Links to Literacy

Lynn Marecek
MaryAnne Anthony-Smith

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One Hundred Hungry Ants, by Elinor J. Pinczes

Objective: Factor composite numbers

Story: 100 ants are going to a picnic. First they are in one column of 100, then two columns of 50, until they have 10 columns of 10.

Read the children's book One Hundred Hungry Ants, by Elinor J. Pinczes

1. What is the story about?

2. How does it help children learn about factors?

3. List all the ways this story factors 100.

    Answer: $1 \cdot 100,\ 2 \cdot 50,\ 4 \cdot 25,\ 5 \cdot 20,\ 10 \cdot 10$

4. Suppose there were 42 hungry ants. Draw a picture showing all the ways they could line up evenly.

    Answer: Picture showing $1 \cdot 42,\ 2 \cdot 21,\ 3 \cdot 14,\ 6 \cdot 7$

5. You'll need 36 of some small object (blocks, toothpicks, candies, etc.)

    - Read One Hundred Hungry Ants to a young child.
    - Ask the child to find all the ways the 36 objects can be separated evenly into lines.
    - Write a short paragraph about the child's comments and reactions, and list all the ways the child found to factor 36.

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One Hundred Hungry Ants, by Elinor J. Pinczes

Objective: Factor composite numbers

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Read the children's book One Hundred Hungry Ants, by Elinor J. Pinczes

1. What is the story about?
2. How does it help children learn about factors?
3. List all the ways this story factors 100.
4. Suppose there were 42 hungry ants. Draw a picture showing all the ways they could line up evenly.
5. You'll need 36 of some small object (blocks, toothpicks, candies, etc.)
    *   Read One Hundred Hungry Ants to a young child.
    *   Ask the child to find all the ways the 36 objects can be separated evenly into lines.
    *   Write a short paragraph about the child's comments and reactions, and list all the ways the child found to factor 36.

Spunky Monkeys on Parade, by Stuart J. Murphy

Objective: Identify Multiples of Numbers

Story: A parade of monkeys has performers marching in rows or
2, 3, and 4.
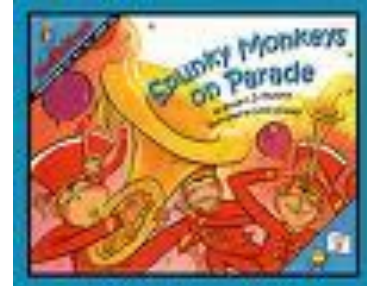
Read the children's book Spunky Monkeys on Parade, by Stuart J. Murphy

1. What is the story about?

2. Multiples of which numbers are included in this book? **Answer:** 2, 3, and 4

    (a) How many cyclists march in a row? **Answer:** 2

    (b) How many tumblers? **Answer:** 3

    (c) How many drummers? **Answer:** 4

3. How does the book help children identify multiples of numbers?

4. What if the monkey parade were longer?

    (a) Could the number of cyclists be 54? **Answer:** yes

    (b) Could the number of tumblers 54? **Answer:** yes

    (c) Could the number of drummers be 54? **Answer:** no

    (d) Explain your reasoning in words or by drawing a picture.

5. Read Spunky Monkeys on Parade to a young child.

    • Ask the child what other performers might be in a parade. Count how many performers
      there would be all together if they lined up in 10 rows of 5. How many would there be in
      10 rows of 6?

    ▪ Write a short paragraph about the child's comments and reactions.

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Spunky Monkeys on Parade, by Stuart J. Murphy

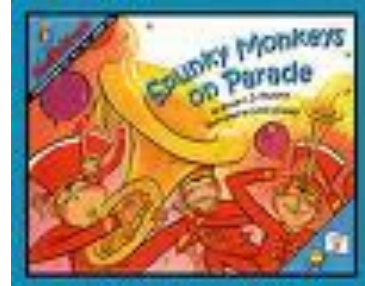**Objective:** Identify Multiples of Numbers

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   ▪ Ask the child what other performers might be in a parade. Count how many performers there would be all together if they lined up in 10 rows of 5. How many would there be in 10 rows of 6?
   ▪ Write a short paragraph about the child's comments and reactions.

A Remainder of One, by Elinor J. Pinczes

Objective: Use divisibility tests

Story: The twenty-five bugs in a parade divide in columns of 2, 3, 4 and always have 1 bug left over, until finally they divide into 5 columns of 5.

Read the children's book A Remainder of One, by Elinor J. Pinczes

1. What is the story about?

2. How does it help children learn about division?

3. Explain how you could use the divisibility tests for two, three, and five to know that the bugs cannot form two or three even columns, but they can form five even columns.

   Answer: 25 is not divisible by 2 since its last digit is not even

   25 is not divisible by 3 since $2+5=7$ and 7 is not divisible by 3

   25 is divisible by 5 since its last digit is 5

4. What is the Least Common Multiple (LCM) of 2, 3, and 5? List all the ways the bugs could form even columns if there were that many of them marching in a parade.

   Answer: 30 is the LCM of 2, 3, and 5; $1\cdot30, 2\cdot15, 3\cdot10, 5\cdot6$

5. You will need 12 small objects (buttons, beans, etc.) to represent the bugs. Read the children's book A Remainder of One to a young child.

   - Set out 8 objects and ask the child to try to place them in even lines of two, then three, and then five.

   - Repeat with 9 objects

     - 10 objects

     - 11 objects

     - 12 objects

   - Write a short paragraph about the child's comments and reactions, and draw a picture that shows how the child made lines with 12 objects.

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A Remainder of One, by Elinor J. Pinczes

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- Repeat with 9 objects
    - 10 objects
    - 11 objects
    - 12 objects

- Write a short paragraph about the child's comments and reactions, and draw a picture that shows how the child made lines with 12 objects.

Clean-Sweep Campers, by Lucille Recht Penner
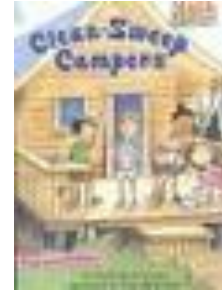
Objective: Model equivalent fractions

Story: Eight girls sharing a cabin at camp try to divide into halves, thirds, fourths, and eighths to tackle their chores.

Read the children's book Clean-Sweep Campers, by Lucille Recht Penner

1. What is the story about?

2. Use a fraction circle with 8 pieces to represent the 8 girls in the cabin. Show that

   $\frac{1}{2}$ is equivalent to $\frac{4}{8}$. Draw a picture of your fraction circle and explain how it shows that

   $\frac{1}{2}$ is equivalent to $\frac{4}{8}$.

3. Use your fraction circle to show that $\frac{1}{4}$ is equivalent to $\frac{2}{8}$. Draw a picture of the fraction circle

   and then explain it in words.

4. Explain how you can use fraction circles to show that there is no fraction equivalent to $\frac{1}{3}$ that

   has denominator 8.

5. Besides the eight girls in the cabin, there are also two counselors.

   • Find all the ways to make equal teams from among all ten people in the cabin.
     Answer: 1 team of 10, 2 teams of 5, 5 teams of 2, 10 teams of 1

   • Draw 3 fraction circles, each with 10 pieces, and show $\frac{2}{10}, \frac{5}{10}$, and $\frac{8}{10}$. Then find an

   equivalent fraction for each that has a denominator smaller than 10.

   Answer: $\frac{2}{10} = \frac{1}{5}$, $\frac{5}{10} = \frac{1}{2}$, $\frac{8}{10} = \frac{4}{5}$

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<u>Clean-Sweep Campers</u>, by Lucille Recht Penner

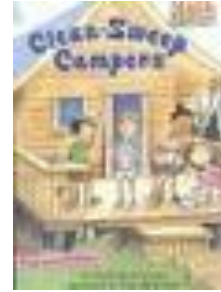**Objective:** Model equivalent fractions

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5. Besides the eight girls in the cabin, there are also two counselors.
    *   Find all the ways to make equal teams from among all ten people in the cabin.
    *   Draw 3 fraction circles, each with 10 pieces, and show $\frac{2}{10}, \frac{5}{10}$, and $\frac{8}{10}$. Then find an

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The Doorbell Rang, by Pat Hutchins
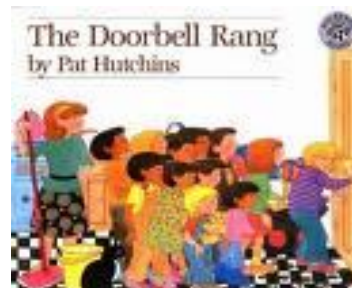
Objective: Simplify fractions

Story: As two children sit at the table to share a dozen cookies, they are joined by successively more children (2 more, then 2 more, then 6 more) until there are 12 children.

Read the children's book The Doorbell Rang, by Pat Hutchins

1. (a) What is the story about?

   (b) On the first page of the book Ma said "I made plenty" of cookies.

   - How many cookies did she make? **Answer:** 12

   - How do you know? **Answer:** 6 cookies each for the 2 children

2. At one part of the story, the cookies will be shared among 4 children.

   (a) Write this as a fraction.

   (b) Explain what the numerator and denominator represent.

   (c) Simplify the fraction to find how many cookies each child would get.

   Answer: $\dfrac{12\,\text{cookies}}{4\,\text{children}} = 3$ cookies per child or $\dfrac{4\,\text{children}}{12\,\text{cookies}} =$ each child gets 3 cookies

3. What is the largest number of children who could share the cookies without having to break any cookies? Explain your reasoning.

   Answer: 12 children, each gets 1 whole cookie

4. What if there were 18 children – how could they share the 12 cookies evenly? Explain your reasoning in words and by drawing a picture.

   Answer: They would each get $\dfrac{2}{3}$ of a cookie

5. You'll need 12 small objects such as blocks, toothpicks, or candies.

   - Read The Doorbell Rang to a young child.

   - Pretend the objects are cookies, and ask the child to divide them evenly among the children as you read the story.

   - Ask the child what would happen if there were 24 children.

   - Write a short paragraph about the child's comments and reactions.

Links to Literacy

The Doorbell Rang, by Pat Hutchins

Objective: Simplify fractions

Read the children's book The Doorbell Rang, by Pat Hutchins

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   (b) On the first page of the book Ma said "I made plenty" of cookies.

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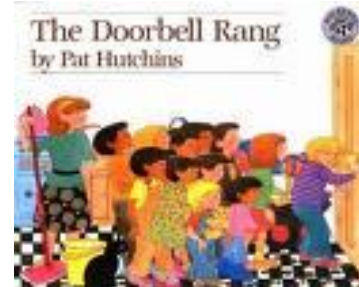4. What if there were 18 children – how could they share the 12 cookies evenly? Explain your reasoning in words and by drawing a picture.

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   - Ask the child what would happen if there were 24 children.
   - Write a short paragraph about the child's comments and reactions.

Elevator Magic, by Stuart J. Murphy

Objective: Subtraction of positive and negative numbers

Story: Ben and his mother take the elevator from her office on the 10th floor to the lobby, stopping for errands at floors along the way.

Read the children's book Elevator Magic, by Stuart J. Murphy

1. What is the story about?

2. The first elevator stop is on the 8th floor, 2 floors down from Ben's mother's office on the 10th floor. What if Ben's mother had forgotten something on her desk? Write the addition equation that would get her back to the 10th floor.

> **Answer:** $8 + 2 = 10$

3. In many countries, the ground floor is floor 0. You need to go up one flight of stairs to get to the 1st floor. Suppose the lobby in Elevator Magic was on floor 0, and suppose there were 3 floors of parking under the building. Draw a picture of all the elevator buttons, including the underground parking. Use negative numbers to label the underground garage floors.

> **Answer:**
> | |
> |---|
> | o 10 |
> | o 9 |
> | o 8 |
> | o 7 |
> | o 6 |
> | o 5 |
> | o 4 |
> | o 3 |
> | o 2 |
> | o 1 |
> | o 0 |
> | o -1 |
> | o -2 |
> | o -3 |

4. Suppose Ben's father had parked his car on the 2nd underground floor.

   (a) Write an equation that describes how Ben's father got from his car to the lobby.

> **Answer:** $-2 + 2 = 0$

   (b) Then write an equation that models Ben's total elevator ride to get from his mother's office to his father's car.

> **Answer:** $10 - (-2) = 12$ or $10 - 12 = -2$

5. Read Elevator Magic, to a young child.

- Ask the child what she would call the floors of the underground garage, and how she would figure out how many floors there were from Ben's mother's office to his father's car on the 2nd floor of the garage.
- Write a short paragraph about the child's comments and reaction.

Links to Literacy

Elevator Magic, by Stuart J. Murphy

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5. Read Elevator Magic, to a young child.

   - Ask the child what she would call the floors of the underground garage, and how she would figure out how many floors there were from Ben's mother's office to his father's car on the 2nd floor of the garage.

   - Write a short paragraph about the child's comments and reaction.

Each Orange Had 8 Slices, by Paul Giganti, Jr.

Objective: Use the associative property of multiplication

Story: The book shows twelve examples similar to the cover
picture (two oranges with 8 slices each, and each slice
with two seeds). The reader is asked to find the total
number of each item (eg, oranges, slices, seeds) .

Read the children's book Each Orange Had 8 Slices, by Paul Giganti, Jr

1. What is the story about?

2. How does it help children learn to multiply numbers?

3. The first page of the book shows 3 flowers with 6 petals and 2 bugs.

   (a) To find the total number of bugs, did you start by finding the number of bugs on each

   flower, or did you find the total number of petals first?

   (b) Would it make a difference in the final answer? **Answer:** No

4. Explain how this book relates to the Associative Property of Multiplication, $(a \cdot b) \cdot c = a \cdot (b \cdot c)$.

   Answer: $3 \cdot (6 \cdot 2)$ starts with the number of bugs on each flower.

   $(3 \cdot 6) \cdot 2$ starts with the total number of petals

5. Read Each Orange Had 8 Slices to a young child.

   - Ask the child to draw a picture that could be another page of the book, and then talk with
     the child about the total number of items in the picture.

   - What did the child draw? How many items were in the picture? Attach the child's
     drawing.

   - Write a short paragraph about the child's comments and reactions.

Links to Literacy

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The 100-pound problem, by Jennifer Dussling

Objective: Subtraction and Addition Property of Equality

Story: Walt borrows a boat to go to an island. The boat can hold only 100 pounds, so Walt figures out how to get himself, his dog, and all his gear to the island..

Read the children's book The 100-pound problem, by Jennifer Dussling

1. What is the story about?

2. Walt weighs 65 pounds and his dog weighs 20 pounds.

   (a) How much more weight can the boat hold?   **Answer:** 15 pounds

   (b) The equation 65 + 20 + x = 100 models the boat's capacity, with Walt and his dog.

     Solve the equation for x.

3. Walt's fishing gear and his backpack together weigh 20 pounds.

   (a) If the backpack weighs 12 pounds, how much does the fishing gear weigh?

   Answer: 8 pounds

   (b) Write an equation to model this.   **Answer:** $12 + x = 20$

At the end of the story, after leaving his fishing gear and backpack on the island, Walt caught a big fish. The fish was too heavy to be in the boat with Walt and his dog, but when the dog jumped out, the boat could carry Walt and the fish.

 4. What is the least the fish could have weighed? Explain your reasoning.

       Answer: 15 pounds; $65 + 20 + x > 100$

5, What is the most the fish could have weighed? Explain your reasoning

       Answer: 35 pounds; $65 + x < 100$

       (student work will likely be in words that demonstrate understanding of these concepts)

Links to Literacy

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4. What is the least the fish could have weighed? Explain your reasoning.

5, What is the most the fish could have weighed? Explain your reasoning

<u>Everybody Wins</u>!, by Sheila Bruce

Objective: Division property of equality

Story: A boy enters several contests and wins many prizes, which he divides among his friends.

Read the children's book <u>Everybody Wins</u>!, by Sheila Bruce

1. What is the story about?

2. How does it help children learn about division?

In one part of the story, Oscar split the cost of a $12 raffle ticket with two friends.

3. How does the equation $12 = 3x$ model this situation?

> **Answer:** x is the amount each of the 3 children contributes to the $12 ticket.

4. What does the solution to that equation tell Oscar and his friends?

> **Answer:** Each person pays $4

5. You'll need one bag (any size) of M&M's or other small candies. Read <u>Everybody Wins</u>! to a child in the second or third grade.

- Ask the child to estimate the number of M&M's in the bag, then count them out.
- Ask the child how many M&M's each person would get if you were to share the M&M's among all the people in the child's family.
- Have the child explain or show you how s/he got that answer.
- Write a short paragraph about the child's comments and reactions.

Links to Literacy

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- Write a short paragraph about the child's comments and reactions.

<u>Math Curse,</u> by Jon Scieszka and Lane Smith

Objective: Approach word problems with a positive attitude

Story: The narrator lives one day in which everything that happens can be written as a math problem.
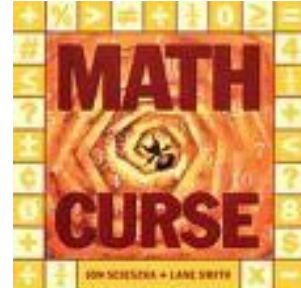
Read the book <u>Math Curse</u> by Jon Scieszka and Lane Smith.

1. What is the story about?

2. List all the different math topics you recognized in this story.

3. Do you think the narrator has a positive or negative attitude towards math?

      (a) Explain why you think so.

      (b) Have you ever felt the same way?

4. How do you feel now about math? Why do you think you feel this way?

5. The narrator sees math problems all day long. Make up a word problem about an event in your everyday life, and use algebra to solve it.

Links to Literacy

Math Curse, by Jon Scieszka and Lane Smith

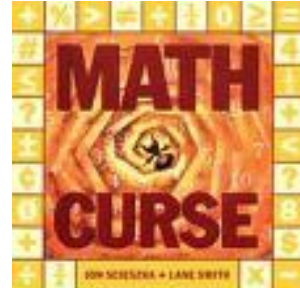**Objective:** Approach word problems with a positive attitude

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Missing Mittens, by Stuart J. Murphy

Objective: Identify odd and even numbers

Story: A farmer and many animals on his farm are all missing
             one mitten.

Read the children's book Missing Mittens, by Stuart J. Murphy

1. What is the story about?

2. How does it help children learn about odd and even numbers?

3. Name 4 other things, besides mittens, that come in even-numbered sets.

4. Name 3 things that come in odd-numbered sets.

5. Read Missing Mittens to a young child.

- Ask the child how many mittens would be needed for 9 chickens, and for 5 cows.
    Answer: 9 chickens need 18 mittens, 5 cows need 20 mittens

- Ask the child to explain why, for 9 chickens and 5 cows, the number of chickens is more than the number of cows but the number of chickens' mittens is less than the number of cows' mittens.
    Answer: each chicken needs 2 mittens, but each cow needs 4 mittens

- Write a short paragraph about the child's comments and reactions.

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- Write a short paragraph about the child's comments and reactions.

Links to Literacy   **Instructor Page**

Among the Odds & Evens, by Priscilla Turner

Objective: Identify properties of odd and even numbers

Story: X and Y find themselves in a strange land populated by numbers.
They discover the properties of sums of odd and even numbers.
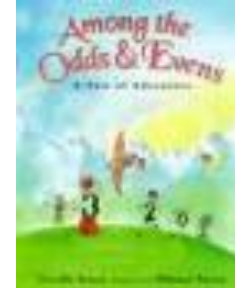
Read the children's book Among the Odds & Evens, by Priscilla Turner

1. What is the story about?

2. How does this book talk about the sums of odd and even numbers?

3. When the author has one character say "there's nothing odd about Even children being a
   product of an Odd pair" the character is not using the correct math vocabulary – what would
   the correct statement be? Why?

   Answer: "Even children are the *sum* of an Odd pair."

   The *product* of a pair of odd numbers is odd (multiplying).

   The *sum* of a pair of odd numbers is even (adding).

4. Make up five different pairs of odd numbers and find the product of each.

   (a) List the number pairs and their products.

   (b) Is the product odd or even? **Answer:** odd

   (c) Do you think this will be true for any pair of odd numbers?

   (d) Explain your reasoning.

5. Make up five different pairs of even numbers and find the product of each.

   (a) List the number pairs and their products.

   (b) Is the product odd or even? **Answer:** even

   (c) Do you think this will be true for any pair of even numbers?

   (d) Explain your reasoning.

Links to Literacy

Among the Odds & Evens, by Priscilla Turner

Objective: Identify properties of odd and even numbers

Read the children's book Among the Odds & Evens, by Priscilla Turner

1. What is the story about?

2. How does this book talk about the sums of odd and even numbers?

3. When the author has one character say, "there's nothing odd about Even children being a product of an Odd pair" the character is not using the correct math vocabulary – what would the correct statement be? Why?

4. Make up five different pairs of odd numbers and find the product of each.
   (a) List the number pairs and their products.
   (b) Is the product odd or even?
   (c) Do you think this will be true for any pair of odd numbers?
   (d) Explain your reasoning

5. Make up five different pairs of even numbers and find the product of each.
   (a) List the number pairs and their products.
   (b) Is the product odd or even?
   (c) Do you think this will be true for any pair of even numbers?
   (d) Explain your reasoning.

<u>Spaghetti and Meatballs for All!</u> by Marilyn Burns

Objective: Understand area and perimeter

Story: Mrs. Comfort plans a family dinner for 32 people. She
rents 8 tables and sets 4 chairs at each table. As the
first guests arrive, they push tables together but as more
arrive they separate the tables to give everyone a place
to be seated.

Read the children's book <u>Spaghetti and Meatballs for All!</u> by Marilyn Burns. You'll need one

piece of grid paper to answer questions 3, 4, and 5.

1. (a) What is the story about?

   (b) How does this story relate to the concepts of area and perimeter?

2. Read the pages titled "For Parents, Teachers, and Other Adults" at the end of the book.

   Figures 1, 5, 6, 7, and 8 show different ways to arrange tables to seat 32 people.

   (a) Copy each of these figures onto your grid paper, letting 1 square represent one table.

   (b) Find the area and perimeter of each figure.

   Answer:

Figure 1	Figure 5	Figure 6
A = 8	A = 15	A = 28
P = 32	P = 32	P = 32

Figure 7	Figure 8
A = 16	A = 12
P = 32	P = 32

3. At one point in the story, there were 12 people seated for dinner (Mr. and Mrs. Comfort, their

   daughter, her husband, their 2 children, Mrs. Comfort's brother and his wife, their daughter

   and her husband and twins.)

(a) On your grid paper, show all the ways to arrange the tables to have 12 people seated.

(b) For each arrangement, find the area and the perimeter.

Answer:

□ □ □	▦	□□□ □	□□ □□	□□□□□	□□□□ □□□□
A = 3	A = 9	A = 4	A = 4	A = 5	A = 8
P = 12	P = 12	P = 12	P = 12	P = 12	P = 12

4. In the story, Mrs. Comfort rented 8 tables.

(a) Using all 8 tables, how many different ways could they be arranged?

(b) Show them all on your grid paper, and find the area and perimeter of each.

Answer:

□ □ □ □ □ □ □ □	�	□□□□ □□□□	□□□□ □□□□	□□□□□□□□
A = 8	A = 8	A = 8	A = 8	A = 8
P = 32	P = 16	P = 20	P = 12	P = 18

5. If you had to rent small square tables like those in the story, how should you arrange them to seat the largest possible number of people? Explain your reasoning.

Links to Literacy

Spaghetti and Meatballs for All! by Marilyn Burns

Objective: Understand area and perimeter

Read the children's book Spaghetti and Meatballs for All! by Marilyn Burns. You'll need one piece of grid paper to answer questions 3, 4, and 5.

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<u>Alexander, Who Used to Be Rich Last Sunday</u>, by Judith Viorst

Objective: Solve coin word problems

Story: A boy gets $1 from his grandparents and subsequently spends it.

Read the children's book <u>Alexander, Who Used to Be Rich Last Sunday</u>, by Judith Viorst

   1. What is the story about?

   2. At the start of the story, Alexander tells you about the money his brother Anthony has. What is the total value of Anthony's money?

     Answer: $3.38

   3. How much money does Alexander's brother Nicholas have? Explain how you calculated it.

     Answer: $2.38 = $1 + 2 quarters + 5 dimes + 5 nickels + 13 pennies

   4. Anthony writes the value of one nickel as $0.5, but Nicholas writes it as $0.05. Who is correct? How do you know?

     Answer: Nicholas; a nickel is 5 hundredths

   5. Make a "checkbook register" for Alexander. The first 2 rows are shown below. Continue filling in transactions, amount, and balance to show how Alexander spent all his money.

     Answer:

Transaction	Amount	Balance
Gift from grandparents	$1	$1
Bought 3 pieces of bubble gum	$0.15	$0.85
Losing bets	$0.15	$0.70
Rent snake	$0.12	$0.58
Fine for saying bad words	$0.10	$0.48
Flushed down toilet	$0.03	$0.45
Crack in floor	$0.05	$0.40
Anthony's candy bar	$0.11	$0.29
Nick's magic trick	$0.04	$0.25
Fine for kicking brothers	$0.05	$0.20
Garage sale	$0.20	$0.00

Links to Literacy

Alexander, Who Used to Be Rich Last Sunday, by Judith Viorst

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Bought 3 pieces of bubble gum	-$0.15	$0.85

One Grain of Rice, by Demi
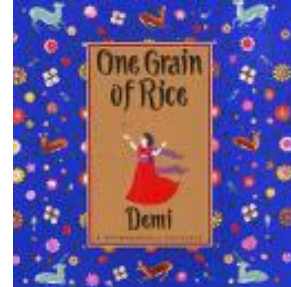
Objective: Evaluate Expressions with Exponents

Story: Rani, a wise village girl, sees some rice falling from the Raja's elephants and, despite there being a famine in the land, returns it to the Raja. The Raja offers her a reward, and she asks for the reward to be given over 30 days – 1 grain of rice the first day, double that the second day, double again the third day, etc.

Read the children's book One Grain of Rice, by Demi.

1. What is the story about?

2. On the twelfth day, Rani received "two thousand and forty-eight grains of rice, about four handfuls."

    (a) How many grains of rice make one handful?   **Answer:** 512

    (b) Does this seem reasonable to you? Why or why not?

3. The last page of the book shows how many grains of rice Rani received on each of the 30 days. Make a table that shows the total number of grains of rice she had accumulated on each day, up to day 15. The first 3 lines are shown here:

      Answer:

Day	Grains received	Total number accumulated
1	1	1
2	2	3
3	4	7
4	8	15
5	16	31
6	32	63
7	64	127
8	128	255
9	256	511
10	512	1023
11	1024	2047
12	2048	4095
13	4096	8191
14	8192	16,383
15	16,384	32,767

4. Since the book shows that Rani had accumulated 1,048,575 grains of rice on day 20, can you tell how many grains she had accumulated by day 19?

   Answer: 524,287

5. The expression $2^n - 1$ represents the total number of grains of rice accumulated by day n.

   (a) Evaluate the expression for $n = 10$.
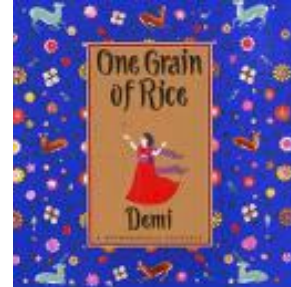
   Answer: 1023

   (b) Explain how your answer relates to this story.

   Answer: on day 10 Rani had accumulated 1023 grains of rice.

Links to Literacy

One Grain of Rice, by Demi

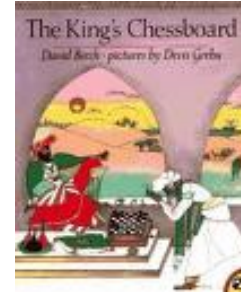**Objective**: Evaluate Expressions with Exponents

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    (a) Evaluate the expression for $n = 10$.

    (b) Explain how your answer relates to this story.

Links to Literacy   **Instructor Page**

The King's Chessboard, by David Birch

Objective: Evaluate Expressions with Exponents

Story: A king insists on rewarding a wise man, so the wise man looks at a
    chess board and asks for 1 grain of rice for the first square, 2 grains
    for the second, 4 grains for the third square, etc.

Read the children's book The King's Chessboard, by David Birch

    1. (a) What is the story about?

      (b) How many grains of rice did the king send to the wise man on the 5th day?

        Answer: 16

    2. This table shows the number of grains of rice the king promised the wise man for each day

      from the first day to the third day. Continue the table through the twelfth day.

        Answer:

Day	Grains of rice
1	1
2	2
3	4
4	8
5	16
6	32
7	64
8	128
9	256
10	512
11	1024
12	2048

    3. The number of grains of rice the king promised each day relates to the mathematical

      concept of exponents. For example, on day 5 the king promised 16 grains of rice, and

      $2^4 = 16$.

(a) What value of x is the solution to $2^x = 512$?

Answer: 9

(b) Write an algebraic expression, using exponents, for the number of grains of rice the king promised on day n.

Answer: 2^{n-1}

4. What if the wise man had asked instead for 1 grain of rice the first day, and two more grains of rice than the day before for each day following? Complete the table below to show how many grains of rice the wise man would have received on the twelfth day.
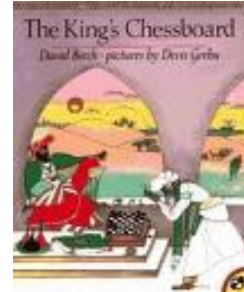
Answer:

Day	Grains of rice
1	1
2	3
3	5
4	7
5	9
6	11
7	13
8	15
9	17
10	19
11	21
12	23

5. Looking at the tables you made in #2 and #4, write a sentence comparing the rate at which the number of grains grows when multiplying by two each day versus when adding two each day.

Answer: student should notice that doubling each day results in much faster growth than adding two each day.

Links to Literacy

The King's Chessboard, by David Birch

Objective: Evaluate Expressions with Exponents

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Day	Grains of rice
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   show how many grains of rice the wise man would have received on the twelfth day.

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3	5

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Sea Squares, by Joy N. Hulme
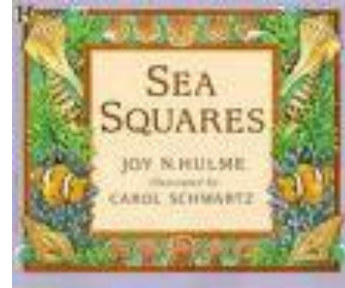
Objective: Recognize perfect square numbers

Story: For each counting number one through ten, the book shows that many of some sea creature, with the same number of parts on each creature. (For example, six sea stars with six arms each.)
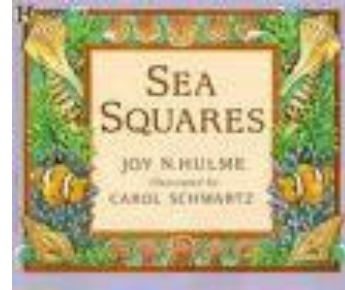
Read the children's book Sea Squares, by Joy N. Hulme

1. What is the story about?

2. Imagine there was another page that showed 12 sailboats with 12 sailors in each boat.

    How many sailors would there be?

    Answer: 144

3. How does the story help children learn about square numbers?

4. Make up 2 examples, similar to those in Sea Squares, but with things found around your

    house, that show 3^2 and 8^2 .

5. Read Sea Squares to a child in 3rd or 4th grade.

    - Ask the child to verify the numbers on each page, and explain her reasoning to you –

      for example, how does she know there are 16 feet on the 4 seals?

    - Did she count all 16 or did she multiply 4x4?

    - Which method is faster?

    - Write a brief paragraph about the child's comments.

Links to Literacy

Sea Squares, by Joy N. Hulme

Objective: Recognize perfect square numbers

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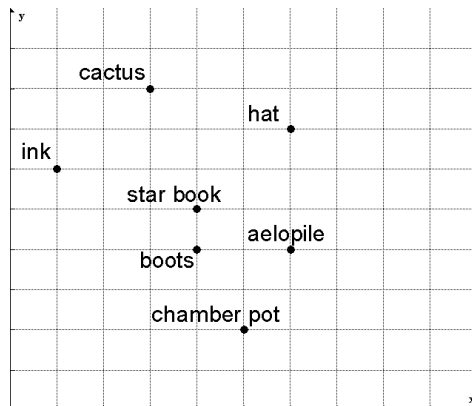
The Fly on the Ceiling, by Dr. Julie Glass

Objective: Introduction to ordered pairs and point plotting.

Story: Rene Descartes watches a fly landing on his ceiling and makes a
coordinate grid to record where the fly lands.

Read the children's book The Fly on the Ceiling, by Dr. Julie Glass

    1. What is the story about?

    2. How does the story help teach about ordered pairs and point plotting?

    3. On a piece of grid paper:

- label a horizontal x-axis and vertical y-axis

- number each axis from 1 to 10 to make a coordinate system, with (0,0) in the lower left corner

- turn to pages 42-43 of The Fly on the Ceiling , and, using the coordinates on the sign on the wall, mark the locations of the boots, star book, cactus, hat, aeolipile, chamber pot, and ink.

    Answer:

    4. Still looking at the picture on pages 42-43, notice that you cannot see the labels on both axes. But you know the cactus is at (3,8). What are the coordinates of the candle, bagel, and cheese?

      Answer: Candle (4, 7)   Bagel (6, 3)   Cheese (7, 4)

    5. Make a graph of a room in your home. Locate 5 objects in the room, mark them on your graph, and give their coordinates.

Links to Literacy

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