

4-H

Eggcellent Adventures

IN CLASSROOM EMBRYOLOGY!

**An Intracurricular Guide to Chicken
Embryology.**



UF | IFAS Extension
UNIVERSITY of FLORIDA



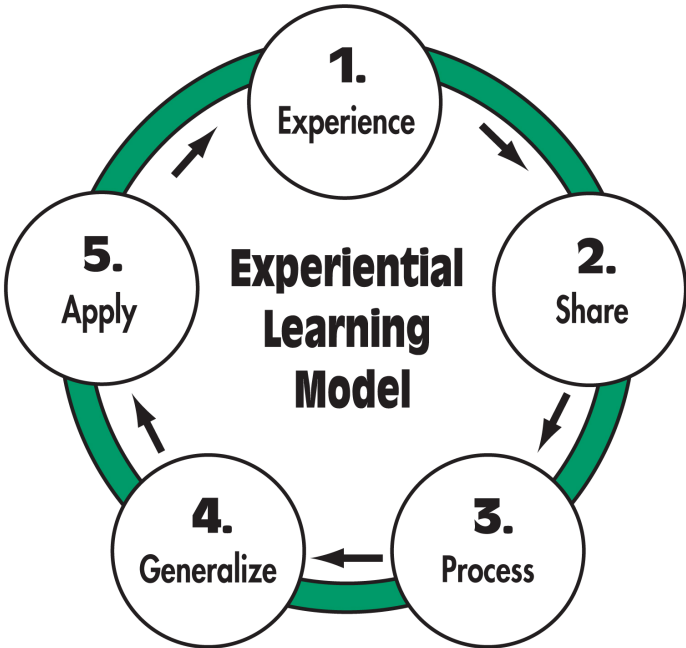
Current research points to the advantage of authentic instruction that involves “active knowledge construction” by learners, relevance, active feedback on learner progress, ongoing opportunities to re-think and reflect, and highly interactive learning activities (Eccles & Gootman, 2002). For decades, 4-H Youth Development has been using active knowledge construction processes through a process called experiential learning.

WHY USE EXPERIENTIAL LEARNING?

- Multiple senses can increase retention.
- Multiple teaching methods can be integrated to maximize creativity.
- Child-centered learning becomes the focus.
- Discovery of knowledge and solutions builds competence and confidence.
- Students can learn life skills that will be used, in addition to subject matter content.
- Learning is more fun!

4-H Youth Development relies heavily upon the five steps of the experiential learning model to teach life skills (Figure 1). The sequential steps of the model help students identify what they have learned from a 4-H experience or activity and to apply that learning to other experiences or situations.

This model requires that the “teacher/leader” be very clear about the skill or concept targeted and that the experience and the processing questions are designed to support that learner goal. The experiential learning process engages the learners in all phases of the activity, resulting in the ability to generalize this learning to new situations.



Pfeiffer, J.W., & Jones, J.E., "Reference Guide to Handbooks and Annuals"
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WHAT IS CHICKEN EMBRYOLOGY, AND HOW CAN I INCORPORATE IT INTO MY CLASSROOM?

Embryology is the study of how embryos grow and develop. What kinds of things grow and develop from embryos? All plants and animals develop from embryos. Just as a lima bean is the embryo of a lima bean plant, a fertilized chicken egg is an embryo of a chicken.

Eggcellent Adventures in Classroom Embryology is about learning through experience. Students see firsthand how a chicken develops in an egg through a series of activities. Students can observe the growth from candling sessions that show the development of the chick; the students can record data, make predictions, and conclude what they think the final outcome will be.

In most cases, when a teacher signs up to teach chicken embryology in the classroom, they set up the incubator, set the eggs, and wait for them to hatch—that is the experience. This guide, however, has lessons to incorporate into a daily plan in order to make the chicken embryology experience an intracurricular experience. The lessons follow Florida Sunshine State Standards and incorporate activities from various sources. Each lesson contains an experience, instructions on how to do the experience, background information if needed, and reflection questions. There are a total of 31 lessons for the unit, or approximately two lessons for each day of in-class instruction. Overall, the lessons address agricultural literacy and science concepts, but they also address math, language arts, and visual arts.

HOW LONG IS THIS UNIT? WHAT DOES IT REQUIRE OF ME AS A TEACHER?

From start to finish, it takes chicks approximately 21 days to hatch. Typically, a unit on chicken embryology is a minimum of 15 instructional days. The lessons will only include the days that students are in the classroom. The unit can also be made longer as desired.

As the teacher, this project comes with a great amount of responsibility, but don't let that scare you away! This

is a very rewarding experience for both the instructor and students involved. This unit requires taking care of chicken eggs, an incubator, and eventually baby chickens. The eggs and incubator require frequent monitoring, and once the chicks hatch they require special care as well. In addition, when the experience is over, teachers are responsible for cleaning equipment and returning everything just as it was given to them.



USING A CHICK JOURNAL

A chick journal is a great way for students to document and record what they learn over the period of the project. A chick journal can be as simple as a pocket folder with fasteners to hold worksheets/sheets of notebook paper from activities. It can also be as fancy as a printed-up workbook with the lessons included. This is all flexible based on the needs and resources of the class.

It is encouraged that the students are incorporating what they are learning in the varying subject areas throughout the project for retention. In addition, the chick journal is a great way for students to show their parents what they are doing in class. Having students use the journals is a great way to focus their enthusiasm about the project. For example, students constantly want to check the incubator and eggs. Having them document the results daily will not only help you as the teacher to remember data, but, if the students have a task they are to complete, they may be less likely to interrupt other classmates and/or the teacher about the incubator.

ADDITIONAL RESOURCES AVAILABLE FOR THE CLASSROOM EXPERIENCE

The following resources are available at:

<https://florida4h.ifas.ufl.edu/4-h-embryology/presenters.shtml>

1. **Classroom Poster** — This poster is a great way to let the school know that you are participating in the embryology project. Post it on your door to let everyone know!
2. **Postcard** — This postcard is to be sent home with students to let their families know what the students are doing in the classroom.
3. **Safe Handling Poster** — This poster is a guide to help students and teachers remember the safe handling procedures when it comes to eggs and chickens.
4. **Post-Letter** — This letter goes home to families to tell them that the embryology experience may be over, but there is more in 4-H that is available!
5. **Evaluation** — This evaluation is tool geared to demonstrate the outcomes and impacts that the embryology program has in the classroom. Without an evaluation, how can we prove that the program is good?

SAMPLE SCHEDULE FOR EMBRYOLOGY LESSONS

DAY	LESSON	TIME	WHO TEACHES
1	INTRODUCTION TO EMBRYOLOGY*	45 MIN–1 HR	AGENT
2	WHAT IS EMBRYOLOGY	1 HOUR	TEACHER
3	PARTS OF EGG** CHICK DEVELOPMENT** CHICK GROWTH**	20 MIN	TEACHER
4	21 DAYS SONG** EGG PRODUCTION*	1 HOUR	TEACHER
5	CANDLED EGG** PICK-A-CHICK**	1–1.5 HR	AGENT TEACHER
6	CHICKEN BREEDS**	45 MIN	TEACHER
7	THE LITTLE RED HEN** THE MAGIC EGG**	1 HOUR	TEACHER
8	EGGCITING FRACTIONS WHAT IS TEMPERATURE?*	25 MIN–1 HR	TEACHER
9	WHAT HAPPENED? EGG WORD SEARCH**	45 MIN–1 HR	TEACHER
10	EGGCEPTIONAL PRODUCTS BABY CHICK**	30–45 MIN	TEACHER
11	EGGCELLENT VOCABULARY** PECKING PROTEIN	30 MIN–1 HR	TEACHER
12	EGGCITING CRISS-CROSS PUZZLE** MAKE-A-WORD**	30–45 MIN	TEACHER
13	FACT OR OPINION** PECKING ORDER	1–1.5 HR	TEACHER
14	EGGSTRAORDINARY FRACTIONS EGGCITING WRITING	1 HOUR	TEACHER
15	EGGCELLENT VOCABULARY II** CREATE AN EGG** DON'T COUNT YOUR CHICKENS BEFORE THEY HATCH EVALUATION*** SUBMIT TO AGENT	1.5 HOUR	TEACHER

*Indicate lessons that ensure basic information for embryology. ** Indicates lessons that go with chick journal.

BASIC INFORMATION ON CHICKEN EMBRYOLOGY

It takes 21 days for chicks to hatch.

Hatching rates all depend on the factors of temperature, humidity, egg position and air exchange being precise and maintained.

- **Temperature:** The temperature for a forced-air incubator is 99.5°F, and the temperature is 101°F to 103°F for a still-air incubator with the bulb of the thermometer at the TOP of the eggs.
 - > Be sure that the incubator is not in direct sunlight or drafts or subject to other conditions that may alter the temperature. The best room temperature for incubators is between 75°F and 80°F.
- **Humidity:** Humidity helps the eggs from drying out. Relative humidity should be 60% for the first 18 days and then increased to 65%–70%. This is important so the chicks can hatch.
- **Egg position:** The more pointed end of the egg should point down (the air cell should be at the top).
 - > Eggs must be turned routinely throughout the day so that the developing embryo does not stick to the shell. Turning the eggs in different directions prevents twisting of the embryonic membranes. An odd number of turning times prevents the eggs from being in the same position each night. This can also be easier if an egg turner is used (an egg turner should be removed on the 18th day).
- **Air exchange:** Make sure that all hands are washed before handling the eggs. Oils from human skin can reduce air exchange.

Using lights to see inside eggs, or candling, should occur on or around days 7, 14, and 18. Always keep in mind, not all eggs will hatch. In addition, not all chicks will hatch out all the way. Do NOT help a chick out of its shell. If

it is not strong enough to get out of the shell, it is not strong enough to survive!

It is imperative that chicks stay in the incubator until they are completely dry and fluffy.

Do not let students handle baby chicks. Handling increases the risk for their survival in the first few days.

Depending on the embryology program, the incubators, egg turners, brooder boxes, and other supplies may be provided. In many cases, only incubators are provided to the classrooms. If you plan on participating in the program frequently, it is suggested that you invest in your own supplies to ensure that all the equipment is always functioning at its best.

DAY 0–1	The first 24 hours. Cells start dividing the germinal disc, circulation system, digestive system, vertebrae, and nervous system begin.
DAY 2	Eyes are appearing, visible vertebral column, ears begin, embryonic membrane forms to prevent sticking, and heartbeat begins.
DAYS 3–4	Allantois begins to form. Limbs, lungs, outer/middle ear begins to form. The tongue and esophagus start to form; the embryo separates from yolk sac; kidney begins; gizzard and large intestine begin to form.
DAYS 5–6	Reproductive system begins, first cartilage present, appearance of beak, voluntary movement, allantois and chorion lay against shell.
DAYS 7–10	Digits appear, comb begins, egg tooth begins, feather tracts appear, mouth opening appears, beak begins to harden, digits are completely separated.
DAY 11	Abdominal walls are established. Intestine becomes more visible, down feathers begin to appear. Comb and wattles are visible. There are scales and claws on toes.
DAYS 12–13	Allantois completes enclosure of egg contents. The cartilaginous skeleton is almost complete.
DAYS 14–15	Embryo begins to turn head toward large end of egg. Ossification (hardening) of the bones begins. Intestines can now be seen in the yolk sac.
DAY 16	Beak, claws, and scales are making keratin. The albumen is practically gone, and the yolk is an important food source. Down feathers are covering the body and the intestines are retracting into the body.
DAYS 17–18	Head toward large end under the right wing, beak toward the air cell. Definitive feathers begin. On day 18, the egg turner (if present) is removed, because turning is no longer needed.
DAY 19	Intestinal retraction is complete, yolk sac begins to enter body, beak may pierce air cell. Some lung functions.
DAY 20	Yolk sac has completely drawn into the body, the air cell has been pierced, pulmonary respiration begins. The embryo can be heard making sounds. May pip shell.
DAY 21	Hatching begins! Remember this can be a fast or long process. Don't help chicks out, they can sometimes take more than 24 hours to hatch out!

WITHIN THE FIRST 6 HOURS, KIDNEY-LIKE CELLS ARE BEGINNING TO FORM!

Adapted from Wilson, Quart, Douglas, & Mather (1990).

TEACHER/AGENT ROLE

- ❑ Set up the incubator in a safe area and start running it 48 hours before eggs are to arrive.
- ❑ Prepare the students a few days before the project begins. Help them understand the meaning of incubation and embryology. Introduce the chick science journal to record data.
- ❑ Discuss what the class wishes to accomplish and what role they will play in reaching the goals of the project. This includes preparing calendars and other project resources.
- ❑ If your class plans to incubate eggs, prepare the eggs for incubation. Turn the eggs three times daily.
- ❑ Keep water pans full at all times. Always add water that is warm to the touch.
- ❑ Keep daily records of all activities involving the eggs (i.e., turning, temperature, water added, candling, and other activities). These records are extremely helpful for troubleshooting causes of poor hatches.
- ❑ Candle the eggs every three days to check progress.
- ❑ Stop turning eggs three days (after 18 days for chicken eggs) prior to expected hatch.
- ❑ Prepare brooder box at least two days prior to expected hatch.
- ❑ Remove the chicks from the incubator and place them in a warm brooder within two to six hours after they hatch. Remember, we want them to be dry before they go into the brooder.
- ❑ Remove and discard all remaining unhatched eggs 60 hours after the first chick hatches, then disconnect incubator power.
- ❑ Clean and disinfect the incubator as soon as the power is disconnected.
- ❑ Let the incubator dry. Then store it in a cool dry place or prepare for it to be picked up.

HAVE STUDENTS KEEP RECORDS THROUGHOUT THE PROJECT AS WELL. IT NOT ONLY HELPS THEM TO MAKE OBSERVATIONS BUT CAN HELP YOU IF YOU MISS A TIME TO WRITE DOWN OBSERVATIONS.

Adapted from Renner (2002).

PLANNING AND SCHEDULING CHECKLISTS STUDENT

STUDENT ROLE

- Keep daily records of all activities involving the eggs (i.e., turning, temperature, water added, candling, and other activities). These records are extremely helpful for trouble-shooting causes of poor hatches.
- Fill out your chick science journal.
 - > Record the temperature of the incubator each time the eggs are turned. Wash your hands before handling eggs or the incubator.
 - > Record the number of infertile eggs, embryos that die, and number of eggs broken open for observation.
- Remove infertile eggs and dead embryos as soon as they are observed. This is done by candling. (Dead embryos give off poisonous gases that could affect the other developing embryos.)
- Candle eggs every three days or on the 4th, 6th, 10th, and 16th days. Record observations in your chick science journal.
- Turn the eggs three times daily.
- Keep water pans full at all times. Always add water that is warm to the touch.
- Stop turning eggs three days prior to expected hatch (after 18 days for chicken eggs). Prepare brooder box at least two days prior to expected hatch.
- Remove the chicks from the incubator and place them in a warm brooder within two to six hours after they hatch.
- Remove and discard all remaining unhatched eggs 60 hours after the first chick hatches, then disconnect incubator power.
- Clean and disinfect the incubator as soon as the power is disconnected.
- Let the incubator dry. Then store it in a cool dry place or prepare for it to be picked up.

TIME: 25–30 minutes

SUNSHINE STATE STANDARDS:

ELA.3.R.2.2—Identify the central idea and explain how relevant details support that idea in a text.

LACC.3.RI.1.1—Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.

OBJECTIVE:

The student will be able to recollect information from a given text and answer questions.

MATERIALS:

“What Is Embryology?” informational text, journals

LIFE SKILLS:

Critical thinking, comprehension

ACTIVITY/EXPERIENCE:

1. Have students individually read the following information about embryology and answer the questions at the end.
2. Discuss the passage and answers with the class.



PARTS OF THE EGG

TIME: 30-45 minutes for both activities

SCIENCE

SUNSHINE STATE STANDARD:

SC.3.L.14.1—Describe structures in plants and their roles in food production, support, water and nutrient transport, and reproduction.

OBJECTIVE:

The student will be able to identify and label the parts of an egg when provided a diagram of the egg after a class activity and discussion.

MATERIALS:

Egg, paper plate

LIFE SKILLS:

Communication, observation

ACTIVITY/EXPERIENCE:

1. Ask, “What do you think the inside of an egg looks like? Almost all of us have seen an egg one time or another. What is in the center of the egg called?” (Answer: Yolk.) “What color is it?” (Answer: Yellow/orange.) “What is the clear stuff around the yolk called?” (Answer: The “white” or “albumen.”) Discuss in further detail that the white is the albumen if needed.
2. Crack open egg onto paper plate (if you have an elmo this is a great way to show the class all at once).
3. Say, “Let’s crack open this egg and look at the insides. What is the yolk? (Answer: The center yellow circle.) Can you see the albumen? Do you see the white twisted string-like things holding the yolk in place? Those are the chalazae (pronounced kuh-LAZE-eye). The chalazae are the ‘seatbelts’ for the yolk so that it doesn’t roll around in the egg and stays in place when the egg is moved. If we look at the inside of the eggshell we will see something that looks like white skin, which is the

membrane. This membrane also helps to make the air cell at the top of the egg. Can you see where the air cell is?”

4. “While we are talking about membranes, there is another membrane that goes around the yolk. It is called the vitelline membrane. The vitelline membrane is a clear casing that protects the yolk, or vitelline. It is kind of hard to see but it holds the yolk in the circle shape that it is. Next is the germinal disc. The germinal disc is a slightly white spot on the yolk that will hopefully develop into a chick. Eggs that are not fertilized have a slight coloration that is harder to see. Can you see the germinal disc?”
5. “Lastly, let’s look at the shell. The shell is the hard part that is the outer part of the egg. It protects all of the parts on the inside and is made of calcium.”

OBJECTIVE:

The student will be able to identify and label the parts of an egg when provided a diagram of the egg after a class activity and discussion.

MATERIALS:

Crayons (or colored pencils), “Egg Parts” worksheet

LIFE SKILLS:

Critical thinking, recollection of material

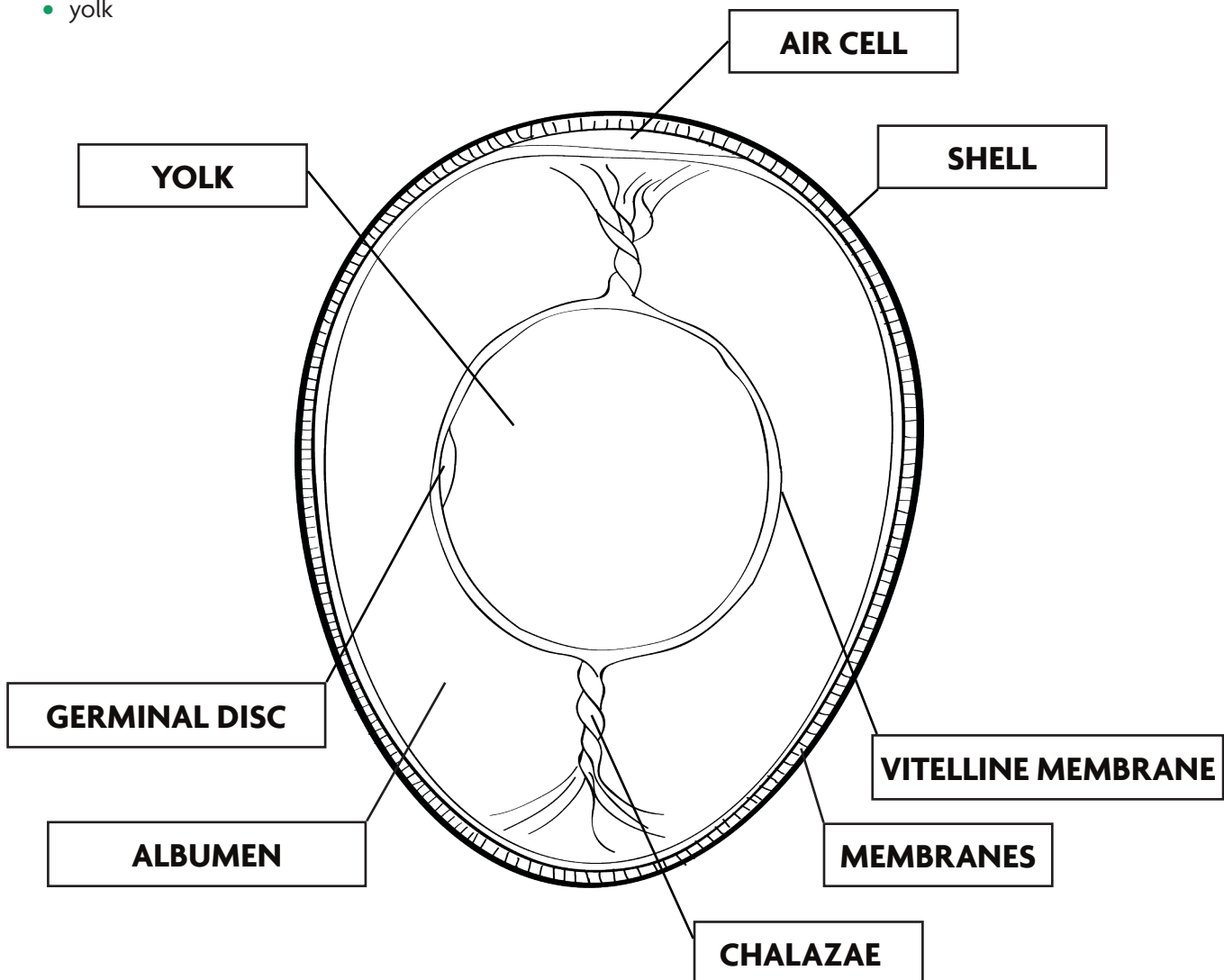
EXPERIENCE:

1. Pass out copies of the “Egg Parts” worksheet.
2. Say, “Now that we have gone over the parts of the egg, here is a worksheet for you to color and fill in the blanks of the parts of the egg.”

DIRECTIONS: Color each part of the egg a different color and label each part of the egg.

USE EACH WORD ONLY ONCE:

- air cell
- albumen or white
- chalazae
- germinal disc
- membranes
- shell
- vitelline membrane
- yolk



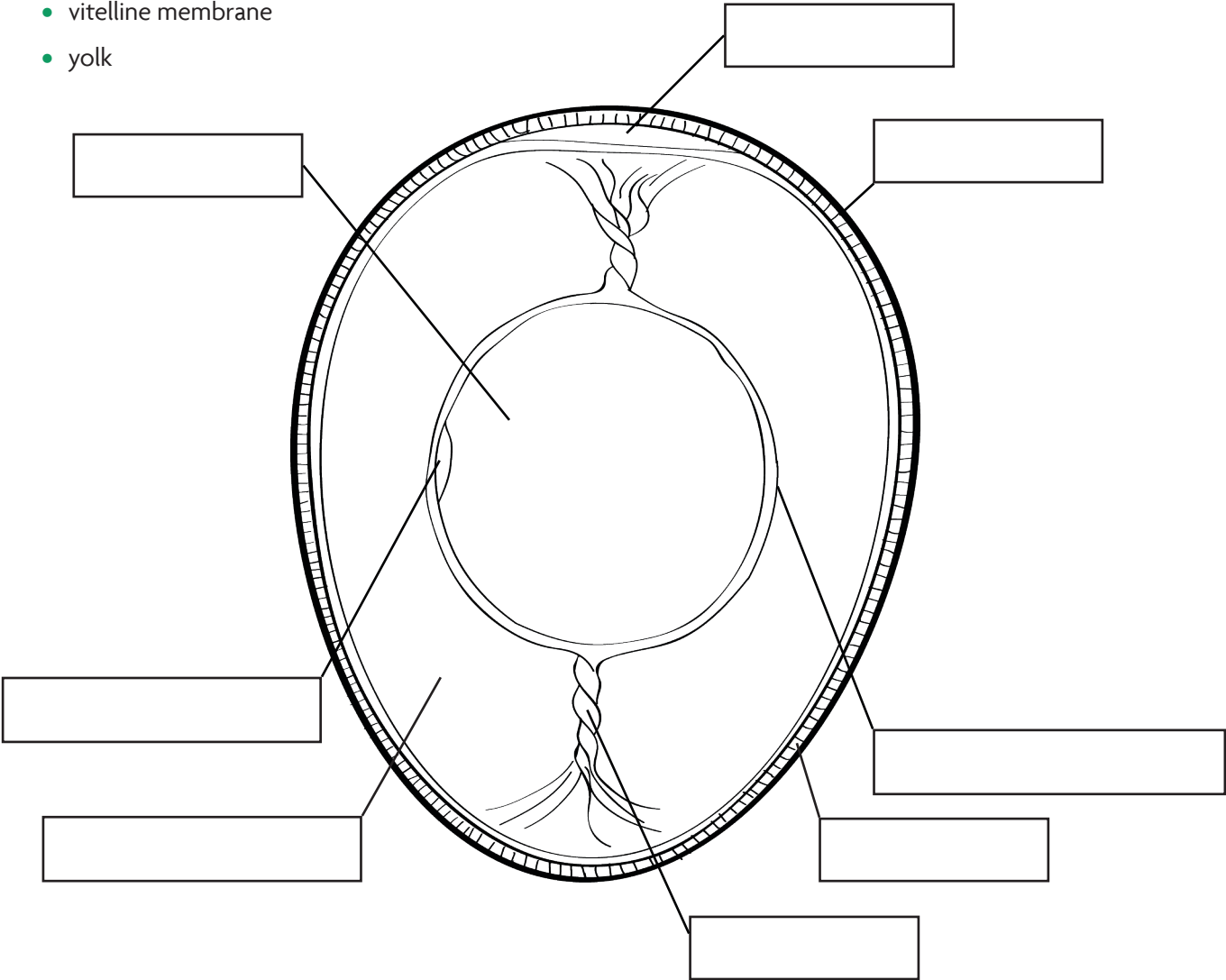
EGG PARTS WORKSHEET

NAME _____

DIRECTIONS: Color each part of the egg a different color and label each part of the egg.

USE EACH WORD ONLY ONCE:

- air cell
- albumen or white
- chalazae
- germinal disc
- membranes
- shell
- vitelline membrane
- yolk



CHICK DEVELOPMENT

TIME: 25–30 minutes

SUNSHINE STATE STANDARDS:

SC.3.L.15.1—Classify animals into major groups (mammals, birds, reptiles, amphibians, fish, arthropods, vertebrates and invertebrates, those having live births and those which lay eggs) according to their physical characteristics and behaviors.

OBJECTIVE:

The student will be able to make predictions about how chicks develop and compare with the appropriate life stages of a chick as it develops in an egg.

MATERIALS:

Chick calendar, journals

Chickscope website (<http://chickscope.beckman.uiuc.edu/explore/embryology/>)

LIFE SKILLS:

Keeping records, critical thinking

ACTIVITY/EXPERIENCE:

Exploring the Development of Baby Chicks

You know that we have baby chicks (hopefully) developing in eggs in our incubator.

1. Ask students: “How do you think the baby chicks develop? Do the feathers grow first? What about when they get their beak?”
2. List students’ predictions on the board.
3. Say, “We are going to explore how a baby chick develops by looking at the Chickscope and our development calendars.”
4. With the Chickscope, look at pictures in color and discuss major development details. For example, look at the development from early on, days 3–6, and then later on like days 15–18.
5. Discuss items developing such as the brain, heart, wings, or feathers. This doesn’t have to be in depth. Use it as an opportunity to show that there is a difference from the beginning to the end of development. Have students write down in their journals and then discuss what things they see that are different from the beginning to end.

QUESTIONS

1. What did you predict? What did you see happen? Was your prediction correct?
2. What was the most exciting part of seeing the development of the baby chick?

CHICK GROWTH

TIME: 25–30 minutes

SUNSHINE STATE/Common Core Standards:

SC.3.L.15.1 – Classify animals into major groups (mammals, birds, reptiles, amphibians, fish, arthropods, vertebrates, and invertebrates; those having live births and those which lay eggs) according to their physical characteristics and behaviors.

OBJECTIVE:

The student will be able to differentiate the appropriate life stages of a chick as it develops in an egg.

MATERIALS:

Chick calendar, journals, “Chick Growth” worksheet

Chickscope website (<http://chickscope.beckman.uiuc.edu/explore/embryology/>)

LIFE SKILLS:

Keeping records, critical thinking, sharing

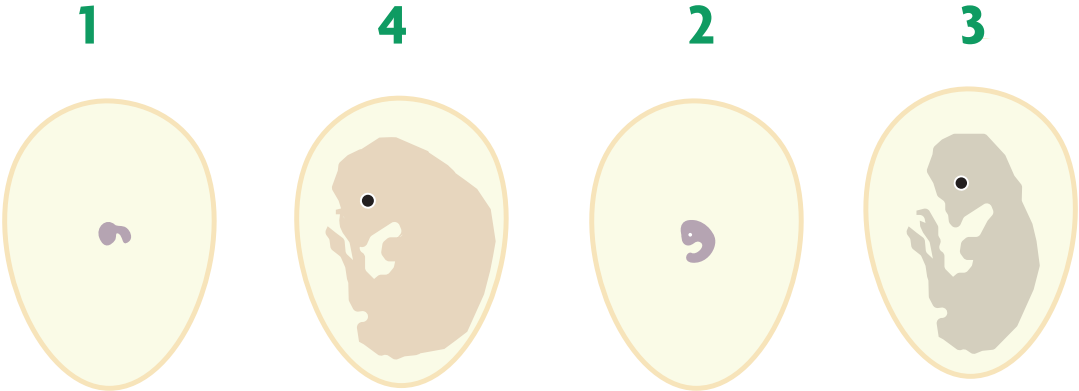
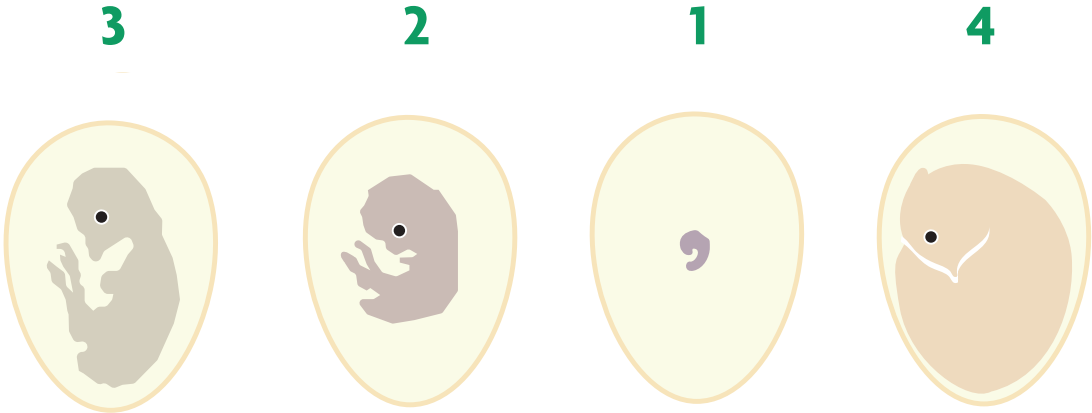
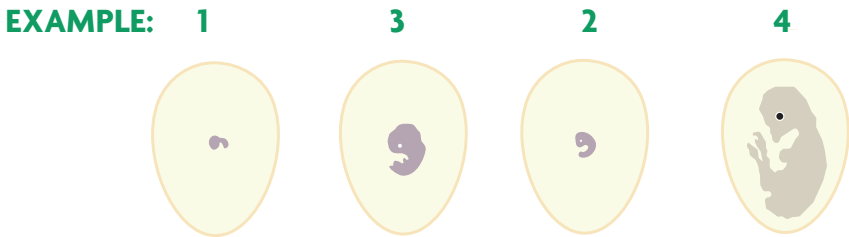
ACTIVITY/EXPERIENCE:

Chick Growth worksheet

1. Share with students:
 - The goal of this assignment is for students to be able to tell how living things change.
 - We know what baby chicks look like in the egg while they develop. But can we tell the difference between chicks that are in early development from chicks in late development? Let’s do this activity to find out.
2. Have students work individually on the “How do living things change” worksheet. Then have students pair up to compare their answers. Review as a whole group and ask the class the following questions:
 - How could you tell the differences in the stages?
 - What differences are there in a chick in the end stages of development from one in the beginning?
 - What happens to the embryo, the yolk, the vitelline membrane, the albumen?

HOW DO LIVING THINGS CHANGE? ANSWER KEY

Directions: Put the chicks in the eggs in the right order, from youngest to oldest. The oldest is 4 and the youngest that came first is 1.

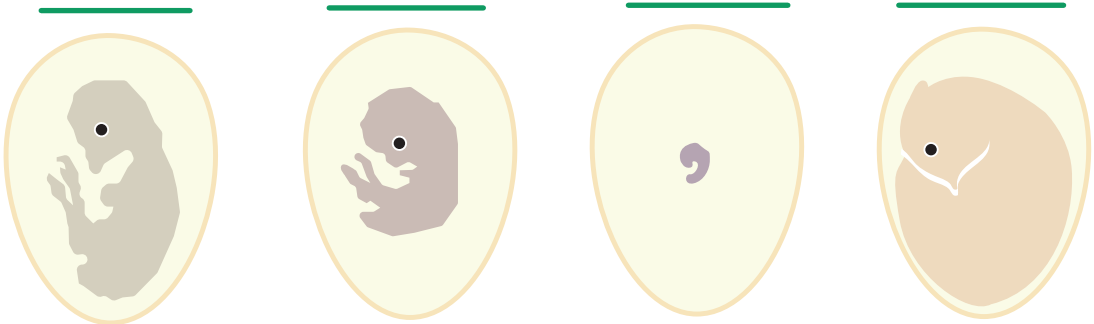
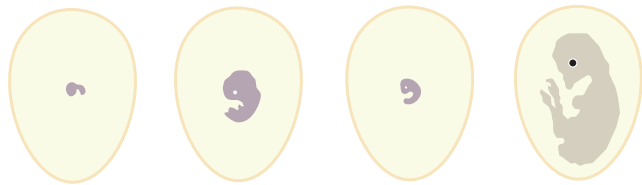


HOW DO LIVING THINGS CHANGE? WORKSHEET

NAME _____

Directions: Put the chicks in the eggs in the right order, from youngest to oldest. The oldest is 4 and the youngest that came first is 1.

EXAMPLE: 1 3 2 4



“21 DAYS” SONG

TIME: 25–30 minutes

MUSIC

SUNSHINE STATE STANDARDS:

MU.3.S.1.2—Create an alternate ending to a familiar song.

OBJECTIVE:

The student will be able to listen to a song and create a new ending to the song with the help from classmates.

MATERIALS:

YouTube access, speakers, journals

LIFE SKILLS:

Sharing, communication, cooperation, social skills

ACTIVITIES:

“21 Days” Song

1. Go to <https://youtu.be/NcfYkX2xyxQ>. (Lyrics can be found at <http://florida4h.org/embryology/documents/21-days-words-and-music.pdf>.)
2. Listen to the song as a class, discuss the parts of the song. Have the students get into groups of four and write either a new ending or add another verse to the song. What happens next?

QUESTIONS

1. What did you enjoy about the song?
2. What did your group think was most important to add to the song?
3. What new information did you learn about embryology?

EGG PRODUCTION

TIME: 20 minutes

SUNSHINE STATE STANDARDS:

SS.3.G.1.1—Use thematic maps, tables, charts, graphs, and photos to analyze geographic information.

OBJECTIVES:

The student will be able to locate the top 10 egg producing states on a given map and explain why chicken egg production is located in the top 10 egg producing states.

MATERIALS:

A map of the United States for the whole class to view, sticky notes (numbered 1–10), copies of “Map of the United States” handout.

LIFE SKILLS:

Critical thinking, geographical/spatial skills

ACTIVITY/EXPERIENCE:

Egg-Layer Production

1. Ask students the following questions: “Where do the eggs we get from the grocery store come from?” (Answer: Farms.) “That’s right, but where are the farms that the eggs come from located?”
2. “Let’s find out.” Share the map of the United States. Share the list of the top 10 egg producing states in the United States for the year 2022 (see below—you can update this by going to https://www.nass.usda.gov/Charts_and_Maps/Poultry/eggmap.php).
3. Ask students to raise their hands when a state is called out and give them a sticky note with a number that represents how many eggs are produced per state. Have students place the sticky notes on the class’s United States map.
4. Ask students to mark on their own maps (the “Map of the United States” handout) by writing the ranking number next to the state. Say, “We will

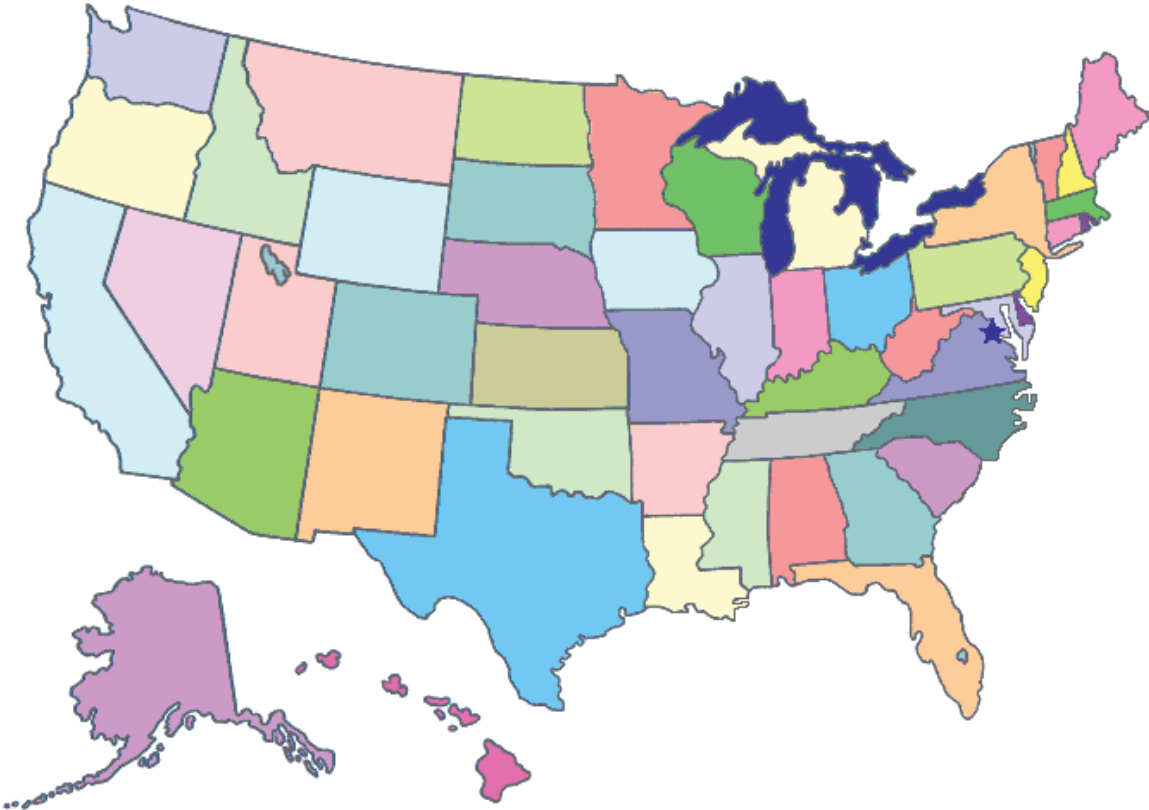
start at number 10, which produces the least out of the 10. I’ll call out the states.”

10. Arkansas: 3,816,000,000 eggs
9. California: 3,933,000,000 eggs
8. North Carolina: 4,075,000,000
7. Michigan: 4,331,000,000 eggs
6. Georgia: 5,100,000,000 eggs
5. Texas: 6,254,000,000 eggs
4. Pennsylvania: 9,248,000,000 eggs
3. Ohio: 10,147,000,000 eggs
2. Indiana: 10,377,000,000 eggs
1. Iowa: 15,385,000,000 eggs

EGG PRODUCTION WORKSHEET

NAME _____

Map of United States



TOP 10 EGG PRODUCING STATES

Why do you think that some states produce more eggs than others? Why is/isn't our state on this list?

- 1. _____
- 2. _____
- 3. _____
- 4. _____
- 5. _____
- 6. _____
- 7. _____
- 8. _____
- 9. _____
- 10. _____

CANDLED EGG

TIME: 25–30 minutes

SCIENCE

SUNSHINE STATE STANDARDS:

SC.3.N.1.3—Keep records as appropriate—such as pictorial, written, or simple charts and graphs—of investigations conducted.

OBJECTIVE:

The student will be able to make predictions, record data from candling eggs, and draw what the chick and/or egg looked like.

MATERIALS:

Journals, flashlight, Elmo document camera (optional)

LIFE SKILLS:

Keeping records, observation

ACTIVITY/EXPERIENCE:

Journal (see page 5)

1. This activity can occur periodically throughout the 15 days, every 3–4 days or as suggested on page 7.
2. Every student in the class must have a chance to see a candled egg. You may be able to use a mobile phone's flashlight with the lights off under an Elmo document camera (if available) to show all of the class at once. This activity consists of watching the embryo move and see how it has developed. Having students draw the chick on each occurrence will show the difference like the worksheet on pages 19–21.
3. Tell students: “Today we are going to take a look at the inside of our eggs and see how our baby chicks are developing. I want all of you to pay close attention. You will need to write down what you see and then draw a big picture of the egg. After you have drawn what the baby chick inside the egg looks like, write a prediction or hypothesis

about what you think the chick will look like the next time we candle the eggs.”

QUESTIONS

1. What was the most interesting thing that we looked at with the chicks?
2. What do you think will happen next in the development of the chick?

PICK-A-CHICK

TIME: 30–45 minutes

ART

SUNSHINE STATE/Common Core Standards:

VA.3.C.1.1—Use the art-making process to develop ideas for self-expression.

OBJECTIVE:

The student will be able to evaluate breeds of chickens and create their own breed.

MATERIALS:

Journals, examples of chicken breeds, drawing supplies (or other art supplies)

LIFE SKILLS:

Critical thinking, teamwork, cooperation, sharing

ACTIVITY/EXPERIENCE:

Pick-a-Chick

1. Tell students to think about the different breeds of chickens (it may be helpful to have some examples printed out or bring some up online from the APA American Poultry Association). Ask the following questions:
 - What are some of the traits, or characteristics that they have?
 - What advantage or disadvantage would having these characteristics be for the chicken and for the farmer?
2. Ask students, “Why would you choose an Americana breed of chicken?” (Answers will vary. Example: “Because it is a good egg layer.”) Share that different breeds were “bred” for different reasons.
3. Tell students to come up with the characteristics they would want in their own breed of chicken. Provide students with drawing materials or

other art supplies so students can either draw or create their own chicken that have the desired characteristics. The characteristics should have advantages for both the chicken and the farmer.

4. Say, “Work with a partner and then we can share our chicken breeds with the class.” Have students name their “new breed of chicken.”

QUESTIONS

1. Why did you choose the breed of chicken you chose?
2. What advantages does the breed have for the chicken and the farmer?
3. What are some important traits to have for a chicken that lays eggs?

CHICKEN BREEDS PART 1

TIME: 25–30 minutes

SCIENCE

SUNSHINE STATE STANDARDS:

SC.3.L.15.1 – Classify animals into major groups (mammals, birds, reptiles, amphibians, fish, arthropods, vertebrates and invertebrates; those having live births and those which lay eggs) according to their physical characteristics and behaviors.

OBJECTIVE:

The student will be able to differentiate breeds and sexes of chickens as well as compare and contrast their characteristics.

MATERIALS:

“Similarities and Differences” worksheet, computer, projector

LIFE SKILLS:

Compare/contrast, critical thinking

ACTIVITIES:

Experience 1 - Chicken Breeds

1. Go online to <http://www.mypetchicken.com/chicken-breeds/breed-list.aspx>, or search the American Poultry Association (APA) list of chickens online. Choose some breeds to look at with students and talk about their characteristics. Also, compare male to female chickens.
2. Share with students that there are different types or breeds of chickens, white, spotted, brown, black, red, and even mixed colored, and they all have different characteristics. There are also male and female chickens that have different characteristics too. This can be based on the level of your students, a discussion on the chicken breeds given on the worksheets can take place, or you can choose different breeds as long as you are discussing the characteristics that they have and the different characteristics the male/females have.
3. Have students work in pairs to work on the Similarities and Differences worksheet. After the students have completed the worksheet discuss the similarities and differences in chicken breeds and sexes. Discuss egg characteristics, too (available on website). Ask, “Is the hen a good layer? What do the eggs look like?”

CHICKEN BREEDS: SIMILARITIES & DIFFERENCES

NAME _____

Directions: Compare and contrast the characteristics of chicken breeds and sexes.

CONTRAST



BLACK AUSTRALORP



FRIZZLE

CONTRAST

CONTRAST

CONTRAST



ROOSTER



HEN

CONTRAST

CONTRAST

CHICKEN BREEDS PART 2

TIME: 25–30 minutes

SCIENCE

SUNSHINE STATE STANDARDS:

MACC.3.MD.2.3—Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories.

OBJECTIVE:

The student will be able to interpret data and organize it in a frequency table and solve problems.

MATERIALS:

“Chicken Breeds” worksheet

LIFE SKILLS:

Critical thinking, problem solving, mathematics

ACTIVITIES:

Experience 2 – Chicken Breeds Bar Graph

1. Share with students that the class has looked at the differences in chicken breeds and sexes. Ask students, “Which breed did you like best?”
2. Say, “Pretend that we are going to be chicken farmers. Which of these three breeds should we choose: White Leghorn, Rhode Island Red, or Frizzle?”
3. Have students think about why they would want this breed.
 - Would they want them for eggs? Do the hens make good mothers?
 - Do they do well in Florida conditions?
 - “What about for show? Some people have special chickens that they raise to show the breed in competition like the fair. Have you ever seen chickens at the fair. They are there to compete for a prize.”
4. Ask students to vote for the breed. Then have them fill out the Chicken Breeds worksheet.

CHICKEN BREEDS ANSWER KEY

DIRECTIONS:

Use the information provided to create a frequency table and answer the questions related to the table.

The students in your class voted for their favorite chicken breeds. They put the information in a frequency table. How many more students chose Frizzles over Rhode Island Reds? **2** (answers will vary)

How many students chose White Leghorn Chickens over Frizzles? **2**

What about Rhode Island Reds? **4**

WHAT NUMBERS ARE YOU COMPARING?

How many students chose a certain breed of chicken over another breed of chicken.

WHAT INFORMATION DO YOU NEED TO USE?

The tally marks of how many students chose White Leghorn, Frizzle, or Rhode Island Red chickens.

FAVORITE CHICKEN BREEDS	
BREED	TALLY
WHITE LEGHORN	
FRIZZLE	
RHODE ISLAND RED	

WHAT DO YOU NEED TO FIND?

What breed our class wanted most for our chicken farm.

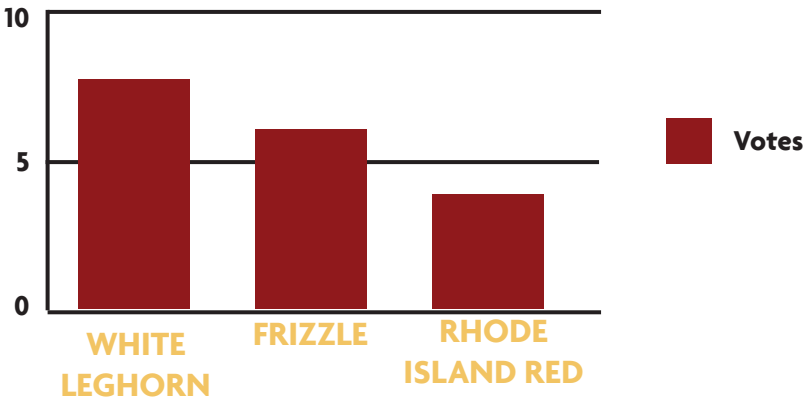
HOW WILL YOU USE THIS INFORMATION?

To see which breed our class wanted most.

WHY ARE YOU USING THIS INFORMATION?

To find what chicken breed our class wanted for our future chicken farm.

DRAW A BAR GRAPH OF THE INFORMATION FROM THE FREQUENCY TABLE. FOR EXAMPLE:



CHICKEN BREEDS WORKSHEET

NAME _____

Directions: Use the information provided to create a frequency table and answer the questions related to the table.

FAVORITE CHICKEN BREEDS	
BREED	TALLY
WHITE LEGHORN	
FRIZZLE	
RHODE ISLAND RED	

1. What numbers are you comparing?
2. What information do you need to use?
3. What do you need to find?
4. How will you use this information?
5. Why are you using this information?
6. Draw a bar graph of the information from the frequency table.

THE LITTLE RED HEN

TIME: 25–30 minutes

LANGUAGE ARTS

SUNSHINE STATE STANDARDS:

ELA.3.R.1.1—Explain how one or more characters develop throughout the plot in a literary text.

ELA.3.R.1.2—Explain a theme and how it develops, using details, in a literary text.

ELA.3.R.1.3—Explain different characters perspectives in a literary text.

OBJECTIVE:

The student will be able to identify the main characters, feelings of the characters, the setting, and overall thoughts of the story, “The Little Red Hen,” based on class discussion and journal entry.

MATERIALS:

Journals, crayons/coloring pencils

LIFE SKILLS:

Comprehension, critical thinking, problem solving, reading comprehension, conflict resolution

ACTIVITY/EXPERIENCE:

The Little Red Hen

From *EnchantedLearning.com*

1. Share with students that you will be reading “The Little Red Hen.” Ask students to listen carefully as they will be asked to identify and describe the main characters, the setting, and the motivation of the characters.

THE LITTLE RED HEN

Once upon a time, there was a little red hen who lived on a farm. She was friends with a lazy dog, a sleepy cat, and a noisy yellow duck.

One day the little red hen found some seeds on the ground. The little red hen had an idea. She would plant the seeds.

The little red hen asked her friends, “Who will help me plant the seeds?”

“Not I,” barked the lazy dog.

“Not I,” purred the sleepy cat.

“Not I,” quacked the noisy yellow duck.

“Then I will,” said the little red hen. So the little red hen planted the seeds all by herself.

When the seeds had grown, the little red hen asked her friends, “Who will help me cut the wheat?”

“Not I,” barked the lazy dog.

“Not I,” purred the sleepy cat.

“Not I,” quacked the noisy yellow duck.

“Then I will,” said the little red hen. So the little red hen cut the wheat all by herself.

When all the wheat was cut, the little red hen asked her friends, “Who will help me take the wheat to the mill to be ground into flour?”

“Not I,” barked the lazy dog.

“Not I,” purred the sleepy cat.

“Not I,” quacked the noisy yellow duck.

“Then I will,” said the little red hen. So the little red hen brought the wheat to the mill all by herself, ground the wheat into flour, and carried the heavy sack of flour back to the farm.

The tired little red hen asked her friends, “Who will help me bake the bread?”

“Not I,” barked the lazy dog.

“Not I,” purred the sleepy cat.

“Not I,” quacked the noisy yellow duck.

“Then I will,” said the little red hen. So the little red hen baked the bread all by herself.

When the bread was finished, the tired little red hen asked her friends, “Who will help me eat the bread?”

“I will,” barked the lazy dog.

“I will,” purred the sleepy cat.

“I will,” quacked the noisy yellow duck.

“No!” said the little red hen. “I will.” And the little red hen ate the bread all by herself.

THE LITTLE RED HEN ANSWER KEY

DISCUSSION

1. Who was the main character in the story?

Answer: *The little red hen.*

2. Who were the other characters?

Answer: *The lazy dog, sleepy cat, and noisy yellow duck.*

3. What was the setting?

Answer: *A farm.*

4. What did the little red hen do?

Answer: *She planted seeds, cut the wheat, took the wheat to be milled into flour, and baked the bread.*

5. Why did the little red hen tell the lazy dog, sleepy cat, and noisy yellow duck they could not eat the bread?

Answer: *Because she did all of the work to make the bread (answers may vary).*

6. How would that make you feel if you were the little red hen?

Answers will vary.

7. If you were the little red hen what would you have done differently? How could you have changed the other animals' minds about helping?

Answers will vary.

JOURNAL

8. Draw the story in your chick journal. It can be the whole story, the end of the story, or just the main parts of the story.

TAKE IT FURTHER FOR AGRICULTURAL LITERACY

- Explore how bread is made—see if any of these books are in your library!
- *Bread, Bread, Bread* by Ann Morris
- *Bread Comes to Life* by George Levenson
- *Tony's Bread* by Tomie dePaola
- *Everybody Bakes Bread* by Norah Dooley

THE MAGIC EGG

TIME: 35 minutes

WRITING

SUNSHINE STATE STANDARDS:

ELA.3.C.1.2—Write personal or fictional narratives using a logical sequence of events, appropriate descriptions, dialogue, a variety of transitional words or phrases, and an ending.

OBJECTIVES:

The student will be able to write a narrative story with details, transitional words, and in proper five-paragraph format.

MATERIALS:

Journal

LIFE SKILLS:

Critical thinking, relating

ACTIVITY:

Writing Prompt—The Magic Egg

1. Tell students the following:



You have received a mysterious package from a friend. Inside is a very unusual egg.

Write a story about what happens next. What does the egg look like? Does the egg hatch? What is inside it?

Provide a small illustration at the end.

Prompt and image from <http://www.k12reader.com>.

EGGCITING FRACTIONS

TIME: 30 minutes

MATHEMATICS

SUNSHINE STATE STANDARD:

MA.3.FR.1.1—Represent and interpret unit fractions in the form $1/n$ as the quantity formed by one part when a whole is partitioned into n equal parts.

OBJECTIVE:

The student will be able to make predictions on a worksheet after classroom discussion about hatching percentages by using fractions to see what the possible outcome could be.

MATERIALS:

White board, “Eggciting Fractions” worksheet, dry erase markers

LIFE SKILLS:

Critical thinking, problem solving

ACTIVITY/EXPERIENCE:

Fractions With Eggs

1. Share with students:

“We know that fractions are parts of totals. For example, if we have 6 apples and 3 are red apples and 3 are green apples, we know that 3 out of 6 apples are either red or green.”

(This can also be taken further to say the $3/6$ is equivalent to $1/2$, if the material has already been learned.)

“Let’s think about what is in our incubators, if we have 26 eggs in our incubator and 18 have a baby chick in them what is the fraction?” (Answer: $18/26$.)

2. Provide additional examples of numbers on the board. Here are some examples:

- 12 out of 15 eggs hatched
- 16 out of 20 chicks hatched on the 20th day
- 7 out of 10 eggs had a chick inside when candled
2 out of 12 eggs were dropped

3. Have students work on their Eggciting Fractions worksheets and then compare answers.

Adapted from The Ohio State University Extension (2000).

EGGCITING FRACTIONS ANSWER KEY

DIRECTIONS:

Write the fraction in the egg provided to the right.

Example: 5 eggs are cracked out of the 10 eggs in the incubator. What is the fraction? $5/10$



$5/10$

1. Out of 20 eggs, 15 eggs hatched and 5 eggs did not hatch. What is the fraction of chicks that hatched?

Answer: $5/15$



$5/15$

2. A total of 22 eggs are in an incubator. If 19 of the eggs hatch, what is the fraction?

Answer: $19/22$



$19/22$

3. 3 out of 10 eggs are cracked and did not hatch. What is the fraction?

Answer: $3/10$



$3/10$

4. Ms. Davis accidentally dropped 4 eggs when she was candling them. There were a total of 17 eggs in the incubator to start. What is the fraction?

Answer: $4/17$



$4/17$

5. 18 eggs hatched into chicks on the 20th day, and those chicks are now in the brooder box, 7 have started hatching, but are not out yet. What is the fraction?

Answer: $18+7=25$; 7 out of 25 have not hatched. $7/25$



$7/25$

MAKING PREDICTIONS:

How many eggs are in your incubator?

How many do you think will hatch? What is the fraction?

How many do you think will not hatch? What is the fraction?

Adapted from The Ohio State University Extension (2000).

EGGCITING FRACTIONS WORKSHEET

NAME _____

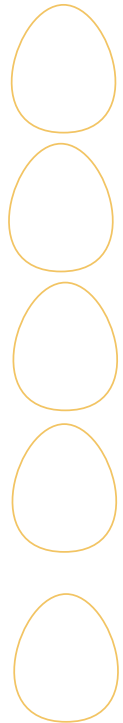
DIRECTIONS: Write the fraction in the egg provided to the right.

EXAMPLE: 5 eggs are cracked out of the 10 eggs in the incubator. What is the fraction? $5/10$



5/10

1. Out of 20 eggs, 15 eggs hatched and 5 eggs did not hatch. What is the fraction of chicks that hatched?
2. A total of 22 eggs are in an incubator. If 19 of the eggs hatch, what is the fraction?
3. 3 out of 10 eggs are cracked and did not hatch. What is the fraction?
4. Ms. Davis accidentally dropped 4 eggs when she was candling them. There were a total of 17 eggs in the incubator to start. What is the fraction?
5. 18 eggs hatched into chicks on the 20th day, and those chicks are now in the brooder box, 7 have started hatching, but are not out yet. What is the fraction?



MAKING PREDICTIONS:

How many eggs are in your incubator?

How many _____

How many do you think will hatch? What is the fraction?

How many _____ Fraction _____

How many do you think will not hatch? What is the fraction?

How many _____ Fraction _____

WHAT IS THE TEMPERATURE?

TIME: 25–30 minutes

SCIENCE AND MATH

SUNSHINE STATE STANDARDS:

SC.3.P.8.1—Measure and compare temperatures of various samples of solids and liquids.

MA.K12.MTR.7.1—Apply mathematics to real-world contexts.

OBJECTIVE:

The student will be able to measure temperature by using a thermometer in a variety of settings.

MATERIALS:

Thermometers, journals, cups of water, incubators

LIFE SKILLS:

Critical thinking, compare/contrast

ACTIVITY:

What Is Temperature?

1. Share with students that temperature is the measure of how hot or cold something is. Say, “When you are sick you use a thermometer to tell your temperature—how much of a fever you have, or how hot your body is. The incubators have to be a certain temperature to keep the chicks in the eggs developing. Who can tell me what that temperature is?” (Answer: 100 degrees Fahrenheit.)
2. Say, “In the United States we use Fahrenheit to measure temperature for weather, cooking, and for body temperature. However, in the other parts of the world and in science, Celsius is used to measure temperature.”
3. Tell students, “Let’s check the temperature in the incubator and record our data on our “How Hot or Cold Is It?” worksheet. Let’s also check some other areas in the classroom. We could see how hot the hot water out of the bathroom faucet is, how cold the cold water coming out of the water fountain is, how cold or hot our classroom is, and if the temperature in the incubator changes, or fluctuates.”

IN CASE THEY ASK...

Fahrenheit, created by German scientist Daniel Gabriel Fahrenheit, used salt water as his 0 degree point. That means that when salt water freezes, a mercury thermometer will read 0 degrees. Thirty-two degrees is when freshwater freezes and 212 degrees is when water boils. Celsius, invented by Swedish astronomer Anders Celsius, is based on freshwater freezing at 0 degrees and water boiling at 100 degrees.

HOW COLD OR HOT IS IT?

NAME _____

Directions: Using a thermometer, measure items in your school to find out how hot or how cold they are. If you can think of more to measure, fill them in in the bottom rows.

For example, the classroom measures 75°F.

OBJECT BEING TESTED	TEMPERATURE OF OBJECT
EXAMPLE CLASSROOM	75°
MY CLASSROOM	
INCUBATOR FIRST TIME	
HOT FAUCET WATER	
COLD FAUCET WATER	
WATER FROM DRINKING FOUNTAIN	
INCUBATOR SECOND TIME	

Why did you choose the other areas to measure the temperature? Did any item or area surprise you with how hot or cold it is?

WHAT HAPPENED?

TIME: 25–30 minutes

LANGUAGE ARTS

SUNSHINE STATE STANDARDS:

ELA.3.R.2.1—Explain how text features contribute to meaning and identify the text structures of chronology, comparison, and cause/effect in texts.

OBJECTIVE:

The student will be able to determine the cause and effect for scenarios given.

MATERIALS:

“What Happened?” worksheet

LIFE SKILLS:

Critical thinking, problem solving, cause/effect

ACTIVITY/EXPERIENCE:

Cause and Effect With Chickens

1. Ask students, “Who can remind everyone what cause and effect is?” (Answers will vary.)
2. Ask students to give examples of cause and effect (Answers will vary.)
3. Say, “Now that we have reminded ourselves what cause and effect is, let’s do this worksheet about chickens and cause and effect.”

WHAT HAPPENED? ANSWER KEY

Directions: Match the correct cause to the correct effect by drawing a line from one to the other.

CAUSE	EFFECT
<p>EXAMPLE: THE HEN SAT ON HER NEST ALL NIGHT.</p>	<p>AN EGG WAS IN THE NEST THE NEXT MORNING.</p>
<p>1. The sun came up.</p>	<p>The hen is nesting in the hen house.</p>
<p>2. Chicken eggs incubated for 21 days.</p>	<p>The hen is protecting her baby chicks.</p>
<p>3. The chicks got mud in the water dish.</p>	<p>The rooster crowed.</p>
<p>4. The hen laid eggs.</p>	<p>The pen needs more fresh water.</p>
<p>5. A fox got in the hen house.</p>	<p>Baby chicks hatched out.</p>

WHAT HAPPENED? WORKSHEET

NAME _____

Directions: Match the correct cause to the correct effect by drawing a line from one to the other.

CAUSE	EFFECT
EXAMPLE: THE HEN SAT ON HER NEST ALL NIGHT.	AN EGG WAS IN THE NEST THE NEXT MORNING.
1. The sun came up.	The hen is nesting in the hen house.
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3. The chicks got mud in the water dish.	The rooster crowed.
4. The hen laid eggs.	The pen needs more fresh water.
5. A fox got in the hen house.	Baby chicks hatched out.

EGG WORD SEARCH

TIME: 30–45 minutes

LANGUAGE ARTS

SUNSHINE STATE STANDARDS:

ELA.3.V.1.3—Use context clues, figurative language, word relationships, reference materials, and/or background knowledge to determine the meaning of multiple-meaning and unknown words and phrases, appropriate to grade level.

OBJECTIVE:

The student will be able to recognize words that are specific to chickens through a word search.

MATERIALS:

“All About Eggs” word search

LIFE SKILLS:

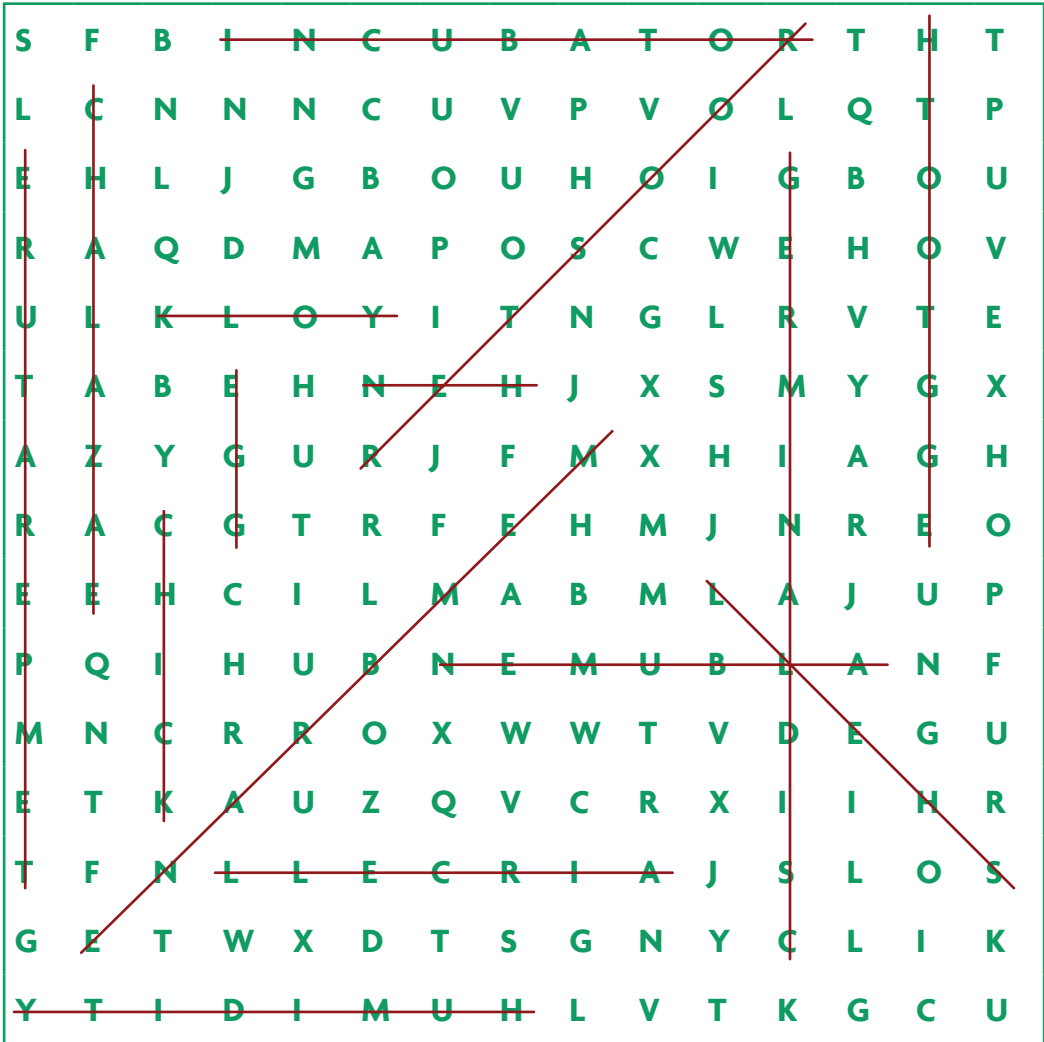
Critical thinking, recollection of knowledge

ACTIVITIES:

Word Search

1. Hand out copies of the “All About Eggs” word search.
2. Say, “Using the words we have learned so far about embryology, solve the word search.”

ALL ABOUT EGGS WORD SEARCH ANSWER KEY

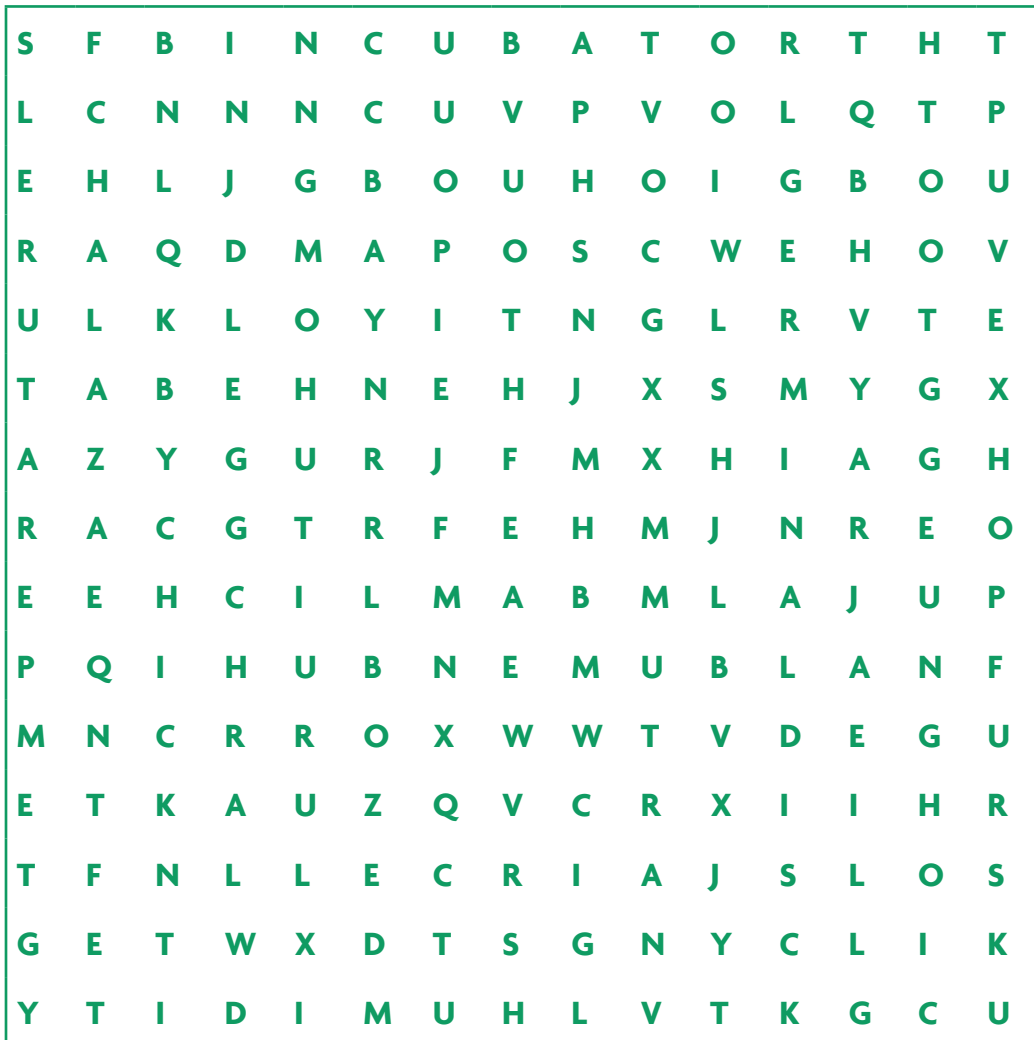


CHALAZAE
 GERMINAL DISC
 SHELL
 MEMBRANE
 YOLK
 ALBUMEN
 CHICK
 EGG

AIRCELL
 INCUBATOR
 HUMIDITY
 TEMPERATURE
 HEN
 ROOSTER
 EGGTOOTH

ALL ABOUT EGGS WORD SEARCH WORKSHEET

NAME _____



CHALAZAE

GERMINAL DISC

SHELL

MEMBRANE

YOLK

ALBUMEN

CHICK

EGG

AIRCELL

INCUBATOR

HUMIDITY

TEMPERATURE

HEN

ROOSTER

EGGTOOTH

EGGCEPTIONAL PRODUCTS

TIME: 25–30 minutes

MATHEMATICS

SUNSHINE STATE STANDARDS:

MACC.3.OA.1.3—Use repeated addition to find the total number of objects in a collection of equal groups. Represent the total number of objects using rectangular arrays and equations.

OBJECTIVE:

The student will be able to multiply rows and columns of eggs in an incubator and in egg cartons to get a final product.

MATERIALS:

Egg cartons, plastic Easter eggs (or whatever else may suffice), “Eggceptional Products” worksheet

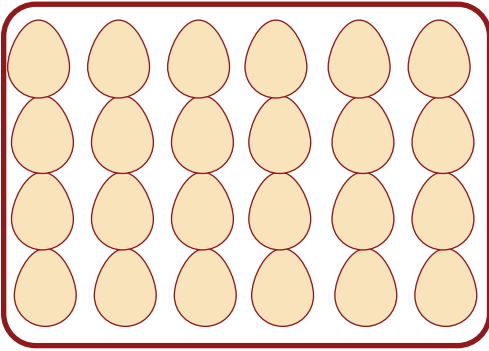
ACTIVITIES:

“Eggceptional Products” Worksheet

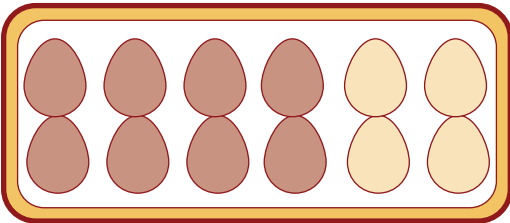
1. Have the students make physical arrays with the egg cartons and Easter eggs. Different sizes of egg cartons can make it more challenging.
2. Have students complete the worksheets. Then discuss the following questions with them:
 - How many eggs do we have in the incubator?
 - How did you know how many are in there? Did you count them? How did you count them? One by one?
 - Did you multiply one row of eggs by a column of eggs?

EGGCEPTIONAL EGGS ANSWER KEY

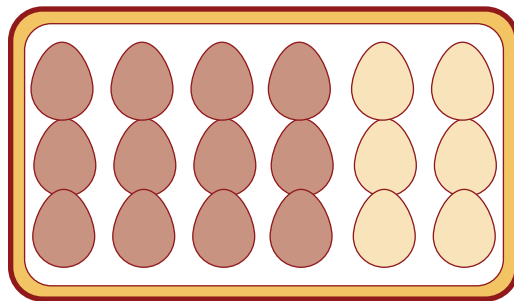
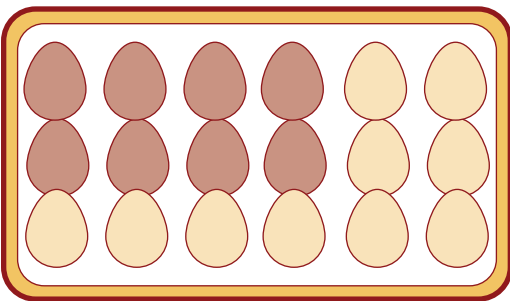
1. There are four rows of eggs with six eggs in each row in the incubator. How many eggs are there? Draw an array of the 4 rows of 6 eggs. Draw your array in the incubator as eggs.



2. If there are 8 eggs in an egg carton, what array can be made in an egg carton? Fill in the empty holes in the carton.



3. If there are 12 eggs in the carton, how many different arrays can you make? Fill in the cartons to show your arrays.



4. Can you set the eggs in any other different arrays? If so, draw one on the back of your sheet.

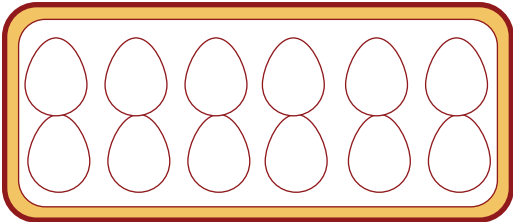
EGGCEPTIONAL PRODUCTS WORKSHEET

NAME _____

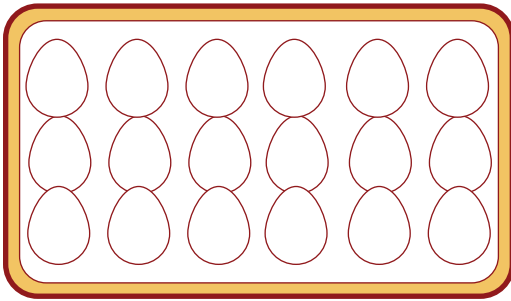
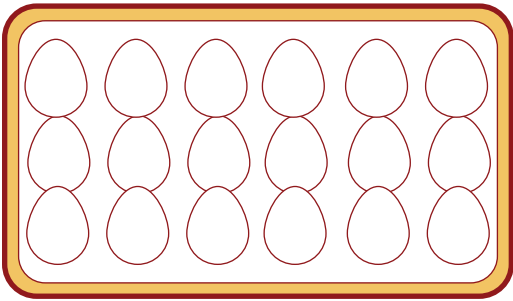
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2. If there are 8 eggs in an egg carton, what array can be made in an egg carton? Fill in the empty holes in the carton.



3. If there are 12 eggs in the carton, how many different arrays can you make? Fill in the cartons to show your arrays.



4. Can you set the eggs in any other different arrays? If so, draw one on the back of your sheet.

BABY CHICK

TIME: 20 minutes

LANGUAGE ARTS

SUNSHINE STATE STANDARDS:

ELA.3.R.I.4—Identify types of poems: free verse, rhymed verse, haiku, and limerick.

OBJECTIVES:

After reading the poem “Baby Chick” by Aileen Fisher, the student will be able to comprehend what the poem’s meaning is.

The student will be able to write a poem of their own.

MATERIALS:

Journals, “Baby Chick” poem by Aileen Fisher

LIFE SKILLS:

Critical thinking

ACTIVITY/EXPERIENCE:

Poem

1. After handing out the worksheet with the “Baby Chick” poem on it and reading the class the poem, discuss what they think the meaning of the poem is.

BABY CHICK

Peck
 Peck
 Peck
 on the warm brown egg.
 OUT comes a neck.
 OUT comes a leg
 How
 does
 a chick,
 Who’s not been about,
 discover the trick
 of how to get out?

— **Aileen Fisher**

2. Ask these questions:

- What do you think the poem’s meaning is?
- How do we know to say the word “out” louder than the rest of the words?
- Is this a happy or sad poem?
- Is it stating a fact or asking a question? What did you think of the poem?
- Do you like it? Is it exciting or boring? What else could we do to make the poem more exciting—speak faster or louder?

BABY CHICK WORKSHEET

NAME _____

BABY CHICK

Peck
Peck
Peck
on the warm brown egg.
OUT comes a neck.
OUT comes a leg
How
does
a chick,
Who's not been about,
discover the trick
of how to get out?

— AILEEN FISHER

Write your own poem about an egg, a baby chick, or a chicken like Aileen Fisher did. At the bottom of this paper, draw a picture that shows your poem.

EGGCELLENT VOCABULARY

TIME: 35 minutes

LANGUAGE ARTS

SUNSHINE STATE STANDARDS:

ELA.3.V.1.3—Use context clues, figurative language, word relationships, reference materials, and/or background knowledge to determine the meaning of multiple-meaning and unknown words and phrases, appropriate to grade level.

OBJECTIVES:

The student will be able to define vocabulary words with the assistance of a dictionary. The student will be able to write vocabulary words in a sentence by utilizing context clues.

MATERIALS:

Journals, dictionaries

LIFE SKILLS:

Critical thinking, recollection of knowledge, research

ACTIVITY/EXPERIENCE:

Vocabulary Assignment

Define the following vocabulary words and then write each one in a sentence.

1. Germinal disc
2. Yolk
3. Chalazae
4. Egg
5. Vitelline Membrane
6. Albumen
7. Air Cell
8. Membrane
9. Shell
10. Incubator

EGGCELLENT VOCABULARY WORKSHEET

NAME _____

Directions: Define the following vocabulary words and then write each one in a sentence.

1. Germinal disc

2. Yolk

3. Chalazae

4. Egg

5. Vitelline Membrane

6. Albumen

7. Air Cell

8. Membrane

9. Shell

10. Incubator

COOKING WITH EGGS

TIME: 1 hour

HEALTH

SUNSHINE STATE STANDARD:

HE.3.B.5.2—List healthy options to health-related issues or problems.

OBJECTIVES:

The student will be able to identify a variety of healthy protein choices.

The student will be able to make informed decisions when choosing to eat eggs. The student will learn how to make eggs.

MATERIALS:

Eggs, paper plates, forks, hot plate/griddle, salsa, cheese, low-fat milk, microwave, non-stick spray, lunch meat (ham), small whole wheat tortillas, salt, pepper, “Food Critique” worksheet

LIFE SKILLS:

Healthy lifestyle choices

ACTIVITIES/EXPERIENCE:

Egg Cookery

1. Ask students the following questions:
 - How many of you eat eggs?
 - How often do you eat them?
 - What are the different ways to eat eggs?
Scrambled, over easy, omelet, boiled, deviled.
(Answers will vary.)
2. Share the following: “Eggs are an excellent source of protein and vitamins that are good for us. They can be a great snack or meal! We are going to explore some healthy ways to make and eat eggs.”
3. “The ways we are going to cook eggs are scrambled, boiled, pan fried, an omelet, and even a breakfast burrito!” (You can change this based on availability of products.)
4. Recipes are from <http://www.incredibleegg.org/recipes/collection/simply-eggs>.
5. With the students make a variety of eggs in the classroom using the recipes provided. After the students have completed their cooking, have them record their results—name of dish, smell, look, taste, thoughts, and attitude about the taste—on the Food Critique worksheet. Have them add this information in their journals.

COOKING WITH EGGS WORKSHEET

DETECTIVE'S HARD-BOILED EGGS

PREP TIME: 1 minute

COOK TIME: 9–15 minutes

SERVINGS: As desired



Ingredients: Eggs

DIRECTIONS:

Step 1

- **PLACE** eggs in saucepan large enough to hold them in single layer. **ADD** cold water to cover eggs by 1 inch. **HEAT** over high heat just to boiling. **REMOVE** from burner. **COVER** pan.

Step 2

- **LET EGGS STAND** in hot water about 12 minutes for large eggs (9 minutes for medium eggs; 15 minutes for extra large).

Step 3

- **DRAIN** immediately and serve warm. **OR**, cool completely under cold running water or in bowl of ice water, then **REFRIGERATE**.

TIP: For easier peeling, use eggs that are 7 to 10 days old. Pack hard-boiled eggs for lunch. Slice or cut into wedges for tossed salad. Dice for egg salad. Color and decorate for Easter.

COOKING WITH EGGS WORKSHEET

THE BEST FRIED EGGS

PREP TIME: 1 minute

COOK TIME: 6-8 minutes

SERVINGS: 2-4 servings



INGREDIENTS: Butter

2 to 4 eggs

Salt and pepper

DIRECTIONS:

Step 1

- For Over-Easy or Over-Hard Eggs—**HEAT** 2 teaspoons (tsp) butter in non-stick skillet over medium-high heat until hot.

Step 2

- **BREAK EGGS** and **SLIP INTO PAN**, 1 at a time. Immediately **REDUCE HEAT** to low.

Step 3

- **COOK SLOWLY** until whites are completely set and yolks begin to thicken but are not hard (5 to 6 minutes). **SLIDE TURNER** under each egg and carefully **FLIP IT OVER** in pan. **COOK** second side to desired doneness. **SPRINKLE** with salt and pepper. **SERVE** immediately.

Step 4

- For Basted Eggs—**COOK** as for Over-Easy or Over-Hard Eggs, but use 2 tablespoons (tbsp) butter. Cook until edges turn white. **BEGIN BASTING** eggs with butter from pan. **COVER PAN** between basting and **CONTINUE COOKING** until whites are completely set and yolks begin to thicken but are not hard.

Step 5

- For Steam-Basted Eggs—**COOK** as for Over-Easy or Over-Hard Eggs, but use 1 tsp butter or a light coating of cooking spray. Cook until edges turn white. **ADD** 1 tsp water to pan. **COVER PAN** tightly. **CONTINUE COOKING** until whites are completely set and yolks begin to thicken but are not hard.

TIP: Serve fried eggs for breakfast, in sandwiches or on top of steaks, burgers, or hash. For a cleaner shape, break eggs into custard cups before sliding them into the pan.

Recipes/images are from <https://www.incredibleegg.org/recipes/basic-fried-eggs/>

COOKING WITH EGGS WORKSHEET

SCRAMBLED EGGS IN THE MICROWAVE

PREP TIME: 1 minute

COOK TIME: 2 minutes

SERVINGS: 1 serving



INGREDIENTS: 2 eggs

2 Tbsp of milk

Salt and pepper

DIRECTIONS:

Step 1

- **BEAT** eggs, milk, salt, and pepper in microwave-safe bowl until blended.

Step 2:

- **MICROWAVE** on **HIGH** 45 seconds. Stir. **MICROWAVE** until eggs are almost set, 30 to 45 seconds longer. **SERVE** immediately.

TIP: Microwave scrambled eggs are done in less than 3 minutes. Add diced meat, shredded cheese, or chopped veggies for a more interesting breakfast or snack. Don't overcook. Scrambled eggs will continue to cook and firm up after removed from microwave.

COOKING WITH EGGS WORKSHEET

SPINACH, HAM AND CHEESE OMELET

PREP TIME: 5 minute

COOK TIME: 5 minutes

SERVINGS: 1 to 2 servings



INGREDIENTS: 2 eggs

1 tsp butter

2 tbsp water

¼ cup finely chopped ham

¼ cup shredded Italian cheese

¼ cup baby spinach, salt and pepper

DIRECTIONS:

Step 1

- **BEAT** eggs and water in small bowl until blended.

Step 2

- **HEAT** butter in 7- to 10-inch nonstick omelet pan or skillet over medium-high heat until hot. **TILT** pan to coat bottom. **POUR IN** egg mixture. Mixture should set immediately at edges.

Step 3

- **GENTLY PUSH** cooked portions from edges toward the center with inverted turner so that uncooked eggs can reach the hot pan surface. **CONTINUE** cooking, tilting pan, and gently moving cooked portions as needed.

Step 4

- When top surface of eggs is thickened and no visible liquid egg remains, season with salt and pepper. **PLACE** cheese on one side of omelet; top with spinach and ham. **FOLD** omelet in half with turner. With a quick flip of the wrist, turn pan and **INVERT** or **SLIDE** omelet onto plate. **SERVE** immediately.

TIP: This fast classic savory egg, spinach, and cheese omelet is an excellent source of protein and vitamin D.

Recipes/images are from <https://www.incredibleegg.org/recipes/spinach-ham-cheese-omelet/>

COOKING WITH EGGS WORKSHEET

CEREAL BOWL EGG & CHEESE BREAKFAST BURRITO

PREP TIME: 2 minute

COOK TIME: 45-60 seconds

SERVINGS: 1 serving



INGREDIENTS: 1 egg

1 flour tortilla

1 tbsp salsa

1 tbsp shredded Mexican cheese blend

DIRECTIONS:

Step 1

- **LINE** 2-cup microwave-safe cereal bowl with microwave-safe paper towel. **PRESS** tortilla into bowl. **BREAK** egg into center of tortilla. **BEAT** egg gently with a fork until blended, being careful not to tear tortilla.

Step 2

- **MICROWAVE** on **HIGH** 30 seconds; stir. **MICROWAVE** until egg is almost set, 15 to 30 seconds longer.

Step 3






- **REMOVE** tortilla with paper towel liner from bowl to flat surface. **TOP** egg with cheese and salsa.

TIP: Whip up an on-the-go Mexican-style breakfast with a quick and easy microwave egg scramble.

Recipes/images are from <https://www.incredibleegg.org/recipes/microwave-egg-cheese-breakfast-burrito-2-2/>

ALL ABOUT EGGS WORD SEARCH

NAME _____






DISH:     

SMELL:

TASTE:

LOOK:

THOUGHTS:





DISH:     

SMELL:

TASTE:

LOOK:

THOUGHTS:






DISH:     

SMELL:

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EGGCITING CRISS-CROSS PUZZLE

TIME: 25–30 minutes

LANGUAGE ARTS

SUNSHINE STATE STANDARDS:

ELA. 3.V.1.3—Use context clues, figurative language, word relationships, reference materials, and/or background knowledge to determine the meaning of multiple-meaning and unknown words and phrases, appropriate to grade level.

OBJECTIVE:

The student will be able to solve the crossword puzzle made of words learned in class.

MATERIALS:

“Eggciting Criss-Cross Words!” puzzle

LIFE SKILLS:

Critical thinking, recollection of knowledge

ACTIVITY/EXPERIENCE:

Vocabulary Crossword Puzzle

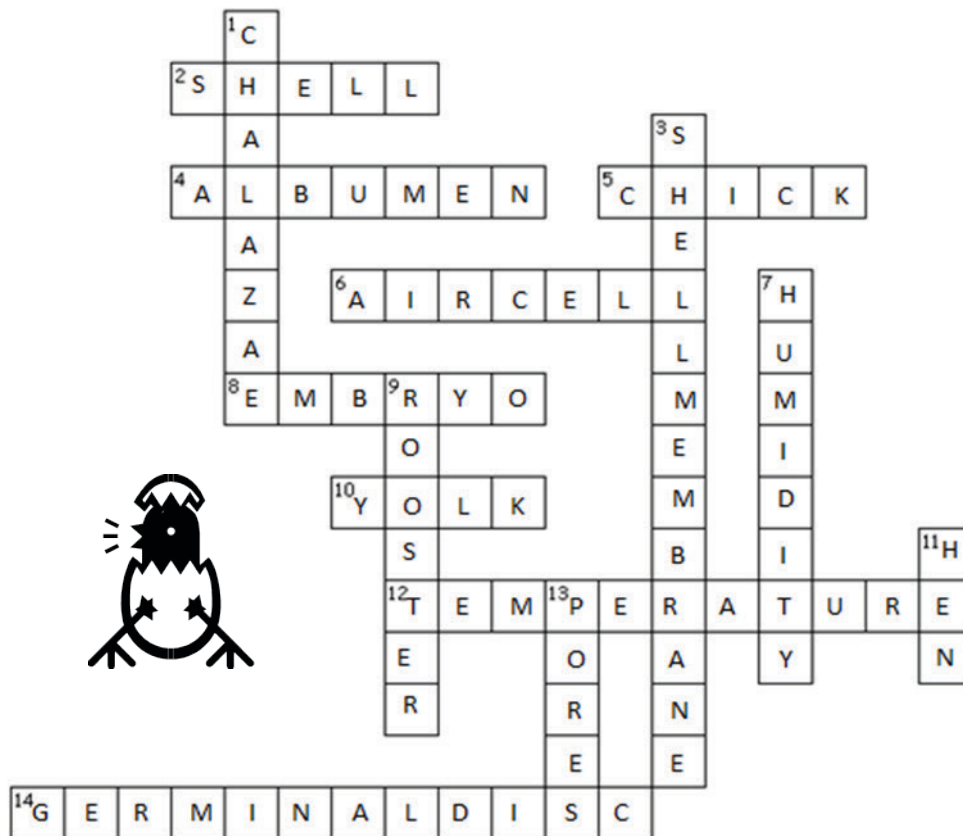
1. Have students fill out the crossword puzzle.

Say, “Using the words we have learned so far about embryology, solve the crossword puzzle. Your journal activities could help solve some of the clues.”

Using their chick journals, they should be able to solve the clues of the words. Depending on level, partnering up may be better for them to work together to solve the puzzle.

EGGCITING CRISS-CROSS WORDS! ANSWER KEY

DIRECTIONS: Use the clues to fill in the blanks with words related to embryology

**ACROSS**

2. Hard protective outer covering of an egg
4. White of an egg, supplies the embryo with food and water
5. Baby chicken
6. Pocket of air at the large end of the egg
8. Earliest stage of growth/development of an organism
10. Yellow of the egg, the primary food source for the embryo
12. How hot or how cold something is
14. "White spot" on the yolk where the embryo develops

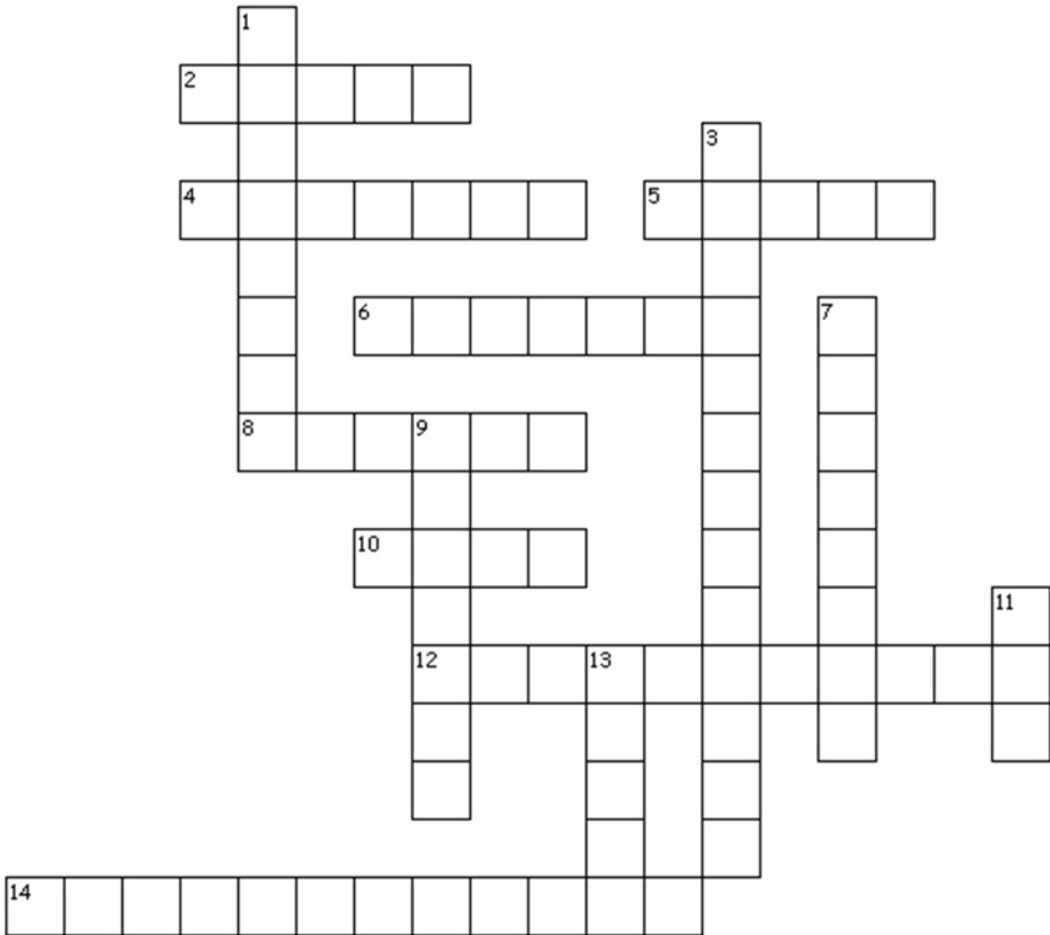
DOWN

1. Two twisted cords at each end of the yolk
3. Two thin layers inside of the shell
7. Water in the air
9. Male chicken
11. Female chicken
13. Tiny holes that let air and water in and out of the egg

EGGCITING CRISS-CROSS WORDS! WORKSHEET

NAME _____

DIRECTIONS: Use the clues to fill in the blanks with words related to embryology



ACROSS

- 2. Hard protective outer covering of an egg
- 4. White of an egg, supplies the embryo with food and water
- 5. Baby chicken
- 6. Pocket of air at the large end of the egg
- 8. Earliest stage of growth/development of an organism
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- 14. "White spot" on the yolk where the embryo develops

DOWN

- 1. Two twisted cords at each end of the yolk
- 3. Two thin layers inside of the shell
- 7. Water in the air
- 9. Male chicken
- 11. Female chicken
- 13. Tiny holes that let air and water in and out of the egg

MAKE-A-WORD

TIME: 30–45 minutes

LANGUAGE ARTS

SUNSHINE STATE STANDARDS:

ELA.3.F.1.4—Read grade-level texts with accuracy, automaticity, and appropriate prosody or expression.

OBJECTIVE:

The student will be able to recognize words that can be made out of other words.

MATERIALS:

“Make-a-Word” worksheet

ACTIVITY:

Make-a-Word

1. Have students make words from the words “chicken” and “hatching.”

Say, “This worksheet is a little difficult, but it is also fun. You will be given a word, and then you have to see how many words you can make from that one word.

“For example, if you are given the word ‘wonderful,’ how many words can you make from it?” (Answers will vary.)

“Some words that I think of are ‘flower,’ ‘found,’ ‘fun,’ ‘red,’ ‘run,’ and ‘folder.’ There are plenty other words, too.” Answers will vary. The answers provided on the answer key are only examples.

MAKE-A-WORD ANSWER KEY

DIRECTIONS: How many words can you make from the words “chicken” and “hatching”?

Print one word on each line.

CHICKEN

1. check
2. nice
3. neck
4. hike
5. chin
6. chick
7. ice
8. inch
9. hen
10. ink

HATCHING

1. chat
2. hat
3. cat
4. act
5. ha
6. at
7. chain
8. giant
9. night
10. thing

Can you think of more than 10 words for “chicken” and “hatching”?

MAKE-A-WORD WORKSHEET

NAME _____

DIRECTIONS: How many words can you make from the words “chicken” and “hatching”?

Print one word on each line.

CHICKEN

- | | |
|----------|-----------|
| 1. _____ | 6. _____ |
| 2. _____ | 7. _____ |
| 3. _____ | 8. _____ |
| 4. _____ | 9. _____ |
| 5. _____ | 10. _____ |

HATCHING

- | | |
|----------|-----------|
| 1. _____ | 6. _____ |
| 2. _____ | 7. _____ |
| 3. _____ | 8. _____ |
| 4. _____ | 9. _____ |
| 5. _____ | 10. _____ |

Can you think of more than 10 words for “chicken” and “hatching”?

FACT OR OPINION

TIME: 25–30 minutes

LANGUAGE ARTS

SUNSHINE STATE STANDARDS:

ELA. 3.V.1.3— Use context clues, figurative language, word relationships, reference materials, and/or background knowledge to determine the meaning of multiple-meaning and unknown words and phrases, appropriate to grade level.

OBJECTIVE:

The student will be able to recognize the differences between facts and opinions.

MATERIALS:

“Fact or Opinion?” worksheet

LIFE SKILLS:

Critical thinking, fact/opinion

ACTIVITY/EXPERIENCE:

Fact or Opinion

1. Share with students, “We all know what facts and opinions are. Who can tell me what they are?” (Answers will vary.) “What are some examples? Now that we have reminded ourselves what fact and opinion are, let’s do this worksheet about chicken facts and opinions.”
2. Have students fill out the worksheet and discuss how to tell if something is fact or opinion.

FACT OR OPINION? ANSWER KEY

DIRECTIONS: Tell whether the statements below are a fact or an opinion.

Example: Chickens have an odor. <i>Fact</i>	Example: Chickens smell bad. <i>Opinion</i>
Chicken feet are creepy. <i>Opinion</i>	Chicken feet have toes. <i>Fact</i>
It takes 21 days for chicks to hatch. <i>Fact</i>	Chicken eggs must be 100° to hatch. <i>Fact</i>
Some breeds of chickens are pretty. <i>Opinion</i>	Hens like laying eggs. <i>Opinion</i>
Roosters crow loudly. <i>Opinion</i>	Baby chicks do not have feathers. <i>Fact</i>
Hens are mean. <i>Opinion</i>	Hens protect their baby chicks. <i>Fact</i>
Make up your own fact about chickens.	Make up your own opinion about chickens.

FACT OR OPINION? WORKSHEET

NAME _____

DIRECTIONS: Tell whether the statements below are a fact or an opinion.

Example: Chickens have an odor. <i>Fact</i>	Example: Chickens smell bad. <i>Opinion</i>
Chicken feet are creepy.	Chicken feet have toes.
It takes 21 days for chicks to hatch.	Chicken eggs must be 100° to hatch.
Some breeds of chickens are pretty.	Hens like laying eggs.
Roosters crow loudly.	Baby chicks do not have feathers.
Hens are mean.	Hens protect their baby chicks.
Make up your own fact about chickens.	Make up your own opinion about chickens.

PECKING ORDER

TIME: 35 minutes

READING

SUNSHINE STATE STANDARDS:

SS.3.CG.3.2—Recognize that government has local, state and national levels.

OBJECTIVE:

The student will be able to describe the levels of government through learning about pecking order.

MATERIALS:

Deck of cards, journal

LIFE SKILLS:

Accepting differences, social skills, cooperation, teamwork

ACTIVITY/EXPERIENCE:

Pecking Order

1. Ask students, “What is meant by the term ‘pecking order?’” (Answers will vary.)
2. Share the following with the students:

“Dominance structure is an important feature of how chickens relate to members of their species. Have you noticed that ‘pecking order,’ or the urge to fit into social hierarchies, is also powerful in humans?”

“For example, the armed forces depend upon a hierarchical structure for efficiency and discipline. We see hierarchical structures in corporations and other organizations as well as in peer groups and on playgrounds. Sometimes a person so badly wants a higher place in that hierarchy that they turn into a bully. Most of us can give examples of how bullying behavior affects our lives or the lives of people we know. Luckily, we humans have the ability to reason

through this and find much more peaceful ways of settling our disputes.”

Such discussions are a valuable part of the preparation and follow-up for this simulation game about pecking order.

3. Have students play the Pecking Order Game.

PECKING ORDER GAME

MAIN IDEA

In this game, each person will find their place in a “pecking order” based on the value of a playing card, which they will chose at random. The highest ranking card is a king, followed by queen, jack, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1, and ace.

DIRECTIONS

1. Each player chooses a playing card. WITHOUT looking at it, each places the card above their forehead so that others can see it.
2. The players interact with one another for 5 minutes. The goal is to interact with people who are at the top of the pecking order. However, players do not know the hierarchical value of their own card. They can only guess this by the way others react to them.
3. At the end of the 5 minutes (and still without having seen their own card), each player lines up according to the place they perceive they fall in the pecking order.
4. Finally, all players look at their cards and check to see how closely the line formed based on everyone’s perceptions.

ASK STUDENTS:

- How accurate was the pecking order? Did most of the players know where they should stand?
- Reflect on this experience and write in your journal.
Did you correctly perceive where you stood in the pecking order? What did it feel like when people reacted to you the way they did? How does it feel to be in a position of higher or lower status?
- What examples can you find of how humans are similar and different from animals with regard to social dominance? Define the word “humane” and use it in your journal writing.

EGGS-TRAORDINARY FRACTIONS

TIME: 25–30 minutes

MATHEMATICS

SUNSHINE STATE STANDARDS:

MA.3.FR.1.1—Represent and interpret unit fractions in the form $1/n$ as the quantity formed by one part when a whole is partitioned into n equal parts.

OBJECTIVE:

The student will be able to add and subtract fractions that look like eggs.

MATERIALS:

“Eggs-traordinary Fractions” worksheet

LIFE SKILLS:

Problem solving, critical thinking

ACTIVITY/EXPERIENCE:

Eggs-traordinary Fractions

1. Have students fill out the “Eggs-traordinary Fractions” worksheet.




Tell students, “We know how to add fractions of things together to make a whole item or more than or less than a whole item. Use the pieces of egg to see what fractions they make.”

EGGS-TRAORDINARY FRACTIONS ANSWER KEY




DIRECTIONS: Add or subtract the eggs, or pieces of eggs to find the sum or difference.

1.  +  = 1

2.  +  = 1 1/2

3.  +  +  = 2

4.  -  = 1/2

5.  +  -  = 1

EGGS-TRAORDINARY FRACTIONS WORKSHEET

NAME _____

DIRECTIONS: Add or subtract the eggs, or pieces of eggs to find the sum or difference.

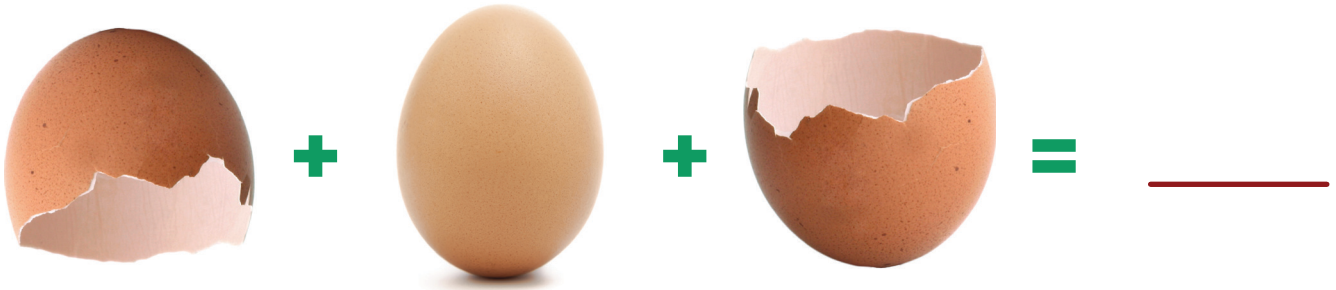
1.



2.



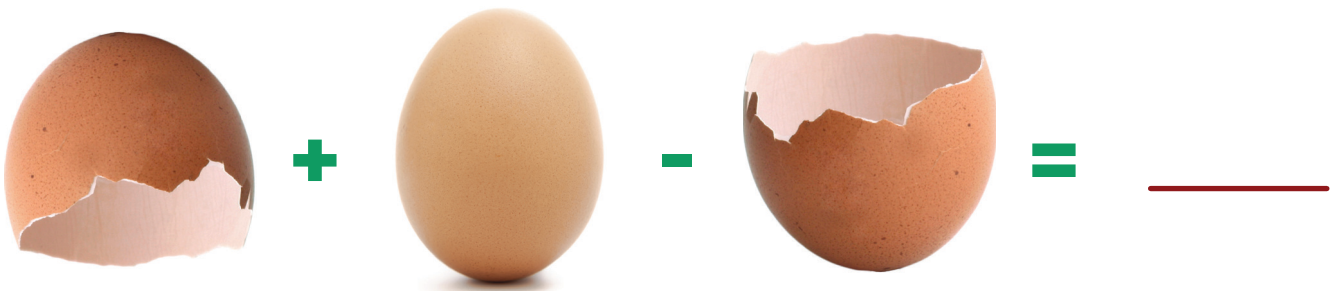
3.



4.



5.



EGGCITING WRITING

TIME: 35 minutes

WRITING

SUNSHINE STATE STANDARDS:

ELA.3.C.1.2—Write personal or fictional narratives using a logical sequence of events, appropriate descriptions, dialogue, a variety of transitional words or phrases, and an ending.

OBJECTIVES:

The student will be able to write a narrative story with details, transitional words, the use of sequences, and in proper five paragraph format.

MATERIALS:

Journal

LIFE SKILLS:

Critical thinking, planning/organizing

ACTIVITY/EXPERIENCE:

Writing About Our Eggs

1. Tell students, “You have just been given an incubator and 15 chicken eggs. Write a story about the journey of a developing chick inside the egg. Be sure to include step by step information as well as your own creativity for this story.”

EGGCELLENT VOCABULARY

TIME: 25–30 minutes

LANGUAGE ARTS

SUNSHINE STATE STANDARDS:

ELA. 3.V.1.3—Use context clues, figurative language, word relationships, reference materials, and/or background knowledge to determine the meaning of multiple-meaning and unknown words and phrases, appropriate to grade level.

OBJECTIVE:

The student will be able to research the definitions and write the word from embryology in a sentence.

MATERIALS:

Journals, dictionaries

LIFE SKILLS:

Critical thinking, recollection of knowledge, research

ACTIVITY:

Vocabulary Assignment

Define the following vocabulary words and then write each one in a sentence.

1. Incubator
2. Pores
3. Embryo
4. Hen
5. Humidity
6. Temperature
7. Fertilize
8. Egg Tooth
9. Rooster
10. Hatch

CREATE AN EGG

TIME: 50–60 minutes

SCIENCE

SUNSHINE STATE STANDARDS:

SC.3.N.3.2—Recognize that scientists use models to help understand and explain how things work.

OBJECTIVE:

The student will be able to recognize the parts of the egg and create a visual display with the help of a partner and provided materials.

MATERIALS:

Journal, pipe cleaners, markers, pens, glue, pom-poms, styrofoam, etc.

LIFE SKILLS:

Critical thinking, creativity, cooperation, teamwork

ACTIVITY/EXPERIENCE:

Create an Egg

1. Similar to cell structure activities, students will take objects and create an egg. For example, a pom-pom could be the yolk, pipe cleaners the shell, and so on. Say, “What we are going to do is take some of the craft pieces that we have in the classroom and create an egg from those pieces by using our imagination.”
2. Tell the students: “Get with a partner to do this project. It can look however you want as long as it follows the basics of what an egg is. Be sure and label all of the parts, and be sure to put your names on your papers.”

Questions

1. What do you like best about your egg?
2. What did you and your partner want to use for the yolk?
3. What would you change about your egg?

DON'T COUNT YOUR CHICKENS BEFORE THEY HATCH

TIME: 45 minutes

MATHEMATICS/SCIENCE

SUNSHINE STATE STANDARDS:

MA.3.FR.1.1—Represent and interpret unit fractions in the form $1/n$ as the quantity formed by one part when a whole is partitioned into n equal parts.

SC.3.L.15.1—Classify animals into major groups (mammals, birds, reptiles, amphibians, fish, arthropods, vertebrates and invertebrates, those having live births and those which lay eggs) according to their physical characteristics and behaviors.

OBJECTIVE:

The student will be able to recognize the number of eggs that are fertile and to make predictions as to how many will hatch, then how many survive after hatching.

MATERIALS:

Record of candled/fertilized eggs from journals

LIFE SKILLS:

Data collection, empathy

ACTIVITY:

1. Begin the discussion by asking students if they know why we say “Don’t count your chickens before they hatch!” (Answers will vary.) Explain that not all eggs will hatch in the incubator.
2. Explain that some eggs will be fertile and some will be infertile (duds). Infertile eggs need to be removed from the incubator.
3. From there, most of the eggs will develop. At a certain point, some of those that have been developing will not continue to develop. This is because something was wrong with them. It may be that a disease or even a temperature change killed the developing embryo.
4. Once chicks begin to hatch, there will be some eggs that do not hatch. There will also be chicks that hatch out that will not survive. Once again, this is because there is something wrong with the chick and it is not strong enough for survival.
5. Have students make predictions on how many chicks they think will hatch.
6. Do some practice fraction examples on the board.
7. For example, if we have 22 eggs in our incubator and 17 hatch, what fraction did not hatch? (Answer: $5/22$.)
8. Using information from when we candled eggs, how many chicks do you think will hatch? How many do you think will survive after the hatch? How many were fertile in the beginning?







VOCABULARY

Air Cell - a cavity or receptacle for air; in the top of the egg between the membrane and shell.

Air Exchange - when air and/or carbon dioxide pass in and out of the shell.

Albumen - the part of the inside of an egg that is clear before it is cooked and white after it is cooked; the white of an egg.

Allantois - a vascular fetal membrane of reptiles, birds, and mammals that is formed as a pouch from the hindgut.

Brooder Box - a heated structure used for raising young fowl.

Candling - to examine by holding between the eye and a light.

Chalazae - two spiral bands in the white of a bird's egg that extend from the yolk and attach to opposite ends of the lining membrane.

Chorion - the highly vascular outer embryonic membrane of reptiles and birds.

Comb - a fleshy crest on the head of the domestic chicken and other domestic birds.

Egg Tooth - a hard sharp prominence on the beak of an unhatched bird or the nose of an unhatched reptile that is used to break through the eggshell.

Egg Turner - Electric motor automatically rotates the eggs to prevent the yolk from settling to one side and to exercise the embryo.

Embryo - a plant or animal in the early stages of growth and differentiation that are characterized by cleavage, the laying down of fundamental tissues, and the formation of primitive organs and organ systems as well as the young sporophyte of a seed plant usually comprising a rudimentary plant with plumule, radicle, and cotyledons.

Embryology - a branch of biology dealing with embryos and their development.

Fertilize - to make (an egg) able to grow and develop.

Germinal Disc - also called the blastodisc, is a small, circular, white spot (approximately 2-3 mm across) on the surface of the yellow yolk of a bird's egg.

Hatch(ing) Rate - The rate or ratio at which fertilized eggs hatch in comparison to eggs that do not hatch.

Incubator - an apparatus with a chamber used to provide controlled environmental conditions especially for eggs to stay warm before they hatch.

Forced Air - An incubator with a motorized fan to keep warm air moving throughout the container.

Still Air - An incubator that has only a heating element.

Infertile - not fertile or productive.

Layer - a person or thing that lays something, in this case a female chicken.

Membrane - a pliable sheet-like structure acting as a boundary, lining, or partition in an organism.

VOCABULARY

Ossification - the process in which cartilage is transformed into bone.

Pip - When a young bird (chick) breaks through the shell to hatch.

Relative Humidity - the amount of water vapor present in air expressed as a percentage of the amount needed for saturation at the same temperature.

Shell - the hard protective outer case.

Ventilation - the provision of fresh air.

Vitelline Membrane - a membrane enclosing an egg.

Wattles - a fleshy process that hangs usually from the head or neck.

Yolk Sac - a membranous sac of most vertebrates that encloses the yolk, is attached in most forms (as in humans) through the yolk stalk with the intestinal cavity of the embryo, and is supplied with blood vessels that transport nutritive yolk products to the developing embryo.

Definitions from Merriam-Webster.com (2015).

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