

Mathematics

Student Workbook

Unit 1

Grade

imagine learning

Fremont Parent University: Illustrative Mathematics







Objectives for Tonight's Session

Participants will:

- Gain an understanding of the beliefs and design behind Illustrative Math and why we choose it as our resource.
- Experience a sample of activities similar to those done in the classroom that support student engagement in learning.
- Share some ideas for how to support your children at home.

Learning Math is like...









Curriculum Review Process

Our Priorities for Math

Themes that Emerged from the Math Review Committee:

- Engaging, authentic, hands-on
- Collaboration
- Diverse/novel problem solving
- Focus on female learners
- Depth over breadth, pacing
- Rigor
- Fun

- Address needs of diverse learners
 - IEP, multilingual, accelerated, MTSS, ethnicity, SES
- Enrichment, extend learning
- Alignment to standards



Illustrative Mathematics. LEARN MATH FOR LIFE

- Interactive
- Problem-based
- Collaborative math discourse
- Inclusive routines
- Promote thinking and reasoning



IM's Beliefs about Teaching & Learning



Illustrative Math

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Problem-Based Teaching and Learning



Why a Problem-Based Curriculum?

"Student learn mathematics as a result of solving problems. Mathematical ideas are the outcomes of the problem-solving experience rather than the elements that must be taught before problem solving."

Hiebert, J. et all (1996) Problem solving as a basis for reform in curriculum and instruction



Math Lesson

Grade 3 Unit 2: Area and Multiplication

Students learn about area concepts and relate area to multiplication and addition.



Section A Goals

*Describe area as the number of unit squares that cover a plan figure without gaps or overlaps.

*Measure the areas of rectangles by counting unit squares.



Section B Goals

*Explain why the area of a rectangle can be determined by multiplying the side lengths. *Solve problems involving the area of rectangles.



Section C Goals *Find the area of figures composed of rectangles.



Lesson 4: Area of Rectangles

In previous lessons, students identified equal groups in the rows and columns of arrays. In this lesson, students describe rectangles in terms of the rows and columns. They find the area of rectangles that have rows or columns of...

ILLUSTRATIVE MATHEMATICS

3.MD.C.6, MP6, MP7



Let's find the area of more rectangles.

2

Warm-up: Which One Doesn't Belong: Area and Arrays



Which one doesn't belong?





How did you determine the total number for each image?





4.1 Activity: What Did I Create?



Let's create rectangles!

First, you will be drawing a rectangle.







3

2

Finally, we will discuss how well you did.





- Can you and your partner draw the same rectangle without looking at each other's drawing?
- Partner A: Draw a rectangle on one of the grids provided. Describe it to your partner without telling them the total number of squares.
- Partner B: Draw the rectangle your partner describes to you.



4.1 Activity: What Did I Create?



- 2) Place your two rectangles next to each other.Discuss: What is the same? What is different?
- ³⁾ Switch roles and repeat.

8



What language did your partner use that was most helpful for you to draw the same rectangle they drew?





4.2 Activity: Find the Area



Let's count squares!

First, you will measure the area of some rectangles.

Then, you will share counting strategies with your partner.







2

Finally, some of you will share strategies with the class.





Find the area of each rectangle and include the units. Explain or show your reasoning.





Did your strategy change from rectangle to rectangle?





Lesson Synthesis



How is area different from an array?







- Describe area in your own words.
- How can we measure area?
- What lingering questions do you have about area?





Cool-down: What's the Area?



Find the area of this rectangle. Explain or show your reasoning.



Illustrative Math: Design Structure



Illustrative Math: Lesson Structure (2-5)

A typical lesson has four phases:

- a warm-up
- one or more instructional activities
- the lesson synthesis
- a cool-down



Illustrative Math: Lesson Structure (K-1)

A typical lesson has four phases:

- a warm-up
- one or more instructional activities and/or centers
- the lesson synthesis
- observations or a cool-down





Assessment





Home Connection

How do I help my child?

- 1. Use the Illustrative Math and other Fremont Resources:
 - Read the Family Letter for the unit.
 - Watch the Family Video for the unit.
 - Review the completed Cool Downs or lesson pages in the student books.
 - Practice and learn new skills on Dreambox (K-2) or Map Accelerator (3-5)
- 2. Let your child do the math.
 - Have them do the thinking and explain what they are doing.
 - Try your best to not explain how the problem should be done or solve the problem for your child.
 - Focus on having your child make sense of the problem, not just learning steps to solve the problem.
 - Listen to your child's thinking and ask questions to help them think through the problem.
 Tips for Parents



How do I help my child?

3. Give positive messages about mathematics.

- Don't give the message that you are or were bad at math, especially if you are a female. (Be careful not to sending this message by saying, "go ask your father")
- Do not tell your child that they are not good at math or not a "math person".
- If you share negative views towards learning math or learning math in a certain way, there is a good chance your child will share those views.
- Have a growth mindset.
- Give praise for effort and hard work.





How do I help my child?

4. Be a math family.

- Make math relevant by doing math in everyday situations.
 - Counting napkins at the table, muffins, train cars
 - Sorting laundry, legos, toys
 - Money If you want to buy a slice of pizza and a drink, how much will that cost? How much money should you get back?
 - Time How much time do we have before we leave to go to grandma's house at 4:45pm?
 - Computation If you are making 12 goodie bags, and have a package of 50 stickers, how many stickers can you put in each bag?
 - Fractions How will we split these four cookies among our family of 5? How much sugar do we need if we halve our recipe that calls for ¹/₄ cup?
- Mix in math to your bedtime reading
- Make math fun through math puzzles and games.
- Explore your child's interests in math.







Math Centers

Illustrative Math: Centers

- Grade K-1 : Integrated in the lessons
- Grades 2-5 : Used as needed to support the needs of students
- Designed to support fluency
- Repeated practice

Illustrative Math: Centers



Shake & Spill, Stage 3

Groups of 2

Materials per group:

1 cup

10 Two-color counters

Crayons - red and yellow

<u>Shake & Spill, Cover Stage 3 Recording Sheet</u> (per player)

Shake and Spin Stage 3	Recording Sheet (1		
Draw a picture.			
Fill in the expression.			
		+	_
Draw a picture.			
Fill in the expression.			
		+	
Draw a picture.			
Fill in the expression.			
		+	_
			Kindergarten, Unit 4, Lesson 15

- Decide together how many counters to use (up to 10).
- Partner A: Shake the counters in the cup and spill them onto the table.
- Both partners: Draw a picture to show the red counters and yellow counters. Work together to figure out how to fill in an expression to show how many red and yellow counters.
- Switch roles and start the next round.

Capture Squares, Stage 2

Grade 1





- On your turn:
 - Choose 2 number cards. Find the difference.
 - Choose a square on the gameboard that shows that number. Draw one line connecting any 2 dots around the number with your color.
 - If you can't draw a line, choose 2 new cards
 - If you draw a line that finishes a square around a number, shade in that box with your color.
- Take turns with your partner. The first player to shade in 3 boxes wins.



Groups of 2

Materials per Group:

1 set of Stage 4 Gameboards

1 set of Digit Cards 0-9

- Pick a puzzle board sheet.
- Use digit cards to make equation true. Use each number card only once.
- Complete a puzzle board sheet before moving to the another one.





Capture Squares, Stage 6: Multiply with 1-5

Grade 3



Groups of 2

Materials: Colored pencils or crayons Number cube (1-6) Paper Clips (to use as a spinner) <u>Capture Squares Stage 6 Spinner</u> <u>Capture Squares Stage 6 Gameboard</u>





- On your turn: Roll the number cube and spin the spinner. Find the product. .
- Choose a square on the gameboard that shows that number. Draw one line connecting any 2 dots around the number.
- If you can't draw a line, roll and spin again.
- If you draw a line that finishes a square around a number, shade in that box with your color.
- Take turns with your partner. The first player to shade in 3 boxes wins.

Compare, Stage 5: Fractions



Groups of 2

Materials: Compare Stage 5 (Grade 4) Fraction Cards

- Mix the cards up and give half to each player.
- Each player turns over a card.
- Compare the values. The player with the greater value keeps both cards.
- If the values are equivalent, each player turns over one more card. The player with the greater value keeps all four cards.
- The player at the end with the most cards wins.



How Close? Stage 7: Multiply Fractions and Whole Numbers to 5 Grade 5



Groups of 2

Materials: <u>Number Cards 0-10 (remove the 10 cards before playing)</u> How Close? Stage 7 Recording Sheet

- Each partner:
 - Take 6 cards.
 - Choose 3 cards to make a multiplication expression.
 - Write an equation to show the product of the number you made.
 - You score for each round is the difference between your product and 5
- Take new cards so that you have 6 cards to start the next round.
- At the end of the game, add your score for each round. The player with the lowest score wins.



More Centers

<u>Kindergarten</u>	<u>Grade 1</u>	<u>Grade 2</u>
 Bingo Counting Collections Make or Break Numbers Apart, Numbers to 9 	Five in a RowNumber PuzzlesCheck It Off	Five in a RowCapture SquaresHow Close?
<u>Grade 3</u>	<u>Grade 4</u>	<u>Grade 5</u>
• Five in a Row (x)	• Compare - Multiply within 100	• Rolling for Fractions

Groups of 4

Materials per group:

2 Connecting Cubes

Two-color counters

<u>Dot mat 1-5</u>

Bingo Stages 1-3 Gameboard (per player)

- Player A: Roll 2 cubes onto the dot mat.
- Work together to agree on the total number of dots.
- Each player covers all the spaces on their game boards with the same number of images.
- Take turns rolling the cubes until someone gets 4 counters in a row.



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Counting Collections, Stage 1: Up to 20

Groups of 2

Materials per group:

<u>5-frames</u>

Variety of different collections of up to 20 objects (most with 6-10 objects)

Counting Mat

Counting Collections Recording Math

- Work together to figure out how many objects are in your collection.
- Use the tools if they are helpful.
- When you and your partner agree on how many objects are in the collection, you can choose another collection.





Make or Break Apart Numbers, Numbers to 9, Stage 1: K

6

8

Q

5

Ц

Groups of 2

Materials per group:

Two-color counters

1 connecting cube

<u>Number Mat 4 - 9</u>

Dot Page

Recording Sheet (per player)

Directions:

- Player A: Roll the cube onto the number page.
- Work together to find 2 groups of dots that go together to make the number that you landed on. Place counters on the two groups of dots.
- Both players write an expression on their recording sheets to match.
- Work together to find 2 more groups of dots that got together to make the same number that you landed on. If you can find another 2 groups, place counters over the groups and write an expression.
- If you can't find any more ways to make the number, switch roles.



Five in a Row, Stage 4: Add or Subtract 10

Grade 1



Groups of 2

Materials: <u>10-frames</u> Connecting cubes in towers of 10 and singles 25 two-color counters <u>Number Cards, Multiples of 10 (0-90)</u> <u>Five in a Row Addition and Subtraction Stage 4 Gameboard</u>



20	40	60	80	30
10	70	90	0	50
60	30	FREE	50	40
90	20	0	30	70
60	50	80	10	40

Stage 4 Directions:

- Take turns flipping a number card over.
- Choose to add or subtract ten from the number on the card and use a counter to cover the sum or difference on the gameboard.
- The first player to place five counters in a row wins



Groups of 2

Materials per Group:

1 set of <u>Stage 2 Gameboards</u>

1 set of Digit Cards 0-9



- Pick a puzzle board sheet.
- Use digit cards to make equation true. Use each number card only once.
- Complete a puzzle board sheet before moving to the another one.

Check it Off, Stage 1



- Partner A:
 - Pick 2 cards and find the sum.
 - Check off the number you found and write the expression.
- Take turns. The partner who has checked off the most numbers at the end of the game wins.

Capture Squares, Stage 4: Subtract within 20

Grade 2

Groups of 2 Materials: Colored pencils or crayons <u>Number cards 0-10</u> Paper Clips (to use as a spinner) <u>Capture Squares Stage 4 Spinner</u> <u>Capture Squares Stage 4 Gameboard</u>





- Spin the Spinner and take 1 number card. Subtract the number on the card from the number on the spinner. If you spin a "wild", you can choose your own number.
- Choose a square on the gameboard that shows that number. Draw one line connecting any 2 dots around the number.
- If you can't draw a line, spin again and take a new card.
- If you draw a line that finishes a square around a number, shade in that box with your color.
- Take turns with your partner. The first player to shade in 3 boxes wins.

Five in a Row, Addition and Subtraction Stage 6:

	81	91	54	46	90
ROW	84	83	35	82	53
Groups of 2	60	92	99	73	51
Materials:	73	42	44	53	92
Paper Clips 25 two-color counters	100	75	82	61	64
Five in a Row Addition and Subtraction Stage 6 Gameboard	16	27	25	24	25
	10	۷	25	54	55
	65	19	57	26	48

Stage 6 Directions:

- Partner A: Put a paperclip on 2 numbers in the grey rows. Cover the sum of the 2 number with a counter.
- Partner B: Move 1 of the paper clips, add the numbers, and cover the sum with a counter.
- Take turns. The first partner to cover 5 squares in a row wins.

Five in a Row, Multiplication Stage 2





Groups of 2

Materials: Paper Clips 25 two-color counters Five in a Row Multiplication Stage 2 Gameboard

Stage 2 Directions:

- Partner A:
 - Put a paperclip on 2 numbers in the grey rows.
 - Multiply the numbers.
 - Cover the product of the 2 numbers with a counter.
- Partner B:
 - Move 1 of the paper clips, multiply the numbers, and cover the product with a counter.
- Take turns. The first partner to cover 5 squares in a row wins.

1	2	3	4	5	6
7	8	9	10	12	14
15	16	18	20	21	24
25	27	28	30	32	35
36	40	42	45	48	49
54	56	63	64	72	81

1	2	3	4	5
---	---	---	---	---

	6	7	8	9
--	---	---	---	---

Compare, Stage 3: Multiply within 100

Grade 4



- Mix the cards up and give half to each player.
- Each player turns over a card with an expression.
- Compare the values. The player with the greater value keeps both cards.
- If the values are equivalent, each player turns over one more card. The player with the greater value keeps all four cards.
- The player at the end with the most cards wins.

Rolling for Fractions Stage 2: Multiply a Fraction by a Whole Number Grade 5

Groups of 2

Materials: 3 Number Cubes Rolling for Fractions Stage 2 Recording Sheet





- Each partner:
 - Roll 3 number cubes. Use the numbers to complete the expression. Write the product.
 - Check your partner's work to make sure you agree.
 - Determine the number of points each partner gets:
 - 2 points for creating an expression less than 1
 - 5 points for creating an expression greater than 1
 - 10 points for creating an expression that is equal to 1
- Repeat for the next round. The partner who has the most points once the recording sheet is full wims the game.



Thank You! Questions?

