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4-H is a community of young people across America who are learning leadership, citizenship, and life skills.

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PUBLISHED FOR OTERO AND  
CROWLEY COUNTY 4H MEM-  
BERS AND LEADERS

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Marlena Griesse, Extension Agent



## Southeast Area 4-H Newsletter



COLORADO STATE UNIVERSITY  
EXTENSION

# May 2019

### Important 4-H Dates

#### May

- 1<sup>st</sup> – Registration opens for Sand Dunes Camp
- 10<sup>th</sup> – Registration Deadline for State Conference
- 24<sup>th</sup> – Registration Closes for Sand Dunes Camp
- 26<sup>th</sup> & 27<sup>th</sup> – Western Heritage Invitational
- 27<sup>th</sup> – Extension Offices Closed



#### June

- 3<sup>rd</sup> & 4<sup>th</sup> – Sand Dunes Camp
- 29<sup>th</sup> - D6 Shoot
- 18<sup>th</sup> - 21<sup>st</sup> – State 4-H Conference



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719-254-7608

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**Bent County**  
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[www.ext.colostate.edu](http://www.ext.colostate.edu)



## Raise Your Hand Campaign

There is a national 4-H campaign asking supporters (alumni, parents, volunteers, etc.) to raise their hand in support of 4-H. It is a competition between states to see who can get the most hands raised. You don't have to be from Colorado or even have been in 4-H to vote. All you need to do is go to <https://4-h.org/raise-your-hand/> by May 15<sup>th</sup> and raise your hand (be sure to select Colorado). Current 4-H members can also raise their hand. Let's help Colorado 4-H win some of the prize money being offered.



## Southeast Area Graduates

Congratulations to our Southeast Area graduates:

- Lane Walter – Crowley
- Tyler Addington – Otero
- Jacquelin Alvey – Otero
- Benjamin Schiferl – Otero
- Molly Stolzenberger – Kiowa
- Reagan Johnson – Kiowa
- Brooklynn Jones – Kiowa
- Alex Suarez – Baca
- Dakota Cool – Baca
- Enrique Gutierrez – Baca
- Jacob Wright – Baca
- Katie McCall – Baca
- Shauna Adams – Baca
- Emily Weber- Cheyenne
- Leandra Melgoza – Prowers
- Angelina Downing – Prowers
- Makayla Torres – Prowers
- Michael Rushton – Prowers
- Emily Bohl – Prowers
- Taylor Chivara – Prowers
- Ty Piner – Prowers
- Taylor Shelton – Prowers
- Cassidie States – Prowers
- Garrett Tyree – Prowers
- Sam Wollert – Prowers



## District VI Shooting Sports Contest

Mark your calendars for the 3<sup>rd</sup> annual District VI 4-H Shooting Sports Contest. It will be Saturday, June 29<sup>th</sup>, 2019 at the La Junta Rifle Club. Entry will open May 1<sup>st</sup> in 4-H Online, and closes May 31<sup>st</sup>. You can receive a refund up until June 2<sup>nd</sup>. Events offered include .22 rifle, .22 pistol, archery, shotgun, muzzleloading, and air rifle. You can only enter events for which you are enrolled in 4-H. You must bring your own ammunition. This is an individual contest, and there will not be teams. The cost is \$5 per discipline (payable to your county extension office). There will be a lunch of hot dogs and hamburgers provided, but please bring side dishes for a potluck. Water will be available on grounds. For more information contact the Otero Extension office.

## 4H Online – Email Blasts

From time to time the State office will be sending emails directly to the 4-H members. It is the easiest and most effective way to communicate important State events and requirements. We know that not everyone particularly enjoys the extra emails and there have been requests to be unsubscribed. It is important to know that if you do that, you would not receive any re-enrollment emails or information the County office sends directly to you. Please do not "unsubscribe."



## Great Sand Dunes Camp

Ready for some fun in the sun. Join the Southeast Area on a trip to the Great Sand Dunes National Park. We will be leaving Monday June 3<sup>rd</sup> for the park. Participants will need to pack their lunch

and bring along a sleeping bag. Once we are done at the Sand Dunes we will travel to Pueblo to the State Fairgrounds and stay overnight in the dorms. Evening activities will include, games, movies, kickball/volleyball, and fun. Registration fees will be \$25. Registration will open May 1<sup>st</sup> on 4-H online and close May 24<sup>th</sup>.



## Sunflower Buckle Series Horse Shows

The Sunflower District in Kansas has graciously allowed Colorado 4-H Horse Members to exhibit in their show series. The shows are June 2<sup>nd</sup> in Goodland, June 9<sup>th</sup> in Sharon Springs, June 16<sup>th</sup> in St. Francis, and June 23<sup>rd</sup> in Colby. For more information visit <http://showringmaster.com/Upcoming-Shows/Sunflower-Buckle-Series-Horse-Shows>.

## State 4-H Conference

State 4-H Conference is June 18<sup>th</sup> through 21<sup>st</sup> in Fort Collins on CSU's campus. The conference is open to youth that are 14 and older. The conference offers speakers, competitive contests, workshops, state elections, and two dances. Registration is open now and closes for the Southeast Area on May 10<sup>th</sup>. For registration information and a schedule see your local extension office.

## State Fair Exhibit Requirements

The 2019 State Fair Exhibit Requirements have been updated. You can find them at <http://www.colorado4h.org/projectresources/StateFairExhibitReq.pdf>. Please be sure to refer to the exhibit requirements when you are planning on your project, as this is what it will be judged on at both county and state fair.

# Crowley County 4-H News

## 4-H Foundation Truck Raffle

Get your tickets and sell, sell, sell! The Crowley County 4-H Council will be offering some incentives for Truck Raffle Ticket Sales.

- 20% of club proceeds will go back to the participating clubs.
- The individual Crowley County youth selling the most tickets will receive \$25, second will receive \$10, and third will receive \$5

Each youth is asked to sell 10 tickets. All money and ticket stubs should be returned to the Crowley County Extension office in a timely manner.

## May Birthdays

- Emma Pachak
- Annabelle Guillermo



## Crowley 4-H Council to Host Cloverbud Camp

Join the Crowley County 4-H Council at Cloverbud Camp! Explore 4-H projects and find what excites you. Cloverbud Camp is open to youth ages 5-7 and will take place on July 8<sup>th</sup> from 9:00-2:00 pm at the Big Blue in Ordway. The cost to attend is \$10 and snacks and a lunch will be provided. Please register by going to <https://forms.gle/iMRBBKRdfxTzctX76>. Payment must be received in the Crowley Extension Office by July 1<sup>st</sup>. Refunds will not be issued after July 1<sup>st</sup>. For questions: [marlena.griesse@colostate.edu](mailto:marlena.griesse@colostate.edu).



# Otero County 4-H News

## Trophy Sponsors Needed

We are looking for trophy sponsors for the following:

Junior Western Riding  
Senior Ranch Cutting  
Junior Market Goat Showmanship  
Breeding Goat - Cash Award – 1<sup>st</sup> Place (\$50)

## Council Meetings

County Council meetings are held the first Thursday of every month promptly at 7:30 p.m. at the extension office. Meetings left in 2019 are June, July, and September. There will be no meetings in August, and October through December. Next month's meeting will be June 6. A requirement for club completion is that you attend a council meeting. Please remember to get that meeting out of the way and not wait until the last minute. Clubs please remember that you need at least one representative at every council meeting.

## May Council Report

By Baylee Stowers

The Council meeting was held on May 2, 2019, at the Otero County extension office at 7:30. At the meeting we talked about multiple camps and the registration deadlines and how much it is to go. All of those camps should be in the news letter and if you are interested contact the extension office or Marlana for more details. We also talked about weigh in for market sheep/swine/goat. Then we talked about the 4-H kitchen, which needs a Manager, so if you are interested in that, please contact Marlana. We are looking for beef donations for the kitchen during fair time. Remember read your newsletters because there is a lot of important information in them.

## Foundation Pool Party

MARK YOUR CALENDAR! - THE 4-H Foundation Pool Party has been scheduled for Thursday, June 27 at the La Junta "Wipe Out" Pool. We will also hold an Otero County 4-H Council meeting just prior the swimming party.

## Jr. Show Meeting

Arkansas Valley Jr. Show will hold their monthly meeting on Wednesday, May 29 at 7:00 p.m. in the Otero County Extension meeting room.



## 2019 4-H Foundation Truck Raffle

This is the twelfth year for the Ford truck raffle, and tickets can be picked up from your club leader. We are looking forward to the challenge of beating last years record sales for both Crowley and Otero Counties.

### Prizes!!

Grand Prize - 2019 Ford F-150 Super Crew pickup truck (valued at more than \$51,000)

2nd Prize - \$1000 cash

3rd Prize - \$500 cash

Counties/program areas will receive 50% of sales, \$500 bonus for counties with sales totaling \$7,000 or more, \$100 bonus for counties with each \$1,000 in sales above \$7,000 (example \$8,000 sales receive \$600 bonus; \$9,000 in sales receive \$700 bonuses; etc.).

Otero County 4-H Council is offering a sales incentive to the three individuals with top sales in the county.

This is a GREAT fundraising opportunity for each club!

County sales end August 31, 2019 with the drawing to be held on September 14, 2019. Please turn in money and tickets regularly to the extension office!



### Leader of the Month

Rick Leone &

Jonathan Fox

### Member of the Month

Chesney Copeland



## Community Service Project-Fairgrounds Cleanup

Arkansas Valley Jr. Show has come up with a checklist of duties to be done when doing your scheduled cleanup on your assigned month.

Outside Show Barn: 1. Pick up trash around the livestock barn, camper area, swine pavilion, and the event center. Place bagged trash in the trash bins. 2. Knock down any weeds, rake and bag.

Inside Show Barn: 1. Clean bathrooms and fill soap, toilet paper and towel dispensers. 2. Sweep office area. 3. Empty all trash cans and replace trash bag liners. 4. Sweep walkway.

The monthly schedule/assignment is:

May - Dams and Sires

June - Cloverleaf Livestock

July - Sand & Sage

Please notify the extension office of the date your club will be cleaning.



## Stock Show U/ Junior Extravaganza Coming

Stock Show University is Saturday, June 1 at Ark Valley Fairgrounds in Rocky Ford. Hosted by WW Feed & Supply, a Sullivan Supply "professor" will offer hands-on lessons, both by demonstration and then helping the youth with each step on their animal on clipping, grooming and showing. This Saturday event is FREE to you. Animals may be stalled

overnight, also at no charge.

The *Junior Extravaganza* is Sunday, June 2 at the same location. This is a multi-breed field day organized by Shorthorn, Red Angus & Simmental associations, but open to any youth. Come join in some of the free fun contests on Sunday, plus participate or at least watch these kids who often exhibit on a larger contest scale. Sunday also an open-to-the-world jackpot, with a nominal fee, and showmanship contest.

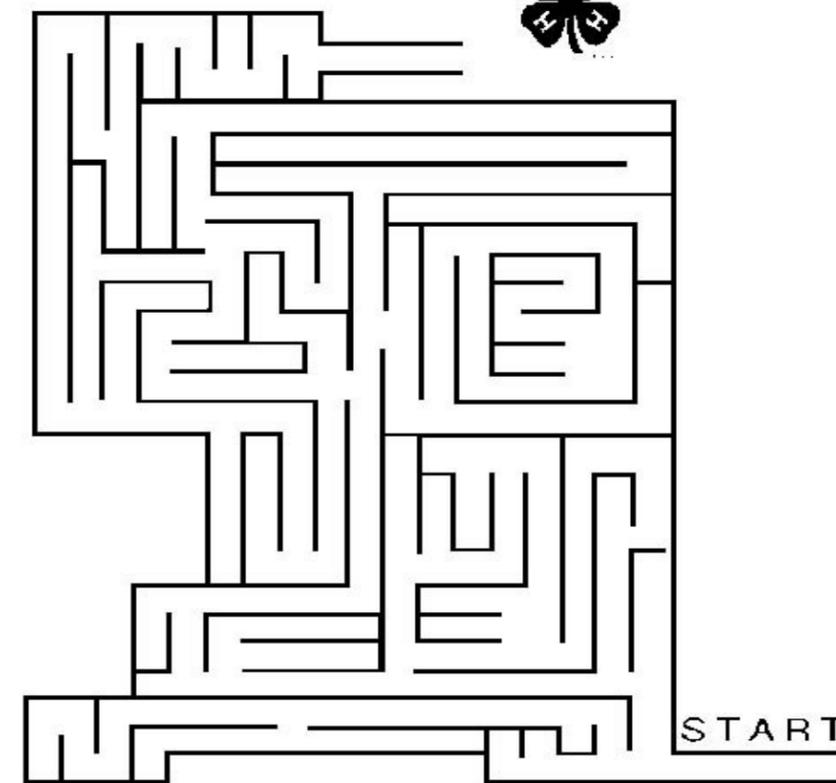
These are GREAT opportunities for both you and your steer or heifer. Please RSVP to WW Feed & Supply by calling 719-384-4463 or emailing [wwfeed1@gmail.com](mailto:wwfeed1@gmail.com).

Further details will be posted on [www.WWFeed.com](http://www.WWFeed.com) and on WW Feed & Supply's facebook page.

## Looking for New District Flag Designs

Submit your design for the new District VI 4-H Senate flag! Designs should include the 4-H clover and represent the Southeast Area (Baca, Bent, Cheyenne, Crowley, Kiowa, Otero, and Prowers Counties). Designs must be submitted by May 15th to [marlena.griesse@colostate.edu](mailto:marlena.griesse@colostate.edu) and will be voted on by the District VI Senate.

## Follow the Path To 4-H



# Otero & Crowley County 4-H News



May 2019

May 6	<b>Sheep/Goat/Swine weigh-in, 4:00 - 6:00 p.m., Crowley County Fairgrounds</b>
May 6	Critter Corner Virtual Club, 6:00 p.m.
May 6	Shooting Sports Practice (All disciplines), 6:00 p.m., La Junta Rifle Club
May 6	Gymkhana, 6:30 p.m., Crowley County Fairgrounds, Ordway (gates open at 6:00)
May 7	<b>Sheep/Goat/Swine weigh-in, 4:00 - 7:00 p.m., Arkansas Valley Fairgrounds, Rocky Ford</b>
May 7	Crowley County Shooting Sports practice, 6:00 p.m., Crowley County Range
May 10	State Conference Registration closes
May 13	Shooting Sports Practice (All disciplines), 6:00 p.m., La Junta Rifle Club
May 14	Crowley County Shooting Sports practice, 6:00 p.m., Crowley County Range
May 15	Crowley County Jr. Fairboard & 4-H Fund meeting, 6:30 p.m., Crowley County Courthouse meeting room
May 19	Shooting Sports Practice (Shotgun, .22 Rifle and .22 Pistol only), 6:00 p.m., Fowler Gun Club
May 20	Shooting Sports Practice (All disciplines), 6:00 p.m., La Junta Rifle Club
May 20	Crowley County 4-H Council meeting, 7:00 p.m., Crowley County Extension office
May 21	Crowley County Shooting Sports practice, 6:00 p.m., Crowley County Range
May 22	Registration closes for Otero/Crowley Summer Day Camps
May 24	Sand Dunes Camp registration closes
May 27	Shooting Sports Practice (All disciplines), 6:00 p.m., La Junta Rifle Club
May 27	Otero and Crowley offices closed - holiday
May 29	Arkansas Valley Jr. Show meeting, 7:00 p.m., Otero County Extension office
June 2	Shooting Sports Practice (Shotgun, .22 Rifle and .22 Pistol only), Fowler Gun Club
June 3	Critter Corner Virtual Club, 6:00 p.m.
June 3	Shooting Sports Practice (All disciplines), 6:00 p.m., La Junta Rifle Club
June 3-4	Great Sand Dunes Camp
June 4	Shooting Sports Practice (All disciplines), 6:00 p.m., Crowley County Range
June 6	Otero County 4-H Council, 7:30 p.m., Otero County Extension office
June 7	Otero Cloverbud Camp, 9:00 a.m. -
June 9	Shooting Sports Practice (Shotgun, .22 Rifle and .22 Pistol only), Fowler Gun Club
June 10	Otero Quilting Class, 9:00 a.m. -
June 10	Shooting Sports Practice (All disciplines), 6:00 p.m., La Junta Rifle Club
June 11	Shooting Sports Practice (All disciplines), 6:00 p.m., Crowley County Range
June 13	Creative Cooks, 5:00 p.m., Home Ec Building, Prowers County Fairgrounds, Lamar
June 17	Gymkhana, 6:30 p.m., Crowley County Fairgrounds, Ordway (gates open at 6:00)
June 17	Shooting Sports Practice (All disciplines), 6:00 p.m., La Junta Rifle Club
June 18	Shooting Sports Practice (All disciplines), 6:00 p.m., Crowley County Range
June 18-21	State Conference
June 19	Crowley County Jr. Fairboard & 4-H Fund meeting, 6:30 p.m., Crowley County Courthouse meeting room
June 22	Crowley County Shoot, 6:00 p.m., Crowley County Range
June 24	Shooting Sports Practice (All disciplines), 6:00 p.m., La Junta Rifle Club
June 24	Crowley County 4-H Council meeting, 7:00 p.m., Crowley County Extension office
June 25	Shooting Sports Practice (All disciplines), 6:00 p.m., Crowley County Range



## Camp Rocky

Are you interested in hands on learning about the environment? Do you like to spend time outdoors? Want to meet new people from all over the state? If so, Camp Rocky is the perfect summer camp for you!

Camp Rocky is a weeklong residential camp July 7-13, 2019 designed for students 14-19 years old who enjoy the outdoors and are interested in natural resources. The camp is located just outside Divide, CO. Camp Rocky's professional staff helps participants learn about their environment through hands-on experiences. The students work in teams, making new friends from across Colorado. Each year, new and returning students choose a resource field for their area of focus: Forest Management, Rangeland Science, Soil and Water Conservation, or Fish and Wildlife Management.

Applications are available at the Conservation District office, 200 South 10<sup>th</sup> Street, Rocky Ford. The Conservation Districts will pay \$100 of the \$350 registration fee. For information contact: [amy.camprocky@gmail.com](mailto:amy.camprocky@gmail.com) or call 719-686-0020. Space is limited to the first 60 applications.



## Creative Cooks

Express your creativity at the District VI Creative Cooks and Cake Decorating Contests! Both contests will be held at the Home Ec Building at the Prowers County fairgrounds in Lamar on June 13th. Set up for the contests will start at 5:00 pm and the contests will start at 6:00 pm. There is a \$5 per person entry fee that must be paid when arriving.

During the Cake Decorating Contest, youth are given the opportunity to show off their skills while decorating a cake in a given amount of time. The Creative Cooks contest allows youth to plan a menu, set a place setting, cook a dish, and participate in an interview with the judge. Judging is based on creativity, taste, and visual appeal, among other factors. Complete contest requirements can be found at [www.colorado4h.org](http://www.colorado4h.org).

We hope to see you all there! For more information or entry forms, contact your local Extension Office. Entries are due to your Extension Office by May 31<sup>st</sup>.



## Summer Day Camp Series

Registration closes May 22<sup>nd</sup>. Go to <https://forms.gle/KTPQTEFuHs6Jd4zM6> to register. Payment must be received in the Crowley or Otero Office by May 22<sup>nd</sup>. Refunds will not be given after May 22<sup>nd</sup>. For more info, contact marlena.griesse@colostate.edu.

- All About Animals Camp  
Explore companion animal careers and opportunities! Youth will participate in hands-on activities with animals, community service, and make their own pet first aid kit to take home.  
Date: June 5th  
Location: Arkansas Valley Fairgrounds Event Center, Rocky Ford  
Cost: \$25 Ages: 8-13
- Outdoor Skills Camp  
Use your five senses and experience the world around you! Youth will participate in activities centered on fishing, hiking, and safety, and will make a first aid kit to take home. The camp includes a field trip to Lake Meredith or Rocky Ford Wildlife Area.  
Location: June 11th, Crowley Extension Office, Ordway; June 12th, Otero Extension Office, Rocky Ford  
Cost: \$25 Ages: 8-13

tion Office, Ordway; June 12th, Otero Extension Office, Rocky Ford  
Cost: \$25 Ages: 8-13

- Get Your Geek On  
Learn about the science behind weather systems and our climate. Youth will participate in science experiments, observational activities, and create their own weather station to take home.  
Location: June 25th, Crowley Extension Office, Ordway; June 26th, Otero Extension Office, Rocky Ford  
Cost: \$25 Ages: 8-13
- Art Camp  
Create masterpieces and learn new techniques in painting, drawing, fiber, leathercraft, and more. Youth will create multiple art projects to take home or enter in the Arkansas Valley Fair.  
Date: July 1st & 2<sup>nd</sup>  
Location: Arkansas Valley Fairgrounds Event Center, Rocky Ford  
Cost: \$40 Ages: 11-18



## Otero 4-H Council to Host Cloverbud Camp

Join the Otero County 4-H Council at Cloverbud Camp! Explore 4-H projects and find what excites you. Cloverbud Camp is open to youth ages 5-7 and will take place on June 7<sup>th</sup> from 9:00-2:00 pm at the Otero Extension Office in Rocky Ford. The cost to attend is \$10 and snacks and a lunch will be provided. Please register by going to <https://tinyurl.com/y2wvys9>. Payment must be received in the Otero Extension Office by May 31<sup>st</sup>. Refunds will not be issued after May 31<sup>st</sup>. For questions, please contact Marlena Griesse at 719-469-0190 or email [marlena.griesse@colostate.edu](mailto:marlena.griesse@colostate.edu).



### Fair Dog, Cat and Horse Registrations

Online registrations for dog, cat and horses were due May 1. If you did not get your animal registered, please contact the extension office. Gymkhana horses must be ID'd in 4-H Online also. These registrations must be done to be eligible to show your animal at the Arkansas Valley Fair and Crowley County Days.

### Gymkhanas

Dates for the remaining gymkhanas at the Crowley County Fairgrounds are as follows: May 6, June 17, July 1 and August 5. Starting time for all dates will be 6:30 p.m. with gates opening at 6:00.

**Helmets will be required for all participants in each event.** This does not affect the horse show at the fair.

You must be enrolled in 4-H but do not have to be enrolled in the horse project. Participants must pay the \$2 horse insurance fee. For more information please call Justin Grafel 719-252-1495 or either one of the extension offices. In case of inclement weather please call the extension office to find out the status of that evening's gymkhana.



### Horse Practices

Anyone signed up for the Horse Project is welcome to join Rianna Welch and other 4-H members for horse practices. Please contact Rianna by phone or text at 719-980-5618 so that she can fill you in on practices and other activities. She also has started a Horse Facebook page, look for Ark Valley Horse Project (Otero/Crowley county).



### Change to Geese Classes at Fair

This year at the Arkansas Valley Fair there will be light, medium and heavy weight divisions in the classes for geese.



### Scrapies Premises I.D. Requirements

For those members planning on showing sheep or goats at the Crowley County Days Progress Show or the Arkansas Valley Fair please note: All breeding sheep and all market ewe lambs will be required to have Scrapies I.D. tags. All does in the market class and all breeding goats will be required to have Scrapies I.D. tags. Any registered breeding goat with a legible premise tattoo will suffice as a Scrapies I.D. tag; however, Scrapies I.D. tags are preferred. Scrapies I.D. tags can be obtained by calling the U.S. Department of Agriculture's APHIS (Animal and Plant Health Inspection Services) at 1-866-873-2824. A limited number of tags are provided at not cost. We would recommend you call before the end of May, as it might take a month or so to get the tags.

### Stock Show U/ Junior Extravaganza coming

Colorado 4-H & FFA beef exhibitors are encouraged to mark the weekend of June 1&2 as a "must-attend" event.

Stock Show University is Saturday, **June 1** at Ark Valley Fairgrounds in Rocky Ford. Hosted by WW Feed & Supply, a Sullivan Supply "professor" will offer hands-on lessons, both by demonstration and then helping the youth with each step on their animal on clipping, grooming and showing. This Saturday event is

FREE to you. Animals may be stalled overnight, also at no charge.

The *Junior Extravaganza* is Sunday, **June 2** at the same location. This is a multi-breed field day organized by Shorthorn, Red Angus & Simmental associations, but open to any youth. Come join in some of the free fun contests on Sunday, plus participate or at least watch these kids who often exhibit on a larger contest scale. Sunday also an open-to-the-world jackpot, with a nominal fee, and showmanship contest.

These are GREAT opportunities for both you and your steer or heifer. Please RSVP to WW Feed & Supply by calling 719-384-4463 or emailing [wwfeed1@gmail.com](mailto:wwfeed1@gmail.com).

Further details will be posted on [www.WWFeed.com](http://www.WWFeed.com) and on WW Feed & Supply's facebook page.



### Display Boards

Display boards for General and Family and Consumer Science projects must measure 4 ft. wide x 3 ft. tall. They should be made of lightweight cardboard, but not poster board. Pre-cut boards can be purchased at most craft and shopping centers, or they are available from either the Otero or Crowley County extension offices. Cost of the boards is \$5.00 each.

## Crowley County Days and Arkansas Valley Fair

### Entries Due June 21!

### Citizenship Washington Focus

Through the cooperation of the Colorado 4-H Foundation, Inc., more than 3,500 4-H members have participated in the National 4-H Citizenship Washington Focus program in Washington, D.C. over the past 40 years. Once again, Colorado 4-H Foundation plans to send delegates, leaders, and agents to this year's Citizenship Washington Focus program that will be held June 22 - 30, 2019. The Colorado 4-H Foundation assists local 4-H youth by sponsoring approximately one-third of the cost for one 4-H youth per county, with the balance paid by the county and delegate.

The 2019 Colorado 4-H Foundation Citizenship Washington Focus award winner for Otero County is:

### Sophie Russell



### Arkansas Valley Fair Entries

Due date for entries for the Arkansas Valley Fair is **June 21**. Entry forms will be available from your club leader the week of May 15. Premium books will be on the website, as well as one to each club's main leader. Individuals may request a copy of the book or pages pertinent to their projects from the extension office. Please note, entry fees will be \$6 per member. Fair dates are August 12-17, 2019.

### Crowley County Days

Crowley County Days will be held July 19-26, 2019. Due date for entries is **June 21**. Entry forms and premium books will be available at the Crowley

and Otero County Extension offices as well as on the website for each county. Entry fees will be \$5 member.



### Crowley County Days Sponsorships

Don't wait; Start today! Crowley County Days sponsorship forms are available in the Crowley County Extension Office. *All youth from Crowley and Otero Counties participating in Crowley County Days are required to find one \$50 or two \$25 sponsorships.* Sponsorships are due with fair entries on June 21, but may be turned in at any time before then. If you are having trouble finding sponsorships, please feel free to contact the Crowley County Extension Office at 719-267-5243 and we will be able to assist you.

### Shooting Sports Practices

Dates have been set for shooting sports practices for the year. A copy of your hunter safety card must be submitted to the extension office prior to practice. You must have your hunter safety card with you, as well as a parent or guardian.

Practices at the **La Junta Rifle Club** will be open to **all disciplines** and will be held at 6:00 p.m. on the following dates: May 6, 13, 20, 27; June 3, 10, 17, 24; July 1 and 8. **Crowley County Gun Range** will have practices for **all disciplines** and will be at 6:00 p.m. on: May 7, 14, 21; and June 4, 11, 18, 25. They will also hold practices for State Fair qualifiers on July 9, 16, 30, and Aug. 6 at 6:00 p.m. **Fowler Gun Club** will have practices for **shotgun, .22 rifle and .22 pistol only** and will be at 6:00 p.m. on the following dates: May 5, 19; June 2 and 9.



### Shooting Sports Members

Shooting sports equipment is available for your use. Please call the extension office to request the firearm(s) and/or bow you would like available for practice. This assures that the equipment will be on site.

### Otero & Crowley County Shooting Sports Contests

The Crowley County Shooting Sports contest will be held Saturday, June 22 at the Crowley County Range at 8:00 a.m. for Crowley County Shooting Sports members.

Otero County Shoot will be at the La Junta Rifle Range on July 12 and 13 for Otero County Shooting Sports members.

### Dog Project Meetings

Dog training is being held at the 4-H barn at the Rocky Ford Fair Grounds. We have a detailed schedule for each member depending on what class they are in. If you are planning on participating in the dog project it is imperative that you begin practicing immediately so you are able to learn all there is to know in time for County Fair. The dog project is a time intensive and extremely fun project that requires a great deal of dedication and effort. We are fortunate to have trainers in the Otero and Crowley area that are willing to assist the dog project members so please take advantage of the training sessions. If you would like to be on the training messaging system and get a copy of the training schedule please call or text Brandie Jackson at 719-251-9746 so she can add you to the contact list. Please also be aware that your dog must be up to date on their vaccines prior to bringing them to a training class. If you have a puppy that you would like to show please make sure your puppy has had all 3 puppy shots to avoid them getting sick with parvo.



# Bent County 4-H Newsletter



## MAY 2019

### FAIR ENTRY

Fair entry will be open from **May 19, 2019 to June 19, 2019**. If you already have a family account with 4HOnline, you will be able to log in with the same username and password. Please **DO NOT** create a new account if you have a family account in 4HOnline already! Fair Entry can be accessed at <https://faireentry.com/Fair/SignIn/2422> If you need help or have to re-set your password for your 4HOnline account, please contact the Extension Office. The Fair Entry Login Process can be accessed [HERE](#) or it is attached to this newsletter.



## OPPORTUNITIES AND DEADLINES

May 1st - Dog and Hose ID Forms Due

May 4th - State Meat Judging

May 9th - Small Animal Weigh In 4-6 PM

May 11th - District 6 Robotics Competition

May 13th - Hog Nominations Due

May 17th - Record Book Workshop/Horse Workshop

May 30th - Shooting Sports Practice

May 31st - Creative Cooks Form Due

June 1st - District Shoot

June 9th - Shooting Sports Practice

June 10th - Record Book Workshop

June 13th - Creative Cooks Contest

June 18th-21st - State 4-H Conference

June 22nd-29th - CWF

### BORN AND RAISED GOATS

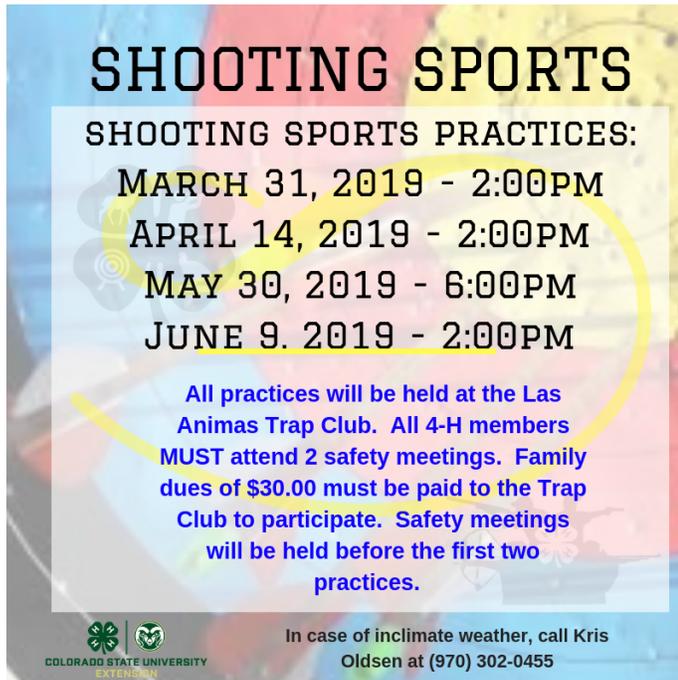
This will be the first year for the Born and Raised Goats class. To be eligible to show in the born and raised goats class members must have a breeder affidavit along with a scrapies tag. The breeder affidavit is attached to this newsletter. It will also be available on our website, or you can come into the Bent County Extension Office for a copy. If the member purchased the goat from a Bent County seller they must have a Bill of Sale along with the other two

required documents listed above. **All documents must be turned in at the Small Animal Weigh In which is May 9, 2019 from 4:00 PM - 6:00 PM at the Bent County fairgrounds.** At this time there is no sponsor for the born and raised goat class, so if you or someone you know is interest in sponsoring the winner for the Bent County Born and Raised Goat class; please let the Bent County Extension Office know.



## 4-H WORKSHOPS

### SHOOTING SPORTS PRACTICE/SAFETY MEETINGS



**SHOOTING SPORTS**  
SHOOTING SPORTS PRACTICES:  
MARCH 31, 2019 - 2:00PM  
APRIL 14, 2019 - 2:00PM  
MAY 30, 2019 - 6:00PM  
JUNE 9, 2019 - 2:00PM

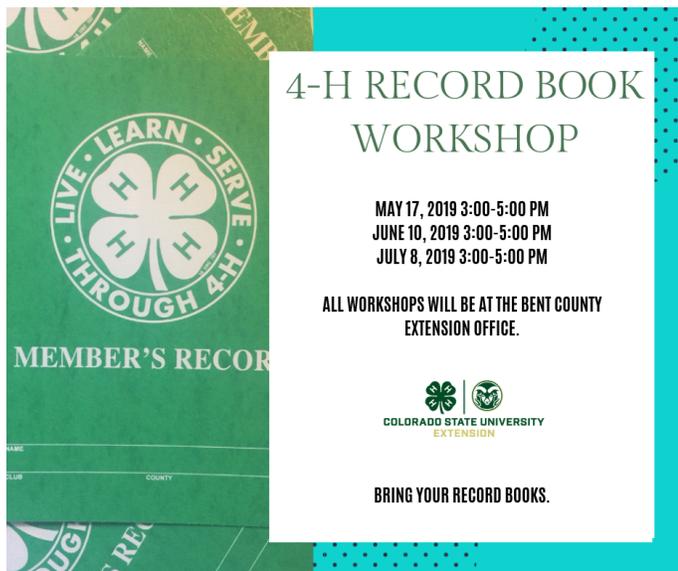
All practices will be held at the Las Animas Trap Club. All 4-H members **MUST** attend 2 safety meetings. Family dues of \$30.00 must be paid to the Trap Club to participate. Safety meetings will be held before the first two practices.

In case of inclement weather, call Kris Oldsen at (970) 302-0455

COLORADO STATE UNIVERSITY EXTENSION

Please make note of the change in the May Shooting Sports Practice. It was originally May 19, but has been moved to May 30th at 6:00 PM.

### RECORDBOOK WORKSHOP



**4-H RECORD BOOK WORKSHOP**

MAY 17, 2019 3:00-5:00 PM  
JUNE 10, 2019 3:00-5:00 PM  
JULY 8, 2019 3:00-5:00 PM

ALL WORKSHOPS WILL BE AT THE BENT COUNTY EXTENSION OFFICE.

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BRING YOUR RECORD BOOKS.

MEMBER'S RECORD BOOK

If you need help with your record book, please plan to attend one or more of the record book workshops this year! All of the workshops will be at the Bent County Extension Office. **The workshop that was originally on May 20th has been moved to May 17th.** Don't forget to bring your record book with you!

### HORSE WORKSHOP

On May 17 2019 there will be a horse workshop at 5:30 PM at the Bent County Fairgrounds. Members need to bring their horse, and saddles. The workshop will cover riding patterns. Contact the Bent County Extension Office with any questions.



**Horse Workshop**

Horse workshop will review what we've learned already and add some pattern practice. **Bring your saddle and be ready to ride - patterns.**

May 17, 2019  
5:30 PM  
Bent County Fairgrounds

COLORADO STATE UNIVERSITY EXTENSION

### RABBIT/POULTRY WORKSHOP

David and Ashland Crossland will be putting on a rabbit/poultry workshop sometime in June 2019 at the Bent County Fairgrounds from 6-7:30 PM. The date will be released later.



SAVE THE DATE

**Rabbit/Poultry Workshop**

June 2019  
Date TBD  
6:00 PM to 7:30 PM  
at the  
Bent County Fairgrounds

COLORADO STATE UNIVERSITY EXTENSION

## DOG AND HORSE ID

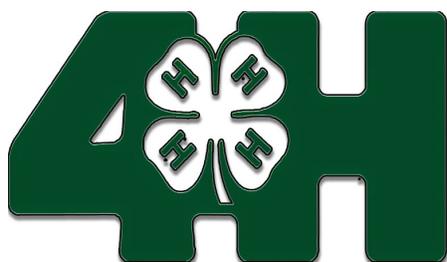


Dog and Horse ID must be completed in **4HOnline** by **May 1, 2019**. **There are no exceptions to this deadline.** If you need help finding where to enter that information, please contact your club leader or the Extension Office in advance.

## SMALL ANIMAL WEIGH IN

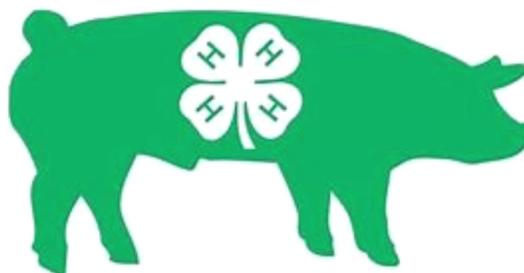


Mark your calendars for Small Animal Weigh In which will be **May 9, 2019 from 4-6PM** at the Bent County Fairgrounds.



## HOG NOMINATIONS

Hog Nominations are due to the Bent County Extension Office no later than **May 13, 2019 by 2:00PM.**



Bent County Hog Nominations due to the Extension Office by May 13, 2019.



## CREATIVE COOKS AND CAKE DECORATING

Express your creativity at the District VI Creative Cooks and Cake Decorating Contests! Both contests will be held at the fairgrounds in Lamar on June 13th. Set up for the contests will start at 5:00 pm and the

contests will start at 6:00 pm. During the Cake Decorating Contest, youth are given the opportunity to show off their skills while decorating a cake in a given amount of time. The Creative Cooks contest allows youth to plan a menu, set a place setting, cook a dish, and participate in an interview with the judge. Judging is based on creativity, taste, and visual appeal, among other factors. Complete contest requirements can be found at [www.colorado4h.org](http://www.colorado4h.org).



We hope to see you all there! For more information or entry forms, contact the Bent County Extension Office. Entries are due to the Bent County Extension Office by May 31st.

## SHOW FEED CLINIC

There will be a Show Tec feeds clinic on May 11, 2019 at the Prowers County Fairgrounds. If you are interest in attending the clinic please go [HERE](#) to sign up.

Winners are bred . . . Champions are fed.<sup>SM</sup>

**MoorMans<sup>®</sup> ShowTec<sup>®</sup>**  
Championship Performance through Feed Technology<sup>SM</sup>

It's free!

### Show Feed Clinic



**Lamar, Colorado**  
**Saturday, May 11 at 9 a.m.**

**Location: Prowers County Fairgrounds**  
Under the pavilion; 2206 Saddle Club Drive, Lamar, CO 81052

**Topics:** Feeding, daily care, and showmanship

**Presenter:** Tadd Knight, ADM ShowTec<sup>®</sup> Specialist

**RSVP:** Prowers County Extension at 719-336-7734

www.MoorMansShowTec.com  
866-866-7626 • AN\_ShowFeedHelp@adm.com

ADM Animal Nutrition<sup>SM</sup>, 1000 N 30th St, PO Box C1, Quincy, IL 62305-3115  
A division of Archer Daniels Midland Company

Design 1666B-0417

## STATE 4-H CONFERENCE

Experience Colorado State University and represent your county at the Colorado State 4-H Conference! Attend leadership activities and exciting workshops. Open to 4-H members ages 14-18, the deadline to register is May 10th, so don't wait!

2019

# COLORADO STATE 4-H CONFERENCE

June 18-21

Registration closes **May 10th** for the Southeast Area. Register in 4HOnline.



COLORADO STATE UNIVERSITY  
EXTENSION

*District VI 4-H Senate*

## CAMP SCHOLARSHIPS

**Deadlines**

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Leadership Development Conference - January 2  
Youth Fest - January 2  
South Central District Retreat - February 15  
State Conference - May 1  
Dare to Be You - November 1

## WELDING MANUAL

Welding is a self determined project. Members enrolled in welding should complete the self determined record book and enhance the story on their welding project. Ohio State University offers a manual for welding [HERE](#). Please contact the Bent County Extension Office for more help.

**GOOD LUCK TO ALL OF OUR 4-H MEMBERS PARTICIPATING IN THE STATE 4-H MEAT JUDGING CONTEST AND THE DISTRICT IV ROBOTICS CHALLENGE THIS MONTH!!!**

# DISTRICT VI 4-H SHOOTING SPORTS COMPETITION

Mark your calendars for the 3rd annual District VI 4-H Shooting Sports Contest. It will be Saturday, June 29th, 2019 at the La Junta Rifle Club. Entry will open May 15th in 4-H Online, and close June 15th. Events offered include .22 rifle, .22 pistol, archery, shotgun, muzzle-loading, and air rifle. You can only enter events for which you are enrolled in 4-H. You must bring your own ammunition. This is an individual contest, and there will not be teams. The cost is \$5 per discipline (payable to DVI 4-H Senate). There will be a lunch of hot dogs and hamburgers provided, but please bring side dishes for a potluck. Water will be available on grounds. For more information contact Marlena Griesse at 719-469-0190.

## DISTRICT VI 4-H SHOOTING SPORTS COMPETITION June 29th

La Junta Rifle Club

Check-In: 7:00 am

**MANDATORY Safety Meeting: 7:30 am**

Potluck lunch to follow shoot. Hamburgers and hotdogs provided.

### DISCIPLINES OFFERED:

\$5 per discipline  
Checks payable to DVI 4-H Senate

- .22 Rifle Scope
- .22 Rifle Open Sight
- .22 Pistol
- Archery-Compound
- Archery-Recurve
- Trap
- Skeet
- Muzzleloading
- Air Rifle

- Junior and Senior Divisions
- May only enter disciplines for which you are enrolled in your county
- Must bring own ammunition
- Medals for 1st-3rd in each division in each discipline
- \*NEW\* High County Team Award



Register in 4HOnline  
May 15th-June 15th



Directions to La Junta Rifle Club

Contact Marlena Griesse

719-469-0190  
marlena.griesse  
@colostate.edu



COLORADO STATE UNIVERSITY  
EXTENSION

Colorado State University, U.S. Department of Agriculture and Southeast Area (Baca, Bent, Cheyenne, Crowley, Kiowa, Otero and Prowers Counties) cooperating. Extension programs are available to all without discrimination. If you have a disability for which you seek an accommodation, please notify your Extension Office when you register.

# ST[EMpower]

## Springtime!

VOLUME 8, ISSUE 5, MAY 2019



### THIS MONTH

- Plant Classification pg. 2
- Flower Dissection pg. 8
- Pollinators pg. 12
- Adopt a Tree pg. 16
- Photosynthetic Pigments pg. 18
- Photosynthesis Experiment pg. 20

### POWER WORDS

- **catkin:** a flowering spike of trees such as quaking aspen; typically downy, hanging down flowers
- **dormancy:** the state of having normal physical functions suspended or slowed for a period of time

### CAREERS

- Organizing Your Career Exploration Information pg. 22

### WAKE UP!

The earliest signs of spring are the blush of yellow on tree tips, bird song in the air, and sighting an insect. What triggers plants and animals to emerge from winter **dormancy**?

How organisms emerge in spring is not yet entirely understood. Plants have a series of chemical pathways that sense warmer soil, increasing daylight, and a 20 day cold snap. Hibernating animals are usually underground and insulated from temperature and light. They have an internal clock that ticks down from onset of hibernating to waking. Some species wake several times through the winter and return to hibernation until spring.

This issue of the ST[EMpower] newsletter will focus on Aspen (or any other deciduous tree). The September issue 44:Aspen focused activities on a specific tree as it prepared for dormancy. This issue picks up as the trees reawaken.

Trees are flowering plants. Tree flowers are usually quite small and often overlooked. Flowers range in size from the 15 pound bloom of *Rafflesia arnoldii* to *Wolffia* sp.



Quaking aspen female **catkins**. Photo by B. Campbell.

flowers that would fit on the point of a pin. They attract pollinators.

Pollinated flowers produce seeds. The size of the seed does not indicate how large the plant will grow. Coco de mer palms have the largest seeds that weigh 40 pounds! (Palms are a type of grass and not a true tree). The smallest seeds are from some orchids from tropical rain forests.

Who are the pollinators? Different flowers attract insects, bats, and bird pollinators. The largest flower, *Rafflesia arnoldii*, smells like rotting flesh to attract flies. Seed dispersal methods include wind and animals to carry the seeds far from the parent plant.



COLORADO STATE UNIVERSITY  
EXTENSION

COLORADO STATE UNIVERSITY EXTENSION 4-H  
PROGRAMS ARE AVAILABLE TO ALL WITHOUT  
DISCRIMINATION

Carolus Linnaeus (born Carl von Linné in 1707) developed the **taxonomic** system by naming each species with two unique names, genus and species. This was during the time of European exploration, and many new and exotic species were discovered by the Western World. In fact, Linnaeus named over 4,400 animal and 7,700 species of plants!

Scientists expanded on **taxonomic** classifying species to better represent the relationships between organisms. Below lists the **hierarchy** and the example (humans):

Domain (Eukaryota)  
 Kingdom (Animalia)  
 Phylum (Chordata)  
 Class (Mammalia)  
 Order (Primates)  
 Family (Hominidae)  
 Genus (*Homo*)  
 species (*H. sapiens*)

Plants use Division instead of Phylum, but everything else follows the animal system of **hierarchy**. The example is for quaking aspen:

Domain (Eukarya)  
 Kingdom (Plantae)  
 Division (Magnoliophyta)  
 Class (Magnoliopsida) (Dicots)  
 Order (Salicales)  
 Family (Salicaceae)  
 Genus (*Populus*)  
 species (*P. tremuloides*)

There are four major groups of plants (formerly divisions, but now grouped a bit differently with DNA data):

- Flowering plants (angiosperms)
- Naked seeded plants (gymnosperms) includes cone-bearing plants like pine and fir trees, cycads, ginkgo, and odd-ball plants like ephedra and welwitschia.

- Seedless vascular plants (Pterophyta) ferns, horsetails, club mosses, and psilopsida.
- Seedless, (spore producing) non-vascular plants (Bryophyta) including mosses, liverworts and hornworts.

*Directions:*

- Call your local extension office and make an appointment with the Native Plant Masters or the Master Gardeners. They have been informed that youth will be calling with this request. To find your county extension office, go to the website below, and click on the link at the top of the page: Contact your local county Extension office through our County Office List: <https://extension.colostate.edu/>
- Ask the Native Plant Masters or the Master Gardeners to help you examine these four groups of plants. They may have specimens in the office, or they may opt to take you out to look at the local plants.
- With each of the 4 groups of plants, sketch the reproductive systems of each as depicted on the data sheet.
- Compare and contrast the similarities and differences among these four groups.

**Most drugs are derived from plants!**

## POWER WORDS

- **hierarchy:** a system of organization in which groups are ranked according to shared biological structures  
 Example: the Order Carnivora (carnivores) include the Families Canidae, Felidae, Ursidae, etc. Canidae include dogs, wolves, coyotes, etc. Felidae includes cats, puma, etc., Ursidae (bears), and others.
- **taxonomic:** concerning the classification of things, especially organisms, and their relationship to each other

## MATERIALS:

- magnifying lens
- optional dissecting microscope
- computer with internet access  
<https://extension.colostate.edu/>
- print data sheet page 7
- color pencils

*What are bryophytes?*

Bryophyta include about 16,200 land plants. Bryophytes are thought to be the first true plants to evolve. This division includes:

- Mosses – class Bryopsida
- Liverworts – class Marchantiopsida
- Hornworts – class Anthocerotopsida

The only prime feature of a bryophyte is that it does not have true vascular tissue (xylem and phloem). Some do have specialized tissues which are used to transport water but are not considered to be a true vascular tissue.

*Characteristics of Bryophytes:*

- primitive vascular plants (no **xylem** and **phloem**)
- they do not have roots but have **rhizoids** instead of roots which helps the plant to anchor to surface
- they have crude stems and leaves
- These roots or **rhizoids** do not absorb nutrients like other plant roots (but can absorb water)
- release spores from their leaves which travels by water and make new bryophytes in new locations.
- water is essential for bryophytes to grow and spread; they can dry out, but revive and continue growing when water returns

*Reproduction in Bryophytes*

- All cells that contain a nucleus are called eukaryote cells. In animals the number of chromosomes or pairs of chromosomes varies. Humans have 23 pairs of DNA organized into separate strands, one from the mother and the other from the father. This is true for almost every cell except reproductive cells (egg and sperm). When a cell is fertilized by a sperm, the cell has two sets of chromosomes, one from each parent.
- Plants are different than animals in the cycle of one set of chromosomes (called haploid) and two sets of chromosomes (called diploid) referred to as alternation of generations. As plants become more complex, they spend more time in the diploid generation, and less time in the haploid state. The green you see in the images of bryophytes are haploid. The brown/orange and the image in the white box are the diploid tissues.
- The life cycle of bryophytes is like all the other land plants with alternation of generations. The only time the plant produces diploid (two sets of chromosomes) is when it is preparing to reproduce.
- Liverworts are extraordinarily cool. The white box show the diploid stage as the plant prepares for sexual reproduction. Like most plants, they can vegetatively reproduce (multicellular structures become detached from the parent plant and develop into new individuals, and there for genetically the same as the parent plant). Liverworts have gemma cups (red arrow). When rain falls on the liverwort, cells bounce out of the gemma cups and start to grow a new plant where they land.

Note: **chromosome**, **haploid**, and **diploid** are defined on page 4.

**POWER WORDS**

**phloem:** vascular tissue in plants that conducts sugars and other metabolic products from leaves

**rhizoid:** filamentous outgrowth on the underside of the plant serving both to anchor the plant and to conduct water

**xylem:** the vascular tissue in plants that conducts water and dissolved nutrients upward from the root



**Moss**



**Liverworts**



**Club Moss**

*What are pteridophytes?*

These primitive spore bearing plants include about 11,000 species of ferns, etc. This Division includes:

- Class Psilopsida - look like woody, green sticks in the tropics
- Class Lycopsidea - club moss
- Class Sphenopsida - horsetails
- Class Pteropsida - ferns

*Characteristics of pteridophytes:*

- true root, stem, and leaves
- vascular system (**xylem** and **phloem**)
- do not produce seeds or flowers
- unlike bryophytes (mosses, etc.), most of their visible tissue is **diploid**
- the **haploid** alternation of generations is a completely separate plant!

*Reproduction in Pteridophytes:*

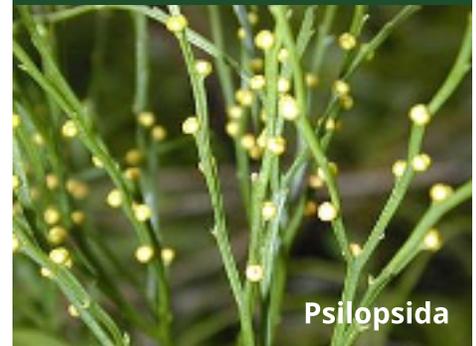
- On the underside of a **diploid** frond, sporangia (singular sporangium) develop (the orange-brown dots on the image below).
- Inside the sporangia, meiotic cell division occurs. Meiotic division is the way cells divide to produce not two sets, but only one set of chromosomes. These are, called spores in pteridophytes. These spores are dispersed by water, landing on the ground.
- The spore develops into a tiny, heart-shaped plantlet called a prothallus. Inside the prothallus, there are two structures, an antheridium and an archegonium.
- Mitotic cell division (division which preserves the same number of chromosomes the prior cell had. In the prothallus, it only has one set of chromosomes, **haploid**). If this cell division is in the antheridium, it produces sperm. If the division is in the archegonium, it produces eggs.
- Water is necessary for the sperm to swim to an egg for fertilization. It can be on the same prothallus, or it can be on a different prothallus.
- This diploid tissue grows out of the prothallus as a fiddlehead fern (image just to the right), which will grow into a new fern plant.

**POWER WORDS**

**chromosome:** a threadlike structure of nucleic acids and protein found in the nucleus of most living cells, carrying genetic information in the form of genes

**diploid:** containing two complete sets of chromosomes, one from each parent

**haploid:** having a single set of unpaired chromosomes



Psilopsida



Club Moss



Fiddle heads



prothallus fern (very small)



Frond

Ferns



diploid fern



Horsetails

*What are gymnosperms?*

Gymnosperms have about 1,000 species, and are divided into:

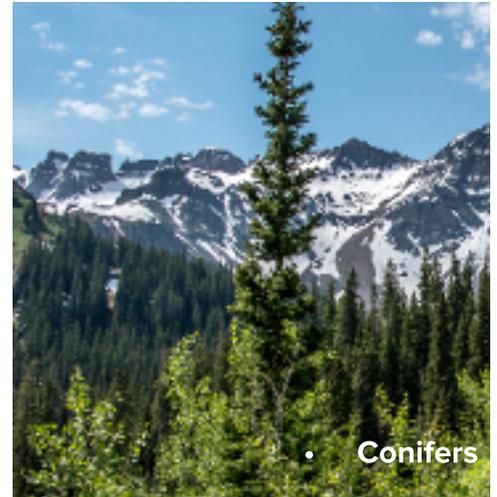
- Class Pinophyta - firs, pines, cedar, and other conifers
- Class Cycadophyta - cycads (also called sago palms)
- Class Ginkgophyta - ginkgo (also called maidenhair tree)
- Class Gnetophyta - some really weird plants, like welwitschia, ephrida, and gnetum (a group of tropical evergreen trees, shrubs, and woody vined lianas)

*Characteristics of gymnosperms:*

- true root, stem, and leaves
- vascular system (**xylem** and **phloem**)
- produce seeds on the surface of reproductive structures, visible as cones at maturity
- do not produce flowers or fruit
- pollen distributed by wind

*Reproduction in gymnosperms:*

- The defining differences among bryophytes (mosses), pteridophytes (ferns), gymnosperms (conifers), and angiosperms (flowering plants) is the alternation of generations. Bryophyte plants are primarily **haploid** plants. The only time they have **diploid** tissue is during the time they are ready for sexual reproduction. With each group, the **haploid** generation is reduced. Pteridophyte plants have a separate **haploid** plant (prothallus). The **diploid** fern emerges from this small prothallus.
- Following this trend, gymnosperms have a reduction of the haploid alternation of generations stage. There are two types of cones: the large, higher, woody cones are female, and the smaller, lower, easily crushed cones are male. The cones are diploid tissue. Inside each cone, the cells begin to divide, leaving only one set of chromosomes per cell (haploid) called the archegonium to produce eggs, and the pollen which houses sperm.
- Pollen from the male cone is distributed by the wind. Male cones are typically lower on conifers to prevent fertilizing the female cones on the same tree. When pollen lands on a female cone, the pollen begins to bore a tube into the bract of the female, reaching the archegonium. Sperm within the pollen migrate to the egg cells to fertilize and produce seeds
- Seeds may remain in the cone for years, depending on the necessary conditions to start germination.



• Conifers



• Cycad



Ginkgo tree with insert of leaves



Welwitschia

*What are angiosperms?*

This is an informal division of plants that include over 350,000 different species! Generally, these plants can be divided into:

- **monocots** (including plants like cacti)
- **dicots**

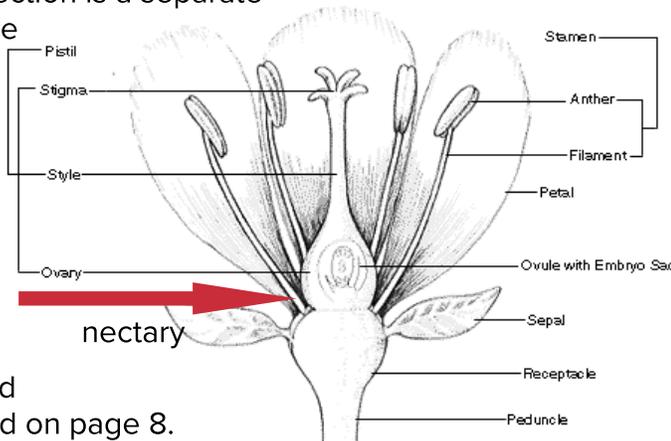
*Characteristics of angiosperms:*

- true root, stem, and leaves
- vascular system (**xylem** and **phloem**)
- produce flowers (modified leaves) with pollen (sperm located inside) and eggs
- fertilization is primarily through pollinators
- seed located in the flower's ovary that becomes the fruit

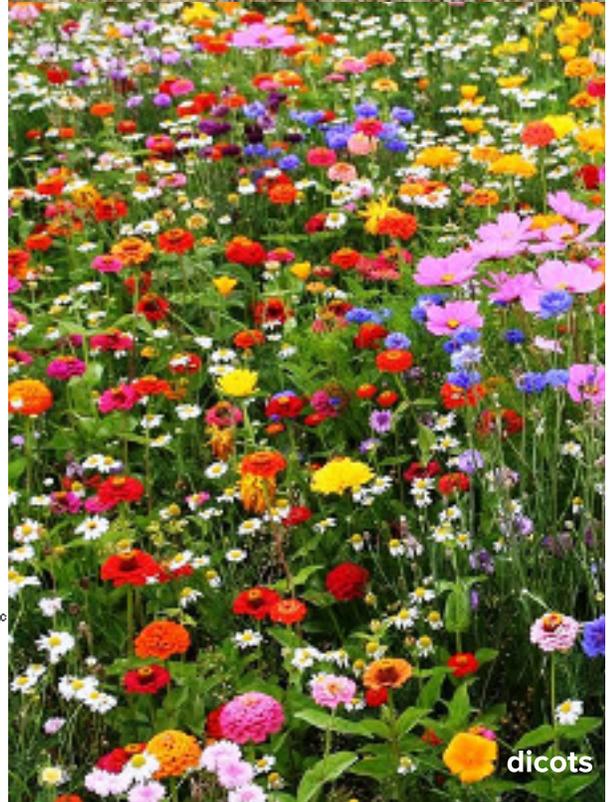
*Reproduction in angiosperms:*

The activity on page 8 goes into depth on flower anatomy of both **monocots** and **dicots**. The flower diagram is on both this page and page 8 for ease of following this information. As you go through the dissection, review this page for more detailed information about the fertilization process.

- Flowering plants' alternation of generation haploid stage is reduced to several cells within the microsporangium (male structure) and megasporangium (female structure).
- The anthers contain pollen. As the pollinator enters a flower to collect the nectar contained in the nectary, it will brush by the anthers, and the pollen will stick to the body and face of the pollinator.
- It will then move to the next flower, and the pollen will brush by the anthers, as well as deposit pollen on the stigma of the flower.
- The pollen grows a tube (the pollen tube) into the stigma, through the style, and down to the ovary. The sperm migrate into the ovary for fertilization.
- There can be multiple ovaries in a single flower.
- Each ovary grows into a fruit. It can be large, like an orange, or small like a currant.
- Each orange section is a separate ovary in a single flower, producing seeds.



Note: **monocot** and **dicot** are described on page 8.



**Bryophyta** (moss, liverwort, and hornwort)

**Pterophyta** (ferns, horsetails, and clubmoss)

**Gymnosperm** (conifers, cycads, ginkgos, and ephidra)

**Angiosperm** (flowering plants)

Flowering plants are divided into two groups: **monocots** (grass, lilies, corn) with floral parts in multiples of three, and **dicots** (carnations, strawberries, columbines) with floral parts in multiples of four or five.

Flowers grow in layers. See the diagram on the lower right.

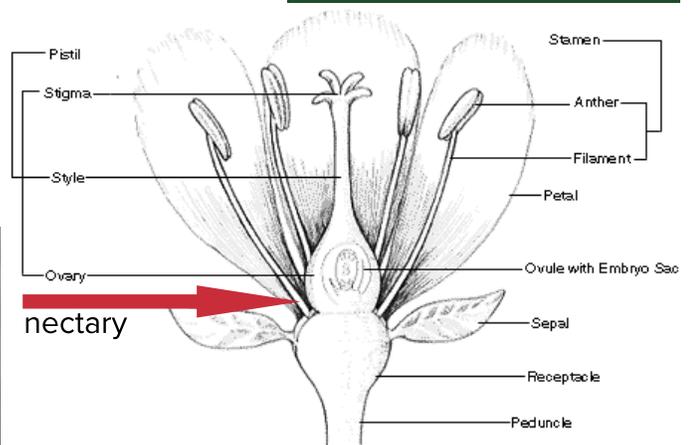
- The outermost layer - sepals, the outer covering of the flower. The green part of a rosebud are sepals. Lily sepals turn the color of the petals when they open.
- The second layer - petals, usually the color part of the flower. This helps to attract pollinators that use sight to find the nectar, like bees, butterflies, hummingbirds, and bats.
- The third layer - male stamen that includes the filament and anther where pollen is located.
- The innermost layer - female pistil that includes the stigma, style, and ovary where a fertilized flower's seeds will grow. The pistil sits on top of the receptacle and peduncle.

**Directions:**

- Start with the lily. For each layer, tape on the data sheet and count the number of each. Record that number.
- Remove the outer layer - sepals. Tape the individual sepals on the data sheet. How many are there? If the lily is completely open, then the sepals will be the same color as the petals. There are equal number of sepals as petals.
- Remove the next layer - petals. Tape the individual petals on the right and label. How many are there?
- Remove the next layer - stamen. Each stamen is comprised of an

anther on a filament. Tape the individual stamen on the data sheet and label.

- The pistil is the remaining structure. Use a safe surface (cutting board or piece of cardboard), cut the pistil in half with the craft knife or box cutter. Tape both halves on the right.
- Repeat these steps with the carnation.
- Examine each closely with your hand lens. Note similarities and differences between these two flowers. Which flower is from a **monocot** plant, and which is from a **dicot** plant?
- Dissect your snapdragon. Follow the same steps. Is your snapdragon a monocot or dicot?
- Flowers, like daisies, are very different, and are called composite flowers. Each "bump" on the daisy head is a flower.



## POWER WORDS

	Dicot	Monocot	
Two red flowers		One green flower	Seed
Two roots		Fibrous roots	Root
Ringed		Scattered	Vascular
Wide flat leaves		Parallel veins	Leaf
4 or 5		Multiple of 3	Flower

## MATERIALS:

- magnifying lens
- optional dissecting microscope
- lily, carnation and snapdragon cut flowers
- computer with internet access
- <https://extension.colostate.edu/>
- print flower dissection page 9-11 (single sided)
- color pencils
- tape
- box cutter or craft knife
- cutting board with parent supervision

Tape each structure on this page.

Number of sepals:

Number of petals:

Number of stamen (anther and filament):

Number of pistils (stigma, style, and ovary):

Tape each structure on this page.

Number of sepals:

Number of petals:

Number of stamen (anther and filament):

Number of pistils (stigma, style, and ovary):

Tape each structure on this page.

Number of sepals:

Number of petals:

Number of stamen (anther and filament):

Number of pistils (stigma, style, and ovary):

Angiosperms and pollinator animals **co-evolved** at least 100 million years ago with the oldest known pollinating insect fossil found in amber (image below) covered with pollen. DNA **molecular clocks** date flowers appearing as far back as 256 million years ago, and pollinators have probably been part of the flower's story for much of that time.



*Directions:*

- Before you look at Pollinator Data Sheet 2, focus on Pollinator Data Sheet 1 to make some predictions.
- How many pollinators can you list? There are some pollinators that do not live here, but you may know about them. You can list those too.
- Go through your list again, and note which are local animals.
- The USDA (US Department of Agriculture) has information about native pollinators you may find interesting. You can find it at the website listed in the green box.
- Sketch each of the local pollinators, especially their mouth parts. Estimate the size of each animal. Both of these characteristics are important in pollinating a flower.
- Look carefully at the three flowers you dissected, especially the

structure to the nectaries, the location of the anthers and the stigma.

- Make your best guess which pollinator from your list would likely pollinate each of your dissected flowers (lily, carnation, and snapdragon).
- Look at the picture of the titan arum. It is also called a corpse flower. What kind of pollinator would pollinate this flower?
- Hint: it smells like rotting meat. What kinds of animals are attracted to rotting flesh?
- Hint: it has dark magenta petals. If you look at the Pollinator Syndromes on page 15, a list of flower characters attracting specific flower. What kind of animals are attracted by dark magenta petals?
- Time to go outdoors and check this out for yourself! Find an area that has a lot of flowers. They can be garden flowers or wildflowers. Bring your pencil, data sheet 2 (on page 14), clipboard, and folding chair. Carefully watch the flowers. Start jotting down what animals you see.
- The data sheet includes common Colorado pollinators. Record what you see.

**POWER WORDS**

- **coevolve:** two things that influence each other in the process of development or evolution
  - **molecular clock:** average rate at which a species' DNA accumulates mutations, used to measure species separation
  - **pollinator:** an animal that moves pollen from the male anther of a flower to the female stigma of a (different) flower
- When you return home, compare it to the Pollinator Syndromes. Do you agree with the that sheet?
  - When you see flowers, predict which pollinators will visit.

**MATERIALS:**

- USDA Pollinator information: [https://plants.usda.gov/pollinators/Native\\_Pollinators.pdf](https://plants.usda.gov/pollinators/Native_Pollinators.pdf)
- pencil
- color pencils
- flower dissection sheets
- magnifying lens
- copy of data sheets pages 13-14
- clipboard
- optional - folding chair

List as many pollinators you can and sketch them:

Look at your flower dissection sheet. Can you guess which flower will attract which pollinator? Look closely at where nectaries are located. Consider the mouth parts of the different pollinators. consider the size of the pollinators. Why do you think each flower will be visited by the pollinator you picked?

Lily

Carnation

Snapdragon

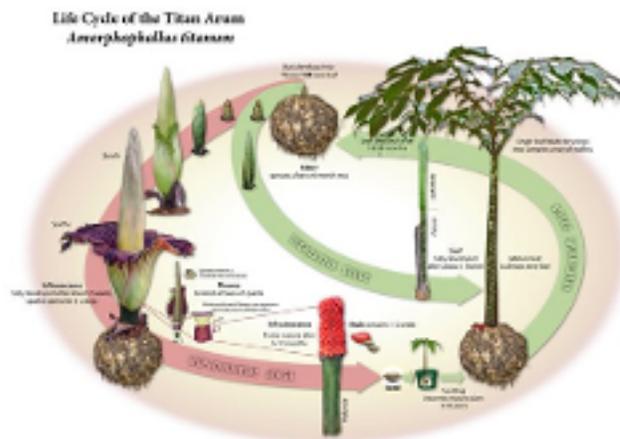
The image on the right is called titan arum (*Amorphophallus titanum*). It is the tallest flower in the world, and the flower can grow as tall as 8 feet! The plant is native to Sumatra in Indonesia. Can you identify the stamen? Can you identify the pistil? Trick question, since the spike is the pistil, and you can't see the stamen!

What pollinator do you think would pollinate the titan arum?

Hint: It smells like rotting meat.

Hint: the dark magenta petals attract a certain type of pollinator.

The plant has a vegetative stage with only leaves and stems, and a reproductive stage, when the flower grows. The life cycle diagram shows these two stages.



## Nature's Partners: Pollinators and Plants Observation Sheet

<b>Animal</b>	<b>Behavior</b> (flying, crawling, drinking nectar, gathering pollen, # of visits, etc.)	<b>Flower Name</b>	<b>Flower Shape</b> (draw flower)	<b>Flower Color</b>	<b>Flower Scent</b>
<b>Bee</b>					
<b>Butterfly</b>					
<b>Hummingbird</b>					
<b>Fly</b>					
<b>(Other)</b>					



## Pollinator Syndromes

"Pollinator Syndromes" describe flower characteristics, or traits, that may appeal to a particular type of pollinator. Such characteristics can be used to predict the type of pollinator that will aid the flower in successful reproduction. A combination of color, odor, quantity of nectar, location and type of pollen, and flower structure can each affect a potential pollinator's ability to locate a flower and its food resources.

Trait	Type of Pollinator							
	Bat	Bee	Beetle	Bird	Butterfly	Fly	Moth	Wind
<b>Color</b>	White, green or purple	Bright white, yellow, blue, or UV	White or green	Scarlet, orange, red or white	Bright red and purple	Pale, or dark brown, purple	Pale red, purple, pink or white	Pale green, brown, or colorless
<b>Nectar guides</b>	None	Present	None	None	Present	None	None	None
<b>Odor</b>	Strong and musty; emitted at night	Fresh, mild, pleasant	None to strongly fruity or foul	None	Faint but fresh	Putrid	Strong sweet; emitted at night	None
<b>Nectar</b>	Abundant; somewhat hidden	Usually present	Sometimes present	Ample; deeply hidden	Ample; deeply hidden	Usually absent	Ample; deeply hidden	None
<b>Pollen</b>	Ample	Limited; often sticky, scented	Ample	Limited	Limited	Limited	Limited	Abundant; small, smooth
<b>Flower Shape</b>	Bowl shaped; closed during day	Shallow; with landing platform; tubular	Large and bowl-shaped	Large, funnel-like; strong perch support	Narrow tube with spur; wide landing pad	Shallow; funnel-like or complex with trap	Regular; tubular without a lip	Regular and small
								

Photo credits © Merlin Tuttle, Tom Eisner, Edward Ross, Aria Altman, Chris Carvalho, Paul Growald

[WWW.POLLINATOR.ORG](http://WWW.POLLINATOR.ORG)

It is not necessary to do the September issue 44.Aspen newsletter before proceeding. If you did, go get your data! You are going to add to it. Skip to the next activity on page 18.

If you did not start with 44.Aspen, you first need to find a tree. While this issue focuses on the natural history of quaking aspen as the example, you can use any tree near you.

You have two options. You can:

1. Complete the Adopt a Tree from the September issue, collecting additional measurements (website located under the image of the map on the right)
2. Simplified version of Adopt a Tree in this activity.

#### Directions:

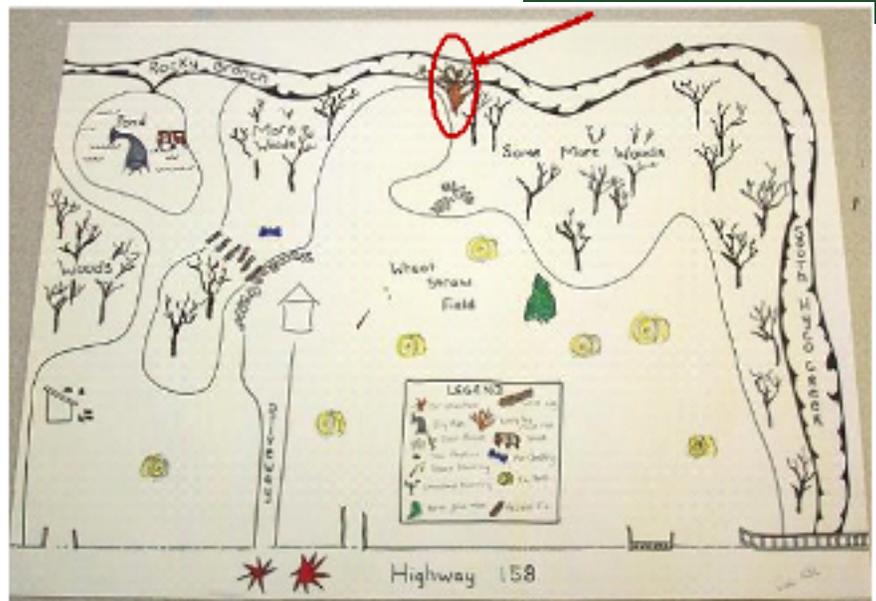
- Gather your supplies in your backpack. Since you are headed outdoors, be sure to dress appropriately for the weather. Layered clothes are the best way to remain comfortable while out and about. As the temperature or your activity level changes, you can remove or add layers.
- Scout around your home, neighborhood, school or park to find a **deciduous** tree (loses its leaves in the fall) that you will “adopt” for all these activities. Find a tree that is on fairly flat ground and separated from other trees. You can also adopt a **conifer** tree (tree with cones) in addition to your deciduous tree.
- On the data sheet, draw a map from your home to the tree. Sketch your tree, and take some pictures. Be sure to include images of the entire tree, the bark, and a couple of leaves).

When you return home, download and print your pictures to add to your data sheet.

- With the sharp scissors or pruning shears, cut a sample of the tree (small branch with leaves). Place in the plastic bag and close the bag to keep leaves fresh.
- Determine the species of tree. You can find tree guide books at your county library or use Internet resources. See the Materials list in the green box below for two great sites. If still in doubt, go to your county extension office and ask the master gardeners to help identify your tree.

### POWER WORDS

- **conifer:** a tree that bears cones and needle-like leaves or scale-like leaves that are typically evergreen
- **deciduous:** a plant that sheds its leaves annually



STEMpower issue 44.Aspen found at this website:

[https://tra.extension.colostate.edu/stem-k12/stem-resources/?preview\\_id=19](https://tra.extension.colostate.edu/stem-k12/stem-resources/?preview_id=19)

### MATERIALS:

- cell phone with camera and calculator
- clipboard (9x12" heavy cardboard and binder clip)
- color pencils
- datasheet page 17
- resources to identify the tree:
  - iPhone or iPad, free download app LeafSnap: <http://leafsnap.com/>
  - <https://www.arboday.org/trees/whatTree/>
- large plastic bag
- pruning or sharp scissors
- backpack
- water bottle
- hat

What species is your tree? \_\_\_\_\_

Draw a map from your house to where your tree is located:

Sketch your tree:

Photosynthesis is a two part **metabolic** process:

- Light Dependent Reaction uses the energy of the sun to make little packets of energy called ATP. ATP is the perfect amount of energy. In the **chloroplast**, ATP is created in the **chlorophyll**, a **pigment** that absorbs most light wave lengths except green.
- Calvin Cycle uses ATP energy to break carbon dioxide gas and water into atoms, rearrange the atoms into a simple sugar and oxygen. This happens in the **chloroplast**.

**Chlorophyll** has two forms, **chlorophyll a** and **chlorophyll b**. It is not the only **pigment** found in leaves. Two other major pigment are carotenoid and xanthophyll (a type of carotenoid). They are hidden by the chlorophyll during the summer. Sunlight is extremely powerful energy. We get sunburns if we stay out in the sun too long. Carotenoids help to absorb some of this energy, so that the **chlorophylls** can do their job.

One more thing before this activity (and totally cool information). Visible light is what we see in a rainbow once the wavelengths of light have been separated. Red, Orange, Yellow, Green, Blue, Indigo, Violet (ROY G. BIV) combined makes white light. The absorption spectra graph on the right shows **chlorophyll** absorbing blue through purple and red. The green-yellow is not absorbed. That is why leaves are green!

In this activity, you extract leaf **pigments** on a filter paper and use paper chromatography to separate the photosynthetic **pigments**.

This repeats the activity you did in

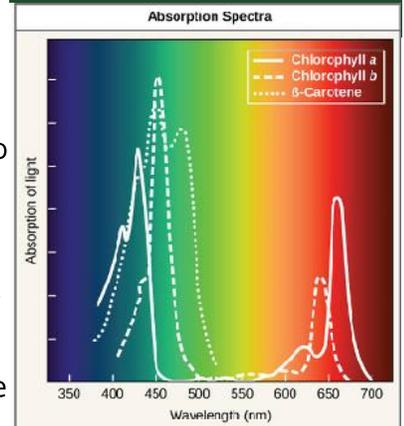
44.Aspen, but using a different technique. In the fall, the leaves were changing. Depending on the color of the leaf, you may not have found any green **pigment** in the leaf at all. Now that it is spring, will you find all the **pigments** (**chlorophyll**, carotenoid, and xanthophyll), or only **chlorophyll**?

*Directions:*

- Cut a strip of coffee filter 3½" x 1".
- Draw a horizontal line with a pencil (not pen) about half an inch from the bottom of the filter strip.
- Crumple your Adopt a Tree leaf to make it more supple.
- Place the leaf on the scratch paper, and put the filter on top of the leaf. With the quarter, press hard and roll the quarter on the pencil line several times until you get a green line. Repeat with another part of the leaf over the same line. Repeat this process until the line is dark green.
- Add about an inch of acetone (clear nail polish) in the canning jar.
- Tape the top of the coffee filter strip to a pencil and balance the pencil across the top of the canning jar. See the image on the next page.
- It is very important that the bottom of the filter strip is in the acetone, but the green line is not in the liquid. If the acetone touches the line directly, the

**POWER WORDS**

- **chlorophyll**: green pigments in photosynthetic organisms
- **chloroplast**: the organelle that houses chlorophyll and in which photosynthesis takes place
- **metabolic**: relating to the chemical processes that occur in living organisms to sustain life
- **pigment**: substances produced by living organisms which give color (i.e. skin, leaves, eyes, fur, etc.)



**MATERIALS:**

- cup sized (8 oz) canning jar
- pencil
- tape
- coffee filter
- scissors
- ruler
- acetone (clear nail polish)
- coin (quarter works well)
- scratch paper
- print table page 17 (or copy table on scratch paper)

- pigment will just dissolve away.
- Observe what happens to the liquid in the canning jar and the line on the filter paper. Results will take about 20 minutes.
- Remove the filter strip from the acetone and allow to dry.
- Identify the different color bands with the table below.
- Measure the distance from your pencil line to the top of each band in millimeters, and record in PT column in your table.
- Measure the pencil line to the highest point the **solvent** traveled in millimeters. This is your PS distance, and is the same measurement for all 4 pigments. Record this in your table below.
- The distance traveled by any particular **compound** can be used

to identify the **compound**. The ratio of the distance traveled by a **compound** to that of the solvent front is known as the Rf value; unknown **compounds** may be identified by comparing their Rf's to the Rf's of **known standards**.

- Paper chromatography works because molecules are different sizes. The larger the molecule, the slower it travels up the filter. the smaller the molecule, the faster it travels up the filter. Order the pigments from smallest to largest. by how far they travel up the filter.

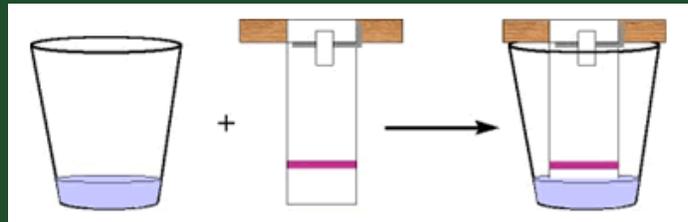
Rf equation:

$$Rf = \frac{\text{distance pigment traveled}}{\text{distance solvent traveled}}$$

**POWER WORDS**

- **compound**: a thing that is composed of two or more separate elements
- **known standard**: set up by an authority as a rule for the measure of quantity, weight, extent, value, or quality to compare to unknowns
- **solute**: the minor component in a solution, dissolved in the solvent
- **solution**: a liquid mixture in which the minor component (solute) is uniformly distributed within the major component
- **solvent**: able to dissolve other substances

**Paper chromatography:** Filters have the capacity to wick liquid up against gravity. As the **solvent** (acetone) travels up the filter, it passes through the **solutes** (pigments). The pigments are dissolved and carried up the filter with the acetone. The pigments are different sizes and shapes. It is harder for a large pigment to wick through the network of the paper fibers than a small pigment. Therefore, large pigments do not travel as far up the filter. For example, if you run a maze holding one person's hand, you can run it much faster than a group of 8 people holding hands trying to run the maze.



Fill cup canning jar between 1/2 and 1 inch of acetone. Tape the filter to the pencil. Insert into the jar. If the acetone is too low, add a bit more into the jar. If the acetone is too high, readjust the tape on the pencil to raise the filter a bit. **The pigments MUST be above the acetone.**

Band Color	Plant Pigment	PT - Distance pigment traveled	PS - Distance solvent traveled	Rf = PT / PS
yellow to yellow orange	carotene			
yellow	xanthophyll			
bright green to blue green	chlorophyll a			
yellow green to olive green	chlorophyll b			

In the fall, 44.Aspen ST[EMpower] newsletter had a photosynthesis activity. The leaves were beginning to change, and the primary photosynthetic pigments (chlorophyll a and b) are breaking down in preparation for winter. With spring, plants begin to leaf out and photosynthesis is renewing.

This experiment collects data on the rate of photosynthesis with varying intensity of light. You may have to order supplies on-line. *Elodea nuttallii* (western water weed) is native to Colorado. You may find some submerged in lakes and ponds.

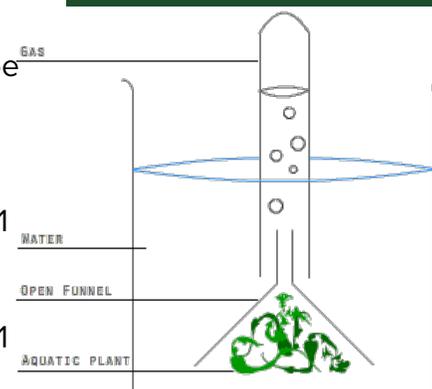
#### Directions:

- You will collect data in three **trials** on three **treatments**: in full sun, in the shade of the box, and under the box, with no light.
- Start in the morning. Each trial is 2 hours long.
- Fill the three canning jars 3/4 full with water. Line them up the jars to make sure that have the same amount of water.
- Add a teaspoon of baking soda and stir to dissolve in the water.
- Insert the funnel into the three canning jars. You will probably need to squeeze the funnel to fit it into the jar. Place the funnel at the bottom of the canning jar, with the stem pointed up.
- Divide the elodea into three equal pieces. Place one piece of elodea in the water, under the funnel, in each of the three jars.
- Move the experiment outside in full sun to complete the set-up. Place the box upside down.
- Place one of the test tubes in the canning jar and fill with water. Keeping the water in the test tube, turn upside down and insert

- it over the stem of the funnel.
- Place this experiment under the box. See the diagram below for proper set-up of the experiment.
  - Repeat with the other two test tubes in the other two jars. With the second jar, place in the shade of the box. With the third jar, place in full sun (in front or on top of the box).
    - Measure the distance between the top of the test tube and the waterline and record. Record the start time.
    - Time the experiment for 2 hours.
    - Measure the distance between the top of the test tube and the waterline in full sun, the shade, and the dark test tube. Record.
    - Add 1 teaspoon baking soda and mix to each jar.
    - Reset the test tubes (fill with water, and insert over the stem of the funnel).
    - Rotate the jars. Full sun will be the shade, shade will be the dark, and the dark will be the full sun.
  - Repeat the data collection steps 1 through 3, above.
  - Reset the test tubes, steps 4-6.
  - Repeat the data collection steps 1 through 3.

### POWER WORDS

- rate**: a ratio of two related quantities, e.g. miles per hour or gas production per minute
- ratio**: the relation between two amounts showing the number of times one value contains or is contained within the other
- treatment**: factor (also called an independent variable) is an explanatory variable manipulated by the experimenter - intensity of sunlight (full, shade, dark)
- trial**: one of a number of experiment repetitions

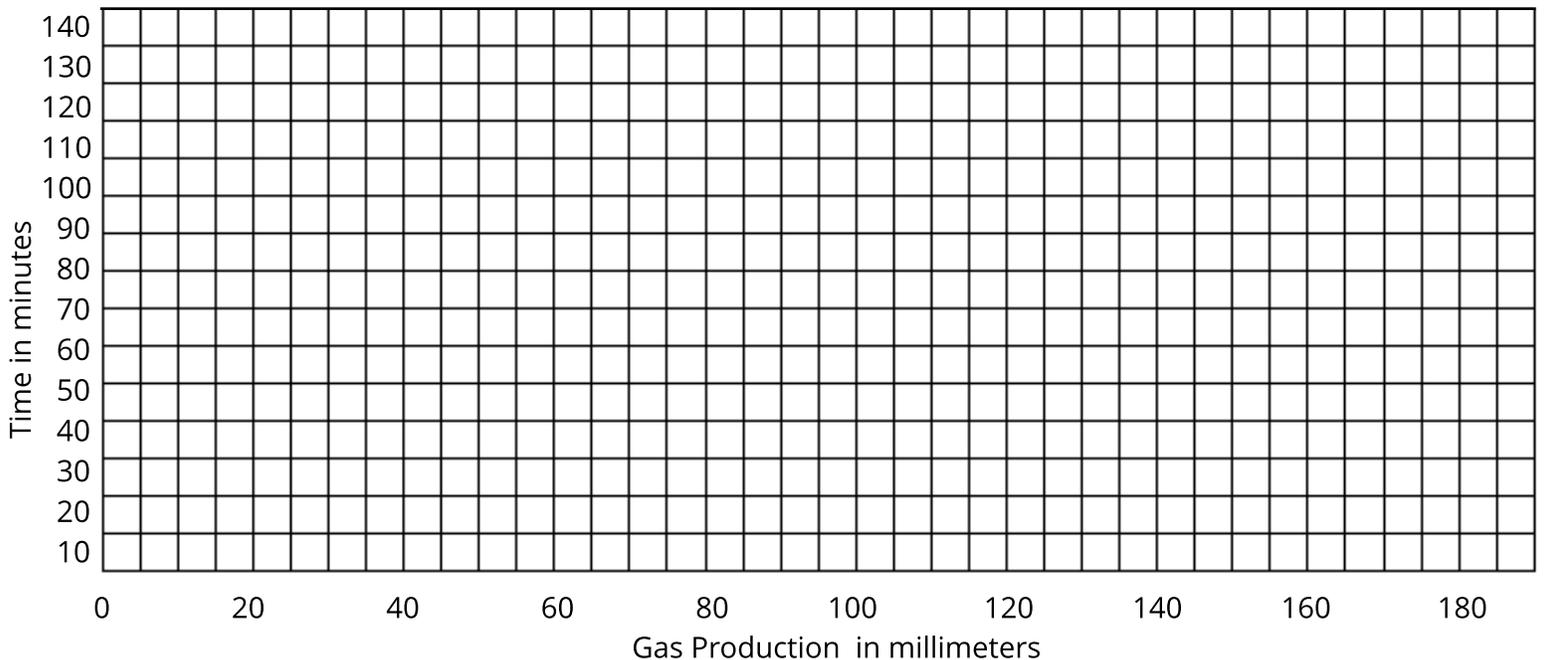


### MATERIALS:

- 3 canning jars wide mouth quart or gallon
- baking soda
- measuring teaspoon
- 3 clear plastic 150 mm funnels (must be clear)
- elodea (water weed) or hydrilla (water thyme)
- 3 pack replacement aquarium test tubes
- large cardboard box
- ruler
- watch or timer on cell phone
- data sheet page 21

Time (stop-start = length)	Light (gas in mm)	Shade (gas in mm)	Dark (gas in mm)
_____ - _____ = _____			
_____ - _____ = _____			
_____ - _____ = _____			
Average			

- Find the average of the light, shade, and dark experiment. Find the average time.
- Graph the data. The X axis is gas production in mm. The Y axis is the length of time in minutes (total of 2 hours 10 minutes).
- Confounding factors to consider:
  - Each **trial** of the experiment took two hours, therefore the sun's angle was different for each **trial**. What could you do to control this variable?
  - Baking soda in water will release carbon dioxide. You added 1 teaspoon to each **trial** to ensure there was available CO<sub>2</sub>. If the CO<sub>2</sub> was not completely consumed, there may be a higher concentration of that gas with each subsequent **trial**. What could you do to control this variable?
- Analyze your graph. What does it mean?
  
- What are your conclusions?



ST[EMpower] issues incorporate STEM careers related to the topic of the activities. If you have worked through these connected activities, you will have a ton of information about your interests, careers that incorporate those interests. You have interviewed neighbors and talked to people in those careers. You have discovered the education required as well as starting salaries.

How do you organize massive amounts of information? One way are mind maps (activity located in 49.Earth In Space issue; website listed in green box below).

Digital information becomes **obsolete**. I wrote science activities in the 1980s on 5" floppy disks. I can't access them anymore because I don't have any computer to read those data. You may want to have access to this information until you have completed your education. If you use an electronic program, how will you store that information to access 10 years in the future? As much as we try to eliminate paper, this may be something that you would like to keep as you work towards your future.

Electronic organization programs are phenomenal. They are easy to access, search, and download. You could use an electronic program, and keep a hard copy as back-up support.

There are some really nice electronic index card programs. They are large enough to store the basics and indicating how to find additional information you have collected.

If you choose to keep all the notebooks you have generated over the years of these articles leading you to explore yourself and ideas for

careers you would love, number your notebooks **chronologically** (oldest notebook is 1). This will help you retrieve ideas in your notebook as they relate to different careers.

The mind map concentrated a lot of information into basic words and pictures. This is the information you will want to capture.

Label each index card with the career. Include basic information:

- education required
- beginning salary
- basic skills required (they should match your interests)
- what the job encompasses

Each index card is a separate career. After you have completed your most desirable future jobs, go through your notebooks. If you find information directly relevant to one of your careers, identify the notebook number and the page number on the index card. It will make it easier for you to find those additional related ideas.

After completing your index cards, review them. Can you group them? Are your ideas wildly different?

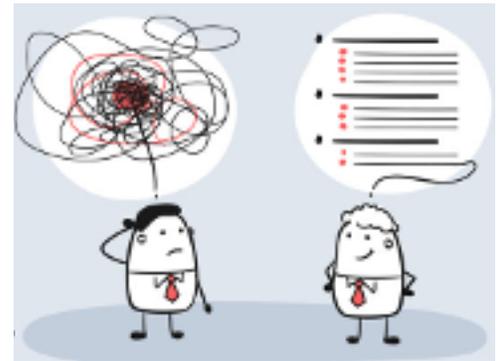
**Keep on dreaming!**

**POWER WORDS**

- **chronological:** a record of events) starting with the earliest and following the order in which they occurred
- **obsolete:** no longer produced or used; out of date

**Success comes from curiosity, concentration, perseverance and self criticism.**

**Albert Einstein**



**MATERIALS:**

- Past ST[EMpower] issues: <https://tra.extension.colostate.edu/stem-k12/stem-resources/>
- computer with internet
- index cards (computer program or paper)
- color pencils or markers
- imagination

**AUTHORS**

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Doug Garcia, Colorado State University Creative Services Communication Coordinator/ Designer

**CITATIONS**

Information:

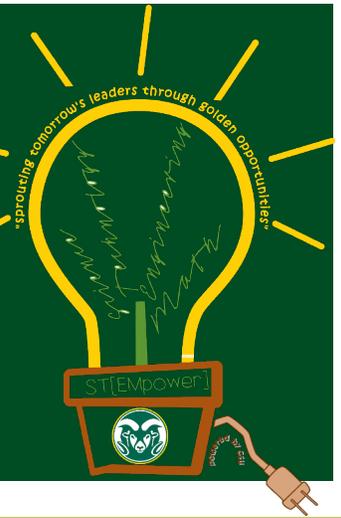
- About Aspen: <https://www.fs.fed.us/wildflowers/beauty/aspen/grow.shtml>
- Chromotography: [https://www.biologycorner.com/worksheets/plant\\_pigments.html](https://www.biologycorner.com/worksheets/plant_pigments.html)
- Classifying plants: <https://www.bioexplorer.net/types-of-plants.html/>
- Rate of photosynthesis: [https://www.biologycorner.com/worksheets/photosynthesis\\_rate.html](https://www.biologycorner.com/worksheets/photosynthesis_rate.html)
- Plant facts: <https://lifeofphyta.weebly.com>
- Pollinators: <https://pollinator.org/learning-center/education#bb>

Images:

- Aspen catkins: <https://www.fs.fed.us/wildflowers/beauty/aspen/grow.shtml>
- Diagram of a flower:  
[https://www.amnh.org/learn/biodiversity\\_counts/ident\\_help/Parts\\_Plants/parts\\_of\\_flower.htm](https://www.amnh.org/learn/biodiversity_counts/ident_help/Parts_Plants/parts_of_flower.htm)
- Examples of plant types:  
Liverwort: <http://www.downgardenservices.org.uk/liverwort.htm>  
moss: <https://ohiomosslichen.org/bryology-101/>
- Club Moss: [https://glovernursery.com/wp-content/uploads/2016/02/1024px-Hornwort\\_3144399921.jpg](https://glovernursery.com/wp-content/uploads/2016/02/1024px-Hornwort_3144399921.jpg)
- Horsetails: [http://www.easttennesseewildflowers.com/gallery/index.php/ferns/Copy\\_of\\_Horsetails](http://www.easttennesseewildflowers.com/gallery/index.php/ferns/Copy_of_Horsetails)
- Psilotum: <https://fr.wikipedia.org/wiki/Psilotum>
- Ferns: <http://angiospermproject.tripod.com/id7.html>; <https://lifeofphyta.weebly.com/pterophyta.html>;  
<https://www.thoughtco.com/fern-life-cycle-4158558>
- conifers <https://www.denverpost.com/wp-content/uploads/2016/06/dpl2059.jpg>;  
<https://i.pinimg.com/originals/99/4a/8a/994a8ad3f6a64e9301db487c428868b4.png>
- Ginkgo: <https://upload.wikimedia.org/wikipedia/commons/e/e0/GINKGOBAUM-2.jpg>  
<https://newsnetwork.mayoclinic.org/discussion/home-remedies-can-ginkgo-biloba-prevent-memory-loss-2/>
- Cycad: <https://en.wikipedia.org/wiki/Cycad>
- Welwitschia: [https://upload.wikimedia.org/wikipedia/commons/0/0c/Welwitschia\\_mirabilis%282%29.jpg](https://upload.wikimedia.org/wikipedia/commons/0/0c/Welwitschia_mirabilis%282%29.jpg)
- Angiosperms: <https://localgardener.net/wildflowers-for-your-garden/>;  
[https://www.gurneys.com/product/fieldgrade\\_lilies](https://www.gurneys.com/product/fieldgrade_lilies);  
<https://www.azplantlady.com/2016/04/cactus-flowers-color-desert-landscape.html>
- Map: [http://handmaps.org/maps/hand\\_drawn\\_map\\_farm\\_map.jpg](http://handmaps.org/maps/hand_drawn_map_farm_map.jpg)
- Pollinator chart: <https://pollinator.org/learning-center/education#bb>
- pollinators: <https://www.sciencedaily.com/releases/2012/05/120514153113.htm>;  
<https://m.usbg.gov/three-corpse-flowers-bloomed-usbg-2017>;  
[http://faculty.montgomerycollege.edu/gyouth/FP\\_examples/student\\_examples/suzy\\_djampouop/growth.html](http://faculty.montgomerycollege.edu/gyouth/FP_examples/student_examples/suzy_djampouop/growth.html)
- Organize information: <https://www.grammarly.com/blog/how-to-write-outline/>

**See you in the fall!**

# ST[EMpower]



## Standards: 52.Springtime!

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### 2020 Colorado Science Academic Standards & NGSS

to streamline the table, I have modified Aligning Standards by their code designations, rather than the full description of the standard.

I have included the 2020 Colorado Academic Science Standards Grade Level Expectations at the end of this document if you want the description for the standards code.

I am developing the Next Generation of Science Standards (NGSS) format. Until that is complete, I have a spreadsheet comparing the 2020 Colorado Science Standards to the NGSS.

If you have any questions, or would like to brainstorm ideas for using the lessons in the ST[EMpower] Newsletter, I would be happy to meet with you.

Happy Sciencing! (Okay, I know that isn't a word, but it sounds good!)



**COLORADO STATE UNIVERSITY**  
**EXTENSION**

COLORADO STATE UNIVERSITY EXTENSION  
4-H PROGRAMS ARE AVAILABLE TO ALL  
WITHOUT DISCRIMINATION

SC20	Science Discipline	Plant Classification	Flower Dissection	Pollinators	Adopt a Tree	Photosynthetic Pigments	Photosynthesis Experiment
GR.K-S.2-GLE.1	Life Science		X	X			
GR.1-S.2-GLE.1	Life Science		X	X	X		
GR.2-S.1-GLE.1	Physical Science					X	
GR.2-S.2-GLE.1	Life Science		X	X	X		
GR.3-S.2-GLE.1	Life Science	X	X	X	X		
GR.3-S.2-GLE.2	Life Science			X	X		
GR.3-S.2-GLE.3	Life Science	X	X	X	X		
GR.4-S.2-GLE.1	Life Science	X	X	X	X	X	X
GR.5-S.1-GLE.1	Physical Science					X	X
GR.5-S.1-GLE.2	Physical Science					X	
GR.5-S.1-GLE.4	Physical Science		X	X	X		
GR.5-S.2-GLE.1	Life Science		X		X		
GR.5-S.2-GLE.2	Life Science		X	X			
GR.MS-S.1-GLE.1	Physical Science					X	X
GR.MS-S.1-GLE.2	Physical Science						X
GR.MS-S.1-GLE.6	Physical Science						X
GR.MS-S.1-GLE.9	Physical Science					X	X
GR.MS-S.2-GLE.2	Life Science	X	X				
GR.MS-S.2-GLE.3	Life Science		X	X		X	X
GR.MS-S.2-GLE.5	Life Science	X					
GR.MS-S.2-GLE.8	Life Science		X				
GR.MS-S.2-GLE.11	Life Science			X			
GR.MS-S.2-GLE.12	Life Science	X	X	X	X		

SC20	Science Discipline	Plant Classification	Flower Dissection	Pollinators	Adopt a Tree	Photosynthetic Pigments	Photosynthesis Experiment
GR.MS-S.2-GLE.2	Life Science	X	X				
GR.MS-S.2-GLE.3	Life Science		X	X		X	X
GR.MS-S.2-GLE.5	Life Science	X					
GR.MS-S.2-GLE.8	Life Science		X				
GR.MS-S.2-GLE.11	Life Science			X			
GR.MS-S.2-GLE.12	Life Science	X	X	X	X		
GR.HS-S.1-GLE.2	Physical Science						X
GR.HS-S.1-GLE.6	Physical Science						X
GR.HS-S.1-GLE.7	Physical Science						X
GR.HS-S.1-GLE.9	Physical Science						X
GR.HS-S.1-GLE.10	Physical Science					X	X
GR.HS-S.1-GLE.11	Physical Science						X
GR.HS-S.2-GLE.1	Life Science	X					
GR.HS-S.2-GLE.2	Life Science	X					
GR.HS-S.2-GLE.3	Life Science			X			X
GR.HS-S.2-GLE.4	Life Science		X	X	X	X	X
GR.HS-S.2-GLE.5	Life Science						X
GR.HS-S.2-GLE.7	Life Science			X			
GR.HS-S.2-GLE.10	Life Science	X					
GR.HS-S.2-GLE.11	Life Science	X					
GR.HS-S.3-GLE.8	Earth Space Science			X			

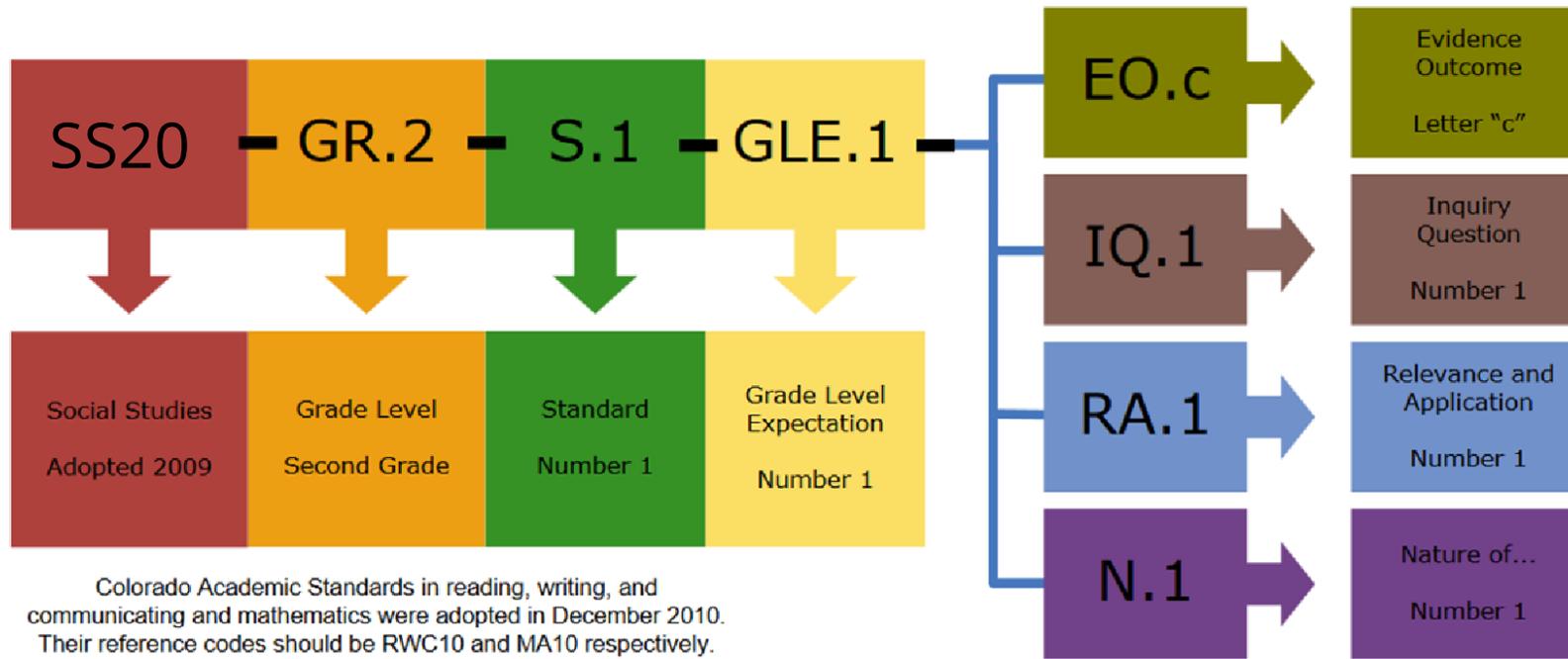
# Colorado Academic Standards Reference System

## 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

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



Colorado Academic Standards in reading, writing, and communicating and mathematics were adopted in December 2010. Their reference codes should be RWC10 and MA10 respectively.

Retrieved on 8/29/2018 from:

<https://www.cde.state.co.us/sites/default/files/documents/educatoreffectiveness/downloads/implementation%20resources/coding-the-cas.pdf>

**Kindergarten**

## 1. Physical Science

1. Pushes and pulls can have different strengths and directions, and can change the speed or direction of an object's motion or start or stop it
2. Sunlight affects the Earth's surface.

## 2. Life Science

1. To live and grow, animals obtain food they need from plants or other animals, and plants need water and light.

## 3. Earth and Space Science

1. Patterns are observed when measuring the local weather, including how humans and other organisms impact their environment.
2. Plants and animals meet their needs in their habitats and impact one another; people can prepare for severe weather.

**First Grade**

## 1. Physical Science

1. Sound can make matter vibrate and vibrating matter can make sound.

## 2. Life Science

1. All organisms have external parts that they use to perform daily functions.
2. Young organisms are very much, but not exactly, like their parents, and also resemble other organisms of the same kind.

## 3. Earth and Space Science

1. Patterns of movement of the sun, moon and stars as seen from Earth can be observed, described and predicted.

**Second Grade**

## 1. Physical Science

1. Matter exists as different substances that have observable different properties.

## 2. Life Science

1. Plants depend on water and light to grow and on animals for pollination or to move their seeds around.
2. A range of different organisms lives in different places.

## 3. Earth and Space Science

1. Some events on Earth occur quickly; others can

occur very slowly.

2. Wind and water can change the shape of the land; models can show the shape and these changes to the land.

**Third Grade**

## 1. Physical Science

1. Patterns of motion can be used to predict future motion.
2. Objects in contact exert forces on each other; electric and magnetic forces between a pair of objects do not require contact.

## 2. Life Science

1. Organisms have unique and diverse life cycles.
2. Being part of a group helps animals obtain food, defend themselves and cope with changes.
3. 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.
4. Some living organisms resemble organisms that once lived on Earth.
5. Sometimes differences in characteristics between individuals of the same species provide advantages in survival and reproduction.

## 3. Earth and Space Science

1. Climate describes patterns of typical weather conditions over different scales and variations; historical weather patterns can be analyzed.
2. A variety of weather hazards result from natural process; humans cannot eliminate weather-related hazards but can reduce their impacts.

**Fourth Grade**

## 1. Physical Science

1. The faster an object moves the more energy it has.
2. Energy can be moved from place to place.
3. A variety of weather hazards result from natural process; humans cannot eliminate weather-related hazards but can reduce their impacts.
4. When objects collide contact forces transfer so as to change objects' motion.
5. Energy can be produced, used or released by converting stored energy.
6. Waves are regular patterns of motion.
7. An object can be seen when light reflected from its surface enters the eyes.
8. Patterns can encode, send, receive and decode information.

## 2. Life Science

1. Organisms have both internal and external structures that serve various functions.

## 3. Earth and Space Science

1. Earth has changed over time.
2. Four major earth systems interact.
3. Earth's physical features occur in patterns.
4. Energy and fuels that humans use are derived from natural sources and their use affects the environment in multiple ways.
5. A variety of hazards result from natural process; humans cannot eliminate natural hazards but can reduce their impacts' effect.

### **Fifth Grade**

## 1. Physical Science

1. Matter exists as particles that are too small to be seen; measurements of a variety of observable properties can be used to identify particular materials.
2. Chemical Reactions that occur when substances are mixed can be identified by the emergence of substances with different properties; the total mass remains the same.
3. The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center.
4. The energy released from food was once energy from the sun.

## 2. Life Science

1. Plants acquire their material from growth chiefly from air and water.
2. Matter cycles between air and soil and among plants, animals and microbes as these organisms live and die.

## 3. Earth and Space Science

1. Stars range greatly in size and distance from Earth, and this can explain their relative brightness.
2. Earth's orbit and rotation and the orbit of the moon around earth cause observable patterns.
3. Earth's major systems interact in multiple ways to affect Earth's surface materials and processes.
4. Most of Earth's water is in the ocean and much of Earth's freshwater in glaciers or underground.
5. Societal activities have had major effects on land, ocean, atmosphere and even outer space.

### **Middle School**

## 1. Physical Science

1. The fact that matter is composed of atoms and molecules can be used to explain the properties of substances, diversity of materials, states of matter and phases changes.
2. Reacting substances rearrange to form different molecules, but the number of atoms is conserved. Some reactions release energy and others absorb energy.
3. Motion is described relative to a reference frame that must be shared with others and is determined by the sum of the forces acting on it. The greater the mass of the object, the greater the force needed to achieve the same change in motion.
4. Forces that act a distance (gravitational, electric, and magnetic) can be explained by force fields that extend through space and can be mapped by their effect on a test object.
5. Kinetic energy can be distinguished from the various forms of potential energy.
6. Energy changes to and from each type can be tracked through physical or chemical interactions. The relationship between the temperature and the total energy of a system depends on the types, states and amounts of matter.
7. When two objects interact, each one exerts a force on the other that can cause energy to be transferred to and from the object.
8. A simple wave model has a repeating pattern with specific wavelength, frequency, and amplitude and mechanical waves need a medium through which they are transmitted. This model can explain many phenomena which include light and sound.
9. A wave model of light is useful to explain how light interacts with objects through a variety of properties.
10. Designed technologies can transmit digital information as wave pulses.

## 2. Life Science

1. All living things are made up of cells, which is the smallest unit that can be said to be alive.
2. Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring.
3. Sustaining life requires substantial energy and matter inputs.
4. Each sense receptor responds to different inputs (electromagnetic, mechanical, chemical), transmitting them as signals that travel along nerve cells to the brain.
5. Organisms and populations of organisms are

- dependent on their environmental interactions both with other living things and with nonliving.
6. Ecosystems are sustained by the continuous flow of energy, originating primarily from the sun, and the recycling of matter and nutrients within the system.
  7. Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem.
  8. Heredity explains why offspring resemble, but are not identical to, their parents and is a unifying biological principle. Heredity refers to specific mechanisms by which characteristics or traits are passed from one generation to the next via genes.
  9. Fossils are mineral replacements, preserved remains, or traces of organisms that lived in the past.
  10. Genetic variations among individuals in a population give some individuals an advantage in surviving and reproducing in their environment.
  11. Adaptation by natural selection acting over generations is one important process by which species change over time in response to changes in environmental conditions.
  12. Biodiversity is the wide range of existing life forms that have adapted to the variety of conditions on Earth, from terrestrial to marine ecosystems.
3. Earth and Space Science
1. Motion is predictable in both solar systems and galaxies.
  2. The solar system contains many varied objects held together by gravity. Solar system models explain and predict eclipses, lunar phases, and seasons.
  3. Rock strata and the fossil record can be used as evidence to organize the relative occurrence of major historical events in Earth's history.
  4. Energy flows and matter cycles within and among Earth's systems, including the sun and Earth's interior as primary energy sources. Plate tectonics is one result of these processes.
  5. Plate tectonics is the unifying theory that explains movements of rocks at Earth's surface and geological history.
  6. Water cycles among land, ocean, and atmosphere, and is propelled by sunlight and gravity. Density variations of sea water drive interconnected ocean currents. Water movement causes weathering and erosion, changing landscape features.
  7. Complex interactions determine local weather patterns and influence climate, including the role of the ocean.

8. Humans depend on Earth's land, ocean, atmosphere, and biosphere for different resources, many of which are limited or not renewable. Resources are distributed unevenly around the planet as a result of past geologic processes.
9. Mapping the history of natural hazards in a region and understanding related geological forces.
10. Human activities have altered the biosphere, sometimes damaging it, although changes to environments can have different impacts for different living things.
11. Human activities affect global warming. Decisions to reduce the impact of global warming depend on understanding climate science, engineering capabilities, and social dynamics.

### **High School**

#### **1. Physical Science**

1. The sub-atomic structural model and interactions between electric charges at the atomic scale can be used to explain the structure and interactions of matter. Sunlight affects the Earth's surface.
2. Chemical processes, their rates, their outcomes, and whether or not energy is stored or released can be understood in terms of collisions of molecules, rearrangement of atoms, and changes in energy as determined by properties of elements involved.
3. The strong nuclear interaction provides the primary force that holds nuclei together. Nuclear processes including fusion, fission, and radioactive decays of unstable nuclei involve changes in nuclear binding energies.
4. Newton's second law and the conservation of momentum can be used to predict changes in the motion of macroscopic objects.
5. Forces at a distance are explained by fields that can transfer energy and can be described in terms of the arrangement and properties of the interacting objects and the distance between them.
6. Energy is a quantitative property of a system that depends on the motion and interactions of matter and radiation within that system.
7. Energy cannot be created or destroyed, but it can be transported from one place to another and transferred between systems.
8. Force fields (gravitational, electric, and magnetic) contain energy and can transmit energy across space from one object to another.
9. Although energy cannot be destroyed, it can be converted to less useful forms as it is captured, stored and transferred.
10. Waves have characteristic properties and

behaviors.

11. Both an electromagnetic wave model and a photon model explain features of electromagnetic radiation broadly and describe common applications of electromagnetic radiation.
12. Multiple technologies that are part of everyday experiences are based on waves and their interactions with matter.

## 2. Life Science

1. DNA codes for the complex hierarchical organization of systems that enable life's functions.
2. Growth and division of cells in complex organisms occurs by mitosis, which differentiates specific cell types.
3. Organisms use matter and energy to live and grow.
4. Organisms interact with the living and nonliving components of the environment to obtain matter and energy.
5. Matter and energy necessary for life are conserved as they move through ecosystems.
6. A complex set of interactions determine how ecosystems respond to disturbances.
7. Organisms interact in groups to benefit the species.
8. The characteristics of one generation are dependent upon the genetic information inherited from previous generations.
9. Variation between individuals results from genetic and environmental factors.
10. Evidence of common ancestry and diversity between species can be determined by examining variations including genetic, anatomical and physiological differences.
11. Genetic variation among organisms affects survival and reproduction.
12. The environment influences survival and reproduction of organisms over multiple generations.
13. Humans have complex interactions with ecosystems and have the ability to influence biodiversity on the planet.

## 3. Earth and Space Science

1. All stars, including the sun, undergo stellar evolution, and the study of stars' light spectra and brightness is used to identify compositional elements of stars, their movements, and their distances from Earth.
2. Explanations of and predictions about the motions of orbiting objects are described by the laws of physics.
3. The rock record resulting from tectonic and other geoscience processes as well as objects from the

solar system can provide evidence of Earth's early history and the relative ages of major geologic formations.

4. Earth's systems, being dynamic and interacting, cause feedback effects that can increase or decrease the original changes, and these effects occur on different time scales, from sudden (e.g., volcanic ash clouds) to intermediate (ice ages) to very long-term tectonic cycles.
5. Plate tectonics can be viewed as the surface expression of mantle convection, which is driven by heat from radioactive decay within Earth's crust and mantle.
6. The planet's dynamics are greatly influenced by water's unique chemical and physical properties.
7. The role of radiation from the sun and its interactions with the atmosphere, ocean, and land are the foundation for the global climate system. Global climate models are used to predict future changes, including changes influenced by human behavior and natural factors.
8. The biosphere and Earth's other systems have many interconnections that cause a continual co-evolution of Earth's surface and life on it.
9. Resource availability has guided the development of human society and use of natural resources has associated costs, risks, and benefits.
10. Natural hazards and other geological events have shaped the course of human history at local, regional, and global scales.
11. Sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources, including the development of technologies.
12. Global climate models used to predict future climate change continue to improve our understanding of the impact of human activities on the global climate system.



Grade	2020 Standards	NGSS
Kindergarten	<b>Physical Science</b> 1. Pushes and pulls can have different strengths and directions, and can change the speed or direction of an object's motion or start or stop it.	<b>K-PS2-1.</b> Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.
Kindergarten		<b>K-PS2-2.</b> Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.
Kindergarten	<b>Physical Science</b> 2. Sunlight effects the Earth's surface.	<b>K-PS3-1.</b> Make observations to determine the effect of sunlight on Earth's surface
Kindergarten		<b>K-PS3-2.</b> Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.
Kindergarten	<b>Life Science</b> 1. To live and grow; animals obtain food they need from plants or other animals, and plants need water and light.	<b>K-LS1-1.</b> Use observations to describe patterns of what plants and animals (including humans) need to survive.
Kindergarten	<b>Earth and Space Science</b> 1. Patterns are observed when measuring the local weather, including how humans and other organisms impact their environment.	<b>K-ESS2-1.</b> Use and share observations of local weather conditions to describe patterns over time
Kindergarten		<b>K-ESS3-2.</b> Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.
Kindergarten		<b>K-ESS2-2.</b> Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.
Kindergarten	<b>Earth and Space Science</b> 2. Plants and animals meet their needs in their habitats and impact one another; people can	<b>K-ESS3-1.</b> Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.
Kindergarten		<b>K-ESS3-3.</b> Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment
First Grade	<b>Physical Science</b> 1. Sound can make matter vibrate and vibrating matter can make sound.	<b>1-PS4-1.</b> Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.
First Grade		<b>1-PS4-2.</b> Make observations to construct an evidence-based account that objects can be seen only when illuminated.

Grade	2020 Standards	NGSS
First Grade		<b>1-PS4-3.</b> Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light.
First Grade		<b>1-PS4-4.</b> Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.
First Grade	<b>Life Science 2.</b> Young organisms are very much, but not exactly, like their parents, and also, resemble other organisms of the same kind.	<b>1-LS3-1.</b> Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.
First Grade		<b>1-LS1-2.</b> Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.
First Grade	<b>Life Science 1.</b> All organisms have external parts that they use to perform daily functions.	<b>1-LS1-1.</b> Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.
First Grade	<b>Earth and Space Science 1.</b> Patterns of movement of the sun, moon, and stars as seen from Earth can be observed, described, and predicted.	<b>1-ESS1-1.</b> Use observations of the sun, moon, and stars to describe patterns that can be predicted.
First Grade		<b>1-ESS1-2.</b> Make observations at different times of year to relate the amount of daylight to the time of year.
Second Grade	<b>Physical Science 1.</b> Matter exists as different substances that have observable different properties.	<b>2-PS1-1.</b> Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.
Second Grade		<b>2-PS1-2.</b> Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.
Second Grade		<b>2-PS1-3.</b> Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.
Second Grade		<b>2-PS1-4.</b> Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.

Grade	2020 Standards	NGSS
Second Grade	<b>Life Science</b> 1. Plants depend on water and light to grow and on animals for pollination or to move their seeds around.	<b>2-LS2-1.</b> Plan and conduct an investigation to determine if plants need sunlight and water to grow.
Second Grade		<b>2-LS2-2.</b> Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.
Second Grade	<b>Life Science</b> 2. A range of different organisms lives in different places.	2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.
Second Grade	<b>Earth and Space Science</b> 1. Some events on Earth occur quickly; others can occur very slowly.	<b>2-ESS1-1.</b> Use information from several sources to provide evidence that Earth events can occur quickly or slowly.
Second Grade	<b>Earth and Space Science</b> 2. Wind and water can change the shape of the land; models can show the shape and these changes to the land.	<b>2-ESS2-1.</b> Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.
Second Grade		<b>2-ESS2-2.</b> Develop a model to represent the shapes and kinds of land and bodies of water in an area.
Second Grade		<b>2-ESS2-3.</b> Obtain information to identify where water is found on Earth and that it can be solid or liquid.
Third Grade	<b>Physical Science</b> 1. Patterns of motion can be used to predict future motion.	<b>3-PS2-1.</b> Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object
Third Grade		<b>3-PS2-2.</b> Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.
Third Grade	<b>Physical Science</b> 2. Objects in contact exert forces on each other; electric and magnetic forces between a pair of objects do not require contact.	<b>3-PS2-3.</b> Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.
Third Grade		<b>3-PS2-4.</b> Define a simple design problem that can be solved by applying scientific ideas about magnets.
Third Grade	<b>Life Science</b> 1. Organisms have unique and diverse life cycles.	
Third Grade	<b>Life Science</b> 2. Being part of a group helps animals obtain food, defend themselves, and cope with changes.	<b>3-LS2-1.</b> Construct an argument that some animals form groups that help members survive.

Grade	2020 Standards	NGSS
Third Grade	<b>Life Science 3.</b> 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>3-LS4-3.</b> Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.
Third Grade	<b>Life Science 5.</b> Sometimes differences in characteristics between individuals of the same species provide advantages in survival and reproduction.	
Third Grade	<b>Life Science 4.</b> Some living organisms resemble organisms that once lived on Earth.	<b>3-LS4-1.</b> Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago
Third Grade		<b>3-LS4-4.</b> Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.
Third Grade	<b>Earth and Space Science 1.</b> Climate describes patterns of typical weather conditions over different scales and	<b>3-ESS2-1.</b> Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.
Third Grade		<b>3-ESS2-2.</b> Obtain and combine information to describe climates in different regions of the world.
Third Grade	<b>Earth and Space Science 2.</b> A variety of weather hazards result from natural process; humans cannot eliminate weather	<b>3-ESS3-1.</b> Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.
Fourth Grade	<b>Physical Science 4.</b> Energy can be produced, used, or released by converting stored energy.	<b>4-PS3-2.</b> Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.
Fourth Grade	<b>Physical Science 1.</b> The faster an object moves the more energy it has.	<b>4-PS3-1.</b> Use evidence to construct an explanation relating the speed of an object to the energy of that object.
Fourth Grade	<b>Physical Science 2.</b> Energy can be moved from place to place.	<b>4-PS3-4.</b> Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.
Fourth Grade	<b>Physical Science 3.</b> When objects collide contact forces transfer so as to change objects' motion.	<b>4-PS3-3.</b> Ask questions and predict outcomes about the changes in energy that occur when objects collide.
Fourth Grade	<b>Physical Science 5.</b> Waves are regular patterns of motion.	<b>4-PS4-1.</b> Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.

Grade	2020 Standards	NGSS
Fourth Grade	<b>Physical Science 6.</b> An object can be seen when light reflected from its surface enters the eyes.	<b>4-PS4-2.</b> Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.
Fourth Grade	<b>Physical Science 7.</b> Patterns can encode, send, receive and decode information.	<b>4-PS4-3.</b> Generate and compare multiple solutions that use patterns to transfer information.
Fourth Grade	<b>Life Science 1.</b> Organisms have both internal and external structures that	<b>4-LS1-1.</b> Construct an argument that plants and animals have internal and external structures that
Fourth Grade		<b>4-LS1-2.</b> Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.
Fourth Grade	<b>Earth and Space Science 1.</b> Earth has changed over time.	<b>4-ESS1-1.</b> Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.
Fourth Grade	<b>Earth and Space Science 2.</b> Four major earth systems interact.	<b>4-ESS2-1.</b> Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.
Fourth Grade	<b>Earth and Space Science 3.</b> Earth's physical features occur in patterns.	<b>4-ESS2-2.</b> Analyze and interpret data from maps to describe patterns of Earth's features.
Fourth Grade	<b>Earth and Space Science 4.</b> Energy and fuels that humans use are derived from natural sources and their use affects the environment in multiple ways.	<b>4-ESS3-1.</b> Obtain and combine information to describe that energy and fuels are derived from natural resources and that their uses affect the environment.
Fourth Grade	<b>Earth and Space Science 5.</b> A variety of hazards result from natural process; humans cannot eliminate natural hazards but can reduce their impacts' affect.	<b>4-ESS3-2.</b> Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.
Fifth Grade	<b>Physical Science 2.</b> Chemical Reactions that occur when substances are mixed can be identified by the emergence of substances with different properties; the total mass remains the same.	<b>5-PS1-2.</b> Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.
Fifth Grade		<b>5-PS1-4.</b> Conduct an investigation to determine whether the mixing of two or more substances results in new substances.
Fifth Grade		<b>5-PS1-3.</b> Make observations and measurements to identify materials based on their properties.

Grade	2020 Standards	NGSS
Fifth Grade	<b>Physical Science</b> 3. The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center.	<b>5-PS2-1.</b> Support an argument that the gravitational force exerted by Earth on objects is directed down.
Fifth Grade	<b>Physical Science</b> 4. The energy released from food was once energy from the sun.	<b>5-PS3-1.</b> Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.
Fifth Grade	<b>Life Science</b> 1. Plants acquire their material from growth chiefly from air and water.	<b>5-LS1-1.</b> Support an argument that plants get the materials they need for growth chiefly from air and water.
Fifth Grade	<b>Life Science</b> 2. Matter cycles between air and soil and among plants, animals, and microbes as these organisms live and die.	<b>5-LS2-1.</b> Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.
Fifth Grade	<b>Earth and Space Science</b> 1. Stars range greatly in size and distance from Earth, and this can explain their relative brightness.	<b>5-ESS1-1.</b> Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from Earth.
Fifth Grade	<b>Earth and Space Science</b> 2. Earth's orbit and rotation and the orbit of the moon around earth cause observable patterns.	<b>5-ESS1-2.</b> Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.
Fifth Grade	<b>Earth and Space Science</b> 3. Earth's major systems interact in multiple ways to affect Earth's surface materials and processes.	<b>5-ESS2-1.</b> Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.
Fifth Grade	<b>Earth and Space Science</b> 4. Most of Earth's water is in the ocean and much of Earth's freshwater in glaciers or underground.	<b>5-ESS2-2.</b> Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.
Fifth Grade	<b>Earth and Space Science</b> 5. Societal activities have had major effects on land, ocean, atmosphere, and even outer space.	
Fifth Grade		<b>5-ESS3-1.</b> Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.



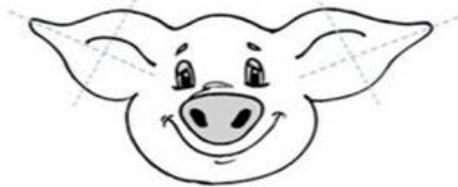
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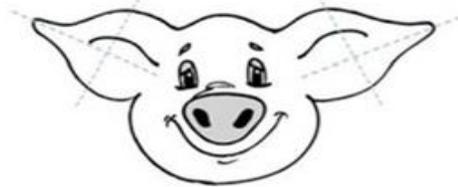
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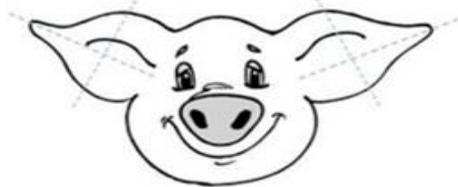
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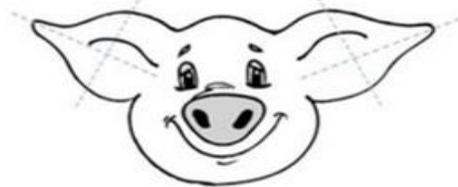
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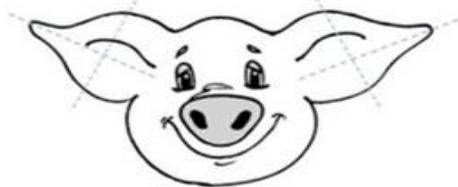
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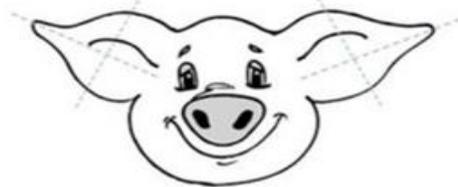
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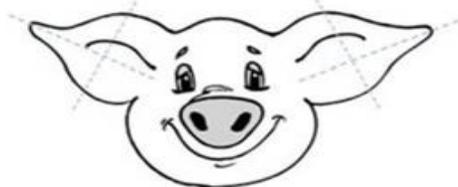
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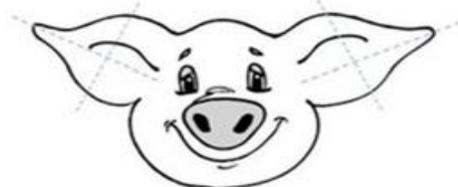
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## Family Entry

### Important Reminders

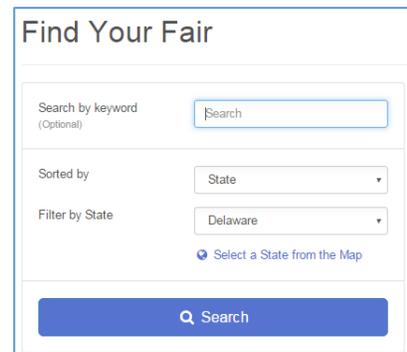
- Your fair probably has dates when entry is accepted into the fair. Be sure to complete your entry (including the final “Submit” step) prior to the cut-off date.
- Recommended browsers: Google Chrome or Mozilla Firefox. Older versions of Internet Explorer may cause unexpected results.
- Register all entries for each exhibitor in the family before proceeding to the Payment section.
- Be sure to click the “Submit” button when you have completed your entries. Entries are not final until they have been submitted.
- Check your email inbox for a confirmation email with a list of your entries and any related fees.
- You will receive a second email when your entries have been approved by your fair.

### Steps

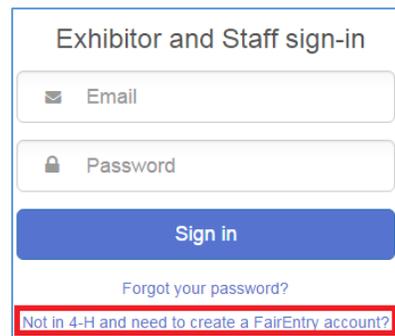
1. Go to <http://www.fairentry.com> and click “Find Your Fair”.



2. Filter by your state, click Search, and then click on the correct fair.



3. (First time) Click on the link to create a FairEntry Account. *(After that, if you are logging back in, enter the email & password that you created and click the Sign in link.)*
4. Enter your email address twice and click Create Account. **IMPORTANT:** *This must be a valid email address, so that you can receive the necessary confirmation messages.*
5. On the Account Creation page, enter information into the fields (all are required).



<p>Account Name, Phone, Password (enter twice to confirm).</p> <p>6. Click Create Account.</p>	
<p>7. Click “Begin Registration”</p>	
<p style="text-align: center;"><b>Exhibitor Information</b></p> <p>If your fair is configured to accept both individual and team entries, click on the appropriate choice for your entry. Some fairs may only be configured for individual entries.</p>	
<p>1. Enter the information into the four fields—all fields are required. Click Continue when all information is entered.</p>	
<p>2. <i>(If you entered/spelled something incorrectly on the previous screen, you have the option to Delete this Exhibitor on this screen.)</i> Enter the information on the Contact Info screen—the only required field is the top Home Phone Number. You can use the same email address that you used to create the account, or an alternate one. If you wish to receive text messages, enter your cell phone number and carrier. That number can be the same as the Home Phone Number entered above, or different. Click Continue when you are finished entering data.</p>	



3. Enter your mailing address. All fields, except Address continued, are required. As the on-screen help states, the address entered here will be used for mailing premium checks, etc. Click Continue when all information is entered correctly.
4. If your fair set up custom fields/questions for you to answer, those will be step 4 on the progress bar at the top. Answer any questions, and click Continue.
5. If your fair requires you to upload any files for your entry, those will be step 5 on the progress bar. Upload requested files, and click Continue.

The screenshot shows the 'Address' step of a registration process. At the top, a progress bar indicates steps 1 through 6, with step 3 (Address) currently selected. The user's name 'Helpsheet, Becky' and date of birth '8/05/2000' are visible. A 'Delete this Exhibitor' button is present. The main section is titled 'Address' and contains a blue informational box: 'The exhibitor's address is very important! If this exhibitor will be receiving checks from the fair, those checks will be mailed to the address entered here.' Below this are input fields for 'Address (Required)', 'Address continued (Optional)', 'City (Required)', 'State (Required)', and 'Zip Code (Required)'. A green 'Continue' button is at the bottom right.

6. Review your exhibitor information. If any information is incorrectly, click the green Edit button in the appropriate group to change it. When all information is correct, click Continue to Entries.

The screenshot shows the 'Review' step of the registration process. The progress bar at the top now has step 6 (Review) selected. A green banner at the top says 'Please review the exhibitor registration.' with a 'Continue to Entries' button. Below, there are two sections: 'Personal Details' and 'Contact Info', each with an 'Edit' button. The 'Personal Details' section shows: First Name: Becky, Last Name: Helpsheet, Date of Birth: 8/05/2000, Gender: Female. The 'Contact Info' section shows: Email, Home Phone: 555-123-4444, Cell Phone, and Cell Phone Carrier.



### Creating Entries

Each exhibitor can have multiple entries. One entry must be made for each item, animal, class, etc. For example, if an exhibitor is bringing 2 photographs, two entries into the photography class must be created. If an exhibitor is showing one horse in 5 events, five class entries must be created. Once all entries have been created for the first exhibitor, you have the choice of creating another exhibitor in this family (and entries) or proceeding to check-out (submitting the entries, whether or not fees are charged).

1. Click Add an Entry beside the correct exhibitor (if more than one has been created).

2. Click Select beside the first department you wish to enter. Any departments that are not available for entry will be noted as "Not Available" with a short explanation.
3. After you select a department, you will see a list of divisions to select from, and then a list of available classes. *Also notice that there are blue "Change" links in case you mistakenly select an incorrect department, division, or class.*
4. After you have selected the class, click the green Continue button.

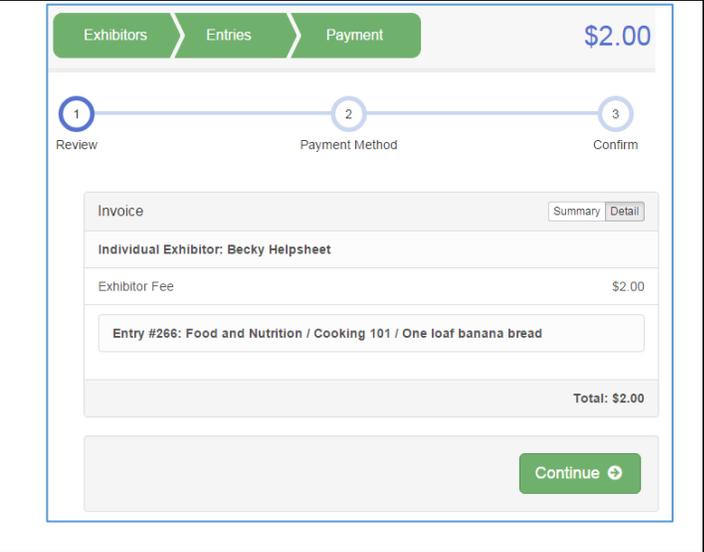
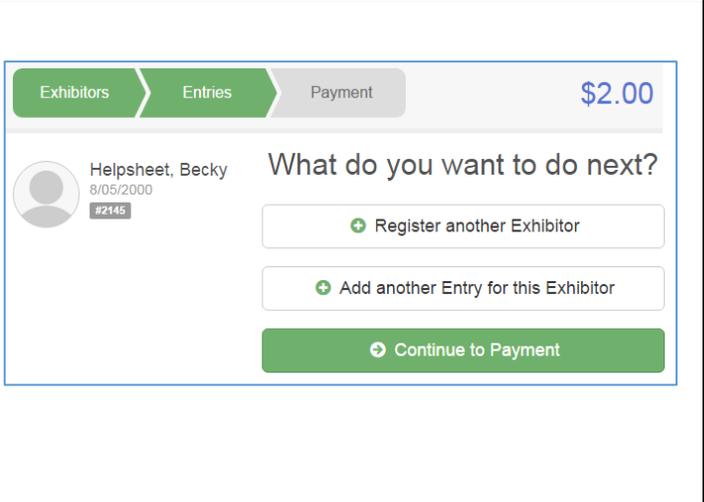
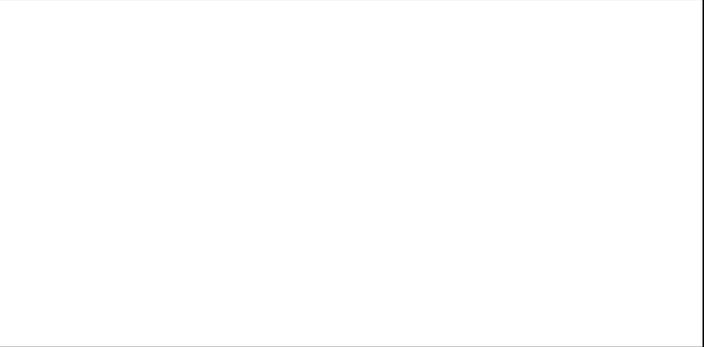
5. If this is an **animal class entry**, you may be required to specify which animal will be exhibited in this class; that may be optional; or you may NOT be able to specify the animal at entry time. If you are able to do that, you will see the option to "Add an animal".
6. Fill in all of the fields with information about the animal you intend to exhibit. Click Create and Add Animal when finished.
7. If the animal information was entered incorrectly, you have the option to either Remove From Entry (creating a new animal) or Edit Animal Details. When it's correct, click Continue.



- 8. Any questions or file uploads related to entry in this class will be next. Click Continue after answering those questions or uploading documents.
- 9. The Review screen allows you to double check this entry for accuracy, and make any changes necessary. When the information is correct, click Continue and that class entry is complete.

- 10. When each class entry is complete, you have 3 choices for what to do next:
  - a. If all class entries have been completed for one exhibitor, you can **Register another Exhibitor** in this family.
  - b. If this exhibitor has more class entries to make, you can **Add another Entry for this Exhibitor**.
  - c. If all entries for all exhibitors in the family have been completed, **Continue to Payment** to finalize and submit your entries.

- 11. Review your entries for completeness and accuracy. *Notice the Summary and Detail buttons at the top of the list on the right.* If there are errors, click on the green Entries section at the top of the page. Click Continue when all information is correct.



12. Read the payment instructions and select your method of payment. Some fairs allow credit card payments, and others do not.  
**NOTE: Even if you owe no money (no fees are charged) you must click Continue to the last “Confirm” step to submit your entries.**

13. Read the information in the “After you Submit” section. You may also have to check a box to “Agree to Terms”. Click Submit to finalize the entries for the exhibitors in this family. **After you click Submit, no changes are possible to these entries.**

