the standard. The lessons are written for 11-13 year olds, but can be adapted to younger or older students. Any comments indicate a focus for the lesson to meet the standard. | All living things are made up of cells, which is the smallest unit that can be said to be alive. | Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring. | Sustaining life requires substantial energy and matter inputs. | Organisms and populations of organisms are dependent on their environmental interactions both with other living things and with nonliving. |  |
| Adopt a Tree  |  |   |  |  |  |
| What Makes a Tree a Tree?   |  |   |  |  |  |
| Anatomy of a Tree—Stems   |  |   |  |  |  |
| Xylem   |  |   |  |  |  |
| Anatomy of a Tree—Roots   |  |   |  |  |  |
| Anatomy of a Tree—Leaves  |  |   |  |  |  |
| Phloem  |  |   |  |  |  |
| Photosynthesis  |  |   |  |  |  |
| Out and About   |  |   |  |  |  |
| Changing Foliage Citizen Science Project  |  |   |  |  |  |
| Adopt a Tree—Your Data Analysis   |  |   |  |  |  |

# Supplemental Information

|   | Middle School   | High School  |
|---|---|--|
|   | GR.MS-S.2-GLE.6   | GR.HS-S.1-GLE.9<br>GR.HS-S.2-GLE.3<br>GR.HS-S.2-GLE.4  |
| <b>SC20 - Activity</b>  |   |  |
| If the cell is filled, the lesson meets part or all of the standard. The lessons are written for 11-13 year olds, but can be adapted to younger or older students. Any comments indicate a focus for the lesson to meet the standard. | Ecosystems are sustained by the continuous flow of energy, originating primarily from the sun, and the recycling of matter and nutrients within the system. | Organisms use matter and energy to live and grow.<br><br>Organisms interact with the living and nonliving components of the environment to obtain matter and energy. |
| <b>Adopt a Tree</b>   |   |  |
| <b>What Makes a Tree a Tree?</b>  |   |  |
| <b>Anatomy of a Tree—Stems</b>  |   |  |
| <b>Xylem</b>  |   |  |
| <b>Anatomy of a Tree—Roots</b>  |   |  |
| <b>Anatomy of a Tree—Leaves</b>   |   |  |
| <b>Phloem</b>   |   |  |
| <b>Photosynthesis</b>   |   |  |
| <b>Out and About</b>  |   |  |
| <b>Changing Foliage Citizen Science Project</b>   |   |  |
| <b>Adopt a Tree—Your Data Analysis</b>  |   |  |



# Supplemental Information

| High School   |   |  |  |  |
|---|---|--|--|--|
|   | GR.HS-S.2-GLE.5   | GR.HS-S.2-GLE.7                                      | GR.HS-S.2-GLE.10   | GR.HS-S.3-GLE.6  |
| <b>SC20 - Activity</b>  | <b>GR.HS-S.2-GLE.5</b>  | <b>GR.HS-S.2-GLE.7</b>                               | <b>GR.HS-S.2-GLE.10</b>  | <b>GR.HS-S.3-GLE.6</b>   |
| If the cell is filled, the lesson meets part or all of the standard. The lessons are written for 11-13 year olds, but can be adapted to younger or older students. Any comments indicate a focus for the lesson to meet the standard. | Matter and energy necessary for life are conserved as they move through ecosystems. | Organisms interact in groups to benefit the species. | Evidence of common ancestry and diversity between species can be determined by examining variations including genetic, anatomical and physiological differences. | The planet's dynamics are greatly influenced by water's unique chemical and physical properties. |
| Adopt a Tree  |   |  |  |  |
| What Makes a Tree a Tree?   |   |  |  |  |
| Anatomy of a Tree—Stems   |   |  |  |  |
| Xylem   |   |  |  |  |
| Anatomy of a Tree—Roots   |   |  |  |  |
| Anatomy of a Tree—Leaves  |   |  |  |  |
| Phloem  |   |  |  |  |
| Photosynthesis  |   |  |  |  |
| Out and About   |   |  |  |  |
| Changing Foliage Citizen Science Project  |   |  |  |  |
| Adopt a Tree—Your Data Analysis   |   |  |  |  |