

Learning English, Math, Science and Social Studies through Agriculture



Curriculum Kit Objectives:

1. To promote the incorporation of agricultural concepts into classroom curriculum.
2. To provide an easy-to-use collection of valuable resource materials in order to help K-6th grade teachers enhance everyday curriculum with the use of ag-accurate lessons.
3. To provide a selection of activities and necessary supplies to teach about the chosen topic or theme while addressing Arizona Learning Standards across all subject areas.

Some notes on using the Curriculum Kit:

Kit Contents- The Poultry Curriculum Kit is intended to be a resource material kit. While some hands-on supplies are provided, because of the number of activities included in the various books and guides within it, such supplies are only included to complete some of the lessons.

Books- A variety of books are included in the Poultry Curriculum Kit to be used as the teacher sees fit. Please be sure that all books are returned in good condition to the kit for its return to the Farm Bureau.

Websites- To further assist teachers and students seeking information about poultry and embryology, a list of web addresses has been provided. Some sites offer online educational games for students.

Consumable Items- The Poultry kit is supplied with a variety of consumable items, such as plates, construction paper, yarn, etc. Please return all unused items.

Incubator- Please be sure that the incubator, egg turner, thermometers, feeder and waterer are returned cleaned. Please wash all materials with warm soapy water and dry completely. DO NOT submerge the incubator; clean with a sponge as to prevent the electrical components from getting wet.

Chicks- Check with your local feed stores and farmers to see if they will take your chicks once your embryology unit is complete. If you need help placing your chicks please contact the Farm Bureau.



Table of Lessons



Math

Lesson # 1	Scrambled Eggs
Lesson # 2	Poultry Word Problems
Lesson # 3	Incubation – Graphing
Lesson # 4	Eggs of a Different Size
Lesson #5	Historical Egg Prices

English Language Arts

Lesson # 1	If I were a chick
Lesson # 2	Which Came First?
Lesson # 3	Show What You Know- Eggs 101
Lesson # 4	Show What You Know- America's Heartland
Lesson # 5	Show What You Know- Poultry Ag Mag
Lesson #6	An Egg-cellent Source of Nutrition

Social Studies

Lesson # 1	Egg Production Methods
Lesson # 2	Arizona's Egg-straordinary Places

Science

Lesson # 1	Anatomy of an Egg
Lesson # 2	Life Cycle of a Chicken
Lesson # 3	Embryo Tracking
Lesson # 4	Breaking Eggs: The Shell
Lesson # 5	Making the Grade
Lesson # 6	Egg in a Bottle
Lesson #7	Biosecurity: Protecting the Hens

Terms



Air Cell- a pocket of air at the large end of the egg where there are more pores, allows for easy air exchange; chick pops the cell before hatching to fill its lungs with fresh air

Albumen- the clear liquid part of the egg also called the white. It provides water and protein to the growing embryo (chick), as well as provides it cushioning

Aviary- a building where laying hens can fly freely

Bacteria – a group of single-celled microorganisms that live in soil, water, the bodies of plants and animals, or matter obtained from living things and are important because of their chemical effects and disease abilities

Battery System- a large system of egg production involving cages

Biosecurity – management practices that reduce the chances infectious diseases will be carried onto a farm by animals or people

Broiler- chickens that are fed to produce meat

Candling- is a term used to describe a method by which bird breeders check to see if eggs are fertile or not

Chalaza- a cord-like strand in the albumen; anchors yolk in the center of the egg; acts a shock absorber for the developing embryo

Chick- a newly hatched chicken, can be either male or female

Consumers- buyers of goods and services

Cost- what a business must pay to produce an item or product

Decalcified- the removal of calcium or calcium compounds

Demand- amount of an item people want to buy

Deviled Eggs- unfertilized hard-boiled eggs cut in half and filled with the hard-boiled egg's yolk mixed with different ingredients

Domesticated- tamed

Economy- system of production, distribution, and consumption

Egg- hard-shelled reproductive body produced by a bird and especially domestic poultry

Egg Tooth- a small, sharp, cranial protuberance used by offspring to break or tear through the egg's surface during hatching

Embryo- an animal in the early stages of development prior to hatching

Expansion: the act of increasing (something) in size or volume or quantity or scope

Fertilized- an egg that has been made fertile by a male rooster; these eggs are not eaten or used in food; produces a chick

Flock- several birds tended to as one unit

Fried Eggs- unfertilized eggs that are fried, typically in a frying pan or on a griddle

Germ- a microscopic living thing, especially one that causes disease

Germ spot- also called blastodisc; the area where the embryo will begin to grow if the egg is fertilized

Gram- metric unit of weight, about 1/28 of an ounce

Hard Boiled Eggs- cooked by immersion in boiling water with their shells unbroken

Hen- a female chicken

Homogenized- to blend (diverse elements) into a uniform mixture

Incubation- the time it takes for a fertilized egg to hatch

Incubator- an apparatus or chamber that provides favorable environmental conditions for development of embryos, used for hatching eggs

Layer hen- female chickens raised for the purpose of egg production

Laying Houses- a building that houses all of the cages where laying hens are kept

Manure- the poop of an animal that can be used as compost or fertilizer

Molt- to shed feathers

Omelet- beaten eggs or an egg mixture cooked until just set; may be folded around e.g. ham or cheese or jelly

Osmosis- movement of a solvent through a semi permeable membrane (as of a living cell) into a solution of higher solute concentration and absolute temperature: as A: the maximum pressure that develops in a solution separated from a solvent by a membrane permeable only to the solvent B: the pressure that must be applied to a solution to prevent osmosis

Over-Easy Egg- an egg prepared as food, fried on one side, then lightly fried on the other, leaving the yolk unbroken and slightly soft

Patented- legally protected from being copied or used without the inventor receiving money

Permeable- can be penetrated, especially by liquids or gases

Pipping- the process the chick goes through to peck a hole and eventually break out of the egg

Poached Eggs- an egg that has been cooked by poaching, that is, in water. No oil or fat is used in its preparation

Porosity- a structure that is porous

Pressure: the force applied to a unit area of surface

Protein- One of three major classes of food or source of food energy

Rooster- a male chicken

Scrambled Eggs- eggs beaten and cooked to a soft firm consistency while stirring

Shell Membrane- two paper-like membranes that provide protection from germs and serve as a breathing surface for the embryo

Shell- the outer covering of an egg, composed of calcium carbonate; it provides protection and has pores for air exchange

Wattle- fleshy, red growth which hang from the side and base of a chicken's beak

Yolk- yellow portion of the egg; provides a major sources of vitamins, minerals and fats; the food source for the developing chick

Background



Arizona Egg Production

- Hickman's Family Farms is the only commercial egg producer in Arizona.
- Hickman's Family Farms has 7 million laying hens and NO roosters.
- Hickman's Family Farms only produces unfertilized eggs.
- Hickman's Family Farms uses their chicken manure to create compost for golf courses and organic farmers.
- You can find Hickman's Eggs in AJ's, Albertsons, Bashas, Costco, Food City, Wal-Mart and through a number of convenient store chains.

General Facts

- A chicken is a bird
- A laying hen can start laying eggs at 6 months of age.
- On average a hen lays an egg every 26 hours.
- A hen only has 30 minutes rest between laying an egg and beginning the process again.
- The younger the chicken the smaller the egg and the older the chicken the larger the egg.
- Mature hens are kept for an average of 12-14 months for egg production.
- There are approximately 175 varieties of chickens which can be classified into 60 breeds.

Incubation

- Incubation period for a chicken is 21 days.
- The internal temperature of a chicken is 100 degrees.
- It can take up to two days for a chick to peck out of its shell.
- Chicks do not need any food for the first 24 hours after they hatch because they still have food from the yolk in their body.
- Eggs should be rotated at least 2 times each day.
- Humidity is needed in the incubator to soften the shell so the chicks can peck out.
- By the nineteenth day, the chick is too big to get enough oxygen through the pores in the shell. At this time, a small tooth called the "egg-tooth" has grown onto its beak. It uses this little tooth to peck a hole into the air sack at the flat end of the egg. The air sack provides only six hours of air for the chick to breathe. Instead of relaxing and breathing deeply, with this newfound supply of air, the chick keeps pecking until it breaks a small hole through the shell to gain access to outside air in adequate amounts.

Eggs

- Egg color depends on the breed of the chicken. Breeds with white feathers and earlobes lay white eggs. Breeds with red feathers and earlobes lay brown eggs.
- Brown eggs are usually more expensive. They come from larger breeds and require more feed costs.
- There are no nutritional differences between brown and white eggs.
- An egg shell contains between 6,000 and 8,000 pores.
- The pores permit passage of air and water to the developing embryo.
- The shell is comprised primarily of a porous form of calcium carbonate.

- The air cell is located at the large end of the egg.
- The chalazae holds the yolk in place.
- Eggs are candled to determine the conditions of the air cell, yolk, white, and to observe germ development.
- Only eggs that have been fertilized (by a rooster) can produce chicks.
- The eggs that are purchased in a store and that come from Hickman's Eggs are unfertilized eggs.

Background Continued

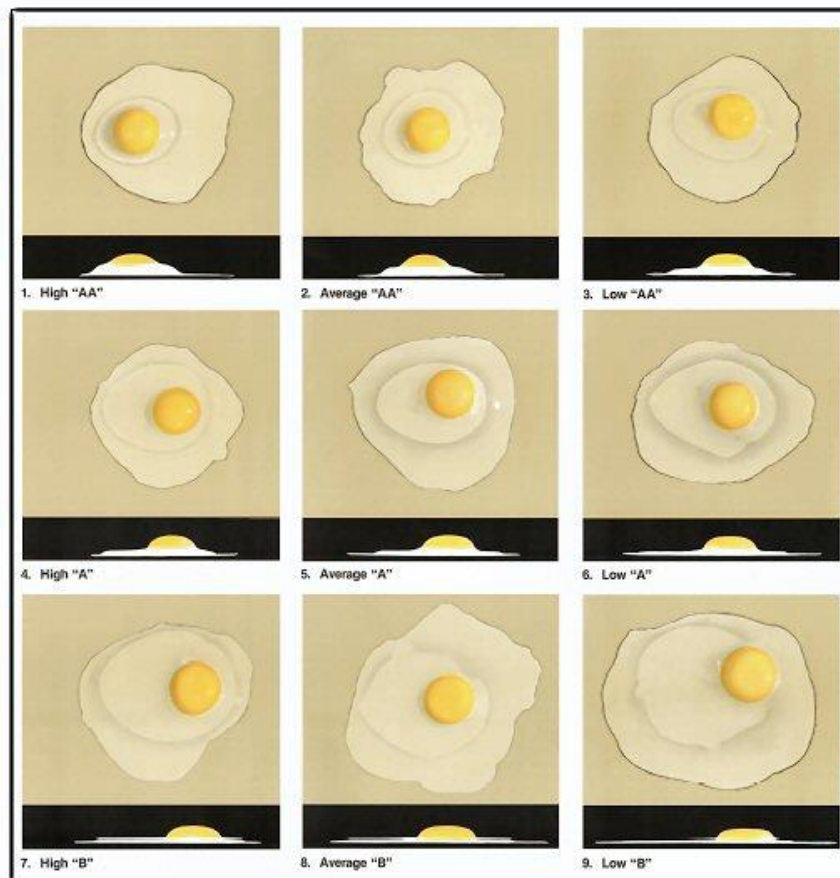
Egg Grading

	Grade AA	Grade A	Grade B
Break Out Appearance	Covers a small area.	Covers a moderate area.	Covers a wide area.
Albumen Appearance	White is thick and stands high; chalaza prominent.	White is reasonably thick, stands fairly high; chalaza prominent.	Small amount of thick white; chalaza small or absent. Appears weak and watery.
Yolk Appearance	Yolk is firm, round and high.	Yolk is firm and stands fairly high.	Yolk is somewhat flattened and enlarged.
Shell Appearance	Approximates usual shape; generally clean,* unbroken; ridges/rough spots that do not affect the shell strength are permitted.		Abnormal shape; some slight stained areas permitted; unbroken; pronounced ridges/thin spots permitted.
Usage	Ideal for any use, but are especially desirable for poaching, frying and cooking in shell.	Ideal for any use, but are especially desirable for poaching, frying and cooking in shell.	Good for scrambling, baking, and as an ingredient in other foods.

*An egg may be considered clean if it has only very small specks, stains or cage marks. Source: USDA

- **Grade AA:** A 'Grade AA' egg will stand up tall. The yolk is firm and the area covered by the white is small. There is a large proportion of thick white to thin white.
- **Grade A:** A 'Grade A' egg covers a relatively small area. The yolk is round and upstanding. The thick white is large in proportion to the thin white and stands fairly well around the yolk.
- **Grade B:** A 'Grade B' egg spreads out more. The yolk is flattened and there is about as much (or more) thin white as thick white.

Taken from the American Egg Board Website www.aeb.org

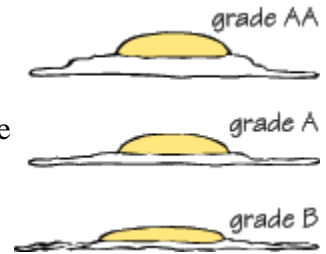


Background Continued

Egg Grading

Candling – placing a very strong light behind the egg – can reveal more about the egg than one might think. For example, if the egg white is thin, twirling the egg will make the yolk move nearer to the shell than it would if the egg white were thicker.

Quality is more obvious once the egg is broken. The yolk of a grade AA egg is tall; the white doesn't spread out much, and there is more thick white than thin white. The yolk of a grade B egg is flattened, it has more thin white than thick white and will spread out to cover a larger area. The USDA has developed a test of egg quality based, for example, on measurements of the height of the egg white on a flat plate.



Hickman's Family Farms



Hickman's Family Farms entered the Arizona food service market by providing fresh, locally produced eggs direct to small independent Restaurants and directly to consumers. Every afternoon, one small, refrigerated truck was sufficient to deliver the day's production to coffee shops in Glendale and to Carnation Restaurant in Phoenix. Grandma Nell Hickman purchased the first chickens as a way to make some extra money; she would hand wash the eggs and deliver them to neighbors and small independent Restaurants. Nell's daughter-in-law Gertie purchased 500 additional chickens to add to the family operations and it continued to grow from there. Bill and Gertie Hickman, because of their entrepreneurial insight, have kept Hickman's competitive for decades.

By 1993, Hickman's was left as the only Arizona commercial egg producer with chickens and a USDA-inspected processing plant. Despite the challenges of the egg industry, the Glendale operation continued to expand. In the late 90's a second operation opened in Buckeye with laying houses that each hold 130,000 hens. In August of 2002 a facility was launched in Maricopa where each laying house holds 230,000 hens. The family now has farms between Arizona, California, and Colorado that produce nearly 10,000,000 dozen eggs per day. Bill and Gertie's children Clint, Glenn, Billy and Sharman now run Hickman's Family Farms and have started shipping eggs to California, Nevada, Texas and Hawaii.



Retail Shopping

Hickman's Eggs - the freshest eggs in Arizona – can be found in AJ's, Albertson's, Bashas', Costco, Food City, Fry's, IGA, Sam's Club, Sprouts, Phoenix Ranch Market, Wal-Mart and many convenience stores.

Changes through the Years- Facility



Bill Hickman Sr. hangs in the stroller with his dad Guy Hickman and the family's chickens before they were raised in conventional cages.



Hickman's Farm in 1967



Old Glendale Farm (67th Ave and Missouri) 1944-1971



Glendale Farm (91st Ave and Missouri) 1971-2003



Arlington South Farm 1998-present
Each house can hold 130,000 chickens



Arlington North Farm 2008-present



Maricopa Farm on Ak Chin Tribal Lands 2002-present
Each house can hold 230,000 chickens



Tonopah
26 Chicken Houses

Hickman's Vehicles



Here is one of the vehicles that promote Hickman's Family Farms.



Hickman's Eggs sell their chicken manure as fertilizer for golf courses and for use in organic farming. Here is a picture of the fertilizer promo truck and the "spreader" that is used to spread the fertilizer.



Hickman's has a large fleet of trucks, in a variety of sizes, for delivering their products.



Hickman's *Egg*-ceptional Products Going Green

Hickman's Family Farms utilize stringent methods of conservation and recycling to remain as environmentally-friendly ("green") as possible. Wash water is recycled and reused, and manure is dried, ground, and turned into high quality fertilizer. By the time they are through at even the largest facilities, they actually discard into dumpsters less waste than the average apartment building does in a day.

Hickman's Eggs completed construction on their fertilizer manufacturing facility and continue to expand their line. They produce pelletized chicken manure and pelletized compost materials for golf courses and organic vegetable growers. Hickman's Family Farms is committed to being "green," or environmentally efficient. It is no secret that chickens produce manure, and they continue to develop ways for EVERYTHING associated with their chickens to be used or recycled.

The Farm Choice staffs a booth at the Arizona Horticulture Show in September. In addition, the fertilizer division provides technical support and information through a number of venues. Please look for updates on promotions and informative seminars and dates at www.hickmanseggs.com.



Hickman's *Egg-ceptional* Products Feedmill



The Feedmill, owned and operated by Hickman's Family Farms is located at their Arlington Farm. Here, rail cars can pull right into the Feedmill and deliver the ingredients needed to make their hen's daily meals. Having the Feedmill on the farm allows Hickman's Family Farms to eliminate 16 trucks, traveling 160 miles, 365 days per year. Talk about reducing their carbon "claw" print!

Hickman's *Egg-ceptional* Products

Liquid Eggs

Hickmans' Family Farms is the king of eggs in Arizona and ranks in the top 20 Egg producers in the United States. It is their forward thinking, community outreach, and innovations that have helped them reach the top. Hickman's is aware of their consumers needs and continue to make products that appeal to their customers. Not only does the company provide unfertilized eggs in a shell, but they have value-added products such as liquid eggs and hard cooked eggs.

Liquid Eggs

1. Eggs are loaded into a washer where the eggs are cleaned and sanitized.
2. The wash process is followed by a Quality Assurance process where eggs are inspected for dirt or leaks.
3. The eggs are then sent into a machine where they are picked up, cracked, and dropped into a "breaker cup". The shells are pumped through an auger to the outside and eventually taken to their fertilizer plant.
4. The eggs are checked again by a specialist for any defects. (*see image 1 & 2*)
5. Eggs are then dropped into a pan and pumped through a screen to remove any remaining shell fragments.
6. The eggs are then homogenized, which mixes the yolk and the white together.
7. The eggs are then dumped into a "raw tank" where they are held until a full batch is ready to be heated and pasteurized.
8. After leaving the holding tank, the raw eggs are then sent through a heat exchanger where the eggs are raised to a temperature of 140 degrees F for 3.5 minutes. This process heats the eggs to a point where bacteria are killed, but the eggs are not cooked.
9. The eggs then go through another heat exchanger where they are cooled to 40 degrees F and brought to the "fill room" where they are bagged, boxed, and sent to the cooler. (*see image 3*)



Image # 1



Image # 2



Image # 3

Liquid Eggs

Hickman's *Egg-ceptional* Products

Hard Cooked Eggs

1. The eggs are loaded onto rollers that will bring the eggs under about ½ inch of water.
2. The eggs continue turning on these rollers for about 2 minutes, which places the yolk in the center of the egg. (*Image # 1*)
3. The eggs then continue to the boiler where they are completely submerged in steam heat water and brought up to 208 degrees F for 17 minutes. Timing varies depending on the size of the eggs. 17 minutes is for medium eggs.
4. Another conveyor belt lifts the eggs out of the water and drops them a high enough distance to create cracks in the shell.
5. The egg then moves to a chiller where they are submerged for 18 minutes in 36 degrees F water. (*Image #2*)
6. They continue to another conveyor belt to the “peeler,” a machine that shatters the shell.
7. The shell pieces fall down a shoot into an “inedible” container. The container is brought to a truck and goes to the fertilizer plant.
8. The eggs continue to another conveyor where inspectors determine if they are salad grade (small dings or imperfections) or premium grade (perfect condition). (*Image # 3*)
9. At the end of the conveyor, there is a bucket with a bag liner placed by an employee on a scale.
10. The employee will put brine in the bucket and zero out the scale.
11. The egg falls into the bucket and the bucket is removed when it reaches its appropriate weight. (*Image # 4*)

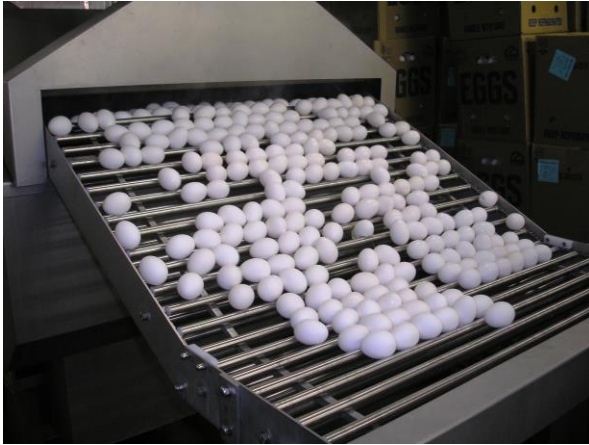


Image # 1



Image # 2



Image # 3

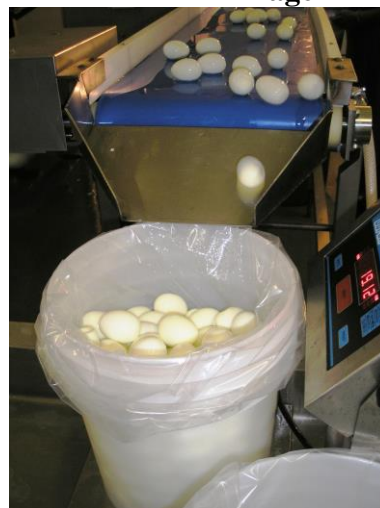


Image #4

HOW WE PROTECT THE HEALTH AND WELFARE OF OUR HENS

CELEBRATING 65 YEARS OF EGGCELLENCE
65
1944-2009

HICKMAN'S
family farms

Hickman's Family Farms has provided fresh eggs since 1944 and is the sole commercial egg producer in Arizona. Our current flock of over 4 million laying hens, work in environmentally friendly, automated houses.

Do you want to live outside in 115°F?

Look for this symbol in your local grocer's egg case.

We care about the health and welfare of our hens. We want them to be well-cared for, with plenty of nutritious food, clean water, fresh air, light, and room to stretch their wings, walk around, and lie down.

We also want to protect them from their natural predators like fox, hawks, coyotes, and even stray cats and dogs; and we want to make sure they are protected from the weather ... snow and ice in the winter, searing heat in the summer and thunderstorms and hail almost any time of the year.

To provide our hens that optimum protection, we have built modern, sanitary cage housing systems that the leading animal welfare and behavior scientists credit with reducing the diseases and mortality of hens, and nearly eliminating food borne diseases. This housing system allows for small groups of hens to be housed together, which is important because chickens tend to be social creatures. This housing system also allows us to inspect them daily and address any health or welfare issues that occur. The hens have continuous access to clean water and are fed several times a day.

But most importantly, this modern, sanitary cage housing system allows our hens to lay their eggs in a clean cage environment, so that their eggs quickly roll out of the cage and onto a conveyor belt that carries them to our sanitary processing room where the eggs are washed, inspected, and graded. Then the eggs are packed and loaded onto trucks to be delivered to your grocery stores and restaurants, often within hours of when they were freshly laid!

While our grandparents might have allowed chickens to roam free in their yard, leading animal welfare scientists now say that hens raised that way tend to be in poorer health, with more diseases, and in more danger from predators and weather than their counterparts raised in modern, sanitary cage housing systems like ours. And most importantly, eggs from our modern, sanitary cage housing systems also tend to be cleaner and disease-free.

Egg farmers who adhere to strict guidelines for animal welfare proudly display the UEP Certified logo on their egg cartons. More information about the UEP Certified guidelines can be found at www.uepcertified.com LOOK FOR THIS LOGO TO BE SURE IT'S CERTIFIED!



Hickman's Protect Their Hens



Hickman's Family Farms is very protective of their flock's health. So much, that they have set in place preventative measures designed to reduce the risk of disease. These preventative measures are a combination of systems and practices.



Authorized vehicles that enter the farms are required to drive through a water bath and then soap the tires of the vehicle.



**Once on the farm employees must change into scrubs.
Scrubs are removed at the end of each day and cleaned.
Employees are also required to wear hats and gloves.**

Everyone who enters the laying houses must wear a protective suit over their clothes and a hairnet or hat.

Remember, the protective clothing is to protect the birds!



In an effort to protect their flocks, Hickman's does not offer tours to the public. It has been this way since 2001.

The Operation Conventional Housing

Phasing Out by 2024



Laying Hens are housed in cages that separate the manure and the eggs. Everything runs off of a conveyer belt system. Hens are fed fresh feed 6 times a day and have a constant supply of fresh water. Up to 230,000 hens can be in one laying house. Laying Houses are kept under 90 degrees on the warmest days and are kept above 70 on the coldest days.

The Operation Aviary/Cage-Free Housing

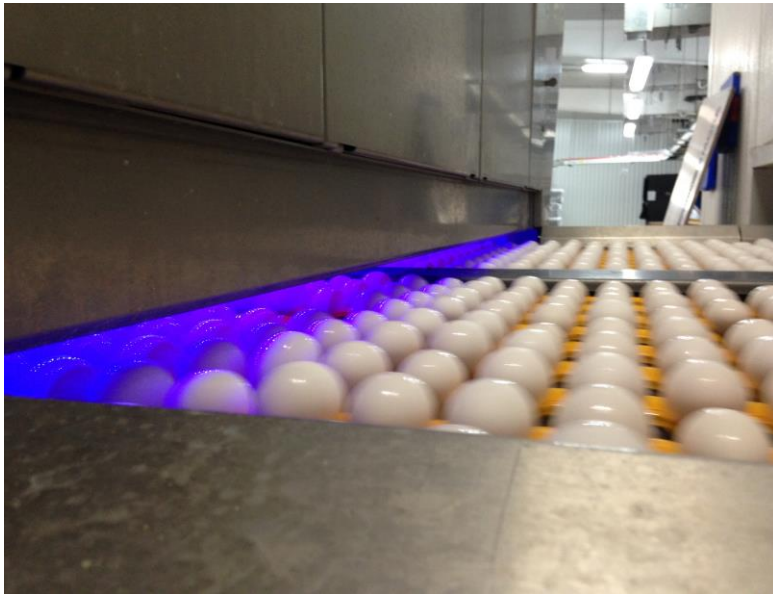
Egg farmers across the Country are phasing out the *Conventional Egg Laying Systems* and moving to *Aviary (cage-free systems)*. Aviary Systems allow birds to exhibit more natural behaviors but also come with their own challenges. For more information be sure to watch the video on Cage Free eggs included on the jump drive in this Poultry kit!



Egg Processing



Eggs are carried 24 hours a day from the pens on a conveyor belt to the processing plant. Here, eggs are cleaned, sorted, inspected, and graded. Eggs are then packaged in a variety of egg cartons depending on the retailer they are being sold at. Eggs can be in local stores less than 24 hours after they are laid.



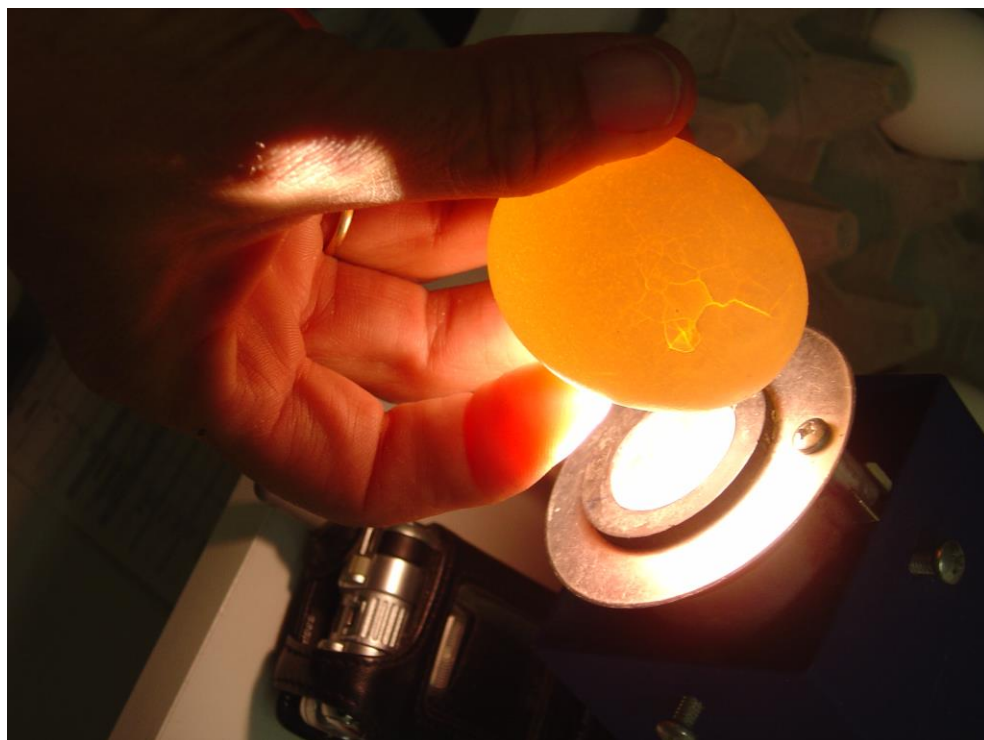
After the eggs are washed they travel through the UV machine that kills any bacteria that is on the egg.



All eggs are candled, a technique used to see through the eggs by shining a light on them, to inspect for imperfections.

Fertilized Eggs at hatcheries and in classrooms can also be candled to see the development of the chick.

**Imperfections
such as cracks can
be detected in the
candling process.**





Hickman's Family Farms has a United States Department of Agriculture (USDA) food grader on the premises at all times during operating hours.

This is to insure quality off egg before they even leave the farm. This service not required and is paid for by Hickman's Family Farms. What a great example to show how much Hickman's Family Farms cares about the products that they're providing to consumers!





Eggs are packaged in a variety of cartons by machines or by hand.



Hickman's Eggs are packaged in a variety of cartons depending on the retail store they will be sold from.



Technology plays a large role at Hickman's Family Farms. These technologies help Hickman's Family Farms package 420,000 dozen eggs each day!

Scrambled Eggs

(Derived from Hickman's Family Farms)



Common Core State Standards: This lesson is correlated to the following CCSS, as well as the Arizona Additions to the CCSS.

1. Mathematical Practices (MP): Problem solving, reasoning and proof, communication, representation, and connections; adaptive reasoning, strategic competence, conceptual understanding, procedural fluency, and productive disposition.

2. Operations and Algebraic Thinking (OA): Understand and apply properties of operations and the relationship between addition and subtraction; represent and solve problems involving multiplication and division; solve problems involving the four operations, and identify and explain patterns in arithmetic; gain familiarity with factors and multiples; generate and analyze patterns; write and interpret numerical expressions; and understand ratio concepts and use ratio reasoning to solve problems.

3. Number and Operations in Base Ten (NBT): Understand place value; extend counting sequences; use place value understanding and properties of operations to perform multi-digit arithmetic; and perform operations with multi-digit whole numbers and with decimals to hundredths.

First Grade:	1.OA.C.6, 1.MP.2, 1.MP.7, 1.MP.8
Second Grade:	2.OA.B.2, 2.MP.2, 2.MP.7, 2.MP.8
Third Grade:	3.OA.C.7, 3.NBT.A.2, 3.NBT.A.3, 3.MP.2, 3.MP.7, 3.MP.8

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. Students will use grade appropriate operations to solve mathematical equations.

Materials needed:

- ✓ Egg Cartons
- ✓ Beans

Terms:

No terms were identified with this lesson

Teaching Strategies: Have students get in groups of 2 or 3. For first grade classes have students put two beans in the egg carton and close the lid. Have the student shake the carton for 5 seconds and then open the lid. Have the students add and subtract the 2 numbers that the beans are on. Rotate around the group. For 2nd and 3rd graders have the students add a 3rd bean and repeat steps above. You can take this activity to your student's math level by doing addition, subtraction, multiplication and division. Students can also use this activity to practice probability by figuring out the probability that they will get an odd number or an even number.

Review/Summary: Use the student learning objectives to summarize the lesson. Have students explain the content associated with each objective. Student responses can be used in determining which objectives need to be reviewed or taught from a different angle. Use observations as the basis for reteaching areas where student mastery may need improvement.

Evaluation: Focus the evaluation of student achievement on mastery of the objectives as stated in the lesson. A written test can also be used to assess student achievement of the objectives.

Name: _____

Scrambled Eggs Student Worksheet Addition and Subtraction



Place your beans inside you egg carton and close the lid. Shake the carton for 5 seconds. Open the carton and using the numbers identified by your bean add and subtract the numbers. Write the problem and answer in the chart below. Repeat 10 times.

Round	Problem	Answer
<i>Example</i>	$3 + 2$ $3 - 2$	5 1
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		



Name: _____

Scrambled Eggs Student Worksheet Multiplication and Division



Place your beans inside you egg carton and close the lid. Shake the carton for 5 seconds. Open the carton and using the numbers identified by your bean and multiply or divide the numbers. Write the problem and answer in the chart below. Repeat 10 times.

Round	Problem	Answer
<i>Example</i>	3×2	6
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		



Name: _____

Scrambled Eggs Student Worksheet Probability



Place your beans inside you egg carton and close the lid. Shake the carton for 5 seconds.
Determine the probability of landing on any given combination of numbers.

Round	Numbers Rolled	Probability of Number	% of Probability
Example	3 and 5	$\frac{3}{4}$ $\frac{5}{1}$	75% 5%
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Which combination has a higher probability of being rolled? _____



Word Problems



Common Core State Standards: This lesson is correlated to the following CCSS, as well as the Arizona Additions to the CCSS.

1. Mathematical Practices (MP): Problem solving, reasoning and proof, communication, representation, and connections; adaptive reasoning, strategic competence, conceptual understanding, procedural fluency, and productive disposition.

2. Operations and Algebraic Thinking (OA): Understand and apply properties of operations and the relationship between addition and subtraction; represent and solve problems involving multiplication and division; solve problems involving the four operations, and identify and explain patterns in arithmetic; gain familiarity with factors and multiples; generate and analyze patterns; write and interpret numerical expressions; and understand ratio concepts and use ratio reasoning to solve problems.

First Grade:	1.OA.A.1, 1.MP.1, 1.MP.2, 1.MP.3, 1.MP.4 1.MP.5, 1.MP.8
Second Grade:	2.OA.A.1, 2.MP.1, 2.MP.2, 2.MP.3, 2.MP.4, 2.MP.5, 2.MP.8
Third Grade:	3.OA.A.3, 3.MP.1, 3.MP.4, 3.MP.7
Fourth Grade:	4.OA.B.4, 4.MP.2, 4.MP.7
Fifth Grade:	5.MP.1
Sixth Grade:	6.MP.1

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. Students will use mathematical strategies to solve word problems.

Materials needed:

- ✓ Math Lesson 1 Student Worksheet – Word Problems

Terms:

Flock – several birds attended to as one unit

Incubator- an apparatus or chamber that provides favorable environmental conditions for developing embryos and hatching chicks.

Laying Hens- chickens raised primarily for egg production purposes

Laying House- building where the cages of chickens are kept

Manure- the poop of an animal that can be used for compost or fertilizer

Teaching Strategies: Instruct the students to apply grade appropriate mathematical strategies to complete the word problems. Have the students complete **Math Lesson 2 Student Worksheet- Word Problems**.

Review/Summary: Use the student learning objectives to summarize the lesson. Have students explain the content associated with each objective. Student responses can be used in determining which objectives need to be reviewed or taught from a different angle. Use observations as the basis for reteaching areas where student mastery may need improvement.

Evaluation: Focus the evaluation of student achievement on mastery of the objectives as stated in the lesson. A written test can also be used to assess student achievement of the objectives.

Name: _____



Word Problems

(Grades 1 & 2)

1. Hickman's Family Farms rotates their flock every 2 years. If they have had their current flock for 1 year, how much longer will they have their flock?
2. Hickman's laying hens are housed in cages in groups of 6. How many laying hens are there in 2 pens?
3. A classroom is hatching chickens for a school project. It will take 21 days for the chicks to hatch. If the eggs have been in the incubator for 10 days, how many days do they have left?
4. A classroom is raising chickens to sell for a fundraiser. They started with 25 chickens and have 5 left. How many chickens have they sold?
5. Hickman's has 12 laying houses at their Arlington South farm and 7 laying houses at their Maricopa farm. How many laying house do they have between the two locations?

Word Problems ANSWERS

(Grades 1 & 2)

1. Hickman's Family Farms rotates their flock every 2 years. If they have had their current flock for 1 year, how much longer will they have their flock?

$$2 \text{ years} - 1 \text{ year} = 1 \text{ year remaining}$$

2. Hickman's laying hens are housed in cages in groups of 6. How many laying hens are there in 2 pens?

$$6 \text{ birds} + 6 \text{ birds} = 12 \text{ birds}$$

3. A classroom is hatching chickens for a school project. It will take 21 days for the chicks to hatch. If the eggs have been in the incubator for 10 days, how many days do they have left?

$$21 \text{ days} - 10 \text{ days} = 11 \text{ days}$$

4. A classroom is raising chickens to sell for a fundraiser. They started with 25 chickens and have 5 left. How many chickens have they sold?

$$25 \text{ chickens} - 5 \text{ chickens} = 20 \text{ chickens were sold}$$

5. Hickman's has 12 laying houses at their Arlington South farm and 7 laying houses at their Maricopa farm. How many laying houses do they have between the two locations?

$$12 \text{ houses} + 7 \text{ houses} = 19 \text{ laying houses}$$

Name: _____



Word Problems

(Grades 3 & 4)

1. In the early 1960s Gertie Hickman bought 500 laying hens to add to her grandma's flock of 250 laying hens. How many laying hens did Hickman's Family Farms have in the early 1960s?
2. Hickman's has 5 laying barns at their Maricopa location. They would like to double their operation at this site. How many laying barns will they eventually have at this location?
3. Hickman's Family Farms began operating in 1944. What anniversary are they celebrating in 2015?
4. A laying hen lays an egg every 26 hours. If you had 1 chicken how many eggs would you have after 52 hours?
5. A classroom embryology project produces 20 chickens. If half of the fertilized eggs did not hatch, how many fertilized eggs did the class start with?

Word Problems ANSWERS

(Grades 3 & 4)

1. In the early 1960s Gertie Hickman bought 500 laying hens to add to her grandma's flock of 250 laying hens. How many laying hens did Hickman's Family Farms have in the early 1960s?

$$500 \text{ laying hens} + 250 \text{ laying hens} = 750 \text{ laying hens}$$

2. Hickman's has 5 laying barns at their Maricopa location. They would like to double their operation at this site. How many laying barns will they eventually have at this location?

$$5 \text{ laying houses} \times 2 \text{ laying houses} = 10 \text{ laying houses}$$

3. Hickman's Family Farms began operating in 1944. What anniversary are they celebrating in 2015?

$$2015 - 1944 = 70 \text{ years}$$

4. A laying hen lays an egg every 26 hours. If you had 1 chicken how many eggs would you have after 52 hours?

$$52 / 26 = 2 \text{ eggs OR } 52 - 26 = 26 = 2 \text{ eggs}$$

5. A classroom embryology project produces 20 chickens. If half of the fertilized eggs did not hatch, how many fertilized eggs did the class start with?

$$20 \text{ chickens} \times 2 = 40 \text{ eggs}$$

Name: _____



Word Problems

(Grades 5 & 6)

1. A chicken poops about $\frac{1}{4}$ of a pound a day. Hickman's has 7 million chickens. How many pounds of manure do they collect each day?
2. A case of eggs contains 30 cartons. If each carton has a dozen eggs, how many eggs are in a case?
3. A semi-truck can haul 720 cases of eggs to the store. How many eggs are in a semi-truck load?
4. Hickman's has 300 employees. A third of their employees are inmates from the local prison. How many of their employees are inmates?
5. A laying hen can begin laying eggs at 6 months of age. A chicken lays 1 egg every 26 hours. How many eggs does a laying hen lay in 1 year?

Word Problems ANSWERS

(Grades 5 & 6)

1. A chicken poops about $\frac{1}{4}$ of a pound a day. Hickman's has 7 million chickens. How many pounds of manure do they collect each day?

1,750,000 million pounds of manure

2. A case of eggs contains 30 cartons. If each carton has a dozen eggs, how many eggs are in a case?

30 cartons x 12 eggs = 360 eggs

3. A semi-truck can haul 720 cases of eggs to the store. How many eggs are in a semi-truck load?

720 cases x 30 cartons = 360 cartons

360 cartons x 12 eggs = 4320 eggs

4. Hickman's has 300 employees. A third of their employees are inmates from the local prison. How many of their employees are inmates?

300 / 3 = 100 inmates

5. A laying hen can begin laying eggs at 6 months of age. A chicken lays 1 egg every 26 hours. How many eggs does a laying hen lay in 1 year?

365 days x 24 hours = 8760 hours in a year

8760 hours / 26 hours = 336.8 eggs

About 337 eggs

Incubation Period

 (adapted from the Illinois Poultry mAGic Kit)

Common Core State Standards: This lesson is correlated to the following CCSS, as well as the Arizona Additions to the CCSS.

1. Measurement and Data (MD): Describe and compare measurable attributes; classify objects and count the number of objects in categories; measure and estimate lengths indirectly and by iterating length units; tell and write time; represent and interpret data; work with money; Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects; understand concepts of area and relate area to multiplication and to addition; recognize perimeter as an attribute of plane figures and distinguish between linear and area measures; solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit; and understand concepts of angle and measure angles.

2. Mathematical Practices (MP): Problem solving, reasoning and proof, communication, representation, and connections; adaptive reasoning, strategic competence, conceptual understanding, procedural fluency, and productive disposition.

Third Grade:	3.MD.B.3, 3.MP.1, 3.MP.4, 3.MP.6, 3.MP.7
Fourth Grade:	4.MP.1, 4.MP.4, 4.MP.5
Fifth Grade:	5.MP.1, 5.MP.4, 5.MP.5
Sixth Grade:	6.MP.1, 6.MP.4, 6.MP.5

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. Locate information from both charts and graphs.
2. Demonstrate computation skills to answer questions.
3. Decide which type of graph would be best to use for information given.

Materials needed:

- ✓ Math Lesson 3 Student Worksheet – Graphing
- ✓ Graph Paper
- ✓ Graph and Chart of incubation periods

Terms:

Fowl – domestic bird eaten for food

Gram- metric unit for weight

Incubation- the time it takes for a chicken to hatch from the shell

Teaching Strategies: Have the students use the chart and graph on incubation to solve the math problems on **Math Lesson 3 Student Worksheet- Graphing**. Have students graph their results on graph paper.

Evaluation: Focus the evaluation of student achievement on mastery of the objectives as stated in the lesson. A written test can also be used to assess student achievement of the objectives.

Name: _____

Incubation Period for Various Birds

Type of Bird	Number of Days
Chicken	21 days
Turkey	28 days
Duck	28 days
Goose	32 days
Road Runner	18 days
Dove	14 days
Pheasant	26 days
Quail	23 days
Cactus Wren	16 days
Parakeet	18 days

Make a graph from the incubation period chart. Use the chart you have made to answer the questions below. Please show your work.

1. Which type of bird takes the longest to hatch?
2. How much longer does it take for the goose to hatch than the Cactus Wren?
3. What two birds take 28 days to hatch? What other two birds have the same incubation rate?
4. How many weeks does it take for a chicken to hatch?
5. List the bird that takes longer than a month to hatch.
6. An ostrich egg weighs 3.3 pounds and is the size of a medium cantaloupe; the cactus wren egg is the size of a grape and weighs 1.4 ounce. How many cactus wren eggs would you have to have to equal the weight of an ostrich egg?

Incubation Period for Various Birds
ANSWERS

Type of Bird	Number of Days
Chicken	21 days
Turkey	28 days
Duck	28 days
Goose	32 days
Road Runner	18 days
Dove	14 days
Pheasant	26 days
Quail	23 days
Cactus Wren	16 days
Parakeet	18 days

Make a graph from the incubation period chart. Use the chart you have made to answer the questions below. Please show your work.

1. Which type of bird takes the longest to hatch?

A Goose

2. How much longer does it take for the goose to hatch than the Cactus Wren?

32 days – 16 days = 16 days longer

3. What two birds take 28 days to hatch? What other two birds have the same incubation rate?

**28 days = Turkey and Duck
18 days = Parakeet and Road Runner**

4. How many weeks does it take for a chicken to hatch?

21 days / 7days in a week = 3 weeks

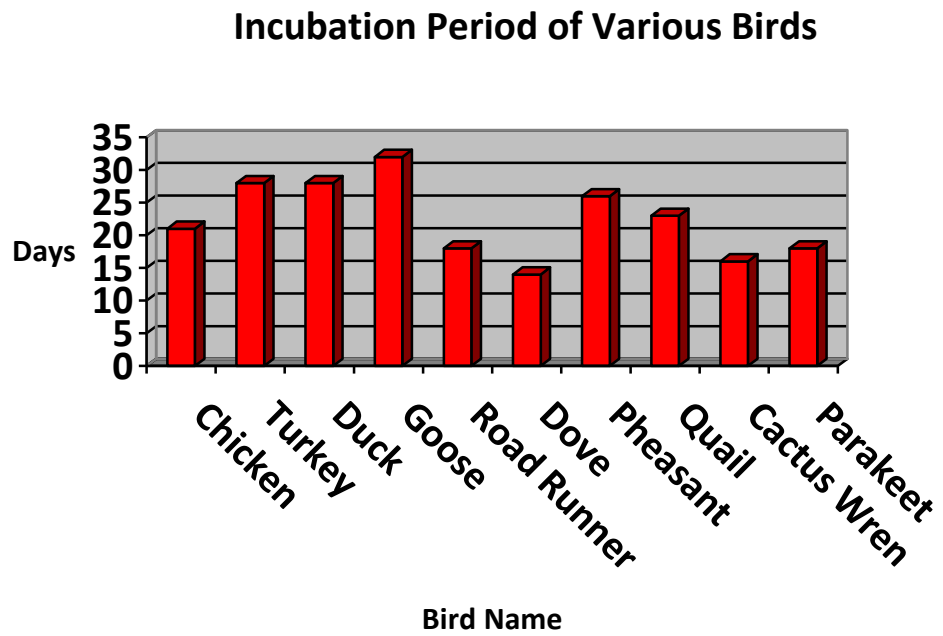
5. List the bird that takes longer than a month to hatch.

A goose

6. An ostrich egg weighs 3.3 pounds and is the size of a medium cantaloupe; the cactus wren egg is the size of a grape and weighs 1.4 ounces. How many cactus wren eggs would you have to have to have 1 pound?

**1 pound = 16 ounces
3.3 pounds x 16 ounces = 52.8 ounces
52.8 ounces / 1.4 ounces = 37.7
About 38 eggs**

Incubation Period for Various Birds
ANSWERS (continued)



Eggs of a Different Size



Common Core State Standards: This lesson is correlated to the following CCSS, as well as the Arizona Additions to the CCSS.

1. Measurement and Data (MD): Describe and compare measurable attributes; classify objects and count the number of objects in categories; measure and estimate lengths indirectly and by iterating length units; tell and write time; represent and interpret data; work with money; Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects; understand concepts of area and relate area to multiplication and to addition; recognize perimeter as an attribute of plane figures and distinguish between linear and area measures; solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit; and understand concepts of angle and measure angles.

2. Mathematical Practices (MP): Problem solving, reasoning and proof, communication, representation, and connections; adaptive reasoning, strategic competence, conceptual understanding, procedural fluency, and productive disposition.

3. Operations and Algebraic Thinking (OA): Understand and apply properties of operations and the relationship between addition and subtraction; represent and solve problems involving multiplication and division; solve problems involving the four operations, and identify and explain patterns in arithmetic; gain familiarity with factors and multiples; generate and analyze patterns; write and interpret numerical expressions; and understand ratio concepts and use ratio reasoning to solve problems.

Third Grade:	3.OA.C.7, 3.MP.2, 3.MP.7, 3.MP.8
Fourth Grade:	4.MD.A.1, 4.MP.2, 4.MP.3, 4.MP.4, 4.MP.5, 4.MP.7, 4.MP.8
Fifth Grade:	5.MD.A.1, 5.MP.1, 5.MP.2, 5.MP.5, 5.MP.6, 5.MP.7, 4.MP.8
Sixth Grade:	6.MP.2, 6.MP.7, 6.MP.8

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. Locate information from a chart.
2. Demonstrate computation skills to answer questions.

Materials needed:

- ✓ Math Lesson 4 Student Worksheet # 1
- ✓ Math Lesson 4 Student Worksheet # 2
- ✓ Pencil
- ✓ Different size eggs (provided by teacher)

Terms:

No terms were identified for this lesson.

Teaching Strategies: Have students use the chart on egg sizes to solve the math problems on **Math Lesson 4 Student Worksheet #1 and #2**.

Review/Summary: Use the student learning objectives to summarize the lesson. Have students explain the content associated with each objective. Student responses can be used in determining which objectives need to be reviewed or taught from a different angle. Use observations as the basis for reteaching areas where student mastery may need improvement.

Evaluation: Focus the evaluation of student achievement on mastery of the objectives as stated in the lesson. A written test can also be used to assess student achievement of the objectives.

Eggs of a Different Size

Background

There are several factors that influence the size of an egg. The major factor is the age of the hen. The younger the hen the smaller the egg and the older the hen the larger the egg she produces. The breed and weight of the hen also play a role in the size of the egg. If a bird is underweight she will lay a smaller egg. There are also environmental factors that can play a role in egg size. Heat, stress, overcrowding and poor nutrition can also decrease egg size. This is why producers strive to make their hens comfortable at all times.

Egg sizes are

Jumbo
Extra Large
Large
Medium
Small
Pee Wee

Although eggs can be purchased in a variety of sizes the most popular sizes are large and extra large. All size eggs can be used for frying, scrambling, poaching or hard boiling, but most recipes call for large eggs.

Egg Weight by Size

Egg Size	Individual Egg Weight (oz)	Per Dozen (oz)
Jumbo	2 ½	30
Extra Large	2 ¼	27
Large	2	24
Medium	1 ¾	21
Small	1 ½	18
Pee Wee	1 ¼	15

Information taken from The American Egg Board Website www.aeb.org

Name: _____

Eggs of a Different Size Student Worksheet # 1

Eggs come in a variety of sizes: Jumbo, Extra Large, Large, Medium, Small and Pee Wee. All sizes can be used to make fried, scrambled, hard boiled and poached eggs. However when it comes to recipes, most call for large eggs. What do you do if you do not have large eggs? Use the chart below to answer the conversion questions.

Size Equivalents

Recipe calls for (large egg)	Jumbo	Extra Large	Medium	Small	Pee Wee
1	1	1	2	2	2
2	2	2	3	3	4
3	3	3	4	4	5
4	4	4	6	6	7
5	4	5	7	7	8
6	5	6	8	8	10
7	6	7	10	10	12
8	7	8	11	11	13
9	8	8	12	12	15
10	8	9	14	14	16
11	9	10	15	15	18
12	10	11	16	16	20

1. If your recipe calls for 4 eggs how many medium eggs would you need to use? Pee Wee?
2. If you need to use 15 medium eggs, how many eggs did your recipe call for?
3. If you need to use 3 extra large eggs, how many eggs did your recipe call for?
4. If your recipe calls for 11 eggs how many Jumbo eggs will you need? Extra Large?
5. List all of the egg sizes that are equal to the number of large eggs the recipe calls for.

Eggs of a Different Size

Student Worksheet # 1

ANSWERS

Eggs come in a variety of sizes: Jumbo, Extra Large, Large, Medium, Small and Pee Wee. All sizes can be used to make fried, scrambled, hard boiled and poached eggs. However when it comes to recipes, most call for large eggs. What do you do if you do not have large eggs? Use the chart below to answer the conversion questions.

Size Equivalentents

Recipe calls for (large egg)	Jumbo	Extra Large	Medium	Small	Pee Wee
1	1	1	2	2	2
2	2	2	3	3	4
3	3	3	4	4	5
4	4	4	6	6	7
5	4	5	7	7	8
6	5	6	8	8	10
7	6	7	10	10	12
8	7	8	11	11	13
9	8	8	12	12	15
10	8	9	14	14	16
11	9	10	15	15	18
12	10	11	16	16	20

1. If your recipe calls for 4 eggs how many medium eggs would you need to use? Pee Wee?
Medium = 6 eggs Pee Wee = 7 eggs
2. If you need to use 15 medium eggs, how many eggs did your recipe call for?
11 eggs
3. If you need to use 3 extra large eggs, how many eggs did your recipe call for?
3 eggs
4. If your recipe calls for 11 eggs how many Jumbo eggs will you need? Extra Large?
Jumbo = 9 eggs Extra Large = 10 eggs
5. List all of the egg sizes that are equal to the number the recipe calls for.
1 = Jumbo and Extra Large
2 = Jumbo and Extra Large
3= Jumbo and Extra Large
4= Jumbo and Extra Large
5= Extra Large
6= Extra Large
7= Extra Large
8= Extra Large

Name: _____

Eggs of a Different Size Student Worksheet # 2

Eggs come in a variety of sizes: Jumbo, Extra Large, Large, Medium, Small and Pee Wee. As you have learned, eggs are classified by the weight (in ounces) of a dozen eggs. But have you ever wondered how many eggs it takes to make a cup? Does it make a difference if you are using the whole egg versus its parts? Use the chart to answer the questions below.

Make a Cup of Eggs

Egg Size	Whole Egg	Whites	Yolks
Jumbo	4	5	11
Extra Large	4	6	12
Large	5	7	14
Medium	5	8	16
Small	6	9	18

1. How many egg whites make a cup if you use Jumbo Eggs? Small eggs?
2. How many yolks do you need to make a cup if you use Large eggs? Medium eggs?
3. How many Large eggs would you need to make 2 cups?
4. How many Extra Large egg whites would you need to make 3 cups?
5. How many Small egg yolks would you need to make a $\frac{1}{2}$ cup?
6. How many Jumbo eggs would you need to make a $\frac{1}{2}$ cup?

Eggs of a Different Size

Student Worksheet # 2

ANSWERS

Eggs come in a variety of sizes: Jumbo, Extra Large, Large, Medium, Small and Pee Wee. As you have learned, eggs are classified by the weight (in ounces) of a dozen eggs. But have you ever wondered how many eggs it takes to make a cup? Does it make a difference if you are using the whole egg versus its parts? Use the chart to answer the questions below.

Make a Cup of Eggs

Egg Size	Whole Egg	Whites	Yolks
Jumbo	4	5	11
Extra Large	4	6	12
Large	5	7	14
Medium	5	8	16
Small	6	9	18

1. How many egg whites make a cup if you use Jumbo Eggs? Small eggs?

$$\text{Jumbo} = 5 \quad \text{Small} = 9$$

2. How many yolks do you need to make a cup if you use Large eggs? Medium eggs?

$$\text{Large} = 14 \quad \text{Medium} = 16$$

3. How many Large eggs would you need to make 2 cups?

$$5 \text{ eggs} \times 2 \text{ cups} = 10 \text{ eggs}$$

4. How many Extra Large egg whites would you need to make 3 cups?

$$7 \text{ egg whites} \times 3 \text{ cups} = 21 \text{ egg whites}$$

5. How many Small egg yolks would you need to make a $\frac{1}{2}$ cup?

$$18 \text{ egg yolks} / 2 = 9 \text{ egg yolks}$$
$$18 \text{ egg yolks} \times .5 = 9 \text{ egg yolks}$$

6. How many Jumbo eggs would you need to make a $\frac{1}{2}$ cup?

$$4 \text{ eggs} \times .5 = 2 \text{ eggs}$$
$$4 \text{ eggs} / 2 = 2 \text{ eggs}$$

Historical Egg Prices



Common Core State Standards: This lesson is correlated to the following CCSS, as well as the Arizona Additions to the CCSS.

1. Measurement and Data (MD): Describe and compare measurable attributes; classify objects and count the number of objects in categories; measure and estimate lengths indirectly and by iterating length units; tell and write time; represent and interpret data; work with money; Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects; understand concepts of area and relate area to multiplication and to addition; recognize perimeter as an attribute of plane figures and distinguish between linear and area measures; solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit; and understand concepts of angle and measure angles.

2. Mathematical Practices (MP): Problem solving, reasoning and proof, communication, representation, and connections; adaptive reasoning, strategic competence, conceptual understanding, procedural fluency, and productive disposition.

Fourth Grade:	4.MP.1, 4.MP.2, 4.MP.3, 4.MP.4, 4.MP.5, 4.MP.7, 4.MP.8
Fifth Grade:	5.MP.1, 5.MP.2, 5.MP.4, 5.MP.5, 5.MP.6, 5.MP.7, 5.MP.8
Sixth Grade:	6.MP.1, 6.MP.2, 6.MP.4, 6.MP.5, 6.MP.7, 6.MP.8

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. Interpret a chart to make a graph
2. Determine what type of graph will work best to display information.
3. Locate trends and determine historical events that might influence those trends.

Materials needed:

1. Student Worksheet
2. Chart of Historical Egg Prices
3. Graph Paper
4. Internet or Encyclopedias

Terms:

No terms were identified for this lesson.

Teaching Strategies: Launch a discussion with your students about how events can influence the prices of goods. Have students complete student worksheet.

Evaluation: Focus the evaluation of student achievement on mastery of the objectives as stated in the lesson. A written test can also be used to assess student achievement of the objectives.

Egg Prices by Year

Year	Retail Price per dozen
1890	\$.20
1895	\$.20
1900	\$.20
1905	\$.27
1910	\$.33
1915	\$.34
1920	\$.68
1925	\$.55
1930	\$.44
1935	\$.37
1940	\$.33
1945	\$.58
1950	\$.60
1955	\$.60
1960	\$.57
1965	\$.52
1970	\$.61
1985	\$.80
1990	\$1.01
1995	\$.96
2000	\$.90
2005	\$1.23
2010	\$1.74



Name: _____



Historical Egg Prices Student Worksheet

1. Create a line graph to show the trends in egg prices through the years. Why is a line graph the best graph to show this information?
2. What is the difference between the price of a dozen eggs in 1890 and 2005?
3. Why do you think there was a jump in the price of a dozen eggs between 1915 and 1920? What was the difference in price?
4. Why do you think there was a jump in price of a dozen eggs between 1940 and 1945? What was the difference in price?
5. What is the difference between the price of a dozen eggs between 1985 and 1990?



Historical Egg Prices ANSWERS

1. Create a line graph to show the trends in egg prices through the years. Why is a line graph the best graph to show this information?

2. What is the difference between the price of a dozen eggs in 1890 and 2005?

$$\mathbf{\$1.23 - \$.20 = \$1.03}$$

Eggs cost \$1.03 more in 2005 than they did in 1890

3. Why do you think there was a jump in the price of a dozen eggs between 1915 and 1920? What was the difference in price?

$$\mathbf{\$.68 - \$.34 = \$.34}$$

Egg cost \$.34 more in 1920 than they did in 1915

The reason could be because of World War I

4. Why do you think there was a jump in price of a dozen eggs between 1940 and 1945? What was the difference in price?

$$\mathbf{\$.58 - \$.33 = \$.25}$$

Eggs cost \$.25 more in 1945 than they did in 1940

The reason could be because of World War II

5. What is the difference between the price of a dozen eggs between 1985 and 1990?

$$\mathbf{\$1.09 - \$.80 = \$.29}$$

Eggs cost \$.29 more in 1990 than they did in 1985

What Is in a Label?



Common Core State Standards: This lesson is correlated to the following CCSS, as well as the Arizona Additions to the CCSS.

- 1. Reading Standards for Informational Text (RI):** Students will gain adequate exposure to a range of texts and tasks and demonstrate an understanding in: key ideas and detail, craft and structure, integration of knowledge and ideas, range of reading and level to text complexity.
- 2. Speaking and Listening Standards (SL):** Students will demonstrate an understanding in: comprehension and collaboration, and presentations of knowledge and ideas.
- 3. Operations and Algebraic Thinking (OA):**
- 4. Mathematical Practices (MP):** Problem solving, reasoning and proof, communication, representation, and connections; adaptive reasoning, strategic competence, conceptual understanding, procedural fluency, and productive disposition.

Kindergarten:	K.RI.1, K.SL.1
First Grade:	1.RI.1, 1.SL.1
Second Grade:	2.RI.1, 2.SL.1, 2.OA.A.1
Third Grade:	3.RI.1, 3.SL.1, 3.OA.A.3, 3.OA.B.6, 3.MP.1

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. Read and interpret a nutrition label
2. Show knowledge of the nutritional elements of an egg
3. Demonstrate computation skills to answer questions.

Materials needed:

- ✓ Math Lesson #6 Student Worksheet
- ✓ Copy of Nutrition labels

Terms:

No terms were identified for this lesson

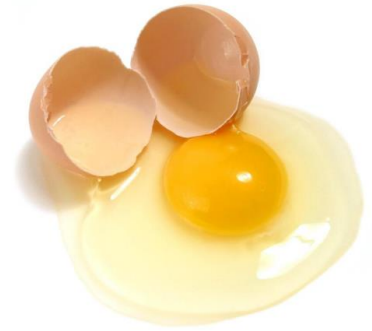
Teaching Strategies: Depending upon the knowledge of the students, the teacher may have to introduce a nutrition label and discuss some of the information provided on the label. Then, assign the reading Math Lesson #6 Student Information Sheet to be done in groups, individually, or as a class. After reading the information, the student will complete the Math Lesson 6 Student Worksheet.

Evaluation: Focus the evaluation of student achievement on mastery of the objectives as stated in the lesson. A written test can also be used to assess student achievement of the objectives.

What Is in a Label?

Eggs are all natural and packed with a number of nutrients

One egg has lots of vitamins and minerals, high-quality protein and antioxidants, and only contains 70 calories. The nutrients in eggs can play a role in weight management, muscle strength, healthy pregnancy, brain function, eye health and much more. At less than \$.15 each, eggs are an affordable and delicious breakfast option.



The protein in eggs is the highest-quality protein found in any food. The high-quality protein in eggs provides the mental and physical energy families need for important days.

Just like people, eggs come in all different sizes and colors. Most eggs are either white or brown. It does not matter if an egg is white or brown because they all of the same nutritional value. The size of the egg does play a role in the nutritional value of an egg. How do we get eggs that are different sizes? The size of the egg depends on the age of the chicken. The younger the chicken the smaller the egg!

Nutrition Facts	
Serving Size 1 egg (38g)	
Servings per Container 12	
Amount Per Serving	
Calories 50	Calories from Fat 30
% Daily Value*	
Total Fat 3.5g	5%
Saturated Fat 1g	5%
Trans Fat 0g	
Cholesterol 140mg	47%
Sodium 55mg	2%
Potassium 50mg	1%
Total Carbohydrate 0g	0%
Protein 5g	10%
Vitamin A 4% • Vitamin C 0%	
Calcium 2% • Iron 4%	
Vitamin D 8% • Thiamin 0%	
Riboflavin 10% • Vitamin B ₆ 4%	
Folate 4% • Vitamin B ₁₂ 6%	
Phosphorus 8% • Zinc 4%	
Not a significant source of dietary fiber and sugars.	
* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:	
	Calories 2,000 2,500
Total Fat	Less than 65g 80g
Sat fat	Less than 20g 25g
Cholesterol	Less than 300mg 300mg
Sodium	Less than 2,400mg 2,400mg
Potassium	3,500mg 3,500mg
Total Carbohydrate	300g 375g
Dietary Fiber	25g 30g
Protein	50g 65g
Calories per gram:	
Fat 9 • Carbohydrate 4 • Protein 4	

SMALL

Nutrition Facts	
Serving Size 1 egg (44g)	
Servings per Container 12	
Amount Per Serving	
Calories 60	Calories from Fat 35
% Daily Value*	
Total Fat 4g	6%
Saturated Fat 1.5g	8%
Trans Fat 0g	
Cholesterol 165mg	55%
Sodium 60mg	3%
Potassium 60mg	2%
Total Carbohydrate 0g	0%
Protein 6g	12%
Vitamin A 4% • Vitamin C 0%	
Calcium 2% • Iron 4%	
Vitamin D 10% • Thiamin 0%	
Riboflavin 10% • Vitamin B ₆ 4%	
Folate 6% • Vitamin B ₁₂ 6%	
Phosphorus 8% • Zinc 4%	
Not a significant source of dietary fiber and sugars.	
* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:	
	Calories 2,000 2,500
Total Fat	Less than 65g 80g
Sat fat	Less than 20g 25g
Cholesterol	Less than 300mg 300mg
Sodium	Less than 2,400mg 2,400mg
Potassium	3,500mg 3,500mg
Total Carbohydrate	300g 375g
Dietary Fiber	25g 30g
Protein	50g 65g
Calories per gram:	
Fat 9 • Carbohydrate 4 • Protein 4	

MEDIUM

Nutrition Facts	
Serving Size 1 egg (50g)	
Servings per Container 12	
Amount Per Serving	
Calories 70	Calories from Fat 45
% Daily Value*	
Total Fat 5g	8%
Saturated Fat 1.5g	8%
Trans Fat 0g	
Cholesterol 185mg	62%
Sodium 70mg	3%
Potassium 70mg	2%
Total Carbohydrate 0g	0%
Protein 6g	12%
Vitamin A 6% • Vitamin C 0%	
Calcium 2% • Iron 4%	
Vitamin D 10% • Thiamin 0%	
Riboflavin 15% • Vitamin B ₆ 4%	
Folate 6% • Vitamin B ₁₂ 8%	
Phosphorus 10% • Zinc 4%	
Not a significant source of dietary fiber and sugars.	
* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:	
	Calories 2,000 2,500
Total Fat	Less than 65g 80g
Sat fat	Less than 20g 25g
Cholesterol	Less than 300mg 300mg
Sodium	Less than 2,400mg 2,400mg
Potassium	3,500mg 3,500mg
Total Carbohydrate	300g 375g
Dietary Fiber	25g 30g
Protein	50g 65g
Calories per gram:	
Fat 9 • Carbohydrate 4 • Protein 4	

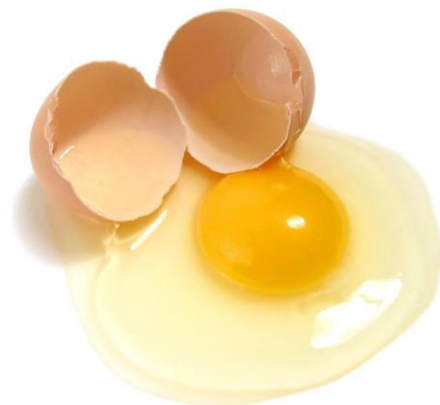
LARGE

Nutrition Facts	
Serving Size 1 egg (56g)	
Servings per Container 12	
Amount Per Serving	
Calories 80	Calories from Fat 45
% Daily Value*	
Total Fat 5g	8%
Saturated Fat 2g	10%
Trans Fat 0g	
Cholesterol 210mg	70%
Sodium 80mg	3%
Potassium 75mg	2%
Total Carbohydrate 0g	0%
Protein 7g	14%
Vitamin A 6%	* Vitamin C 0%
Calcium 4%	* Iron 6%
Vitamin D 10%	* Thiamin 0%
Riboflavin 15%	* Vitamin B6 4%
Folate 6%	* Vitamin B12 8%
Phosphorus 10%	* Zinc 4%
Not a significant source of dietary fiber and sugars.	
* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:	
	Calories 2,000 2,500
Total Fat	Less than 65g 80g
Sat fat	Less than 20g 25g
Cholesterol	Less than 300mg 300mg
Sodium	Less than 2,400mg 2,400mg
Potassium	3,500mg 3,500mg
Total Carbohydrate	300g 375g
Dietary Fiber	25g 30g
Protein	50g 65g
Calories per gram:	
Fat 9 • Carbohydrate 4 • Protein 4	

EXTRA LARGE

Nutrition Facts	
Serving Size 1 egg (63g)	
Servings per Container 12	
Amount Per Serving	
Calories 90	Calories from Fat 50
% Daily Value*	
Total Fat 6g	9%
Saturated Fat 2g	10%
Trans Fat 0g	
Cholesterol 235mg	78%
Sodium 90mg	4%
Potassium 85mg	2%
Total Carbohydrate 0g	0%
Protein 8g	16%
Vitamin A 6%	* Vitamin C 0%
Calcium 4%	* Iron 6%
Vitamin D 15%	* Thiamin 0%
Riboflavin 15%	* Vitamin B6 6%
Folate 8%	* Vitamin B12 10%
Phosphorus 15%	* Zinc 6%
Not a significant source of dietary fiber and sugars.	
* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:	
	Calories 2,000 2,500
Total Fat	Less than 65g 80g
Sat fat	Less than 20g 25g
Cholesterol	Less than 300mg 300mg
Sodium	Less than 2,400mg 2,400mg
Potassium	3,500mg 3,500mg
Total Carbohydrate	300g 375g
Dietary Fiber	25g 30g
Protein	50g 65g
Calories per gram:	
Fat 9 • Carbohydrate 4 • Protein 4	

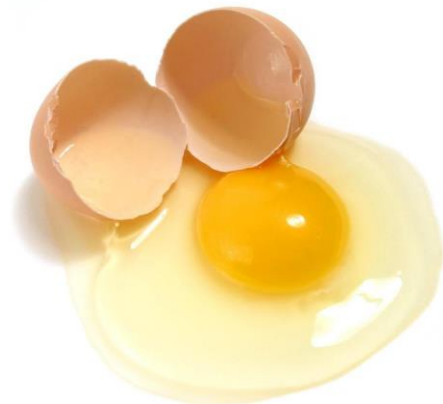
JUMBO



Name: _____

What Is in a Label?

1. What is the difference in grams of protein between a small egg and a jumbo egg?
2. How many servings are in a carton of eggs?
3. If I eat a small, large and jumbo egg how many grams of protein have I eaten?
4. What vitamins do eggs provide us?
5. If I consumed 15 grams of protein, how many small eggs have I eaten?
6. Are brown or white eggs more nutritious?



What Is in a Label?

ANSWERS

1. What is the difference in grams of protein between a small egg and a jumbo egg?

$$8 \text{ grams} - 5 \text{ grams} = 3 \text{ grams}$$

2. How many servings are in a carton of eggs?

12 servings

3. If I eat a small, large and jumbo egg how many grams of protein have I eaten?

$$5 \text{ grams} + 6 \text{ grams} + 8 \text{ grams} = 19 \text{ grams}$$

4. What vitamins do eggs provide us?

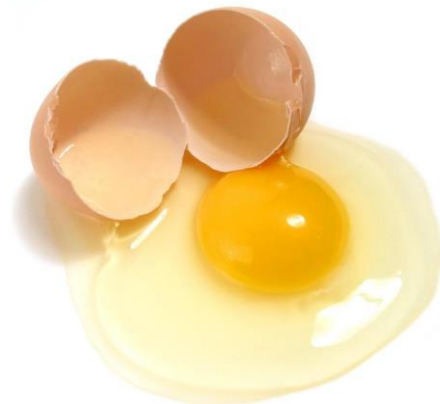
Vitamin A, Vitamin C, Vitamin D, Vitamin B₆ and Vitamin B₁₂

5. If I consumed 15 grams of protein, how many small eggs have I eaten?

$$15 / 5 = 3 \text{ small eggs}$$

6. Are brown or white eggs more nutritious?

There is no nutritional difference between white and brown eggs



If I were a Chick

(Taken from Illinois Ag in the Classroom)



Common Core State Standards: This lesson is correlated to the following CCSS, as well as the Arizona Additions to the CCSS.

1. **Language (L):** Student will demonstrate an understanding in; conventions of Standard English, knowledge of language, and vocabulary acquisition and use.
2. **Writing (W):** Students should demonstrate an understanding in all aspects of language use; text types and purpose, production and distribution of writing, research to build and present knowledge, and range of writing.

First Grade:	1.L.2, 1.W.3
Second Grade:	2.L.2, 2.W.3
Third Grade:	3.L.2, 3.W.3
Fourth Grade:	4.L.2, 4.W.3
Fifth Grade:	5.L.2, 5.W.3
Sixth Grade:	6.L.2, 6.W.3

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. Identify poultry terms.
2. Write with fluency at a grade appropriate level.

Materials needed:

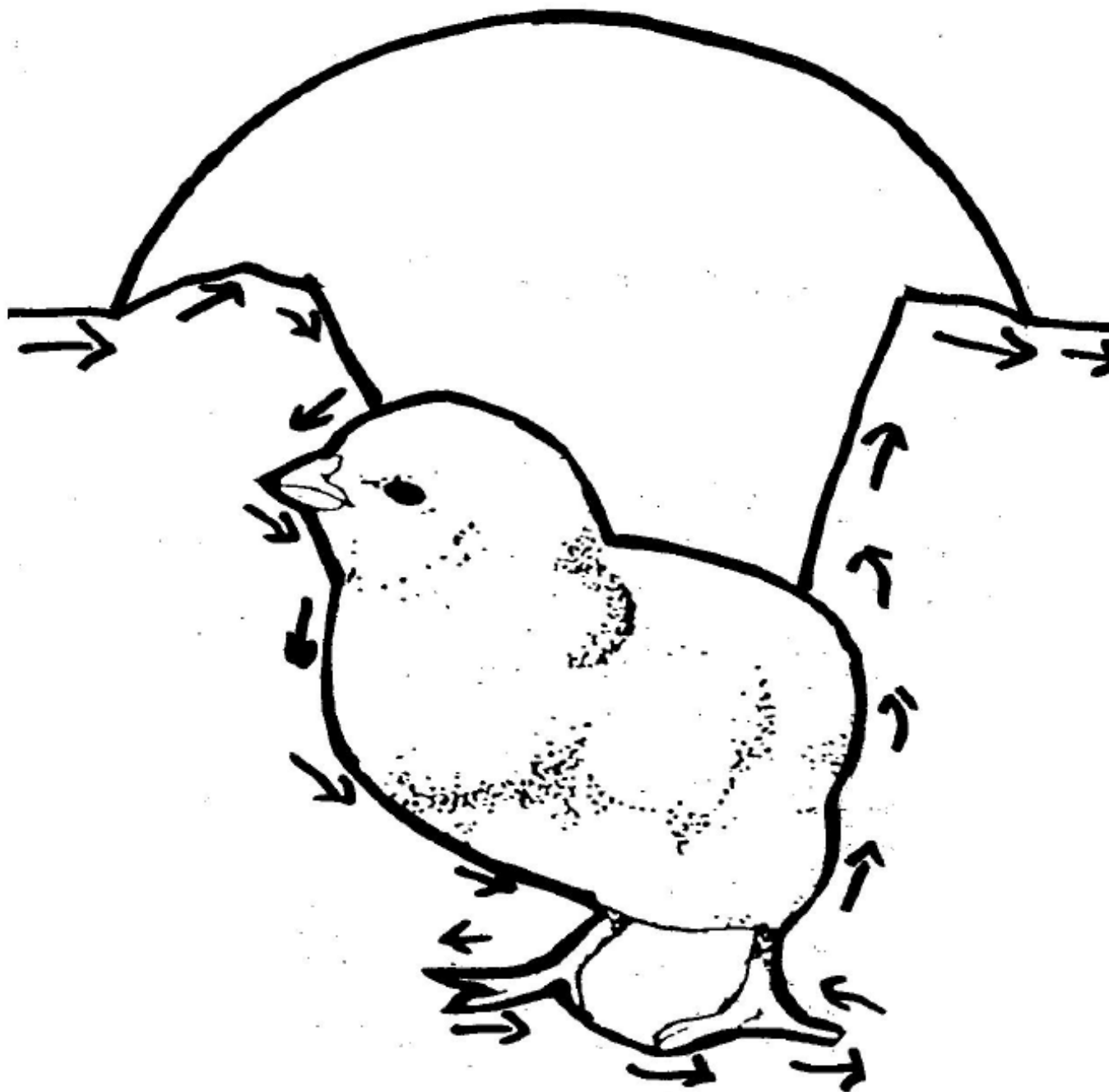
- ✓ Paper
- ✓ Student Writing Template

Terms:

No terms were identified for this lesson

Teaching Strategies: Have the students use the steps of the writing process to create a story. Have students imagine that they are a chick inside an egg and they are about to hatch. Have them write about what they see, feel, and hear. Students may use the writing template if age appropriate, otherwise use journal paper.

Evaluation: Focus the evaluation of student achievement on mastery of the objectives as stated in the lesson. A written test can also be used to assess student achievement of the objectives.

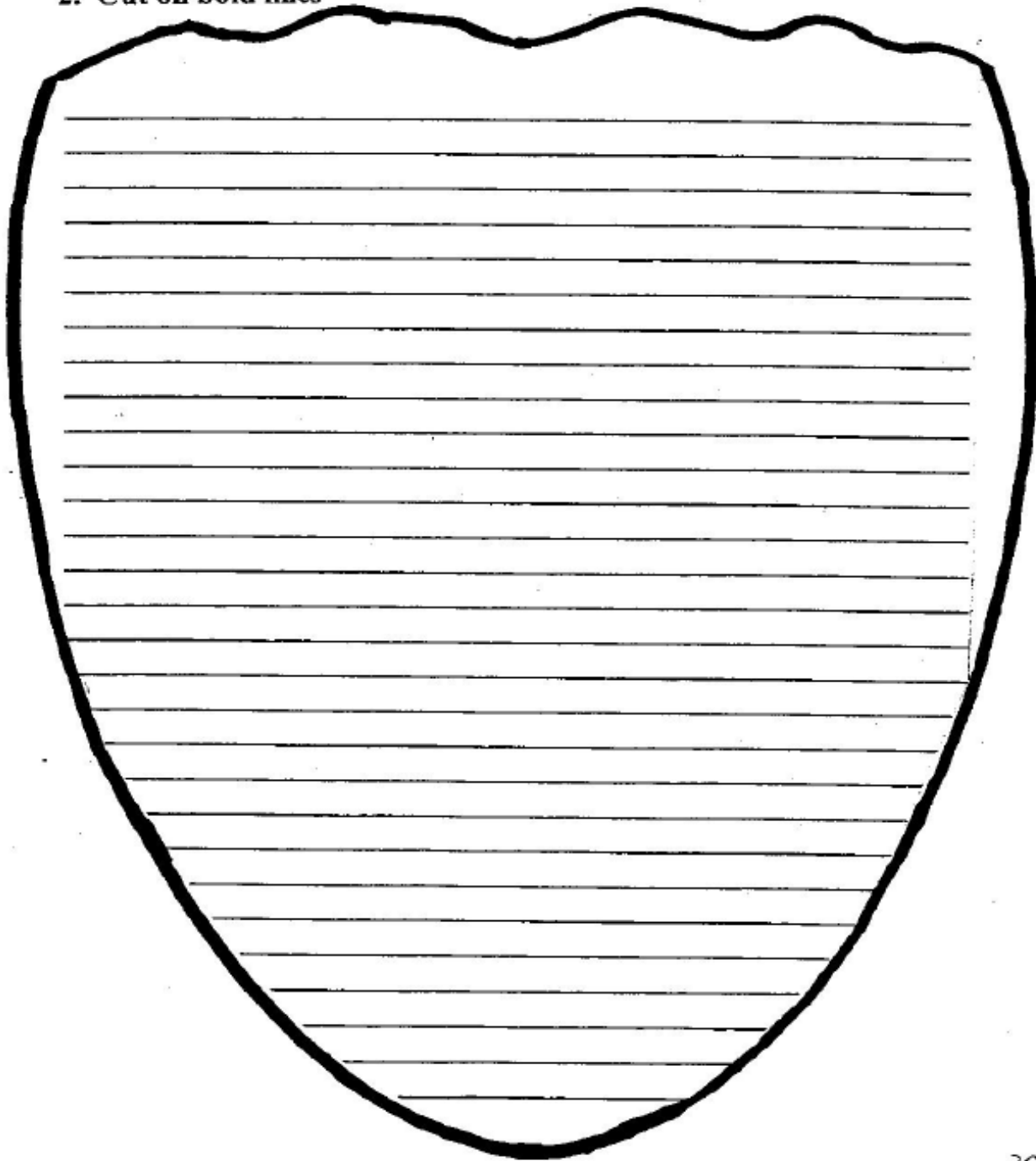


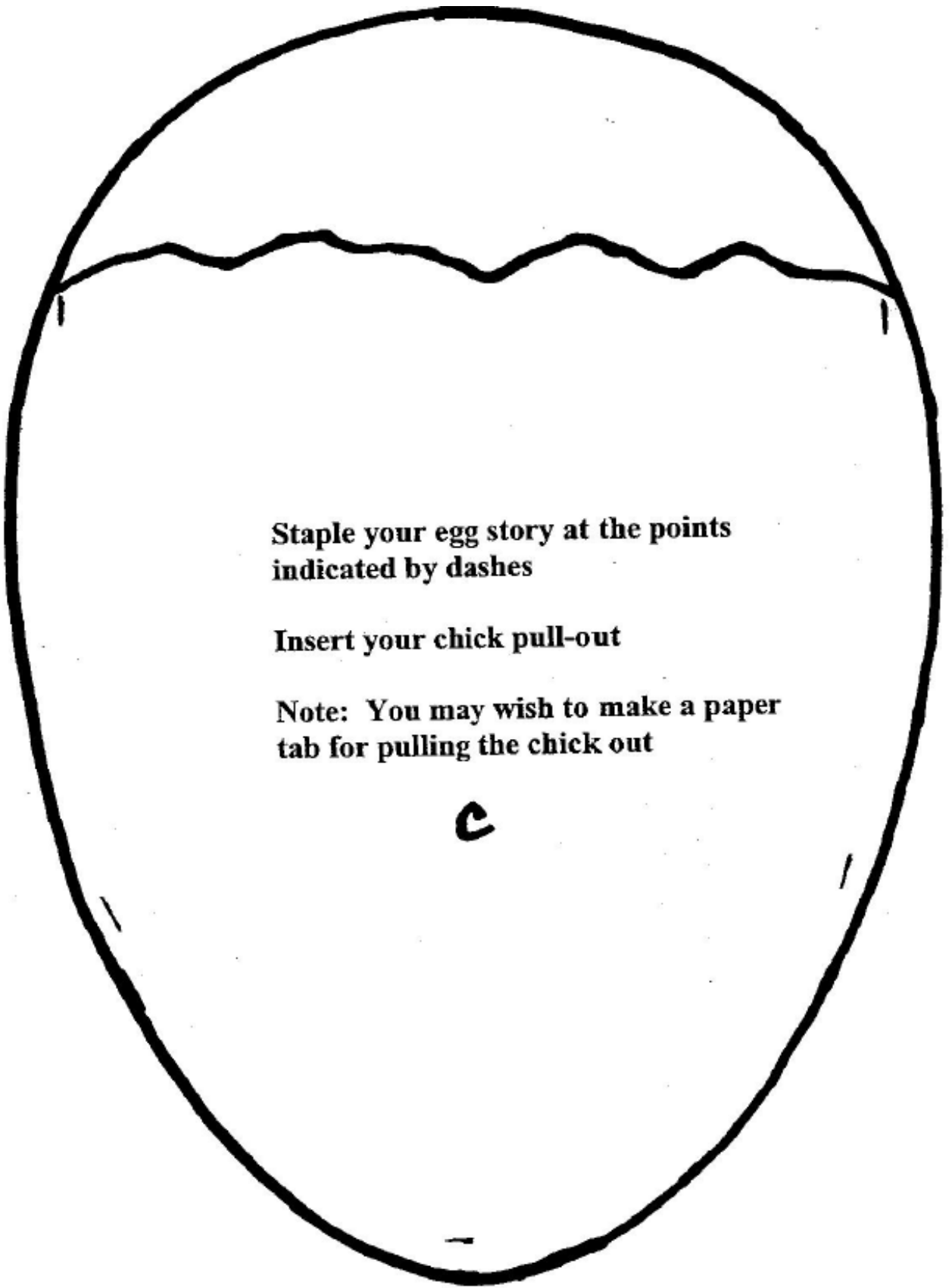
1. COLOR THE CHICK
2. CUT ON BOLD LINE MARKED BY ARROWS

A

1. Imagine you are a chick hatching from the egg. On the lines provided, write a story about what you saw, felt, and did before and after hatching.

2. Cut on bold lines





Staple your egg story at the points indicated by dashes

Insert your chick pull-out

Note: You may wish to make a paper tab for pulling the chick out



Which Came First



Common Core State Standards: This lesson is correlated to the following CCSS, as well as the Arizona Additions to the CCSS.

1. **Language (L):** Student will demonstrate an understanding in; conventions of Standard English, knowledge of language, and vocabulary acquisition and use.
2. **Writing (W):** Students should demonstrate an understanding in all aspects of language use; text types and purpose, production and distribution of writing, research to build and present knowledge, and range of writing.

First Grade:	1.L.2, 1.W.1
Second Grade:	2.L.2, 2.W.1
Third Grade:	3.L.2, 3.W.1
Fourth Grade:	4.L.2, 4.W.1
Fifth Grade:	5.L.2, 5.W.1
Sixth Grade:	6.L.2, 6.W.1

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. Identify poultry terms.
2. Write with fluency at a grade appropriate level.

Materials needed:

- ✓ Paper
- ✓ Student Writing Templates

Terms:

No terms were identified for this lesson

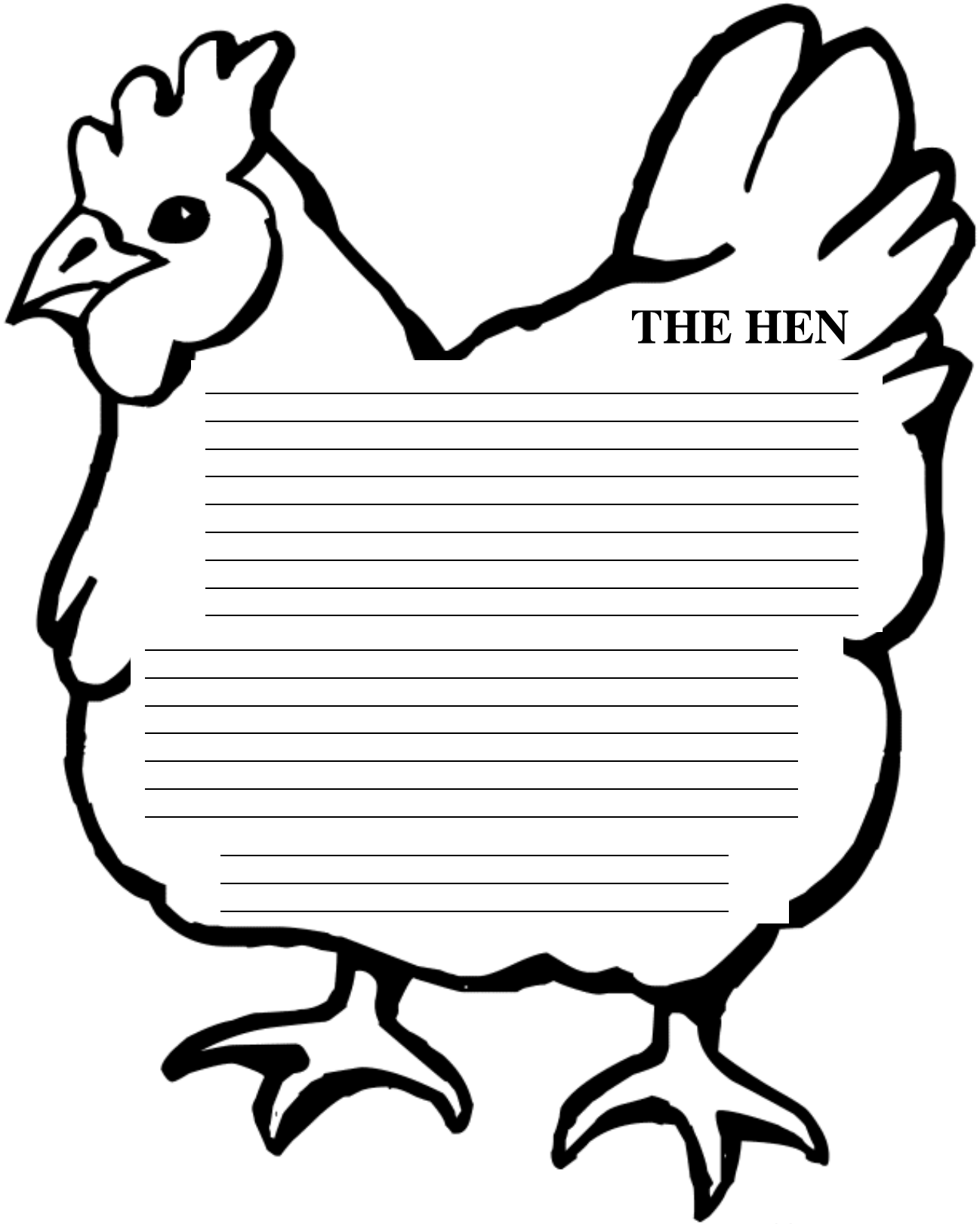
Teaching Strategies: Have your students determine if they think the chicken or the egg came first. Depending upon their answer, have them choose the egg or chicken writing template. For older students you can have them use regular writing paper. Have the students use the steps of the writing process to create a story. Their story should be why they believe the chicken or the egg came first. You may have students do some research before beginning their story so that they can include facts or supporting information in their story/paper. Some ideas may be religion or evolution based.

Evaluation: Focus the evaluation of student achievement on mastery of the objectives as stated in the lesson. A written test can also be used to assess student achievement of the objectives.

Name: _____

THE EGG

Name: _____



THE HEN

Show What You Know- Eggs 101



Common Core State Standards: This lesson is correlated to the following CCSS, as well as the Arizona Additions to the CCSS.

1. **Language (L):** Student will demonstrate an understanding in; conventions of Standard English, knowledge of language, and vocabulary acquisition and use.
2. **Writing (W):** Students should demonstrate an understanding in all aspects of language use; text types and purpose, production and distribution of writing, research to build and present knowledge, and range of writing.

Third Grade:	3.L.2, 3.W.2
Fourth Grade:	4.L.2, 4.W.2
Fifth Grade:	5.L.2, 5.W.2
Sixth Grade:	6.L.2, 6.W.2

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. Identify poultry terms.
2. Write with fluency at a grade appropriate level.
3. Identify interesting facts about the poultry industry and paraphrase in a essay or journal entry.

Materials needed:

- ✓ Paper
- ✓ Eggs 101: A Video Project DVD

Terms:

No terms were identified for this lesson

Teaching Strategies: Have the students watch Eggs 101: A Video Project. Have them take notes throughout the video. Once the video is completed have the students write a paragraph, journal entry, or review from the movie. Have the students use the steps of the writing process to create their text.

Evaluation: Focus the evaluation of student achievement on mastery of the objectives as stated in the lesson. A written test can also be used to assess student achievement of the objectives.

Name: _____

Show What You Know-Eggs 101 Student Worksheet

1. What is the most popular breed for laying hens?
2. How do you tell what color egg a hen will lay?
3. Where does the egg spend most of its time?
4. The egg laying process begins how long after an egg is laid?
5. What part of the egg is referred to as the egg white?
6. What problems did/do producers run into with raising their birds outside?
7. What are the different sizes of eggs?
8. After World War II, what helped speed up the egg business?
9. What were the benefits of moving hens into hen houses?
10. What are the different ways to raise hens?

Show What You Know-Eggs 101

ANSWERS

1. What is the most popular breed for laying hens?

The White LegHorn

2. How do you tell what color egg a hen will lay?

By the color of her earlobes and feathers

3. Where does the egg spend most of its time?

In the Uterus

4. The egg laying process begins how long after an egg is laid?

30 minutes

5. What part of the egg is referred to as the egg white?

The Albumen

6. What problems did/do producers run into with raising their birds outside?

Predators, weather, and pecking orders

7. What are the different sizes of eggs?

Small, medium, large and extra large

8. After World War II, what helped speed up the egg business?

Conveyor belts and machines

9. What were the benefits of moving hens into hen houses?

No predators could reach them, they did not have temperature extremes, it helped prevent disease and improved mortality rate.

10. What are the different ways to raise hens?

Cage System (battery), laying houses (barns) and outside (free range)

Show What You Know- Americas Heartland



Common Core State Standards: This lesson is correlated to the following CCSS, as well as the Arizona Additions to the CCSS.

1. **Language (L):** Student will demonstrate an understanding in; conventions of Standard English, knowledge of language, and vocabulary acquisition and use.
2. **Writing (W):** Students should demonstrate an understanding in all aspects of language use; text types and purpose, production and distribution of writing, research to build and present knowledge, and range of writing.

Third Grade: 3.L.2, 3.W.2

Fourth Grade: 4.L.2, 4.W.2

Fifth Grade: 5.L.2, 5.W.2

Sixth Grade: 6.L.2, 6.W.2

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. Identify poultry terms.
2. Write with fluency at a grade appropriate level.
3. Identify interesting facts about the poultry industry and paraphrase in a essay or journal entry.

Materials needed:

- ✓ Paper
- ✓ Americas Heartland Hickman's DVD Episode 220

Terms:

No terms were identified for this lesson

Teaching Strategies: Have the students watch Americas Heartland Hickman's DVD. Have them take notes throughout the video. Once the video is completed have the students write a paragraph, journal entry, or review from the movie. Have the students use the steps of the writing process to create their text.

Evaluation: Focus the evaluation of student achievement on mastery of the objectives as stated in the lesson. A written test can also be used to assess student achievement of the objectives.

Name: _____

Show What You Know-America's Heartland Student Worksheet

1. How many pounds of chicken are consumed by every American each year?
2. What does Biosecurity mean?
3. How many days does it take fertilized chicken eggs to hatch?
4. How long does it take for a broiler chicken to be ready for market?
5. How much can one laying house cost?
6. When did Hickman's Family Farms begin?
7. A hen can lay an egg every how many hours?
8. What breed of chicken does Hickman's Family Farms use?
9. Are Hickman's egg fertilized or unfertilized eggs?
10. Why does Hickman's Family Farms use women to pack their eggs?

Show What You Know-America's Heartland

ANSWERS

- How many pounds of chicken are consumed by every American each year?

60 lbs

- What does Biosecurity mean?

Taking measures to prevent visitors/workers from bringing in diseases

- How many days does it take fertilized chicken eggs to hatch?

21 days

- How long does it take for a broiler chicken to be ready for market?

8 weeks

- How much can one laying house cost?

\$175,000

- When did Hickman's Family Farms begin?

1944

- A hen can lay an egg every how many hours?

26 hours

- What breed of chicken does Hickman's Family Farms use?

White Leghorn

- Are Hickman's egg fertilized or unfertilized eggs?

Unfertilized eggs

- Why does Hickman's Family Farms use women to pack their eggs?

The women are gentler/more careful with the eggs and break less than men do

Show What You Know- Poultry Ag Mag



Common Core State Standards: This lesson is correlated to the following CCSS, as well as the Arizona Additions to the CCSS.

1. **Reading Standards for Literature (RL):** Students gain adequate exposure to a range of texts and tasks.
2. **Reading Standards: Foundational Skills (RF):** Students will demonstrate an understanding and working knowledge of concepts of print, the alphabetic principle, and other basic conventions of the English writing system.

Third Grade:	3.RL.1, 3.RF.1
Fourth Grade:	4.RL.1, 4.RF.1
Fifth Grade:	5.RL.1, 5.RF.1
Sixth Grade:	6.RL.1, 6.RF.1

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. Identify poultry terms.
2. Read with fluency at a grade appropriate level.
3. Identify interesting facts about the poultry industry and paraphrase by answering questions on the student worksheet.

Materials needed:

- ✓ Poultry Ag Mag
- ✓ English Language Arts Student Worksheet

Terms:

No terms were identified for this lesson

Teaching Strategies: Have the students work individually, in pairs or groups. Have the students answer the questions from the Student Worksheet. Once they are finished have them read the Poultry Ag Mag and answer the remaining questions. Do NOT have the students write on the magazines, they must be returned to the Farm Bureau.

Review/Summary: Use the student learning objectives to summarize the lesson. Have students explain the content associated with each objective. Student responses can be used in determining which objectives need to be reviewed or taught from a different angle. Use observations as the basis for reteaching areas where student mastery may need improvement.

Evaluation: Focus the evaluation of student achievement on mastery of the objectives as stated in the lesson. A written test can also be used to assess student achievement of the objectives.

Name: _____

Show What you Know- Poultry Ag Student Worksheet

1. Name three birds that fall under the definition of poultry.
2. How many days does it take for a chicken egg to hatch?
3. Do chicks come from fertilized or unfertilized eggs?
4. What is the yellow part of the egg called?
5. Name 3 breeds of chickens.
6. What are some of the uses for eggs besides for eating?
7. The largest single chicken egg laid weighed how many pounds?
8. Chickens swallow their food without chewing and then it is broken up by what?



Show What you Know- Poultry Ag

ANSWERS

1. Name three birds that fall under the definition of poultry.

Chickens, turkeys, ducks, ostriches, emus, pigeons, geese, quail and pheasants.

2. How many days does it take for a chicken egg to hatch?

21 days

3. Do chicks come from fertilized or unfertilized eggs?

Fertilized Eggs

4. What is the yellow part of the egg called?

Yolk

5. Name 3 breeds of chickens.

White Leghorns, Rhode Island Reds, Plymouth Rock, Polish, Sussex, Cochin, etc

6. What are some of the uses for eggs besides for eating?

Paint, shampoo, conditioner, animal feed, vaccines, and pillows.

7. The largest single chicken egg laid weighed how many pounds?

1 pound

8. Chickens swallow their food without chewing and then it is broken up by what?

Gizzard



An Egg-cellent Source of Nutrition



Common Core State Standards: This lesson is correlated to the following CCSS, as well as the Arizona Additions to the CCSS.

1. **Reading Standards for Literature (RL):** Students gain adequate exposure to a range of texts and tasks.
2. **Reading Standards: Foundational Skills (RF):** Students will demonstrate an understanding and working knowledge of concepts of print, the alphabetic principle, and other basic conventions of the English writing system.

Third Grade: 3.RL.1, 3.RF.3

Fourth Grade: 4.RL.1, 4.RF.3

Fifth Grade: 5.RL.1, 5.RF.3

Sixth Grade: 6.RL.1, 6.RF.3

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. Identify poultry terms.
2. Identify information from a chart

Materials needed:

- ✓ Poultry Ag Mag
- ✓ English Language Arts #6 Student Worksheet
- ✓ English Language Arts Lesson #6 Fact Sheet

Terms:

No terms were identified for this lesson.

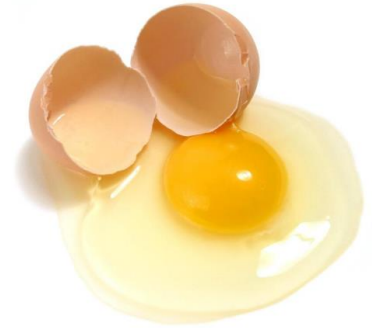
Teaching Strategies: Launch a discussion with your students about nutrition. Things that are important to our diets. Then discuss the role that eggs can play in their diet. Have students bring in or research the foods they eat. Do they contain eggs? How often do they consume eggs in their diet?

Evaluation: Focus the evaluation of student achievement on mastery of the objectives as stated in the lesson. A written test can also be used to assess student achievement of the objectives.

An *Egg*-cellent Source of Nutrition Fact Sheet

Eggs are all natural and packed with a number of nutrients

One egg has lots of vitamins and minerals, high-quality protein and antioxidants, and only contains 70 calories. The nutrients in eggs can play a role in weight management, muscle strength, healthy pregnancy, brain function, eye health and much more. At less than \$.15 each, eggs are an affordable and delicious breakfast option.



The protein in eggs is the highest-quality protein found in any food. The high-quality protein in eggs provides the mental and physical energy families need for important days.

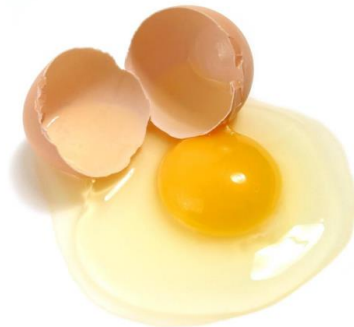
Nutrient (unit)	Whole Egg	Egg White	Egg Yolk
Calories (kcal)	72	17	55
Protein (g)	6.3	3.6	2.7
Carbohydrate (g)	0.36	0.24	0.61
Total fat (g)	4.8	0.06	4.5
Monounsaturated fat (g)	1.8	0	2
Polyunsaturated fat (g)	1	0	0.72
Saturated fat (g)	1.6	0	1.6
Trans fat (g)	0.02	0	0.02
Cholesterol (mg)	186	0	184
Choline (mg)	126	0.4	116
Riboflavin (mg)	0.2	0.15	0.09
Vitamin B12 (mcg)	0.45	0.03	0.33
Folate (mcg)	24	1	25
Vitamin D (IU)	41	0	37
Vitamin A (IU)	270	0	245
Vitamin B 6 (mg)	0.09	0	0.06
Thiamin (mg)	0.02	0	0.03
Vitamin E (mg)	0.5	0	0.44
Selenium (mcg)	15.4	6.6	9.5
Phosphorous (mg)	99	5	66
Iron (mg)	0.88	0.03	0.46
Zinc (mg)	0.65	0.01	0.39
Calcium (mg)	28	2	22
Sodium (mg)	71	55	8
Potassium (mg)	69	54	19
Magnesium (mg)	6	4	1

Name: _____

An *Egg*-cellent Source of Nutrition Student Worksheet

Directions: Use the fact sheet to answer the questions below.

1. If I eat 2 eggs for breakfast, how many calories have I consumed?
2. If I do not want to eat any cholesterol, which part of the egg should I eat?
3. If I consumed 19 mg of potassium, which part of the egg did I eat?
4. If I consumed 2.7 grams of protein, which part of the egg did I eat?
5. How many mg of calcium do we get from a whole egg?



An *Egg*-cellent Source of Nutrition

Student Worksheet

1. If I eat 2 eggs for breakfast, how many calories have I consumed?

$$72 + 72 = 144\text{kcal}$$

2. If I do not want to eat any cholesterol, which part of the egg should I eat?

The Egg White

3. If I consumed 19 mg of potassium, which part of the egg did I eat?

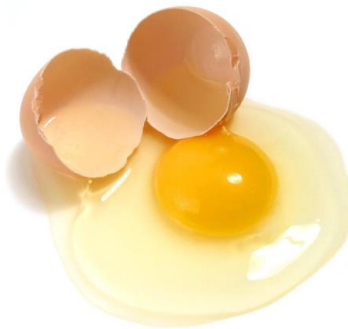
The Egg Yolk

4. If I consumed 2.7 grams of protein, which part of the egg did I eat?

The Egg Yolk

5. How many mg of calcium do we get from a whole egg?

28mg



Egg Production Methods

(Derived from Illinois Poultry Magic kit)



Arizona State Learning Standards: This lesson is correlated to the following State Learning Standard.

1. **American History:** understand events, trends, individuals and movements shaping the history of the United States and other nations.
2. **Economics:** explains historical developments and patterns, the results of trade, and the distribution of income and wealth in local, regional, national and world economies.

Arizona State Objectives: This lesson addresses the following objectives: (Strand, Concept, Performance objective)

Second Grade:	5.1.3
Third Grade:	1.1.3, 5.1.2, 5.1.4
Fourth Grade:	1.1.1, 1.7.1, 1.7.1, 1.10.2
Fifth Grade:	5.2.2, 5.2.4
Sixth Grade:	5.1.2

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. Create a chart and Venn diagram from information that was read.
2. Create a KWL chart to show what they have learned.
3. Explain how technology has changed egg production

Materials needed:

- ✓ Student Worksheet KWL Egg Production Methods
- ✓ Student Worksheet Venn Diagram Egg Production Methods
- ✓ Student Worksheet History of Egg Production Methods
- ✓ Student Information Sheet History of Egg Production Methods
- ✓ *Cage-Free Egg Farms Peck Away At Consumer Reality* Article
- ✓ Production Method Videos (<http://educationstation.discoveryeducation.com/>)

Terms:

- Aviary-** a building with two or more floors that laying hens can fly about freely
- Barn Method-** a building where laying hens stay during their laying cycle
- Battery System** a large system of egg production involving cages
- Flock-** several birds tended to as one unit
- Free Range-** chickens that are allowed to roam the farm area or yard

Teaching Strategies: Prior to having students read Student Information Sheet History of Hickman's, initiate a discussion with students to complete the *Student Worksheet KWL Egg Production Method Sheet*. After discussion, students will read *Student Information Sheet History of Egg Production Methods* and the *Cage-Free Egg Farms Peck Away At Consumer Reality* article and complete the *Student Worksheet History of Egg Production Methods*, which creates a chart explaining the different types of production. The *Student Worksheet Venn Diagram* can be completed as individual, small groups, or as a class activity. Students may also look online at hickmanseggs.com or aeb.org to find more information. You can also show online videos of each production method. These videos can be found at <http://educationstation.discoveryeducation.com/>

Review/Summary: Use the student learning objectives to summarize the lesson. Have students explain the content associated with each objective. Student responses can be used in determining which objectives need to be reviewed or taught from a different angle. Use observations as the basis for reteaching areas where student mastery may need improvement.

Evaluation: Focus the evaluation of student achievement on mastery of the objectives as stated in the lesson. A written test can also be used to assess student achievement of the objectives.

Egg Production Methods

Student Information Sheet

Grocery stores stock hundreds of thousands of eggs ready for us to purchase and eat in a variety of ways. However, it is important to remember that it has not always been this way. There have been times where finding an egg for breakfast was no easy task.

There is information dating back to 300 B.C that the Egyptians had domesticated birds. It has even been recorded that in 14000 B.C the Chinese had birds that were laying eggs for humans to eat. In 1492 it has been recorded that Columbus brought the first chickens to the New World. In these times and before refrigerated cars and rapid transportation, if a family wanted fresh eggs or chicken, they had to raise the birds themselves. People in both urban and rural communities raised their own chickens. Mothers and children raised the chickens in their backyard for eggs and sold any extras they might have for grocery money or traded with neighbors for other products. Families would eventually harvest their chickens for the meat.

As the railroad system made its way to more places and refrigerated cars were introduced, producing eggs and chickens became more of a cash product on many farms. Farmers would raise more chickens than they had need for. Though it is important to remember even at this time the raising of crops such as cotton, beef, milk, wheat, and corn were thought to be more important and a higher priority than chickens. The chickens were kept as a backup for when crops were ruined, prices fell, or off-farm jobs were not available, such as during the Great Depression.

Prior to World War II, most egg production came from farm flocks of less than 400 hens that laid an average of 100 eggs per year. By the early 1960s, improved technology and the development of mechanical equipment caused a change from small farm flocks to large commercial operations. In the major egg producing states, flocks of 100,000 laying hens are not unusual and some flocks are as large as 1,000,000. Each of the 235 million laying hens in the US produces 250 to 300 eggs per year.

After World War II, many farmers stopped raising chickens and focused on crop production. However, some farmers got more hens instead of getting out of egg production. Many producers entered into informal or formal agreements with processors, who often provided specialized medicines, ration ingredients and advice to their larger producers. At this time, the farmer chose between making their operation eggs or broilers (birds raised for meat).

There are four options to house birds in today's poultry production. The first is called a "battery system," a large system that may involve carefully climate-controlled houses containing thousands of cages and tens of thousands of birds. The second option is called the "barn," a building in which layer hens are restrained during their laying cycle, but can move about. The third system is called the "aviary." In this system layer hens are not in cages. This option is similar to a barn, but has two or more floors the bird can move through. The fourth method of raising hens is the way they did it in the olden days; through backyards flocks, which are free to roam the farm. This system is called "free-range."

The egg industry has changed greatly in the past century through the development of various ways to house the chickens. The development of specialized machines has also allowed for substantial growth. Machines now do the collecting, cleaning, sorting, and most of the packing!

Name: _____

KWL of Egg Production Methods

K Know (think we know)	W Want to learn	L Learned



Battery Cages



Free Range



Barn Raised

KWL of Egg Production Methods

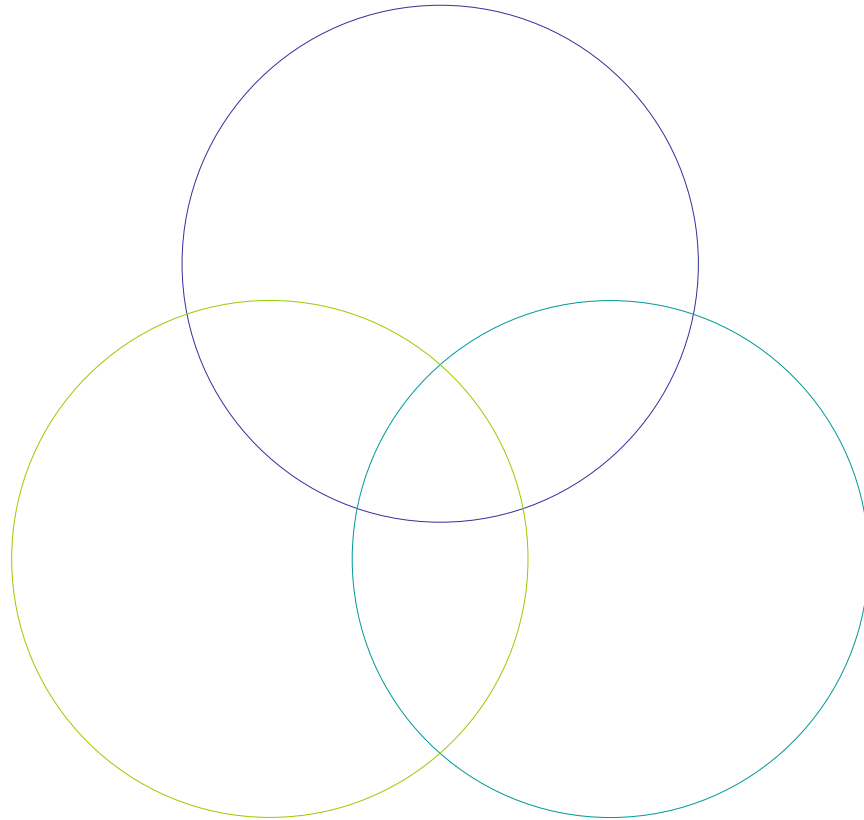
ANSWERS

K Know (think we know)	W Want to learn	L Learned
<p>Take any reasonable answer. You may place a question mark by the things that the students think they know.</p>	<p>Whatever the students want to learn. They might skim the background information or go online to get ideas.</p>	<p>List the things that the students did not know before reading the article, skimming the background information, or looking online.</p>

Name: _____

Venn Diagram Egg Production Methods Student Worksheet

**Battery
Cages**



**Barn
Method**

**Free-
Range**

Venn Diagram Egg Production Methods

TEACHER INFO SHEET

Egg Production Methods

Answers will vary, below are some simple answers

Barn System

- Chickens are not in cages.
- Chickens can fly around.
- Eggs are laid on the ground.
- Eggs are collected by hand.
- Chickens have access to all the other chickens.
- Chickens have competition from other chickens for food.
- Can eat feathers, manure, or anything else that is on the ground.
- Barns are cleaned when a new flock is brought in, usually 2 years.
- Temperature controlled.
- Biosecurity measures.

Free Range

- Chickens are not in cages.
- Chickens can fly around.
- Eggs are collected by hand.
- Chickens have access to all other chickens.
- Eggs are laid on the ground or in a coop.
- Chickens have competition from other chickens for food.
- Chickens are exposed to the weather conditions.
- Chickens are exposed to natural predators.
- Can eat bugs, manure, seeds, and soil; anything that is on the ground.

Battery Cages

- Chickens are kept in a barn in cages.
- Eggs are collected on a conveyor belt and taken immediately to be processed.
- Chickens have free access to food rations.
- Caged with birds of the same temperament.
- Manure is removed daily.
- Temperature controlled.
- Biosecurity measures.

Name: _____

Egg Production Methods Student Worksheet

1. Complete the chart after reading the History of Egg Production Methods, *Cage-Free Egg Farms Peck Away At Consumer Reality* article, and searching the American Egg Board Website and Hickman's Eggs website, explain what each type of production means.

Free Range	Battery System	Barn

2. Prior to World War II, the average hen laid _____ eggs a year. Now, using modern production systems and technology, the average hen lays _____ to _____ eggs a year. The difference between the number of eggs laid today from the number of eggs laid in the past is _____ to _____.

3. Complete the following chart:

Numbers	Written Out Numbers
<i>25 laying hens</i>	<i>Twenty five laying hens</i>
500 laying hens	
	One hundred thousand laying hens
	Two hundred and thirty thousand laying hens
1,000,000 laying hens	
235, 000,000 laying hens	

4. Which do you think would lay more egg, a free-range hen or a hen raised in a battery system? Why?

Egg Production Methods

ANSWERS

1. Complete the chart after reading the History of Egg Production Methods, *Cage-Free Egg Farms Peck Away At Consumer Reality* article, and searching the American Egg Board Website and Hickman’s Eggs website, explain what each type of production means.

Free Range	Battery System	Barn
Small backyard operation. Chickens are not in cages.	A large poultry operation where chickens are raised in cages in temperature controlled buildings.	A building where hens are restrained in a farmhouse during their laying cycle, but can move about.

2. Prior to World War II, the average hen laid 100 eggs a year. Now, using modern production systems and technology, the average hen lays 250 to 300 eggs a year. The difference between the number of eggs laid today from the number of eggs laid in the past is 150 to 200.

3. Complete the following chart:

Numbers	Written Out Numbers
<i>25 laying hens</i>	<i>Twenty five laying hens</i>
500 laying hens	Twenty five laying hens
100,000 laying hens	One hundred thousand laying hens
230,000 laying hens	Two hundred and thirty thousand laying hens
1,000,000 laying hens	One million laying hens
235, 000,000 laying hens	Two hundred and thirty five million laying hens

4. Which do you think would lay more egg, a free-range hen or a hen raised in a battery system? Why?

Answers will vary. Give credit to any answer that was thought through.

Arizona's *Egg-straordinary* Places

(Taken from the American Egg Board)



Arizona State Learning Standards: This lesson is correlated to the following State Learning Standard.

1. **Geography:** provides an understanding of the human and physical characteristics of the Earth's places and regions and how people of different cultural backgrounds interact with the environment.

Arizona State Objectives: This lesson addresses the following objectives: (Strand, Concept, Performance objective)

First Grade:	4.1.4, 4.1.5
Second Grade:	4.1.5, 4.1.6
Third Grade:	4.1.6, 4.1.7
Fourth Grade:	4.1.1, 4.1.2, 4.1.3, 4.1.5, 4.1.6, 4.1.7, 4.2.3, 4.2.4
Fifth Grade:	4.1.3, 4.1.4, 4.2.2
Sixth Grade:	4.1.3

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. Locate landmarks or towns in Arizona on a map.
2. Research facts about historical landmarks or towns in Arizona.

Materials needed:

- ✓ Photos of different egg dishes
- ✓ Different maps of Arizona

Terms:

Deviled Eggs- are hard-boiled eggs cut in half and filled with the hard-boiled egg's yolk mixed with different ingredients.

Fried- refers to eggs that are fried, typically in a frying pan or on a griddle.

Hard Boiled- are eggs (typically chicken's eggs) cooked by immersion in boiling water with their shells unbroken.

Omelet- Beaten eggs that are cooked in butter, then rolled or folded into an oval. They may be filled with any variety of ingredients before folding.

Over Easy- fried egg that has been turned but the yolk is still soft.

Poached- A chicken egg that has been cooked by gently breaking it into simmering water

Scrambled- is a dish made from beaten whites and yolks of eggs.

Soft boiled- egg that is boiled, but the yolk is still soft. Usually less than 5 minutes.

Sunny Side Up- fried egg that has not been turned

Teaching Strategies: Take a survey of the class: How do you like your eggs? After the class has submitted their answers, have them describe all of the different egg dishes. Use the egg dish photo cards to have them describe the egg. Next have the students identify their favorite places in

Arizona. Have the students identify which of those are historical land marks. If a student has been to that location have them describe the geography of the location and find it on a map. Have the students work as individuals or in a group to rename Arizona's Historical Sites or town to names that include an egg dish. Be sure the name reflects that geography of the landmark.

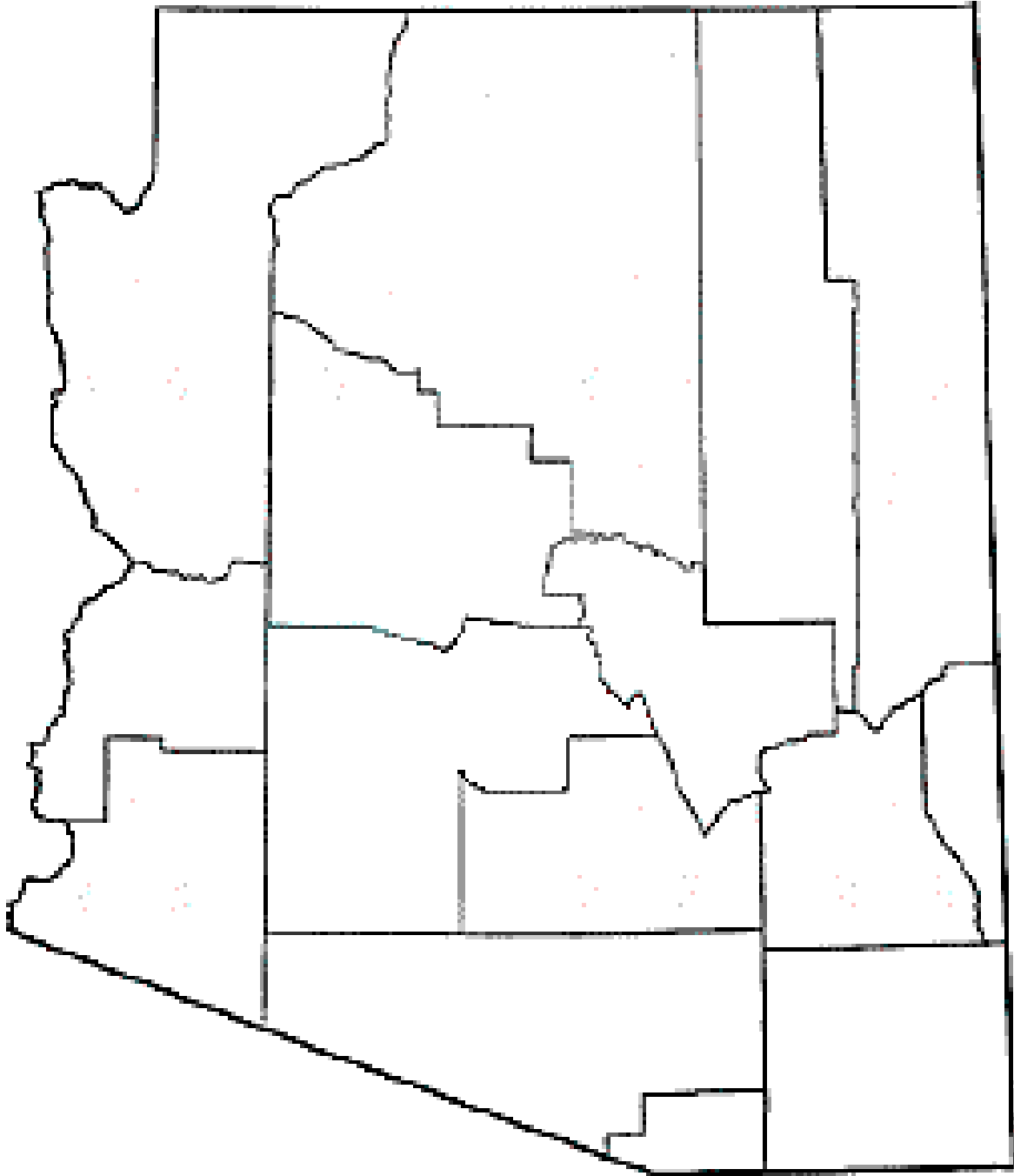
Example: A hard boiled egg is tough and rubbery. The name might be a good place for someplace that is really rocky or rugged. When you boil an egg the water bubbles and breaks at the top of the water, thus it might be a good name for someplace that has waves crashing on a shore like ***Hard-Boiled Harbor***.

When you fry eggs too long or on too high a heat, the edges of the egg turn brown and crinkly and dry up. A place where it is so hot and there is little rain that ordinary plants could dry up could be the ***Fried Forest***.

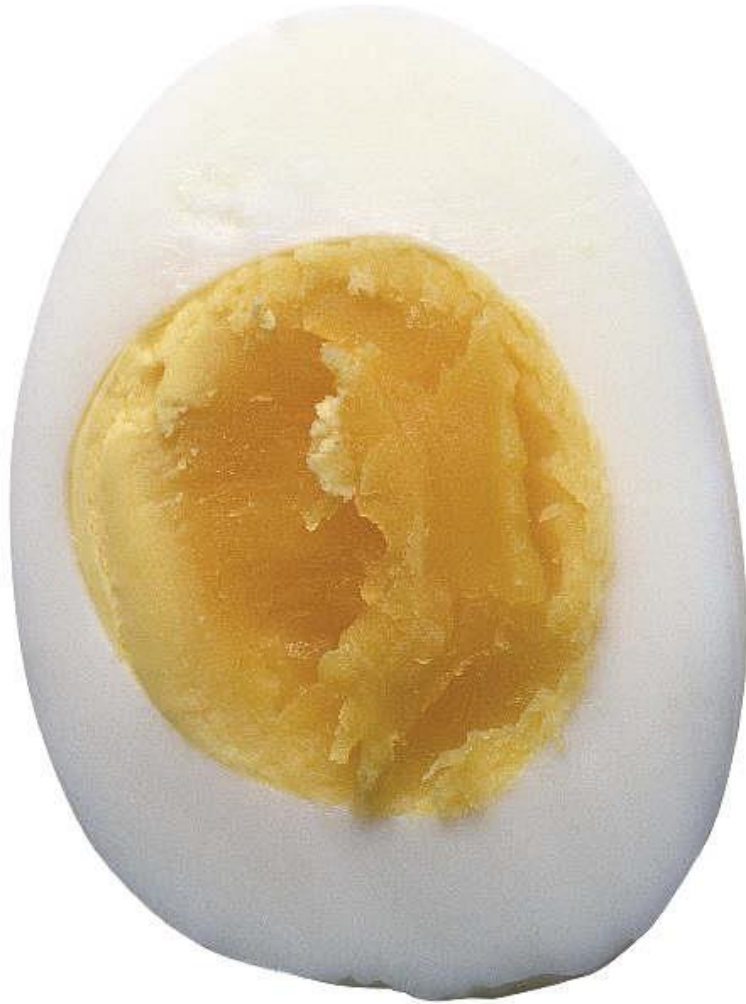
Review/Summary: Use the student learning objectives to summarize the lesson. Have students explain the content associated with each objective. Student responses can be used in determining which objectives need to be reviewed or taught from a different angle. Use observations as the basis for reteaching areas where student mastery may need improvement.

Evaluation: Focus the evaluation of student achievement on mastery of the objectives as stated in the lesson. A written test can also be used to assess student achievement of the objectives.

Arizona's *Egg*-straordinary Places Map



Hard Boiled Egg



Soft Boiled Egg



Scrambled Eggs



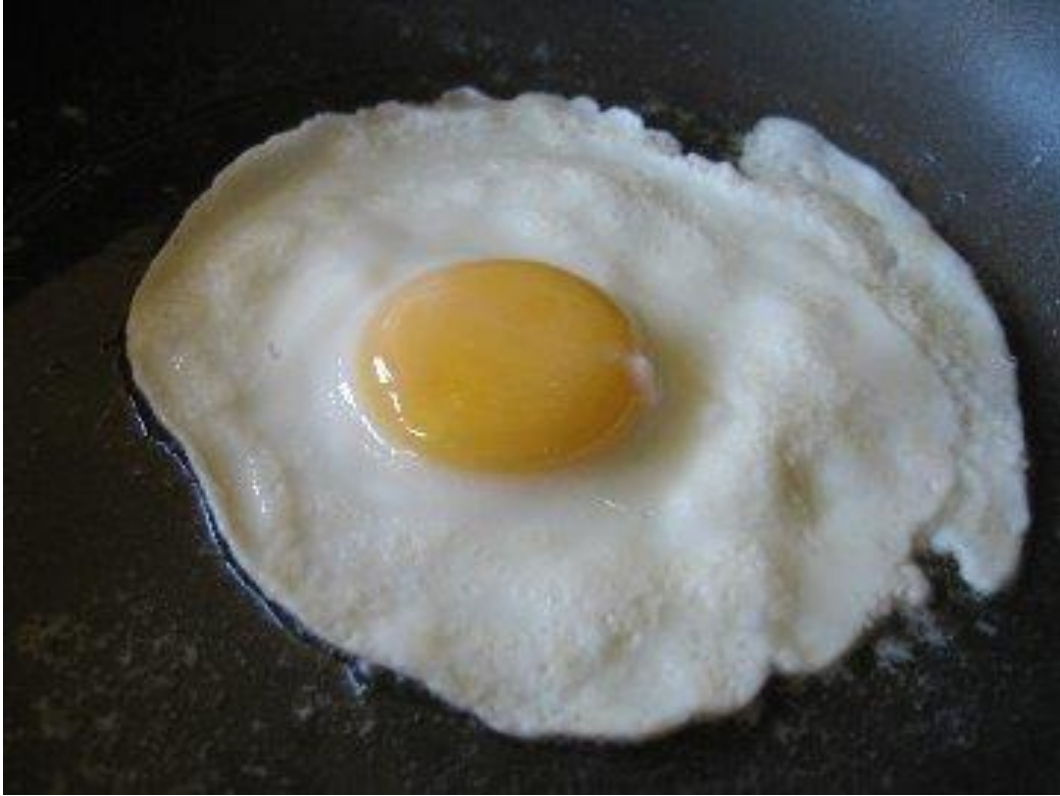
Sunnyside Up



Poached



Fried



Omelet



Deviled Egg



Anatomy of an Egg

(Taken from Illinois Ag in the Classroom)



Arizona State Learning Standards: This lesson is correlated to the following State Learning Standard.

1. **History and Nature of Science:** focuses on the human aspects of science and the role that scientists play in the development of various cultures.
2. **Life Science:** expands students' biological understanding of life by focusing on the characteristics of living things, the diversity of life, and how organisms in populations change over time in terms of biological adaptation and genetics.

Arizona State Objectives: This lesson addresses the following objectives: (Strand, Concept, Performance objective)

Second Grade: 2.2.1, 2.2.2, 2.2.3

Fourth Grade: 4.1.1

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. Identify the part of an egg.
2. Identify the functions of the parts of an egg.

Materials needed:

- ✓ Student Worksheet
- ✓ Saran wrap
- ✓ Tape
- ✓ Yellow construction paper
- ✓ Brown construction paper
- ✓ Black marker
- ✓ Unfertilized eggs (1 for every 4 students)

Terms:

Air Cell- located at the large end where there are more pores. Allows easy air exchange. Chick pops cell before hatching to fill lungs with fresh air.

Chalaza- Holds yolk in center of albumen. Acts like a shock absorber to protect the embryo.

Germ Spot- All eggs have this spot. In a fertilized egg, the spot contains a tiny microscopic embryo. When the egg is incubated the embryo starts to grow rapidly.

Shell- Provides protection and has pores for air exchange.

Shell Membrane- Provides protection from germs and serves as a breathing surface for the embryo.

White or Albumen- Provides water and protein for embryo. Has germ killing properties.

Yolk- Provides a rich source of food for the developing embryo.

Teaching Strategies: Have students work individually or in pairs. Have students look at the outside of the egg. Talk about what the purpose of the shell is. Have students crack open the egg and place the contents in a cup. Talk about the different parts of the egg and have students identify those parts. Have students complete the student egg anatomy project by following the student instructions.

Evaluation: Focus the evaluation of student achievement on mastery of the objectives as stated in the lesson. A written test can also be used to assess student achievement of the objectives.

Anatomy of an Egg

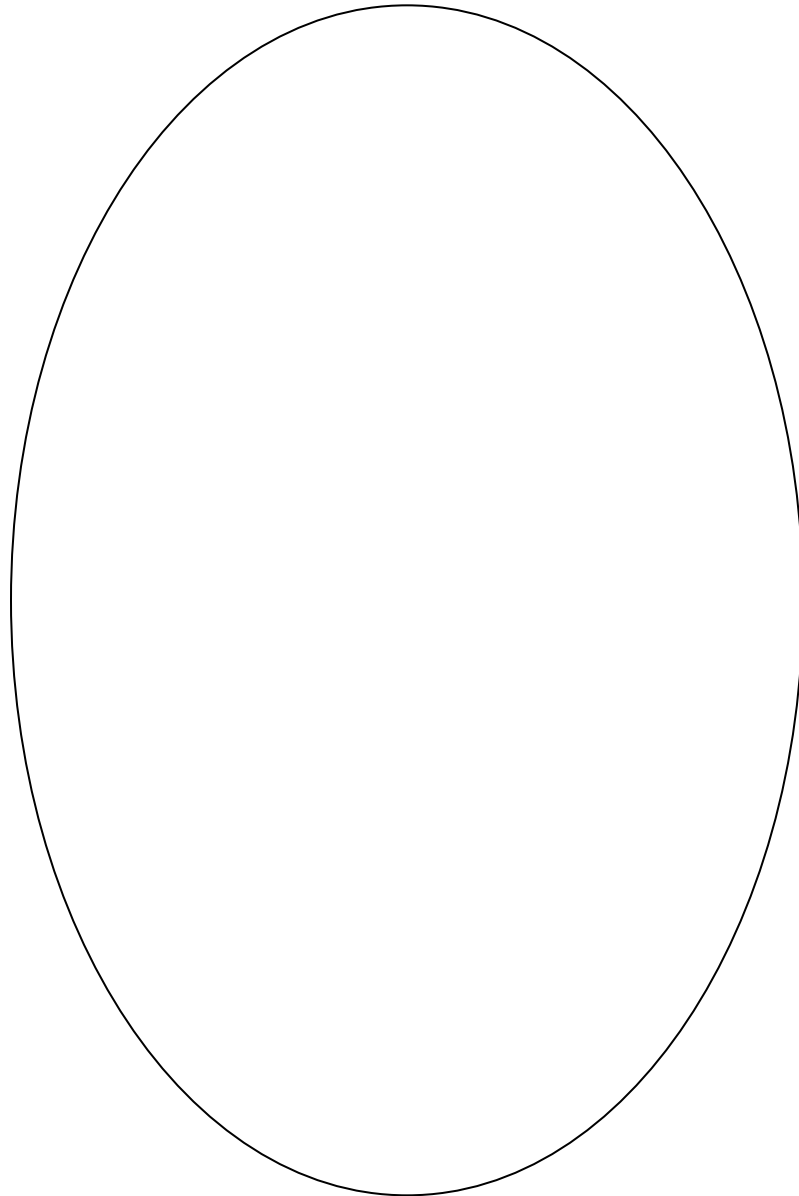
Teacher Instructions

1. Using Student Worksheet # 1, have students cut out the frame of the egg. Cut along the inside edge, but not through the paper. This will serve as your frame. You should have a piece of paper with a hole in the center.
2. Using Student Worksheet # 2, have students cut out the shell of the egg on white paper.
3. Using Student Worksheet # 3, have students cut out the shell membrane and color brown.
4. Using Student Worksheet # 4, have students cut out the air cell and color brown. Cut out the Germ spot on white paper. Cut out the yolk and color yellow. Cut out the Chalaza and color yellow.
5. Cut a piece of saran wrap large enough to cover the hole in Student Worksheet #1.
6. Tape the saran wrap to the back side of Student Worksheet # 1.
7. Tape or glue student worksheet # 2 around the egg cutout on worksheet #1.
8. Tape or glue the shell membrane from Student Worksheet #3 on the inside of the shell on Student Worksheet # 1.
9. Place the air cell, chalaza, yolk, and germ spot in their appropriate locations as shown in the example.
10. Place the definitions on the outer space of worksheet #1. Have student draw a line that connect the definition to the correct part of the egg.

Anatomy of an Egg

Student Worksheet # 1

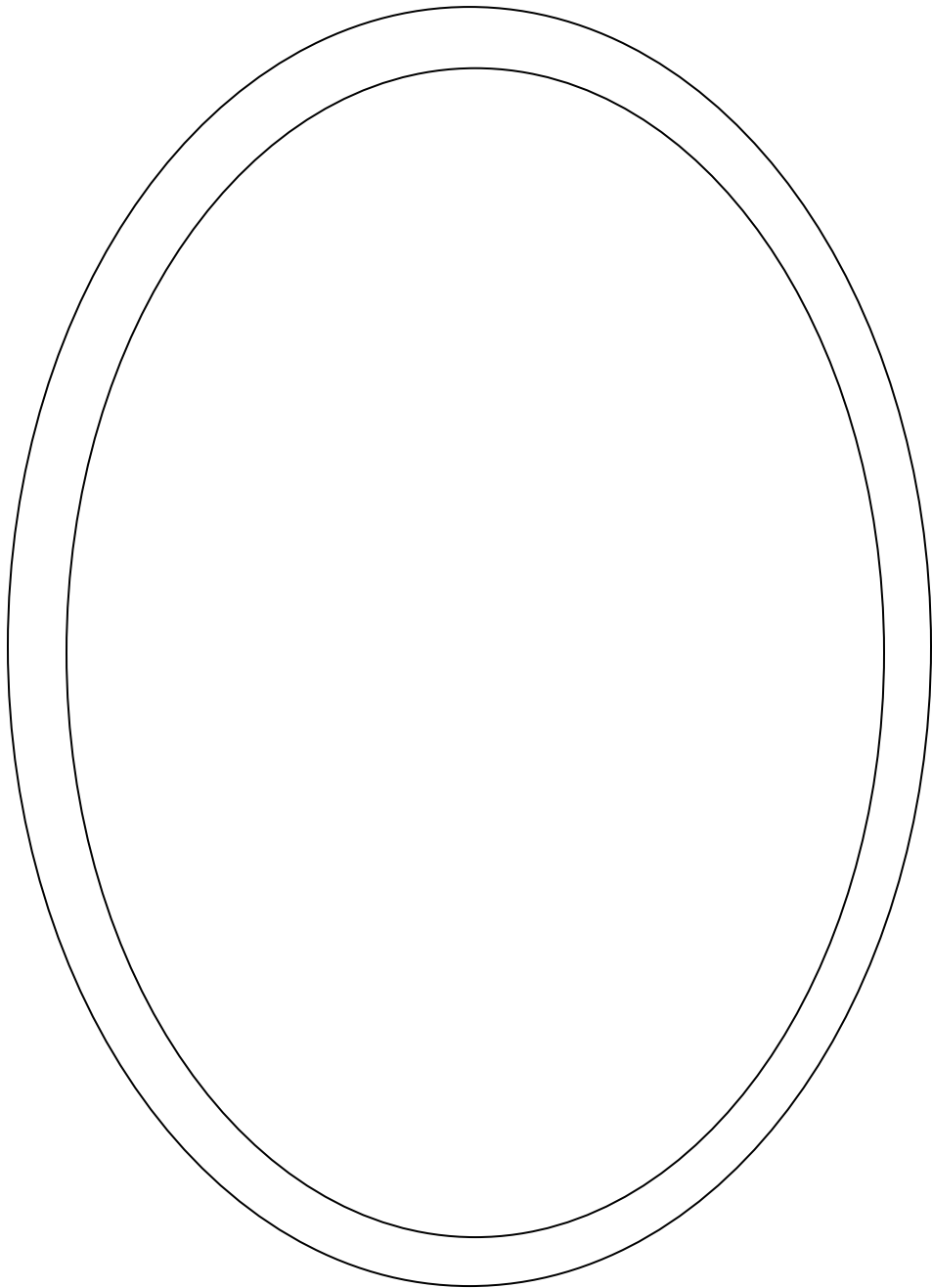
Directions: Cut around the line. Do not cut through the paper, this will serve as your border. Once cut, the paper should be complete with a hole in the middle. Your saran wrap square will be taped on the back side of this paper.



Anatomy of an Egg

Student Worksheet # 2

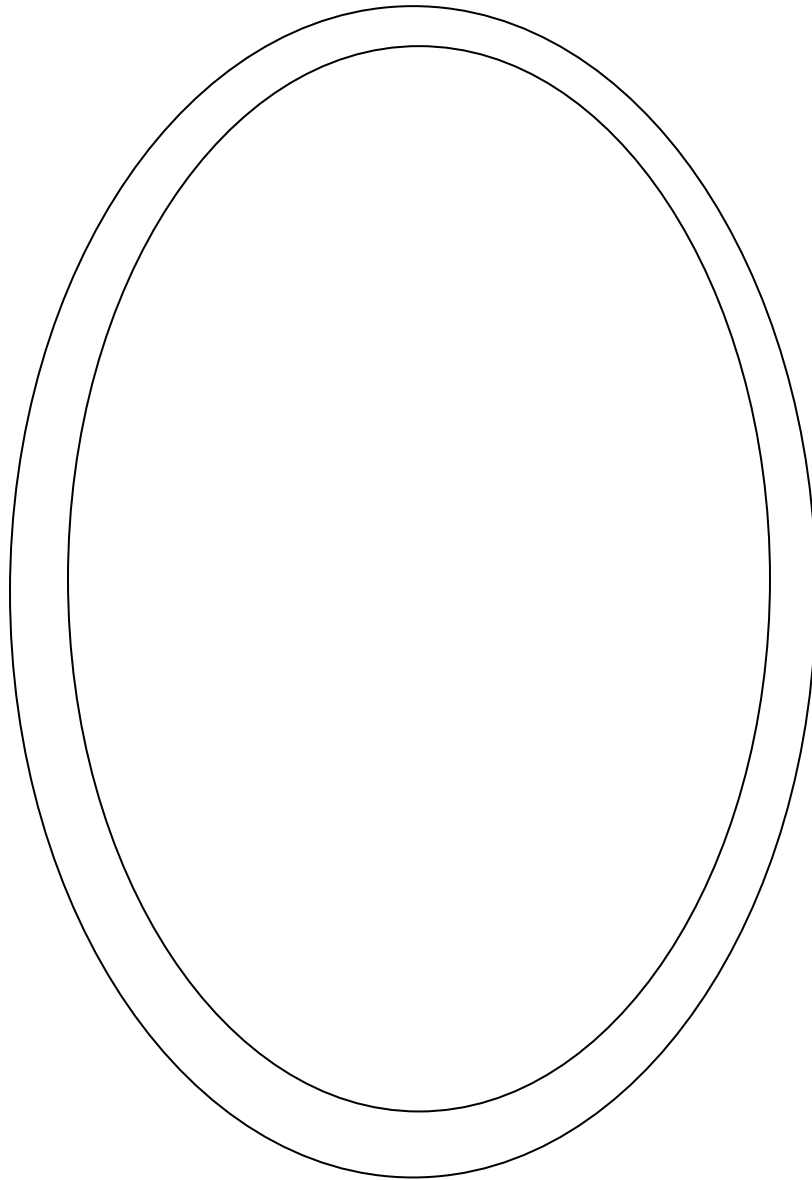
Directions: Cut on all lines. Do not cut through the line. Leave white. This will serve as your egg shell.



Anatomy of an Egg

Student Worksheet # 3

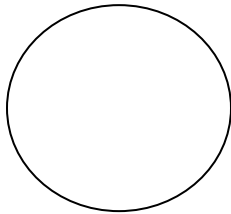
Directions: Cut on all lines. Do not cut through the lines. Color brown. This will serve as your cell membrane.



Anatomy of an Egg

Student Worksheet # 4

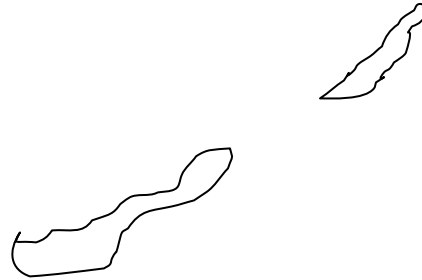
Directions: Cut out designs. Color yellow. These shapes will serve as your yolk, chalaza, and germ spot. These will be taped onto your egg on Student Worksheet # 1. Follow the example.



YOLK



GERM SPOT



CHALAZA

Directions: Cut out the squares below and tape or glue the word and definition to Student Worksheet # 1. Draw a line from the definition to its correct place on the egg.

The Egg

The **Shell Membrane** provides protection from germs and serves as a breathing surface for the embryo.

The **White or Albumen** provides water and protein for the embryo and has germ killing properties.

The **Air Cell** is located at the large end of the egg where there are more pores. It allows for easy air exchange. Chicks will pop the air cell before hatching to fill their lungs with fresh air.

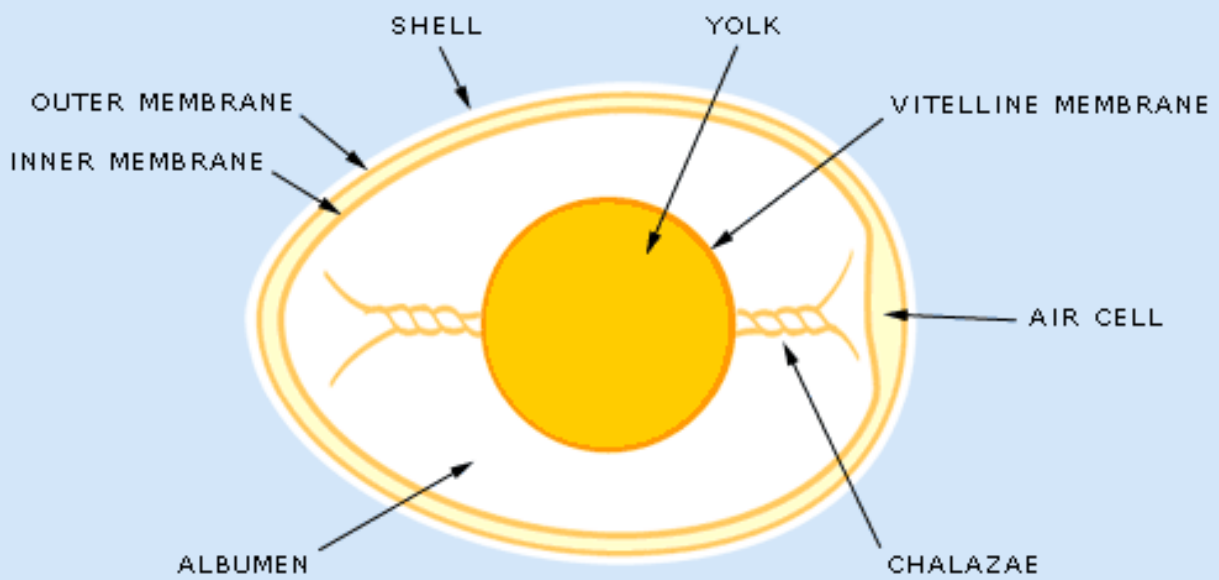
The **Yolk** provides a rich source of food for the developing embryo.

All eggs have a **Germ Spot**. In a fertilized egg, the spot contains a tiny microscopic embryo. When the egg is incubated the embryo starts to grow rapidly.

The **Chalaza** holds the yolk in the center of the albumen. It acts like a shock absorber to protect the embryo.

The **Shell** provides protection and has pores for air exchange.

Anatomy of an Egg



Life Cycle of a Chicken



Arizona State Learning Standards: This lesson is correlated to the following State Learning Standard.

- 1. Life Science:** expands students' biological understanding of life by focusing on the characteristics of living things, the diversity of life, and how organisms in populations change over time in terms of biological adaptation and genetics.

Arizona State Objectives: This lesson addresses the following objectives: (Strand, Concept, Performance objective)

Kindergarten:	4.2.1
First Grade:	4.1.1, 4.1.3, 4.2.2
Second Grade:	4.2

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. Identify the life stages of a chicken.
2. Describe that most animals will grow to physically resemble their parents.

Materials needed:

- ✓ Student Worksheet – Life Cycle of a Chicken
- ✓ 2 paper plates per student
- ✓ 1 brad per student
- ✓ Scissors
- ✓ crayons

Terms:

Chick- a newly hatched chicken, can be either male or female

Egg- hard-shelled reproductive body produced by a bird and especially domestic poultry

Pipping- the process the chick goes through to peck a hole and eventually break out of the egg

Teaching Strategies: Read to students the life cycle of a chicken and Chicks and Chickens by Gail Gibbons. Talk with the students about where chickens come from and the stages of development they go through. Have students complete the Life Cycle of a Chicken Spinner.

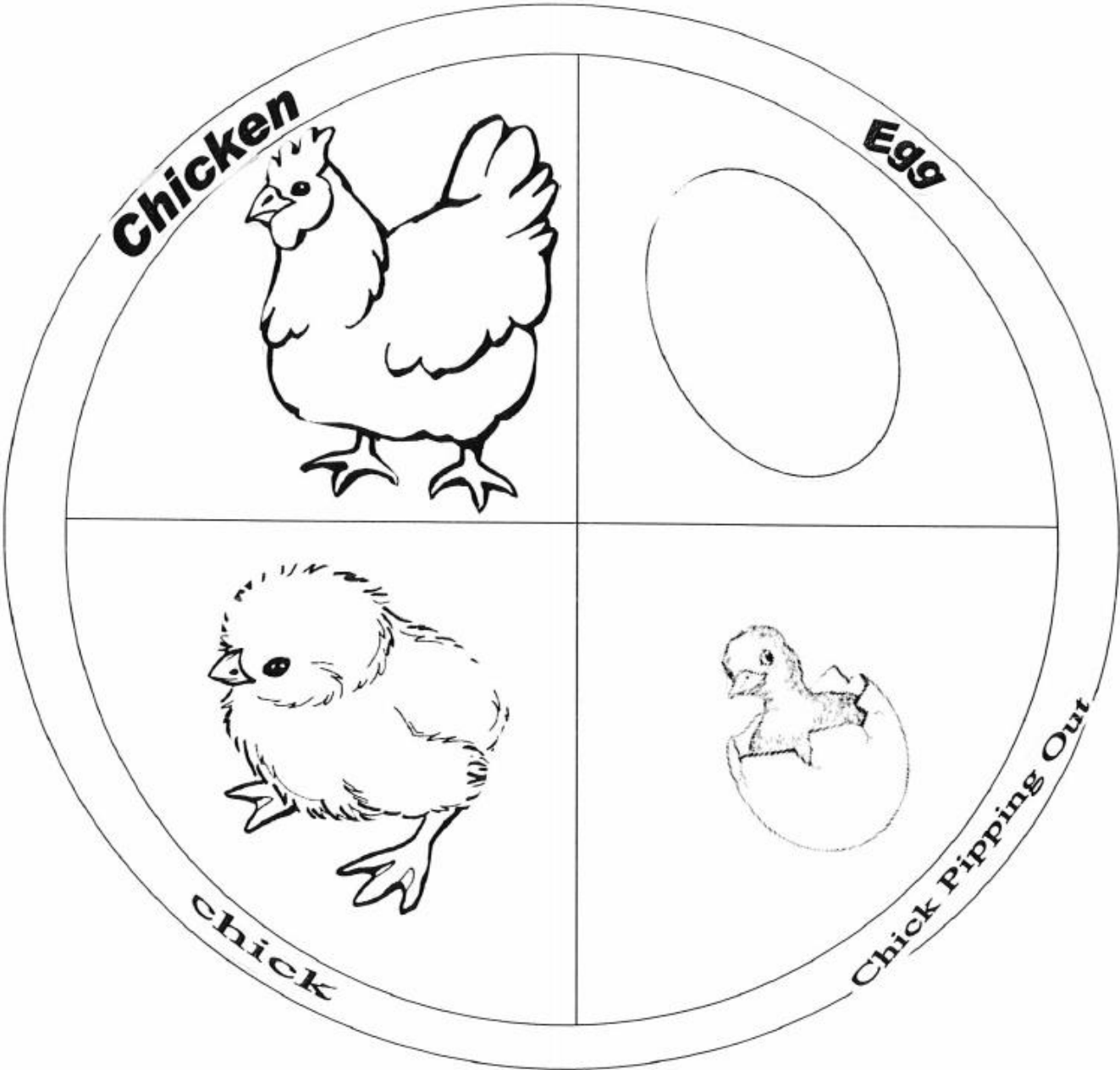
Evaluation: Focus the evaluation of student achievement on mastery of the objectives as stated in the lesson. A written test can also be used to assess student achievement of the objectives.

Life Cycle of a Chicken

Teacher Instructions

1. Pass out the Life Cycle of a Chicken Student Spinner, 2 paper plates, and a brad to each student.
2. Have students color the Life Cycle of a Chicken Student Spinner.
3. Have students cut out the Life Cycle of a Chicken Student Spinner (only outside edge).
4. Have students glue the Life Cycle of a Chicken Student Spinner to the inside of one of the paper plates.
5. Cut the opening in the second paper plate.
6. Have students attach the first and second plate by placing the brad in the center of the plate.
7. Students will then spin the plate and identify which stage has landed in the opening.

Life Cycle of a Chicken Student Spinner



Embryo Tracking



Arizona State Learning Standards: This lesson is correlated to the following State Learning Standard.

- 1. Life Science:** expands students' biological understanding of life by focusing on the characteristics of living things, the diversity of life, and how organisms in populations change over time in terms of biological adaptation and genetics.

Arizona State Objectives: This lesson addresses the following objectives: (Strand, Concept, Performance objective)

Kindergarten:	4.2.1
First Grade:	4.1.1, 4.1.3, 4.2.2
Second Grade:	4.2

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. Identify the life stages of a chicken.
2. Describe that most animals will grow to physically resemble their parents.

Materials needed:

- ✓ Student Worksheet- Tracking Embryology
- ✓ Crayons
- ✓ Incubator and fertilized eggs
- ✓ Egg candling light

Terms:

Embryo- an animal in the early stages of development prior to hatching

Candling- is a term used to describe a method by which bird breeders check to see if eggs are fertile or not

Fertilized Eggs- an egg that has been made fertile by a rooster (male); these eggs are not eaten or used in food products; produces chicks

Teaching Strategies: Pass out Student Worksheet- Embryo Tracking to each student to keep for the time that the eggs are in the incubator. Have students color or mark off each day as they pass. If you candle the eggs have students compare what they see to their embryo sheet.

Evaluation: Focus the evaluation of student achievement on mastery of the objectives as stated in the lesson. A written test can also be used to assess student achievement of the objectives.

Embryo Tracking

Teacher Information Sheet

Day One

The egg formation starts in a chicken's ovary; the yolk of an egg is actually a single cell called an ovum. The ovum is released from the chicken's ovary and passes through her oviduct. It is fertilized along the way by sperm that can be held in special compartments of the oviduct for up to three weeks (if no mating has taken place, no sperm will be present and the egg will not be fertilized). As the ovum passes down the oviduct, it is surrounded by layers of egg white and supporting structures. It then passes into a gland that adds the protective shell to the egg before laying. An air cell is left at the blunt end of the egg, and the embryo develops with its head toward that end. Within 24 hours of fertilization, the digestive tract appears and the eyes, brain and nervous system begin to form.

Days Two Through Five

About 25 hours after fertilization, the embryo's heart begins to form. At 33 hours, the ears begin to form, and at 42 hours, the heart starts beating. On day three the tongue develops, the tail appears and buds begin to appear where the wings and legs will develop. The toes begin to form on day four, and the upper portion of the embryo and the tail begin to curve to fit the shape of the egg. On day five, the embryo starts forming reproductive organs, leg bones and the crop (part of the digestive tract that acts as food storage and passes a little food at a time to the chicken's stomach).

Days Six Through Nine

The embryo begins forming a gizzard on day six. The beak also becomes visible, the wings bend at the elbows and ribs begin to appear. On day seven, feather papillae form on the thighs, and the legs bend at the knees. By day eight, three rows of feather germs (which will later develop into feathers) are visible on the tail. The inner eyelids, egg tooth and bone marrow cavity of the femur start forming. On day nine, the upper eyelids start covering the eyes, and kneecaps have begun forming.

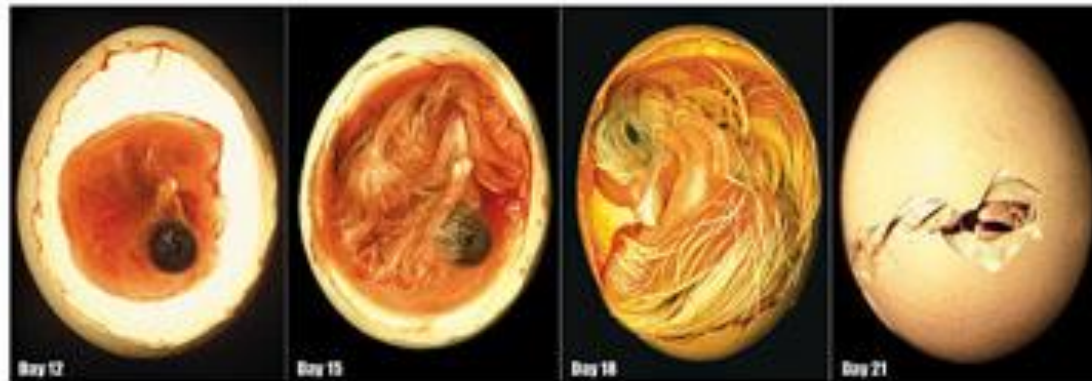
Days 10 Through 13

The claws begin to form on day 10. The comb and flight feathers appear, and the lower eyelids begin forming. On the 11th day, pads form on the bottoms of the embryo's feet and its beak begins to harden. At this point, the embryo starts drawing calcium from the eggshell in order to grow bones. On days 12 and 13, the embryo continues to grow bigger, the ribs begin to harden and the collarbones fuse to form the wishbone. Feather papillae cover the fingers of the wings by day 13.

Days 14 Through 21

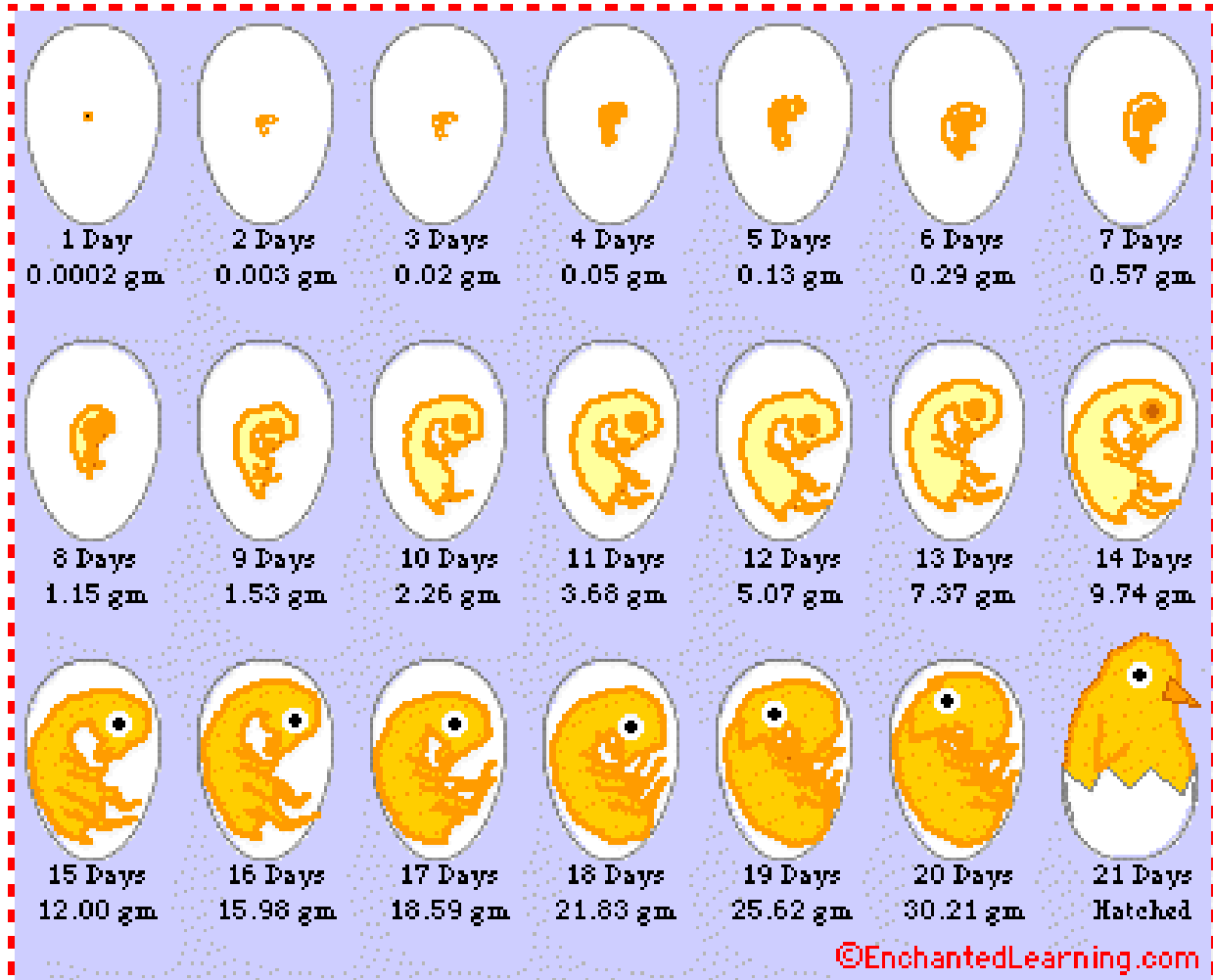
The embryo turns its head to face the blunt end of the egg and its skull starts to harden on the 14th day. Days 15 through 17, the claws and beak become firm and the embryo turns its beak toward the air cell at the blunt end of the egg. On day 18 or 19, the beak breaks through the inner shell membrane into the air cell and the lungs function for the first time. By the 20th day, the lungs are completely functional. On day 21, the chick's neck begins to spasm, causing the egg tooth to break through the shell. After a struggle of a few hours to a day, the chick breaks free of its egg.

Embryo Tracking Teacher Information Sheet



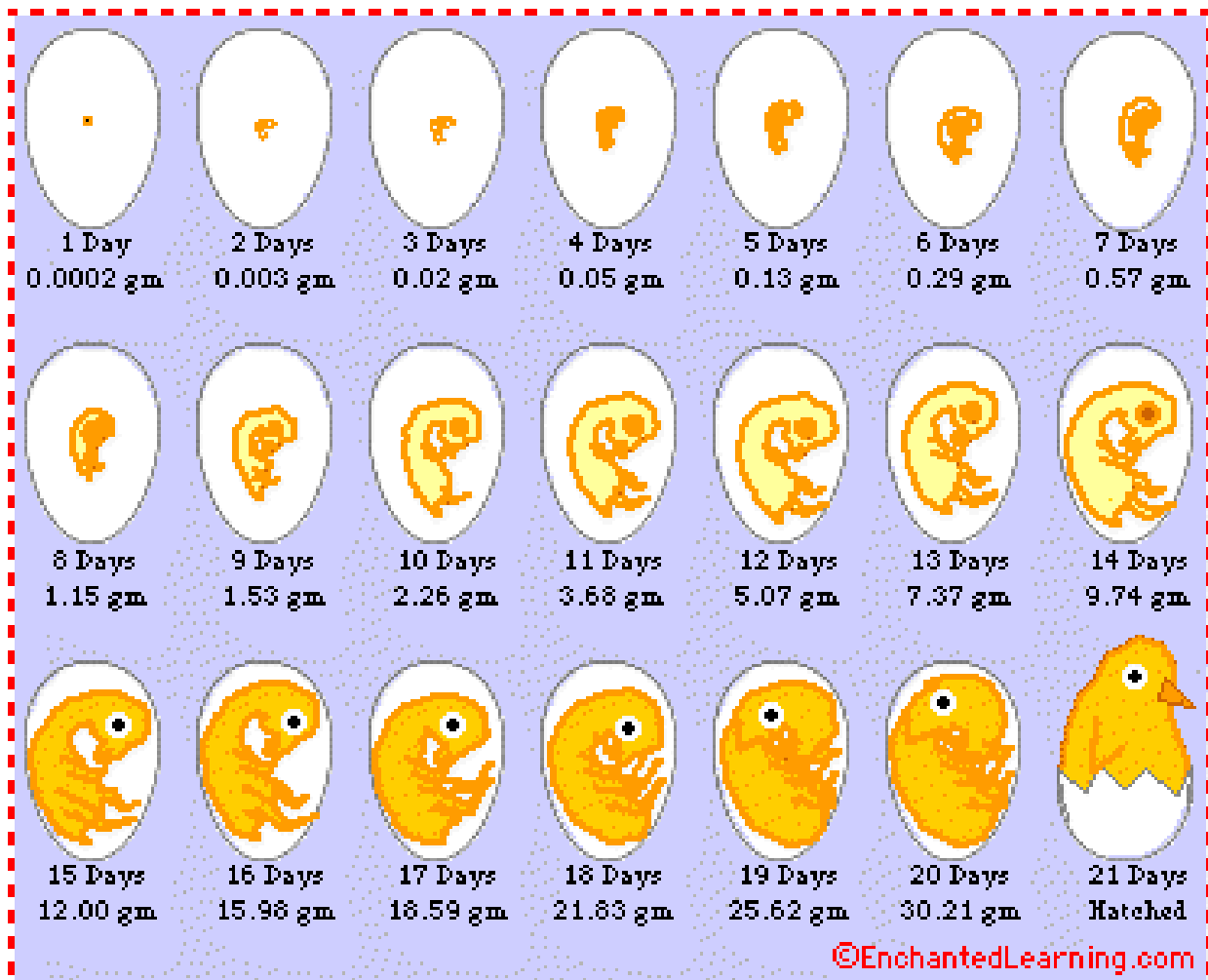
Name: _____

Embryo Tracking Student Worksheet



1. What day does the chick weigh 5.07 grams?
2. How many days does it take for a chick to hatch?
3. What day does the chick weigh 15.98 grams?
4. How much does the chick weigh at 15 days?
5. What happens on day 21?

Embryo Tracking ANSWERS



1. What day does the chick weigh 5.07 grams?

Day 12

2. How many days does it take for a chick to hatch?

21 days

3. What day does the chick weigh 15.98 grams?

Day 16

4. How much does the chick weigh at 15 days?

12.00 grams

5. What happens on day 21?

The chick hatches

Breaking Eggs: The Shell

(Adapted from Oklahoma and Michigan Ag in the Classroom)



Arizona State Learning Standards: This lesson is correlated to the following State Learning Standard.

- 1. Inquiry Process:** Students understand the processes of scientific inquiry and technological design to investigate questions, conduct experiments, and solve problems.

Arizona State Objectives: This lesson addresses the following objectives: (Strand, Concept, Performance objective)

First Grade:	1.1.2, 1.2.1, 1.2.4, 1.3.1, 1.4.1
Second Grade:	1.1.1, 1.1.2, 1.2.1, 1.2.4, 1.3.1, 1.3.3, 1.4.1
Third Grade:	1.1.1, 1.1.2, 1.2.1, 1.2.5, 1.3.1, 1.4.3
Fourth Grade:	1.1.1, 1.1.2, 1.2.1, 1.2.5, 1.3.3, 1.4.1, 1.4.2
Fifth Grade:	1.1.1, 1.1.2, 1.2.1, 1.2.5, 1.3.3, 1.4.1, 1.4.2
Sixth Grade:	1.1.1, 1.1.2, 1.2.1, 1.2.5, 1.3.1, 1.4.1

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. Observe the movement of liquid through pores of an eggshell.
2. Understand and describe that pores on an egg allow for the movement of air and water to the embryo.
3. Students will test the strength of the dome shaped egg.

Materials needed:

- ✓ Student Worksheet
- ✓ 3-4 fresh unfertilized eggs
- ✓ Bathroom scale
- ✓ Paper towels
- ✓ Books or blocks
- ✓ Food coloring

Terms:

Albumen- the clear liquid part of the egg also called the white. It provides water and protein to the growing embryo (chick), as well as provides it cushioning

Calcium Carbonate- a compound which gives strength and shape commonly found in eggshells and chalk

Dome Construction- construction built with a hemispherical roof or vault

Embryo- an animal in the early stages of development prior to hatching

Incubation- the time it takes for a fertilized egg to hatch

Protein- One of three major classes of food or source of food energy

Pullet- an immature female chicken

Yolk- yellow portion of the egg; provides a major sources of vitamins, minerals and fats; the food source for the developing chick

Teaching Strategies: Go over the background information with your students. Talk about something in your area that is dome construction (NAU Football Dome, etc). Talk about how the dome shape provides added strength.

Shell Strength- Follow the steps on Teacher Instruction #1 to have students experiment with how strong an eggshell is. Repeat the experiment several times and have students graph the results.

Shell Porosity- Follow the steps on Teacher Instruction #2 to help students discover that eggs have pores that allow for the movement of water and air.

Evaluation: Focus the evaluation of student achievement on mastery of the objectives as stated in the lesson. A written test can also be used to assess student achievement of the objectives.

Breaking Eggs: The Shell

Background Information

An eggshell is a hard, three layered structure composed of calcium carbonate. Its sole purpose is to protect the enclosed embryo from the weight of the hen's body during the 21 days of incubation. Though most eggs today are not incubated by the hen, the strength of the shell protects the embryo during the incubation process. The hard shell also prevents unfertilized eggs from breaking as they make their way from the hen house to the grocery store shelves.

All living things must have three basic things to survive: food, water, and air. The developing chick is no exception. So then how does the developing chick get food, water and air while it is in the tiny little egg? The food is provided by the yolk, which is mostly protein. Protein helps to build strong bones and muscles. Water is supplied to the chick from both the yolk, which is 50 percent water and the albumen, which is 85 percent water. The albumen is the clear portion of the egg. In an unfertilized, cooked egg the albumen is referred to as the egg white. The air that is need by the chick passes through the shell and the shell membrane through the thousands of pores on the shell. The chick uses the oxygen and passes carbon dioxide back through the shell.

All egg shells contain a coating or covering, called a bloom. The bloom seals the pores and prevents bacteria from getting inside the egg and reduces moisture loss. Unfertilized eggs are cleaned before they are sent to the retailer. Washing the egg is necessary for cleanliness but removes the natural bloom. To restore the protection of the egg, packers spray a light coating of edible mineral oil to each egg.

Although the exact shape of an egg varies with each egg, most eggs are roughly egg-shaped. Some abnormalities that can be found in the shells of fresh eggs are ridges, bulges and rough texture. Unfertilized eggs that have the abnormalities are given poor ratings from the US Department of Agriculture. Some extreme oddities in eggshell shapes include shells that are long, appear bent, or look as though they have been smashed on one side. All low rated eggs are then broken and the contents are used as liquid eggs for making other foods. It would be very rare to see any of the shell abnormalities on grocery store shelves.

The size of an egg is an inherited characteristic, and poultry breeders spend large amounts of time, effort and money selecting and breeding chickens for egg size. When a pullet, a hen less than one year of age, first begins laying eggs they are small. After 15-20 days of laying, the size of her eggs will reach the size of a standards grocery store egg.

The extraordinary strength of the eggshell inspired one of the most beautiful architectural forms in the world: the dome construction. With dome construction, weight is distributed evenly around a central point, like the large end, or air cell end of an egg. St. Peters Basilica in Rome is one of the oldest and most famous examples of dome construction. Domes today are constructed in a variety of materials: steel, aluminum, reinforced concrete, or glued laminated wood or plastic. Some other famous domes are the Astrodome in Houston, the US Capitol in DC, and the Palazzo Dello Sports Dome in Rome.

Breaking Eggs: The Shell

Teacher Instructions #1

1. Share background material with your students.
2. Crack an egg, trying to leave more of the shell intact at the larger air cell end. Discard the contents of the egg and the small end. Carefully chip the large end of the shell until its edge is relatively even.
3. Place the eggshell chipped edge (broken edge) down on a towel. Measure the height of the egg as it sits on the towel. Stack books on the towel across from the egg until they reach the same height as the top of the egg.
4. Stack books, one at a time, so their weight is evenly distributed between the stack of books and the egg. Do not press down on the books. Simply stack them one at a time.
5. Have students watch to see how many books you can stack on the eggshell before it begins to crack. Explain that the spiral pattern of the crack indicates the weight was distributed evenly over the dome shape.
6. Use the scale to weigh the books that you stacked on the eggshell. Have students record the weight before repeating the experiment. Have students record the weight after each trial and then graph the numbers.



Name: _____

Breaking Eggs: The Shell

Student Worksheet #1

TRIAL NUMBER	WEIGHT	Drawing of egg
#1		
#2		
#3		
#4		
#5		
#6		

1. Did all of the eggs break when the same weight of books were stacked on top of it?
2. What trial held the most amount of weight? Why do you think this held the most?
3. What trial held the least amount of weight? Why do you think this held the least?



Breaking Eggs: The Shell

Teacher Instructions #2

1. Have students examine an egg with a microscope or magnifying glass and describe what they see.
2. Immerse the unbroken egg at room temperature in a container of ice water, to which you have added food coloring.
3. Leave the egg in the solution for approximately 3 minutes.
4. Remove the egg and dry it gently with a paper towel.
5. Carefully crack the egg and let students observe the small dots of color on the inside of the shell.
6. Pour out the egg contents and have students examine the remaining eggshell.
 - a) Larger and more frequent dots of color will appear at the larger end know as the air cell end.
 - b) Dots of color will also appear randomly throughout the other parts of the eggshell.



Making the Grade



Arizona State Learning Standards: This lesson is correlated to the following State Learning Standard.

- 1. Inquiry Process:** Students understand the processes of scientific inquiry and technological design to investigate questions, conduct experiments, and solve problems.

Arizona State Objectives: This lesson addresses the following objectives: (Strand, Concept, Performance objective)

First Grade:	1.1.2, 1.2.1, 1.2.4, 1.3.1, 1.4.1
Second Grade:	1.1.1, 1.1.2, 1.2.1, 1.2.4, 1.3.1, 1.3.3, 1.4.1
Third Grade:	1.1.1, 1.1.2, 1.2.1, 1.2.5, 1.3.1, 1.4.3
Fourth Grade:	1.1.1, 1.1.2, 1.2.1, 1.2.5, 1.3.3, 1.4.1, 1.4.2
Fifth Grade:	1.1.1, 1.1.2, 1.2.1, 1.2.5, 1.3.3, 1.4.1, 1.4.2
Sixth Grade:	1.1.1, 1.1.2, 1.2.1, 1.2.5, 1.3.1, 1.4.1

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. Identify the different grades of eggs.

Materials needed:

- ✓ Student Worksheet
- ✓ Different Grade Eggs

Terms:

Grade AA: will stand up tall, yolk is firm and area covered by white is small, more thick white than thin white

Grade A: egg covers a relatively small area. Yolk is round. Thick and thin white are even in size

Grade B: egg spreads out more. Yolk is flattened. More thin white than thick white

Teaching Strategies: Go over the background information on egg grading with your students. Have students grade the eggs on the Student Worksheet- Making the Grade by using the egg grading key. You may also use real eggs of different grades to have your students practice what they have learned.

Evaluation: Focus the evaluation of student achievement on mastery of the objectives as stated in the lesson. A written test can also be used to assess student achievement of the objectives.

Making the Grade

Background Information

Eggs are graded based on interior and exterior quality and then assigned a letter- AA, A or B based on the qualities of the egg. In many packing plants, the USDA provides a grading service for shell eggs. Its official grade logo certifies that the egg has been graded under federal supervision according to USDA standards and regulations. This grading service is not mandatory. Eggs that are not graded by the USDA service are packed under state regulations which must meet or exceed federal standards.

In the process of grading, eggs are examined for both interior and exterior quality and are sorted according to weight. Grade quality and egg size are not related to one another. In descending order of quality eggs are graded AA, A and B.

There is no difference in nutritional value between the different grades.

Because production and marketing methods have become very efficient, eggs move so rapidly from laying house to market that you will find very little difference in quality between Grades AA and A. Although Grade B eggs are just as wholesome to eat, they rate lower in appearance when broken out. Almost no Grade B eggs find their way to the retail supermarket. Some go to institutional egg users such as bakeries or foodservice operations, but most go to egg breakers for use in egg products.

Below you will find the definition of each of the egg Grades:

Grade AA

The shell must be clean, unbroken, and normal. The air cell must not exceed 1/8 inch in depth and be regular. The white must be clear and firm so that the yolk outline is only slightly defined when the egg is twirled before the candling light. The yolk must be free from apparent defects.

Grade A

The shell must be clean, unbroken, and practically normal. The air cell must not exceed 3/16 inch in depth and must be practically regular. The white must be clear and at least reasonably firm so that the yolk outline is only fairly well defined when the egg is twirled before the candling light. The yolk must be practically free from apparent defects.

Grade B

The shell must be unbroken but may be slightly abnormal and may show slight stains but no adhering dirt; provided that the stains do not appreciably detract from the appearance of the egg. When the stain is localized, approximately 1/32 of the shell surface may be slightly stained, and when the slightly stained areas are scattered approximately 1/16 of the shell surface may be slightly stained. The air cell must not exceed 3/8 inch in depth, may show unlimited movement, and may be free or bubbly. The white must be clear and may be slightly weak so that the yolk outline is well defined when the egg is twirled before the candling light. The yolk may appear slightly enlarged or slightly flattened and may show other definite, but not serious, defects.

Making the Grade

Background Information Continued

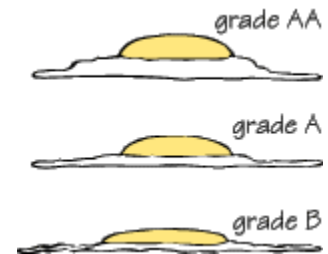
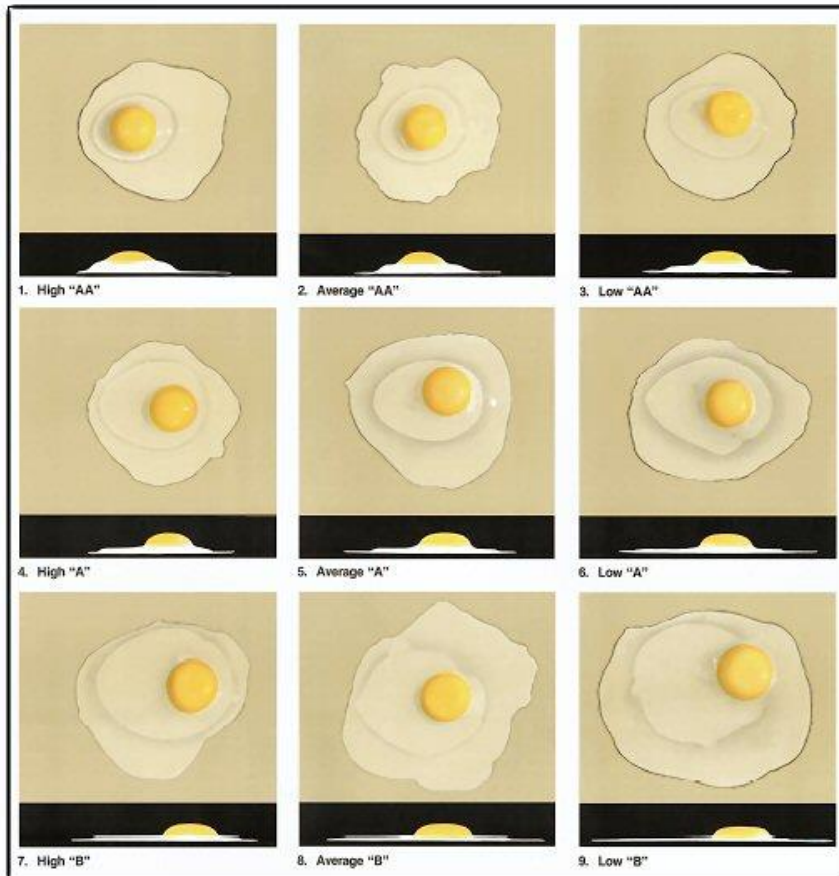
Egg Quality

	Grade AA	Grade A	Grade B
Break Out Appearance	Covers a small area.	Covers a moderate area.	Covers a wide area.
Albumen Appearance	White is thick and stands high; chalaza prominent.	White is reasonably thick, stands fairly high; chalaza prominent.	Small amount of thick white; chalaza small or absent. Appears weak and watery.
Yolk Appearance	Yolk is firm, round and high.	Yolk is firm and stands fairly high.	Yolk is somewhat flattened and enlarged.
Shell Appearance	Approximates usual shape; generally clean,* unbroken; ridges/rough spots that do not affect the shell strength are permitted.		Abnormal shape; some slight stained areas permitted; unbroken; pronounced ridges/thin spots permitted.
Usage	Ideal for any use, but are especially desirable for poaching, frying and cooking in shell.	Ideal for any use, but are especially desirable for poaching, frying and cooking in shell.	Good for scrambling, baking, and as an ingredient in other foods.

*An egg may be considered clean if it has only very small specks, stains or cage marks. Source: USDA

- **Grade AA:** A 'Grade AA' egg will stand up tall. The yolk is firm and the area covered by the white is small. There is a large proportion of thick white to thin white.
- **Grade A:** A 'Grade A' egg covers a relatively small area. The yolk is round and upstanding. The thick white is large in proportion to the thin white and stands fairly well around the yolk.
- **Grade B:** A 'Grade B' egg spreads out more. The yolk is flattened and there is about as much (or more) thin white as thick white.

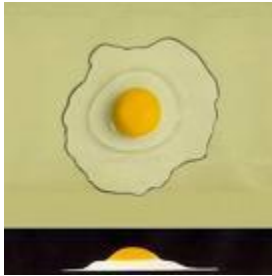
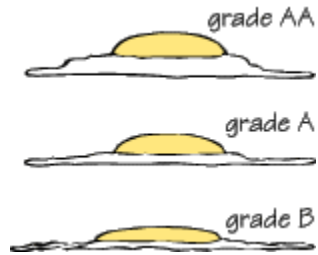
Taken from the American Egg Board Website www.aeb.org

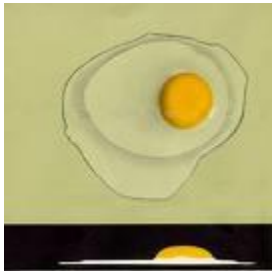


Name: _____

Making the Grade Student Worksheet

Directions: Using the key below, identify what grade the egg would get.



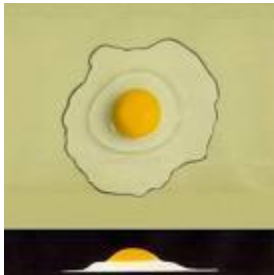
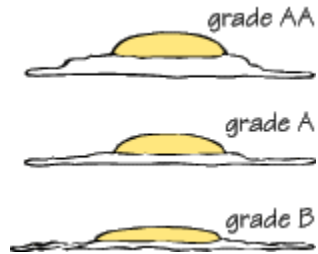




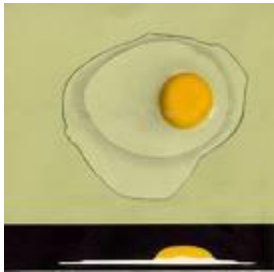
Making the Grade

ANSWERS

Directions: Using the key below, identify what grade the egg would get.



Grade A



Grade B



Grade AA

Egg in a Bottle



Arizona State Learning Standards: This lesson is correlated to the following State Learning Standard.

- 1. Inquiry Process:** Students understand the processes of scientific inquiry and technological design to investigate questions, conduct experiments, and solve problems.

Arizona State Objectives: This lesson addresses the following objectives: (Strand, Concept, Performance objective)

First Grade:	1.1.2, 1.2.1, 1.2.4, 1.3.1, 1.4.1
Second Grade:	1.1.1, 1.1.2, 1.2.1, 1.2.4, 1.3.1, 1.3.3, 1.4.1
Third Grade:	1.1.1, 1.1.2, 1.2.1, 1.2.5, 1.3.1, 1.4.3
Fourth Grade:	1.1.1, 1.1.2, 1.2.1, 1.2.5, 1.3.3, 1.4.1, 1.4.2
Fifth Grade:	1.1.1, 1.1.2, 1.2.1, 1.2.5, 1.3.3, 1.4.1, 1.4.2
Sixth Grade:	1.1.1, 1.1.2, 1.2.1, 1.2.5, 1.3.1, 1.4.1

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. Students learn how molecules move in different temperatures.
2. Students will understand the concept of pressure.

Materials needed:

- ✓ Student Worksheet
- ✓ Glass bottle
- ✓ Peeled, hard-boiled egg (medium egg)
- ✓ Matches and paper

Terms:

Expansion: the act of increasing (something) in size or volume or quantity or scope

Pressure: the force applied to a unit area of surface

Teaching Strategies: Discuss the background information with your students. Have your students hypothesis what will happen to the egg. Complete the experiment. Have students complete the Student Worksheet- Egg in a Bottle.

Evaluation: Focus the evaluation of student achievement on mastery of the objectives as stated in the lesson. A written test can also be used to assess student achievement of the objectives.

Egg in a Bottle

Background Information

Expansion is the increase in the size of a body without the addition of materials to the body. Heat is one cause of expansion. It increases the speed at which the atoms/molecules move about. Increased movement forces the atoms or molecules farther apart and the space needed become greater.

For this experiment, lit matches will heat the air in the bottle. When the air is heated it expands and takes up more room. As the air expands, some of it escapes out of the bottle. The matches in the container go out and the air inside the bottle cools and contracts, thus decreasing the air pressure in the bottle. The air pressure outside the bottle is now greater than the pressure inside the bottle pushing the egg to the lower pressure inside the bottle.

How do we get the egg out of the bottle? We need to reverse the experiment and make the pressure inside the bottle greater than the pressure outside of the bottle. How might we do this? Tip the bottle so the egg rolls to the opening. Blow into the bottle. The increased pressure in the bottle will cause the egg to pop back out.



Egg in a Bottle

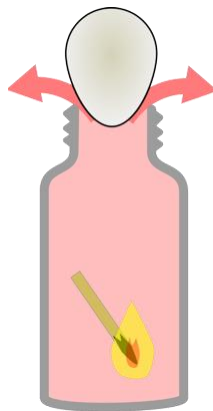
Teacher Instructions

Egg In

1. Hard boil several medium eggs.
2. Peel the hardboiled eggs
3. Introduce heat to the glass bottle
 - a. Light 2-3 matches and drop into the bottle
 - b. Light a 6 inch piece of rolled paper on fire and drop into the bottle
 - c. Place the glass bottle under hot running water
4. Immediately place the egg small end down onto the top of the bottle.
5. Wait and watch (should not take more than 5 minutes) If it does, try again. If it is still not working you egg may be too large for the bottle.

Egg Out

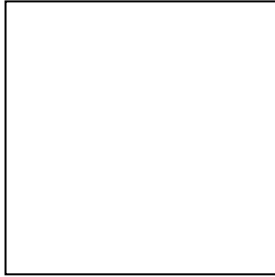
1. Turn bottle upside down so the egg is at the mouth of the bottle.
2. Roll the egg slightly to the side of the bottle so there is a little space at the opening.
3. Blow into the bottle.
4. Immediately roll the egg over the opening (small end down)
5. Wait and watch!



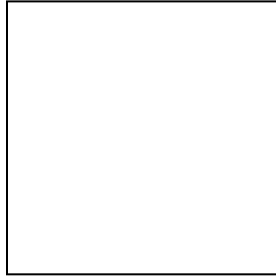
Name: _____

Egg in a Bottle Student Worksheet

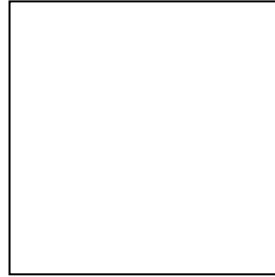
1. Draw what molecules look like at the different temperatures



Room Temperature



Heated



Cooled

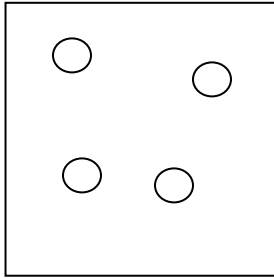
2. What do you think will happen to the egg once the flame goes out?
3. Was the air pressure greater inside or outside the bottle? How do you know?
4. How might we get the egg out of the bottle?
5. Was the air pressure greater inside our outside of the bottle? How do you know?



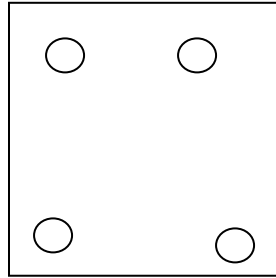
Egg in a Bottle

ANSWERS

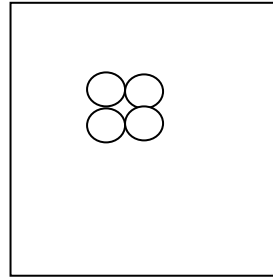
1. Draw what molecules look like at the different temperatures



Room Temperature



Heated



Cooled

2. What do you think will happen to the egg once the flame goes out?

The egg will get pulled into the bottle....accept any reasonable answer from the student.

3. Was the air pressure greater inside or outside the bottle? How do you know?

**The air pressure was greater outside the bottle because the egg was pushed into the bottle.
The egg will go to where there is less pressure..**

4. How might we get the egg out of the bottle?

**Increase the pressure inside the bottle so that it exceeds the pressure outside the bottle.
Blow into the bottle**

5. Was the air pressure greater inside or outside of the bottle? How do you know?

**The air pressure was greater inside the bottle because the egg was pushed out of the bottle.
The egg will go to where there is less pressure.**



Biosecurity: Protecting the Hens

(Derived from Oklahoma Ag in the Classroom...How Germs Spread)



Arizona State Learning Standards: This lesson is correlated to the following State Learning Standard.

1. **Inquiry Process:** establishes the basis for students' learning in science. Students use scientific processes; questioning, planning and conducting investigations, using appropriate tools and techniques to gather data, thinking critically and logically about relationships between evidence and explanations, and communicating results.
2. **History and Nature of Science:** emphasizes the importance of the inclusion of historical perspectives and the advances that each new development brings to technology and human knowledge. This strand focuses on the human aspects of science and the role that scientists play in the development of various cultures.

Arizona State Objectives: This lesson addresses the following objectives: (Strand, Concept, Performance objective)

Kindergarten:	1.1.1, 1.1.2, 1.2.2, 1.2.1, 1.4.2
First Grade:	1.1.1, 1.1.2, 1.3.2, 1.3.4, 2.1.1,
Second Grade:	1.1.1, 1.1.2, 1.2.4, 1.3.1, 1.3.2, 1.3.3,
Third Grade:	1.1.1, 1.1.2, 1.2.1, 1.2.5, 1.3.1, 1.3.3

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. Identify how germs spread.
2. Identify the biosecurity measures used by poultry farmers
3. Identify the importance of keeping animals safe
4. Understand the reasons for why the public cannot visit most chicken farms

Materials needed:

- ✓ Student Worksheet
- ✓ GloGerm
- ✓ Black Light
- ✓ Bleach
- ✓ Water (supplied by the teacher)
- ✓ Bathroom cups
- ✓ Phenolphthalein
- ✓ beaker

Terms:

Bacteria- a group of single-celled microorganisms that live in soil, water, the bodies of plants and animals, or matter obtained from living things and are important because of their chemical effects and disease –causing abilities

Biosecurity- management practices that reduce the chances infectious diseases will be carried onto a farm by animals or people.

Contagious- capable of being transmitted by bodily contact with an infected person or object.

Fungus- any of a kingdom of living things that lack chlorophyll, are parasitic or live on dead or decaying organic matter, and were formally considered plants.

Germ- a microscopic living thing, especially one that causes disease.

Pathogen- an agent that causes disease, especially a living microorganism such as bacterium or fungus.

Population- a group of organisms of the same species populating a given area.

Quarantine- a strict isolation imposed to prevent the spread of disease.

Virus- any of submicroscopic parasites of plants, animals and bacteria that often cause disease.

Teaching Strategies:

Activity #1 (younger students)

Talk to the students about germs and how germs can spread. Use the Background information to assist in this section. Also discuss with the students the importance of keeping animals healthy and free of germs.

Ask the students if they think they carry germs on their skin. Spray the GloGerm on **your** hands (without knowledge to your students). Go around the room and ask students to give you a high-five or to shake your hand. After you have made your way around the room, turn out the lights or take the students to a darker area. Shine a black light on your hands. Tell them that these are the germs that are naturally on your hands. Ask them to hold out their hands. Do any of their hands glow? This is how easy it is to spread germs! Explain that this is the reason why people cannot visit chicken farms. Farmers want to protect their birds from any disease.

Activity #2 (For older students...teacher provides own phenolphthalein or this can be given by an AITC representative as part of a poultry presentation)

1. Read and discuss the relevant background information. As you read through the background information, have students list the different ways germs can spread.
2. Conduct the following experiment to demonstrate how germs spread.
 - a. Prepare a mixture of 25mL water and 25mL bleach.
 - b. Give each student a clear plastic cup.
 - c. Each student will fill his/her cup ½ way with water. Instruct the students NOT to drink the water.
 - d. Tell students that an infected bird has entered the classroom and one unknown person in the class will represent the infected bird.
 - e. Have the students hypothesize as to whether the infected bird will affect other birds, and if so, to what extent.
 - f. Students will then spend the next 5-10 minutes walking around the class and pouring small amounts of their water into other student's cups. Be sure to caution them about overflowing the cups.
 - g. The teacher should take their cup (1/2 bleach and ½ water) and also participate in the activity.
 - h. After 5minutes stop and ask the following questions
 - i. Did the birds drink after one another?
 - ii. Did you walk in the contaminated poop of another?
 - iii. Were you in the same area as the infected bird?
 - iv. Do you think you shared any germs?

- v. Who thinks they have water that has been infected?
- i. Put 1 drop of phenolphthalein in each students' cup.
- j. Students will observe what happens. If the water turns pink, a germ (represented by the bleach) was shared.
- k. Discuss with the students
 - i. Was your hypothesis correct?
 - ii. Can germs be spread easily without you knowing it?
 - iii. How did the contamination occur?
 - iv. Reveal to the students that the teacher was the host bird and how the "germ" spread
- l. Evaluate the number of infections spread by other boards
 - i. Use tally marks on the board for each cup that has pink water
 - ii. Students can create a data table to compare the number of students who shared the germ with the number of students that were germ free.

Evaluation: Focus the evaluation of student achievement on mastery of the objectives as stated in the lesson. A written test can also be used to assess student achievement of the objectives.

Biosecurity: Protecting the Hens

Background Information

The most common way for infectious disease to spread is through the direct transfer of bacteria, viruses and other germs from one person to another. This can occur when an individual with a bacterium or virus touches, coughs on, or kisses someone who is infected.

Animals carry many germs. Being bitten or scratched by an infected animal can make you sick. You might also become infected by scooping your cat's litter box or by cleaning mouse poop off the garage floor. The best way to prevent this is to wash your hands often.

Disease-causing organisms can also be passed along by indirect contact. Many germs can linger on inanimate objects, such as doorknobs, tabletop, light switches, faucets, keys, etc. When you touch the same item that has been touched by someone ill with the flu or a cold, you can pick up the germs left by that person. If you touch your eyes, mouth or nose before washing your hands, you may become infected.

When you cough or sneeze, you expel droplets into the air around you. When you're sick with a cold or the flu-or any other illness- these droplets contain the germ that caused your illness. Crowded, indoor environments may promote the chances of droplet transmission.

Some germs travel through the air in particles considerably smaller than droplets. These tiny particles remain suspended in the air for extended periods of time and can travel in air currents. If you breathe in the germ, you may become infected and show signs and symptoms of disease.

Some germs rely on insects- such as mosquitoes, fleas, lice or ticks- to move from host to host. These carriers are known as vectors.

Another way disease-causing germs can infect you is through food and water. This is why we have to be sure to wash our produce and cook meats to the appropriate temperature.

Because there are so many different diseases and so many ways that diseases can spread, farmers have taken precautions to help keep their animals disease-free. This is where biosecurity comes into play. Biosecurity refers to management practices that reduce the chances infectious diseases will be carried onto a farm by animals or people.

The US Department of Agriculture (USDA) has safeguards in place to help prevent diseases coming into the country from other countries. Individual poultry producers in the United States also have a variety of biosecurity precautions:

1. Quarantine all new animals
2. Properly vaccinate all animals
3. Wash and sanitize hands before and after handling the animals and sanitize shoes before entering barns
4. Wear protective clothing to prevent any germs on the person's skin or clothing from reaching the animals.
5. Quarantine workers who have visited another farm
 - a. Hickman Family Farms does not allow employees who have come in contact with another farm to gain access back on their farm for 4 days. This length of time increases to 1 week if the individual has left the country. In addition, workers cannot own chickens or any other birds of any kind.
6. Limit contact of animals with other animals (wild and domesticated) from outside their farm
7. Protective clothing should be worn to cover exposed skin and clothing in case the person is carrying harmful germs on their skin or clothes that could potentially harm the bird.
8. Wash and sanitize the wheels of vehicles before they enter the farm – *rubber can transfer disease over long distances over long periods of time. What happens if the truck hits an animal while driving or runs off roadkill? What happens if that animal had a disease? Would it now be on the tires? Sanitization of the tires can eliminate any outside disease that may have been on the tires prior to entering the farm.*

Websites



- **www.aeb.org**
The American Egg Board: The American Egg board provides eggciting information to consumers, health professionals, teachers, food service operators, retail marketers, and food manufacturers. Their site includes nutrition information, recipes, statistics, egg facts, and marketing and promotion ideas.
- **www.incredibleegg.org**
The Incredible Edible Egg is a program of the American Egg Board. The website provides, recipes, egg health and nutrition facts, fun facts about eggs, videos and other educational resources.
- **www.educationstation.discoveryeducation.com**
The Good Egg Project: Education Station allows students and teachers to view online videos of different poultry operations and to meet the farmers. Students will also learn the Journey the egg takes from Farm to Table.
- **www.hickmanseggs.com**
Hickman's Family Farms has been family owned and operated in Arizona since 1944. They are the only egg producer in Arizona and have been since 1993.
- **www.agintheclassroom.org**
Illinois Agriculture in the Classroom provides a plethora of hands-on lessons for teachers and students. The program was developed to help students acquire adequate knowledge to function effectively as agriculturally literate citizens supportive of wise agricultural policies and programs.
- **ag.arizona.edu/extension**
The University of Arizona Cooperative Extension
- **www.urbanext.uiuc.edu/eggs/index.html**
This website is designed to increase knowledge and develop personal confidence and leadership ability through embryology project activities.

Fertilized Chicken Egg Resources

1. www.meyerhatchery.com (1-888-568-9755)
 - 1 dozen hatching eggs \$27.84
 - Egg sales start February 27th
 - Ships out Monday, Tuesdays and Wednesdays...arrives at post office
2. www.mccallumsflock.com (jamielmccallum@mccallumsflock.com)
 - 1/2 dozen mixed hatching eggs \$20.00
 - 2 dozen mixed hatching eggs \$28.00
 - *called *Grab Bag Eggs* on website
3. www.ideal-poultry.com (1-254-697-6677)
 - 1 dozen hatching eggs \$29.00
 - Egg sales start January 20th
 - Orders ship on Friday, eggs arrive on Tuesday

LOCAL – try craigslist or any of the Facebook Chicken pages



Hatching Eggs in the Classroom PDF

Poultry: A Guide to Anatomy PDF

EGG CARTON PDF

Hatching Symptoms, Causes & Corrective Measures

<i>Symptoms</i>	<i>Probable Cause</i>	<i>Corrective Measures</i>
Blood Rings	Improper Storage Improper incubation temperatures	Follow recommended egg storage Check thermometer for accurateness
Dead embryos at early stages	Improper incubation temps (too hot) Improper egg turning Improper ventilation	Follow recommended incubation temps Turn at least 3 times daily Increase ventilation
Chicks fully formed, dead without pipping	Low average humidity Improper incubation temperature Improper incubator ventilation Chilling of eggs	Maintain recommended humidity Check thermometer for accuracy Adjust ventilation Follow recommended storage care
Piped eggs, but died without hatching	Insufficient Moisture Improper ventilation Improper setting of eggs	Increase humidity during hatching Increase ventilation Set eggs with small end down
Early Hatching (may have bloody navels)	High incubation temperatures Improper egg storage	Follow recommended incubation temps Store eggs at 50-60 degrees turn 3 times daily
Late hatching	Low incubation temperatures Old or improperly stored eggs	Follow recommended incubation temps Do not store longer than 7 days
Sticky embryos	High average incubation humidity Low incubation temperature Inadequate ventilation	Follow recommended incubation humidity Follow recommended temperature settings Increase ventilation
Embryos sticking to shell	Low incubation humidity Excessive ventilation rate	Increase incubation humidity Reduce ventilation rate
Crippled and malformed chicks	Incubation temp too high Low incubation humidity Improper egg setting position Slick hatching trays	Follow recommended incubation temps Increase incubation humidity by increasing water evaporation Set eggs with small ends down Use trays with wire floors
Abnormal, weak or small chicks	High incubation or hatching temperatures Small eggs hatch small Insufficient incubation humidity Improper ventilation	Follow recommended incubation temperatures Set only standard or large eggs Maintain recommended humidity Maintain recommended humidity
Large, soft bodied mushy chicks, bad odor	Low average incubation temperature Poor ventilation	Follow recommended incubation temperatures Increase ventilation

Embryology Step by Step

Visit www.azfbaitc.org for video instructions and demos



Fertilized Eggs

1. Eggs ordered are typically shipped on Fridays and arrive on Monday or Tuesday. Plan accordingly. Your eggs will take 21 days to hatch so be sure that you place them with enough time before your kit return date. (Reference the Fertilized Egg Source Worksheet)
2. Do not wash dirty eggs or wipe eggs clean with a damp cloth. This removes the egg's protective coating and exposes it to entry of disease organisms. The washing and rubbing action also serves to force disease organisms through the pores of the shell.
3. Store eggs in a cool-humid storage area. Ideal storage conditions include a 55-degree F. temperature and 75% relative humidity. Store the eggs with the small end pointed downward. Alter egg position periodically if not incubating within 4-6 days. Turn the eggs to a new position once daily until placing in the incubator. Hatchability holds reasonably well up to seven days but declines rapidly afterward. Therefore, do not store eggs more than 7 days before incubating. After 3 weeks of storage, hatchability drops to almost zero. Plan ahead and have a regular hatching schedule to avoid storage problems and reduced hatches.
4. Allow cool eggs to warm slowly to room temperature before placing in the incubator. Abrupt warming from 55 degrees to 100 degrees causes moisture condensation on the eggshell that leads to disease and reduced hatches.

Embryology Step by Step

Visit www.azfbaitc.org for video instructions and demos



Incubator

(allow 1 day to set-up and adjust thermostat to stabilize the temperature)

1. Prep Incubator
 - a. Install the plastic liner and wire floor
 - b. Fill the center trough with warm water (surface area, not depth, effects humidity; refill trough as necessary to prevent it from drying out)
 - c. Thermostat set-up (**desired temp 100 degrees**)
 - i. Adjusting the thermostat
 1. Use the + and – buttons on the thermostat.
 2. Start at the lower numbers
 - d. Hatching
 - i. Remove chicks and place in brooder within 24 hours after hatch (chicks should be dry and fluffy)
 - ii. After chicks begin hatching pull the red vent plugs to help dry chicks.

Embryology Step by Step

Visit www.azfbaitc.org for video instructions and demos



Automatic Egg Turner

1. Place the automatic egg turner on the wire floor in the bottom of the incubator.
2. Place turner so the power cord exits through the notch in the corner of the incubator
3. Water can be placed in the incubator through the gap without moving the turner
4. The thermometer should be placed directly on top of the eggs
5. The turner motor uses metal gears for additional strength when turning heavy loads. These gears can emit noise during normal operation.
6. The turner operates very slowly. You should not expect to see movement upon installation. Proper operation is detected by noting rack angle over time.
7. **Place eggs on their side**



Embryology Step by Step

Visit www.azfbaitc.org for video instructions and demos

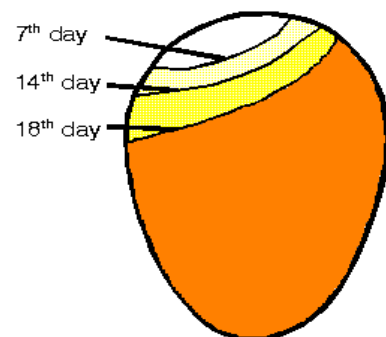


Candling

After an egg is laid a small air bubble forms in the large end under the shell. A membrane separating the mass of the egg and the air bubble serves as a diaphragm to relieve stress and pressure resulting from thermal changes of temperature. The drier the ambient air is, naturally the more fluid is depleted and the faster the bubble grows. Correct humidity in the incubator insures that the bubble does not grow to a certain degree by the time the embryo is ready to hatch, but the air bubble does not enlarge to the point of depleting the fluids that are necessary for the final growth of the embryo.

The importance of correct humidity is more apparent at the end of incubation. The normal condition is that the bubble has enlarged to the point where the chick can reach his beak through the membrane wall and pick around the shell breaking the bubble area off as a door. If humidity has been excessive, the chick may not reach the bubble but will pip the shell in the fluids under the bubble and may drown at that moment, before he is able to go any further with his effort to release himself from the confines of the egg. On the other hand, if humidity has been too low, the bubble will be oversized and the fluids under it will have dehydrated to the point where the final development of the embryo will be retarded and the chick may become stuck to the shell hen it pips. In this condition, the chick will exhaust itself but will not be able to get out of the shell. After a half day, a chick that is stuck to the shell, after piping, may be relieved by pulling the top of the shell off.

1. Take egg from incubator
2. Turn on classroom lights
3. Hold egg in front of candling light
4. Have students chart what they see at day 7, 14, and 18



Size of air cell on 7th, 14th and 18th day of incubation

Embryology Step by Step

Visit www.azfbaitc.org for video instructions and demos



Brooder

1. Get a cardboard box with side large enough that chicks cannot jump out
2. Place heat lamp over box
3. Spread shavings around bottom of the box
4. Place feed and water in the box
5. Place thermometer in bottom of box
6. Brooder should be kept at **95°F the first week** and **reduced by 5° per week after that**. To reduce the temperature, place the lamp higher over the box.



What you need to know about Bird Flu in North America

Fortunately the highly pathogenic strain of bird flu (H5NI) that is causing so much concern in Asia and Europe has not come to the United States or Arizona. Less virulent forms have been found in North American migrating birds for many years but are not a health threat to humans working with chicks of domestic origin.

We have been carefully monitoring poultry flocks in Arizona and have found *no evidence* of bird flu. It is completely safe to incubate and handle chicks in the classroom without the fear of contracting bird flu. If this situation were to change, all county farm bureaus would be immediately notified situation and what to do.

As teachers work with the incubation project, please practice common sanitation procedures of *washing your hands with soap before and after* handling incubating eggs and chicks. Bacteria can enter the pores of the eggs from human hands as well as from dirty incubation environments.

Also, if you have had a student that has traveled to or from Asia, please ask them to completely wash and clean all clothing before coming back to school. Human transfer of the disease is a much larger concern to the poultry industry now than migrating birds across the ocean.

