

Dairy Math!

Dear Educator,

When we consider the skills that it takes to be a dairy farmer, animal care and agriculture may come to mind. But what about math? As with running any business, numbers are top of mind for dairy farmers as they calculate how much feed their herd will need to stay healthy, how many gallons of milk they will provide to school systems, restaurants, and home consumers, how much energy they can save by using technology effectively, and more.

This free educational program from Dairy Farmers of Wisconsin, created in cooperation with the curriculum specialists at Young Minds Inspired (YMI), includes engaging activities built on standards-based math skills that profile a day in the life of a dairy farmer. Students will help farmers by computing the math needed to provide care for their cows and practice sustainability on their farms. And at the end of the day, students will calculate how the farmer's family can follow the USDA MyPlate guidelines for healthy eating and apply those same guidelines to their families' meals at home.

Please share these materials with other teachers in your school. Although the materials are copyrighted, you may make as many copies as needed for educational purposes. Please comment online at ymiclassroom.com/feedback-WisconsinDairy to provide feedback. We look forward to hearing from you.

Sincerely,

Youth and Schools Team at
Dairy Farmers of Wisconsin

Dr. Dominic Kinsley
Editor in Chief
Young Minds Inspired



For questions, contact us toll-free at 1-800-859-8005 or by email at feedback@ymiclassroom.com.

Target Audience

Elementary school students in grades 2-4 and their families

Program Objectives

- Explore how dairy farmers use math to manage farm operations
- Raise awareness of the animal care principles that dairy farmers follow
- Inform students about the sustainability practices that help dairy farmers protect the environment
- Inspire students and their families to build and maintain healthy eating patterns based on MyPlate guidelines that include dairy products
- Support math and language arts skills

Program Components

- This one-page teacher's guide
- Three reproducible activity sheets

Please comment online at ymiclassroom.com/feedback-WisconsinDairy.

How to Use This Program

Photocopy the teacher's guide and activity sheets. Students can work individually, in small groups, or as a class to complete the activities. To review program alignment with Common Core standards, visit ymiclassroom.com/WisconsinDairy.



Cow Care Counts

In this activity, students will help the dairy farmer solve math problems as she cares for her cows. Healthy cows ensure that the milk that reaches our schools, restaurants, and homes provides the nutrition recommended by USDA's MyPlate guidelines for dairy consumption (2½ servings of dairy per day for 4- to 8-year-olds, and 3 servings for children 9 and older).

Distribute the activity sheet. Tell students that farmer Heather Jauquet needs their help as she begins the day caring for her cows. Have them read the directions on the activity sheet, and then complete the math problems. When students are finished, discuss the answers, pointing out that caring for cows is a 24/7/365 job that requires care and dedication. No days off! **Answers:** 1: 450 square feet; 2: 64 pints; 3: 5 minutes; 4: 15 minutes; 5: 5 hours of rest; 7 more hours; 6: 42 hours. Bonus: 960 teeth.

Extension Activity: Help students see that calculating the amount of feed needed for dairy cows is just like making sure their pets have enough feed on hand at home. Challenge them to calculate how much feed their pet(s) eat in a week, based on one day's worth. If they don't have a pet, they can partner with someone who does. Compare and contrast different pet needs.



Adding Sustainability

In this activity, students will learn about the math associated with farming practices that help promote sustainability. First grab students' attention by crumpling up a piece of paper and casually tossing it onto the floor instead of into the recycling bin. Once students react, lead them to agree that paper should be recycled, and then ask them why. Discuss the importance of recycling and other ways we conserve or save natural resources to take care of the Earth. Explain that this is known as *sustainability*. Practicing sustainability means dairy farmers do more with fewer natural resources, and reuse resources like water and manure effectively to save costs and reduce waste.



Distribute the activity sheet and review the directions. When students are finished, discuss the answers, pointing out that care for the environment, plus care for cows, are key responsibilities embraced by dairy farmers. **Answers:** 1: 66°; 2: 1,750 gallons; 3: 20 gallons; 4: 3,950 gallons; 5: creates energy, replaces fertilizer, is used as cow bedding; 6: 17 million more cows.

Extension Activity: Ask students to graph the type and number of tasks and chores they do each day. How does their work compare to that of the dairy farmer? Have them use their data to write word problems they can use to challenge their classmates.



Nutrition Sums It Up!

In this activity, students will help the dairy farmer and her family enjoy a balanced meal based on MyPlate guidelines.

Ask students to name foods made from milk (yogurt, cheese, cottage cheese). Explain that these foods are all called "dairy" foods, and they are an important part of a balanced diet.

Tell students that, after a hard day's work on the farm, it's time for the farmer and her family to enjoy a nutritious meal together. But is the family making balanced food choices? As a class, discuss why it is important to eat healthy. Tell students that the USDA provides MyPlate guidelines to help people eat balanced meals that include nutrients needed to maintain good health.

Distribute the activity sheet and review the directions, including the MyPlate guidelines. When students have finished Part 1, discuss the categories students chose. **Answers:** Food groups missing from each meal – 1: whole grains, dairy; 2: vegetables, fruits; 3: vegetables, protein. **Add it up!** – 21 servings of each food group per week.

For Part 2, have students create a nutritious meal that includes their choice of a favorite dairy food such as milk, yogurt, or cheese. Ask students to share and explain their choices.

Extension Activity: Have students work together to make MyPlate posters to display in the cafeteria to help classmates make healthy food choices.

Resources

- Dairy Farmers of Wisconsin: WisconsinDairy.org
- Virtual Farm Tour with Alice in Dairyland: <https://www.wisconsin dairy.org/Youth-and-Schools/Dairy-Education/Farm-to-Table-Lesson-Registration/Farm-to-Table-Lesson-Farm-Tour>
- Farm to Table with Wisconsin Dairy Lesson: <https://www.wisconsin dairy.org/Youth-and-Schools/Dairy-Education/Farm-to-Table-Lesson-Registration/Farm-to-Table-Lesson>
- Dairy Lessons, Books, and Videos: <https://www.wisconsin dairy.org/Youth-and-Schools/Dairy-Education>
- Wisconsin Dairy Facts: <https://dfwblobstorage.blob.core.windows.net/ewcmediacontainer/eatwisconsincheese/media/content/statistics/proudly-wisconsin-dairy-facts.pdf>
- Wisconsin Cheese Facts: <https://dfwblobstorage.blob.core.windows.net/ewcmediacontainer/eatwisconsincheese/media/content/statistics/proudly-wisconsin-cheese-facts.pdf>
- Wisconsin Fuel Up to Play 60: <https://www.wisconsin dairy.org/Youth-and-Schools/Fuel-Up-To-Play-60>
- Dairy Foods Fun Book: <https://www.wisconsin dairy.org/WisconsinDairy/media/Wisconsin-Dairy/Youth%20and%20Schools/YSP-FTT-funbook.pdf>

Cow Care Counts

REPRODUCIBLE MASTER



Meet Heather Jauquet. Heather is a dairy farmer who owns Synergy Family Dairy in Pulaski, WI. Heather is up with the sun and ready to care for her cows. To get started, she needs to plan for their comfort and productivity. Can you help her by solving the math problems below?

1. First, it's time to milk the cows! The cows live in a cool, comfortable barn with open space where they can move around and stalls where they can rest. The average Wisconsin dairy farmer has 189 cows. To stay healthy, each cow needs about 15 square feet of stall space. How much space would 30 cows need?

square feet

5. In between milkings, cows have plenty of time to eat and rest. Cows rest on average for about 12 hours per day. If one cow rests from 7:30 a.m. to 10:30 a.m., then again from 3 p.m. to 5 p.m., how many hours of rest is this? How many more hours will this cow rest today after 5 p.m.?

hours of rest



2. When cows are ready to be milked, they make their way from the barn to the milking parlor. Dairy cows produce about 8 gallons of milk per day. There are 8 pints in one gallon. How many pints of milk will each cow produce every day?

pints

more hours

6. Cows can eat and drink all they want. A cow spends about 6 hours a day eating. How many hours is that each week?

hours

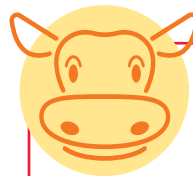
3. Several cows may be in the milking parlor at the same time. One cow starts being milked at 5:15 a.m., and is finished at 5:20 a.m. This is the average time it takes for milking. How long did it take for the cow to be milked?

minutes



4. Some cows are milked three times a day. How many minutes total will each cow spend being milked in a day? Use your answer from question 3 to solve this problem.

minutes



Bonus!

Did you know that cows have 32 teeth? They only have teeth on the bottom of their mouths. How many teeth do 30 cows have?

teeth



Local milk is available 365 days a year.



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Adding Sustainability

REPRODUCIBLE MASTER

There's a lot to do on a dairy farm in addition to taking care of the cows. For one thing, dairy farmers try to follow sustainability practices. That means finding ways to conserve resources like water and energy. Do the math and help George Crave, dairy farmer and cheesemaker at Crave Brothers Farm in Waterloo, WI, achieve his farm's sustainability goals.

1. Water is an important resource on a dairy farm. To conserve water, dairy farmers use a special recycling system. Cow's milk starts at a temperature of 101°. A plate cooler uses cold water to cool the milk to the optimal temperature of 35°. The water gets warm in the process. Dairy farmers reuse this warm water to water their cows. With the help of the cold water and plate cooler, what is the difference between the milk's starting and ending temperatures?

degrees

2. Dairy farmers know that each cow will drink about 35 gallons of water each day. That's enough to fill a bathtub! They need to be sure water is always on hand. How many gallons of water will 50 cows drink in one day?

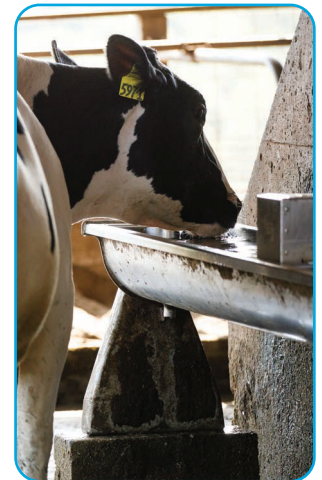
gallons

3. A cow must drink about 4 gallons of water to produce one gallon of milk. How many gallons of water does it take to produce 5 gallons of milk?

gallons

4. Dairy farmers reuse water in many other ways. When it's hot, they use water to cool off their cows. They also use it to clean the barn, and to water their crops. Dairy farmers are experts at reusing water! If the farm uses a total of 5,000 gallons of water each day, and the cows drink 1,050 gallons of water, how much water does that leave for other uses?

gallons



5. Now it's time for the dairy farmers to check the farm's methane digester. This is a system that recycles the methane gas in cow manure to create energy. The liquid part of the manure is used as fertilizer for crops. The solid part is recycled and dried to make cow bedding. You've just learned the ways that water is used on the farm. Now list the ways manure is used. Together, these practices help dairy farmers achieve sustainability.

- _____
- _____
- _____

6. These sustainability practices and others have allowed dairy farmers to produce more milk with fewer cows. For example, in 1944 it took 26 million cows to produce the same amount of milk as 9 million cows do today. How many more cows were needed in 1944 to produce milk than are needed today?

cows

Cows are the ultimate recyclers!

Their feed creates byproducts from manure and their milk creates delicious dairy products.



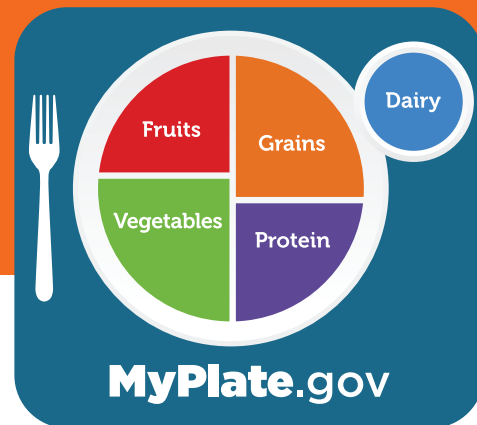
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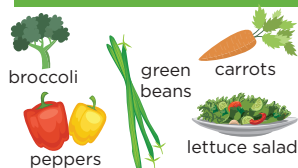
Nutrition Sums It Up!

REPRODUCIBLE MASTER



It's been a busy day on the dairy farm, and now the farmers are looking forward to enjoying a tasty meal with their family. Can you help the family make balanced food choices? Follow the USDA's MyPlate guidelines for nutritious eating to create balanced meals.

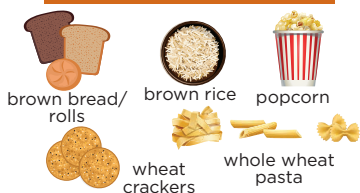
Vegetables



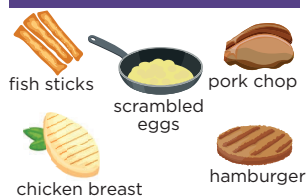
Fruits



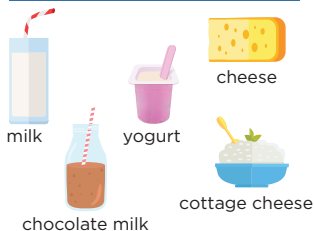
Whole Grains



Protein



Dairy



Part 1: The MyPlate graphic shows that a balanced meal should include five food categories — fruits, vegetables, whole grains, lean protein, and a serving of dairy, such as a glass of milk or cup of creamy yogurt.

First read the descriptions of what each family member recommends for dinner below. Check the food categories they have chosen. Then select foods from the column on the left to complete the meal so that it is balanced.

1. Mom's meal suggestion: pork chop, broccoli, and an apple. Is this a balanced meal? Check off the MyPlate food groups included in her meal:

☐ vegetables ☐ fruits ☐ whole grains ☐ protein ☐ dairy

What foods can she add to the meal to make it balanced?

2. Dad's meal suggestion: pork chop, a whole grain roll, and two slices of cheddar cheese. Is this a balanced meal? Check off the MyPlate food groups included in his meal:

☐ vegetables ☐ fruits ☐ whole grains ☐ protein ☐ dairy

What foods can he add to the meal to make it balanced?

3. Kids' meal suggestion: grapes, popcorn, and a large glass of milk. Is this a balanced meal? Check off the MyPlate food groups included in this meal:

☐ vegetables ☐ fruits ☐ whole grains ☐ protein ☐ dairy

What foods can they add to the meal to make it balanced?

Add it up!

It's important to include foods from all five food groups for a balanced meal. If you eat three balanced meals every day, how many servings from each food group will you eat in a week?
_____ servings of each food group per week

Part 2: Now it's your turn to make healthy food choices! Draw your own meal on the other side of this sheet, choosing from the foods listed in the column. Make sure half your plate is vegetables and fruits, and don't forget to include your favorite dairy product such as milk, yogurt, or cheese. Then share your meal choices with your classmates and explain why you chose what you did.

Attention Parents!

Check out these "dairy delicious" recipes prepared by a student and Green Bay Packer Mason Crosby at <https://www.wisconsinmilk.org/Youth-and-Schools/Fuel-Up-To-Play-60/Play-60-Resources/Play-60-Mason>.



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Dairy Math!

STANDARDS

Grades 2-4 Mathematics and English Language Arts
Common Core State Standards *

MATHEMATICS STANDARDS			
SECOND GRADE	Activity 1	Activity 2	Activity 3
OPERATIONS & ALGEBRAIC THINKING			
Represent and solve problems involving addition and subtraction. <u>CCSS.MATH.CONTENT.2.OA.A.1</u> Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.	√	√	
Add and subtract within 20. <u>CCSS.MATH.CONTENT.2.OA.B.2</u> Fluently add and subtract within 20 using mental strategies. By end of Grade 2, know from memory all sums of two one-digit numbers.	√	√	
NUMBER & OPERATIONS IN BASE TEN			
Understand place value. <u>CCSS.MATH.CONTENT.2.NBT.A.3</u> Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.	√	√	
Use place value understanding and properties of operations to add and subtract. <u>CCSS.MATH.CONTENT.2.NBT.B.5</u> Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.	√	√	
<u>CSS.MATH.CONTENT.2.NBT.B.7</u> Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.	√	√	

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MEASUREMENT & DATA

Work with time and money.

CCSS.MATH.CONTENT.2.MD.C.7

Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.

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THIRD GRADE

Activity 1

Activity 2

Activity 3

OPERATIONS & ALGEBRAIC THINKING

Represent and solve problems involving multiplication and division.

CCSS.MATH.CONTENT.3.OA.A.1

Interpret products of whole numbers, e.g., interpret 5×7 as the total number of objects in 5 groups of 7 objects each.

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CCSS.MATH.CONTENT.3.OA.A.3

Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

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Multiply and divide within 100.

CCSS.MATH.CONTENT.3.OA.C.7

Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that $8 \times 5 = 40$, one knows $40 \div 5 = 8$) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

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NUMBER & OPERATIONS IN BASE TEN

Use place value understanding and properties of operations to perform multi-digit arithmetic

CCSS.MATH.CONTENT.3.NBT.A.2

Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

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MEASUREMENT & DATA

Solve problems involving measurement and estimation.

CCSS.MATH.CONTENT.3.MD.A.1

Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.

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Geometric measurement: understand concepts of area and relate area to multiplication and to addition.

CCSS.MATH.CONTENT.3.MD.C.5

Recognize area as an attribute of plane figures and understand concepts of area measurement.

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OPERATIONS & ALGEBRAIC THINKING**Use the four operations with whole numbers to solve problems.**CCSS.MATH.CONTENT.4.OA.A.1

Interpret a multiplication equation as a comparison, e.g., interpret $35 = 5 \times 7$ as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.

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NUMBER & OPERATIONS IN BASE TEN**Use place value understanding and properties of operations to perform multi-digit arithmetic.**CCSS.MATH.CONTENT.4.NBT.B.4

Fluently add and subtract multi-digit whole numbers using the standard algorithm.

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CCSS.MATH.CONTENT.4.NBT.B.5

Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

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MEASUREMENT & DATA**Solve problems involving measurement and conversion of measurements.**CCSS.MATH.CONTENT.4.MD.A.2

Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.

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ENGLISH LANGUAGE ARTS STANDARDS

SECOND GRADE

Activity 1

Activity 2

Activity 3

READING: INFORMATIONAL TEXT

Key Ideas and Details:

CCSS.ELA-LITERACY.RI.2.1

Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.

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Craft and Structure:

CCSS.ELA-LITERACY.RI.2.4

Determine the meaning of words and phrases in a text relevant to a grade 2 topic or subject area

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READING: FOUNDATIONAL SKILLS

Phonics and Word Recognition:

CCSS.ELA-LITERACY.RF.2.3

Know and apply grade-level phonics and word analysis skills in decoding words.

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Fluency:

CCSS.ELA-LITERACY.RF.2.4

Read with sufficient accuracy and fluency to support comprehension.

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SPEAKING & LISTENING

Comprehension and Collaboration:

CCSS.ELA-LITERACY.SL.2.1

Participate in collaborative conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups.

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LANGUAGE

Conventions of Standard English:

CCSS.ELA-LITERACY.L.2.1

Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

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Knowledge of Language:

CCSS.ELA-LITERACY.L.2.3

Use knowledge of language and its conventions when writing, speaking, reading, or listening.

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Vocabulary Acquisition and Use:

CCSS.ELA-LITERACY.L.2.4

Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 2 reading and content, choosing flexibly from an array of strategies.

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ENGLISH LANGUAGE ARTS STANDARDS

THIRD GRADE

Activity 1

Activity 2

Activity 3

READING: INFORMATIONAL TEXT

Key Ideas and Details:

CCSS.ELA-LITERACY.RI.3.1

Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.

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Craft and Structure:

CCSS.ELA-LITERACY.RI.3.4

Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 3 topic or subject area.

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Integration of Knowledge and Ideas:

CCSS.ELA-LITERACY.RI.3.7

Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur).

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READING: FOUNDATIONAL SKILLS

Phonics and Word Recognition:

CCSS.ELA-LITERACY.RF.3.3

Know and apply grade-level phonics and word analysis skills in decoding words.

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Fluency:

CCSS.ELA-LITERACY.RF.3.4

Read with sufficient accuracy and fluency to support comprehension.

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SPEAKING & LISTENING

Comprehension and Collaboration:

CCSS.ELA-LITERACY.SL.3.1

Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 3 topics and texts, building on others' ideas and expressing their own clearly.

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LANGUAGE

Conventions of Standard English:

CCSS.ELA-LITERACY.L.3.1

Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

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Knowledge of Language:

CCSS.ELA-LITERACY.L.3.3

Use knowledge of language and its conventions when writing, speaking, reading, or listening.

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Vocabulary Acquisition and Use:

CCSS.ELA-LITERACY.L.3.4

Determine or clarify the meaning of unknown and multiple-meaning word and phrases based on grade 3 reading and content, choosing flexibly from a range of strategies.

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FOURTH GRADE	Activity 1	Activity 2	Activity 3
READING: INFORMATIONAL TEXT			
Key Ideas and Details: <u>CCSS.ELA-LITERACY.RI.4.1</u> Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.	√	√	√
Craft and Structure: <u>CCSS.ELA-LITERACY.RI.4.4</u> Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.	√	√	√
Integration of Knowledge and Ideas: <u>CCSS.ELA-LITERACY.RI.4.7</u> Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.	√	√	√
READING: FOUNDATIONAL SKILLS			
Phonics and Word Recognition: <u>CCSS.ELA-LITERACY.RF.4.3</u> Know and apply grade-level phonics and word analysis skills in decoding words.	√	√	√
Fluency: <u>CCSS.ELA-LITERACY.RF.4.4</u> Read with sufficient accuracy and fluency to support comprehension.	√	√	√
SPEAKING & LISTENING			
Comprehension and Collaboration: <u>CCSS.ELA-LITERACY.SL.4.1</u> Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.	√	√	√
LANGUAGE			
Conventions of Standard English: <u>CCSS.ELA-LITERACY.L.4.1</u> Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.	√	√	√
Knowledge of Language: <u>CCSS.ELA-LITERACY.L.4.3</u> Use knowledge of language and its conventions when writing, speaking, reading, or listening.	√	√	√
Vocabulary Acquisition and Use: <u>CCSS.ELA-LITERACY.L.4.4</u> Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 4 reading and content, choosing flexibly from a range of strategies.	√	√	√

