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Pre- alg- ebra

Links to Literacy

**Lynn Marecek
MaryAnne Anthony-Smith**

To the Teacher:

Links to Literacy is a set of 20 activities connecting a math-themed children's book to a topic in our **Prealgebra** textbook. The children's books give students an alternate, and usually simple, view of key **Prealgebra** topics and show how they apply to common life situations. They help fill in the 'holes' in developmental math students' math background, and they give students an opportunity to use their critical thinking skills in a unique setting.

Links to Literacy activities help students strengthen their understanding of basic mathematical concepts while improving their fluency with written English. Each **Links to Literacy** worksheet poses a series of questions to the students, progressing developmentally from retelling the book's story, explaining how the book helps children learn the math topic, applying the concepts to their lives, reading the book to a child, doing an activity with the child, and, finally, reporting on the child's reaction to the book and activity.

By doing **Links to Literacy** activities our students become empowered as they take on the role of a teacher, reading and explaining math to the children in their lives. As they use appropriate math vocabulary and procedures to solve problems together, our students build confidence in their math abilities.

Links to Literacy grew out of our recognition that many of our developmental mathematics students did not fully experience the incremental steps of the K-12 math curriculum. They may have weak math foundations, having missed key areas in the development of basic math concepts. In addition, their general literacy skills are weak, with low reading levels and poor understanding of math vocabulary.

We realized that while we had read math-themed books to our own children when they were young, many of our students had not been exposed to books like these. Our children grew up thinking that talking about mathematics was natural, and they understood math concepts early. So we thought "why not introduce these books to our students?"

Then we had a brainstorm, "We can teach two generations at the same time!" Our students were already bringing their children to the college library, and the children had to be kept busy so their parents could study. By putting children's math literature in the college library, we had an opportunity to expose our students' children to mathematical concepts. We purchased books for our college library whenever we became aware of available mini-grant money. Over time, we created a set of assignments to connect the children's books to the content of our **Prealgebra** course. These assignments became the **Links to Literacy** activities.

Each activity consists of an Instructor Page and a Student Worksheet. The Instructor Page includes:

- the title and author of a math-themed children's book
- the arithmetic or algebra topic associated with the book
- the corresponding section in *Prealgebra*
- a summary of the book's story
- the student worksheet questions, with answers to calculations

You may want to use the *Links to Literacy* activities as homework, group activities, or extra credit assignments. You can devote as much or as little class time to them as you wish. The math-themed books can be found in most public libraries and bookstores.

In addition to the benefits to developmental mathematics students, teachers have found that the completed student worksheets give them valuable insight into their students' thought processes. We encourage you to try *Links to Literacy* with your students!

Lynn Marecek

MaryAnne Anthony-Smith

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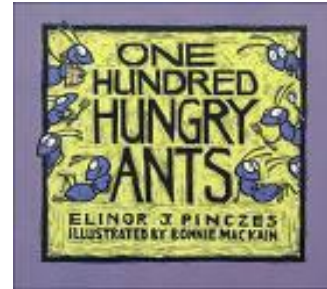
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One Hundred Hungry Ants, by Elinor J. Pinczes

Objective: Factor composite numbers

Prealgebra section 2.4 Find Multiples and Factors

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: 1·100, 2·50, 4·25, 5·20, 10·10

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

Answer: Picture showing 1·42, 2·21, 3·14, 6·7

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.

Links to Literacy

One Hundred Hungry Ants, by Elinor J. Pinczes

Objective: Factor composite numbers



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

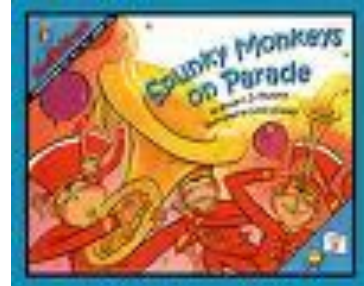
1. What is the story about?
2. How does it help children learn about factors?
3. List all the ways this story factors 100.
4. Suppose there were 42 hungry ants. Draw a picture showing all the ways they could line up evenly.
5. You'll need 36 of some small object (blocks, toothpicks, candies, etc.)
 - 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

Prealgebra section 2.4 Find Multiples and Factors

Story: A parade of monkeys has performers marching in rows of 2, 3, and 4.



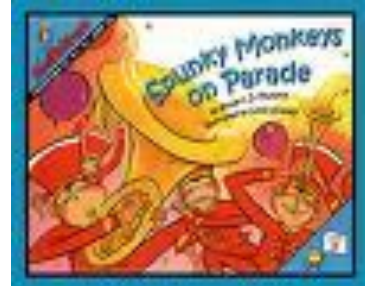
Read the children's book Spunky Monkeys on Parade, by Stuart J. Murphy

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.

Links to Literacy

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

Prealgebra section 2.4 Find Multiples and Factors

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; $1 \cdot 30, 2 \cdot 15, 3 \cdot 10, 5 \cdot 6$

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.

Links to Literacy

A Remainder of One, by Elinor J. Pinczes

Objective: Use divisibility tests



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

1. What is the story about?
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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.
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.
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.

Elevator Magic, by Stuart J. Murphy



Objective: Subtraction of positive and negative numbers

Prealgebra section 3.3 Subtract Integers

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:

- | |
|--------------------------|
| <input type="radio"/> 10 |
| <input type="radio"/> 9 |
| <input type="radio"/> 8 |
| <input type="radio"/> 7 |
| <input type="radio"/> 6 |
| <input type="radio"/> 5 |
| <input type="radio"/> 4 |
| <input type="radio"/> 3 |
| <input type="radio"/> 2 |
| <input type="radio"/> 1 |
| <input type="radio"/> 0 |
| <input type="radio"/> -1 |
| <input type="radio"/> -2 |
| <input type="radio"/> -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

Objective: Subtraction of positive and negative numbers



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

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 - (a) Write an equation that describes how Ben's father got from his car to the lobby.
 - (b) Then write an equation that models Ben's total elevator ride to get from his mother's office to his father's car.
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.

Clean-Sweep Campers, by Lucille Recht Penner



Objective: Model equivalent fractions

Prealgebra section 4.1 Visualize Fractions

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

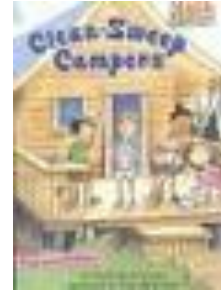
Read the children's book Clean-Sweep Campers, by Lucille Recht Penner

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

Links to Literacy

Clean-Sweep Campers, by Lucille Recht Penner

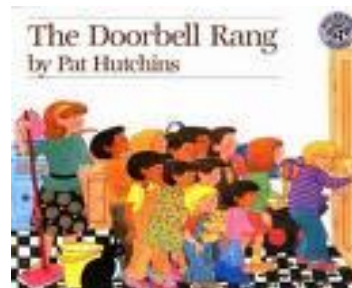


Objective: Model equivalent fractions

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

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

The Doorbell Rang, by Pat Hutchins



Objective: Identify fraction numerator and denominator

Prealgebra section 4.1 Visualize 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

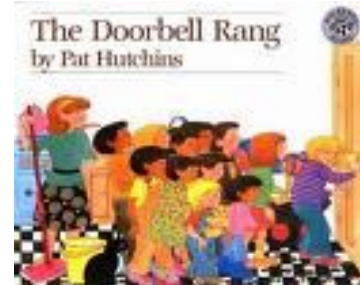
1. (a) What is the story about?
 (b) On the first page of the book Ma said “I made plenty” of cookies.
 - How many cookies did she make? **Answer:** 12
 - How do you know? **Answer:** 6 cookies each for the 2 children
2. At one part of the story, the cookies will be shared among 4 children.
 - (a) Write 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: $\frac{12 \text{ cookies}}{4 \text{ children}} = 3 \text{ cookies per child}$ or $\frac{4 \text{ children}}{12 \text{ cookies}} = \text{each child gets } \frac{1}{3} \text{ of a cookie}$
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 $\frac{2}{3}$ 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: Identify fraction numerator and denominator



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

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

Objective: Add and subtract decimal numbers

Prealgebra section 5.2 Decimal Operations

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



Read the children's book Alexander, Who Used to Be Rich Last Sunday, 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: $\$2.38 = \$1 + 2 \text{ quarters} + 5 \text{ dimes} + 5 \text{ nickels} + 13 \text{ pennies}$
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

Objective: Add and subtract decimal numbers

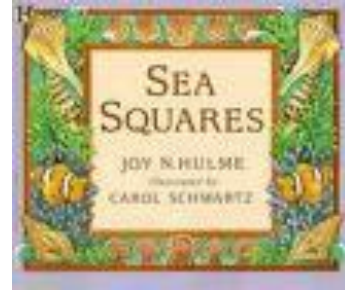


Read the children's book Alexander, Who Used to Be Rich Last Sunday, by Judith Viorst

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

Transaction	Amount	Balance
Gift from grandparents	\$1	\$1
Bought 3 pieces of bubble gum	-\$0.15	\$0.85

Sea Squares, by Joy N. Hulme



Objective: Recognize perfect square numbers

Prealgebra section 5.7 Simplify and Use Square Roots

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.)

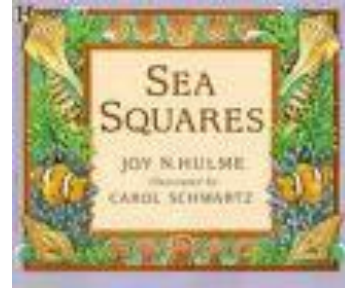
Read the children's book Sea Squares, by Joy N. Hulme

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 4×4 ?
 - 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



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?
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 32 and 82.
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.

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

Objective: Use the associative property of multiplication

Prealgebra section 7.2 Commutative and Associative Properties

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

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

Objective: Use the associative property of multiplication



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

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

The 100-pound problem, by Jennifer Dussling



Objective: Use the Subtraction and Addition Properties of Equality

Prealgebra section 8.1 Solve Equations using the Subtraction and Addition Properties 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

The 100-pound problem, by Jennifer Dussling

Objective: Use the Subtraction and Addition Property of Equality



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?
 - (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?
 - (b) Write an equation to model this.

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

Everybody Wins!, by Sheila Bruce

Objective: Use the Division Property of Equality

Prealgebra section 8.2 Solve Equations using the Division and Multiplication Properties of Equality

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



Read the children's book Everybody Wins!, 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 Everybody Wins! 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

Everybody Wins!, by Sheila Bruce

Objective: Division property of equality



Read the children's book Everybody Wins!, 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.

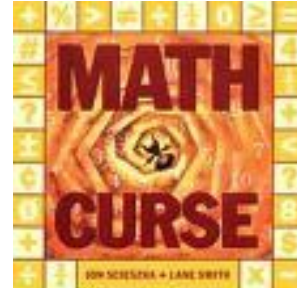
3. How does the equation $12 = 3x$ model this situation?
 4. What does the solution to that equation tell Oscar and his friends?
5. You'll need one bag (any size) of M&M's or other small candies. Read Everybody Wins! to a child in the second or third grade.
- Ask the child to estimate the number of M&M's 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.

Math Curse, by Jon Scieszka and Lane Smith

Objective: Approach word problems with a positive attitude

Prealgebra section 9.1 Use a Problem Solving Strategy

Story: The narrator lives one day in which everything that happens can be written as a math problem.



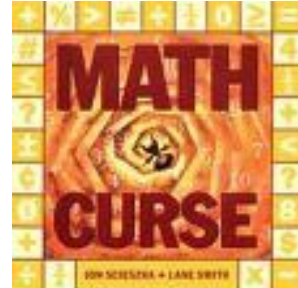
Read the book Math Curse by Jon Scieszka and Lane Smith.

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



Read the book Math Curse 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.

Missing Mittens, by Stuart J. Murphy

Objective: Identify odd and even numbers

Prealgebra section 9.1 Use a Problem Solving Strategy

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.

Links to Literacy

Missing Mittens, by Stuart J. Murphy

Objective: Identify odd and even numbers



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

Among the Odds & Evens, by Priscilla Turner



Objective: Identify properties of odd and even numbers

Prealgebra section 9.1 Use a Problem Solving Strategy

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

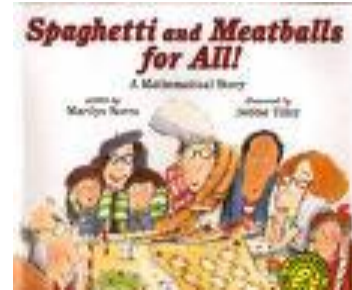


Objective: Identify properties of odd and even numbers

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.

Spaghetti and Meatballs for All! by Marilyn Burns



Objective: Understand area and perimeter

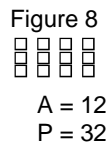
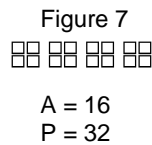
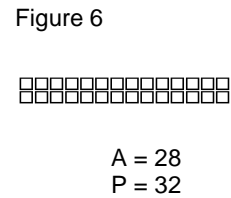
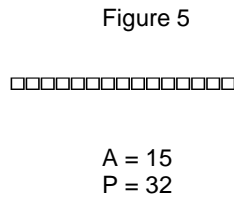
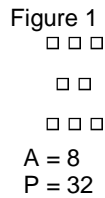
Prealgebra section 9.4 Use Properties of Rectangles, Triangles and Trapezoids

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 Spaghetti and Meatballs for All! 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:









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:

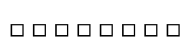




					
$A = 3$	$A = 9$	$A = 4$	$A = 4$	$A = 5$	$A = 8$
$P = 12$	$P = 12$	$P = 12$	$P = 12$	$P = 12$	$P = 12$

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

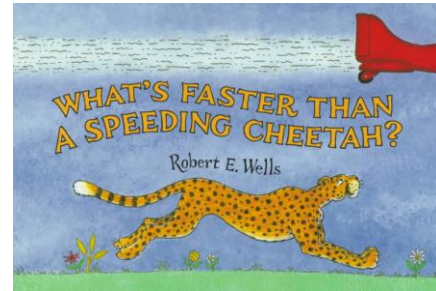


Read the children's book Spaghetti and Meatballs for All! by Marilyn Burns. You'll need one piece of grid paper to answer questions 3, 4, and 5.

- What is the story about?
 - How does this story relate to the concepts of area and perimeter?
- 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.
 - Copy each of these figures onto your grid paper, letting 1 square represent one table.
 - Find the area and perimeter of each figure.
- 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.)
 - On your grid paper, show all the ways to arrange the tables to have 12 people seated.
 - For each arrangement, find the area and the perimeter.
- In the story, Mrs. Comfort rented 8 tables.
 - Using all 8 tables, how many different ways could they be arranged?
 - Show them all on your grid paper, and find the area and perimeter of each.

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.

What's Faster than a Speeding Cheetah?, by Robert E. Wells



Objective: Use Distance, Rate, Time model

Prealgebra section 9.7 Solve a Formula for a Specific Variable

Story: This book compares the speed of many fast objects, such as a cheetah, a peregrine falcon, a jet, and the speed of light.

Read the children's book What's Faster than a Speeding Cheetah?, by Robert E. Wells

1. What is the story about?
2. The book says a cheetah runs at a rate of 70 miles per hour. If a cheetah could run at this rate for any amount of time, how far would it go in
 - (a) one hour? (b) two hours? (c) five hours?

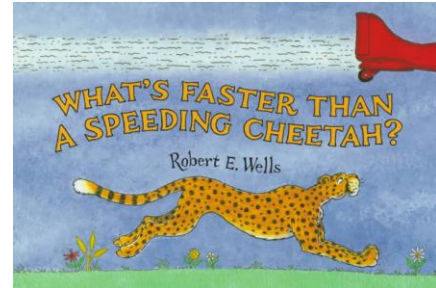
Answer: (a) 70 miles (b) 140 miles (c) 350 miles
3. How long would it take a cheetah, running at a rate of 70 miles per hour, to run
 - (a) 175 miles? (b) 20 miles?

Answer: (a) 2.5 hours (b) $\frac{2}{7}$ of an hour
4. A propeller plane can fly 300 miles per hour. The moon is about 239,000 miles from earth.
 - (a) How many hours would it take a propeller plane to fly from the earth to the moon?
Answer: 796.67 hours
 - (b) One day is 24 hours. How many days would it take a propeller plane to fly from the earth to the moon? **Answer:** 33.19
 - (c) One week is 7 days. How many weeks would it take a propeller plane to fly from the earth to the moon? **Answer:** 4.7 weeks
5. The speed of light is 186,000 miles per second.
 - (a) How many seconds are in one hour? **Answer:** 3600 seconds
 - (b) What is the speed of light in miles per hour? **Answer:** 669,600,000 miles per hour

Links to Literacy

What's Faster than a Speeding Cheetah?, by Robert E. Wells

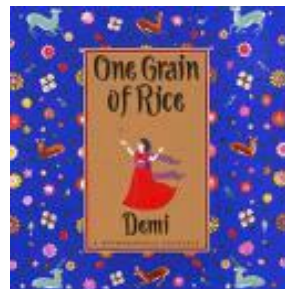
Objective: Use Distance, Rate, Time model



Read the children's book What's Faster than a Speeding Cheetah?, by Robert E. Wells

1. What is the story about?
2. The book says a cheetah runs at a rate of 70 miles per hour. If a cheetah could run at this rate for any amount of time, how far would it go in
(a) one hour? (b) two hours? (c) five hours?
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(c) One week is 7 days. How many weeks would it take a propeller plane to fly from the earth to the moon?
5. The speed of light is 186,000 miles per second.
(a) How many seconds are in one hour?
(b) What is the speed of light in miles per hour?

One Grain of Rice, by Demi



Objective: Evaluate Expressions with Exponents

Prealgebra section 10.2 Use Multiplication Properties of 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
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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



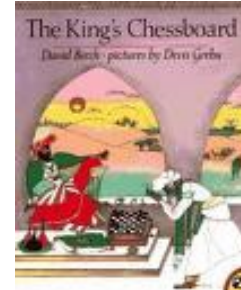
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Day	Grains received	Total number accumulated
1	1	1
2	2	3
3	4	7

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?
5. The expression $2^n - 1$ represents the total number of grains of rice accumulated by day n .
 - (a) Evaluate the expression for $n = 10$.
 - (b) Explain how your answer relates to this story.

The King's Chessboard, by David Birch



Objective: Evaluate Expressions with Exponents

Prealgebra section 10.2 Use Multiplication Properties of 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:

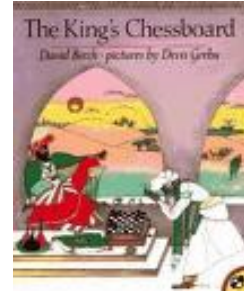
Day	Grains of rice
1	1
2	3
3	5
4	7
5	9
6	11
7	13
8	15
9	17
10	19
11	21
12	23

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

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

- (a) What is the story about?
(b) How many grains of rice did the king send to the wise man on the 5th day?
- 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.

Day	Grains of rice
1	1
2	2
3	4

- 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 $2^4 = 16$.
 - What value of x is the solution to $2^x = 512$?
 - Write an algebraic expression, using exponents, for the number of grains of rice the king promised on day n .
- 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.

Day	Grains of rice
1	1
2	3
3	5

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.

The Fly on the Ceiling, by Dr. Julie Glass



Objective: Introduce ordered pairs and point plotting.

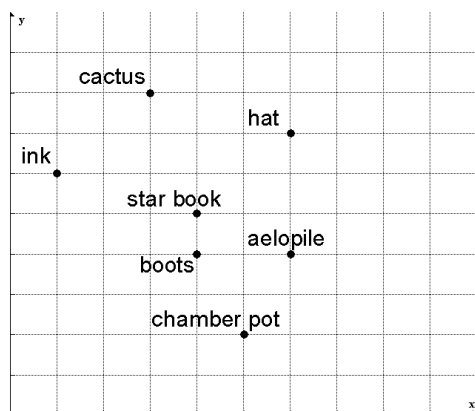
Prealgebra section 11.1 Use the Rectangular Coordinate System

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

The Fly on the Ceiling, by Dr. Julie Glass



Objective: Introduce ordered pairs and point plotting.

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.
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?
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

Instructor Page

Lemonade for Sale, by Stuart J. Murphy

Objective: Plot points

Prealgebra section 11.1 Use the Rectangular Coordinate System



Story: Four children set up a lemonade stand to raise money. They record their sales for each day of the week on a bar graph.

Read the children's book Lemonade for Sale, by Stuart J. Murphy

1. What is the story about?
2. How does it help children learn about bar graphs?
3. The lemonade sales from Monday through Thursday are shown in the bar graph on page 22.
 - (a) Which day had the most sales? How do you know? **Answer:** Wednesday; it has the tallest bar.
 - (b) Which day had the least sales? How do you know? **Answer:** Thursday; it has the shortest bar.
 - (c) If lemonade sold for 25 cents a cup, how much money did the lemonade stand make on Thursday? **Answer:** \$6.00
4. Sheri said the sales Friday were "over the top".
 - (a) What is the least number of cups of lemonade they sold on Friday? **Answer:** at least 81 cups
 - (b) Explain how you know this. **Answer:** The bar for Friday is shaded higher than 80.
5.
 - (a) Make a bar graph that shows something in your everyday life.
 - (b) Explain what your graph shows.
 - (c) State one conclusion someone might say as a result of reading your graph.

Links to Literacy

Lemonade for Sale, by Stuart J. Murphy

Objective: Plot points



Read the children's book Lemonade for Sale, by Stuart J. Murphy

1. What is the story about?
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 - (a) Which day had the most sales? How do you know?
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 - (a) Make a bar graph that shows something in your everyday life.
 - (b) Explain what your graph shows.
 - (c) State one conclusion someone might say as a result of reading your graph.