

TABLETOP MATH GAMES COLLECTION

ADVANCED MATH GAMES

VOLUME ONE



DENISE GASKINS

Contents

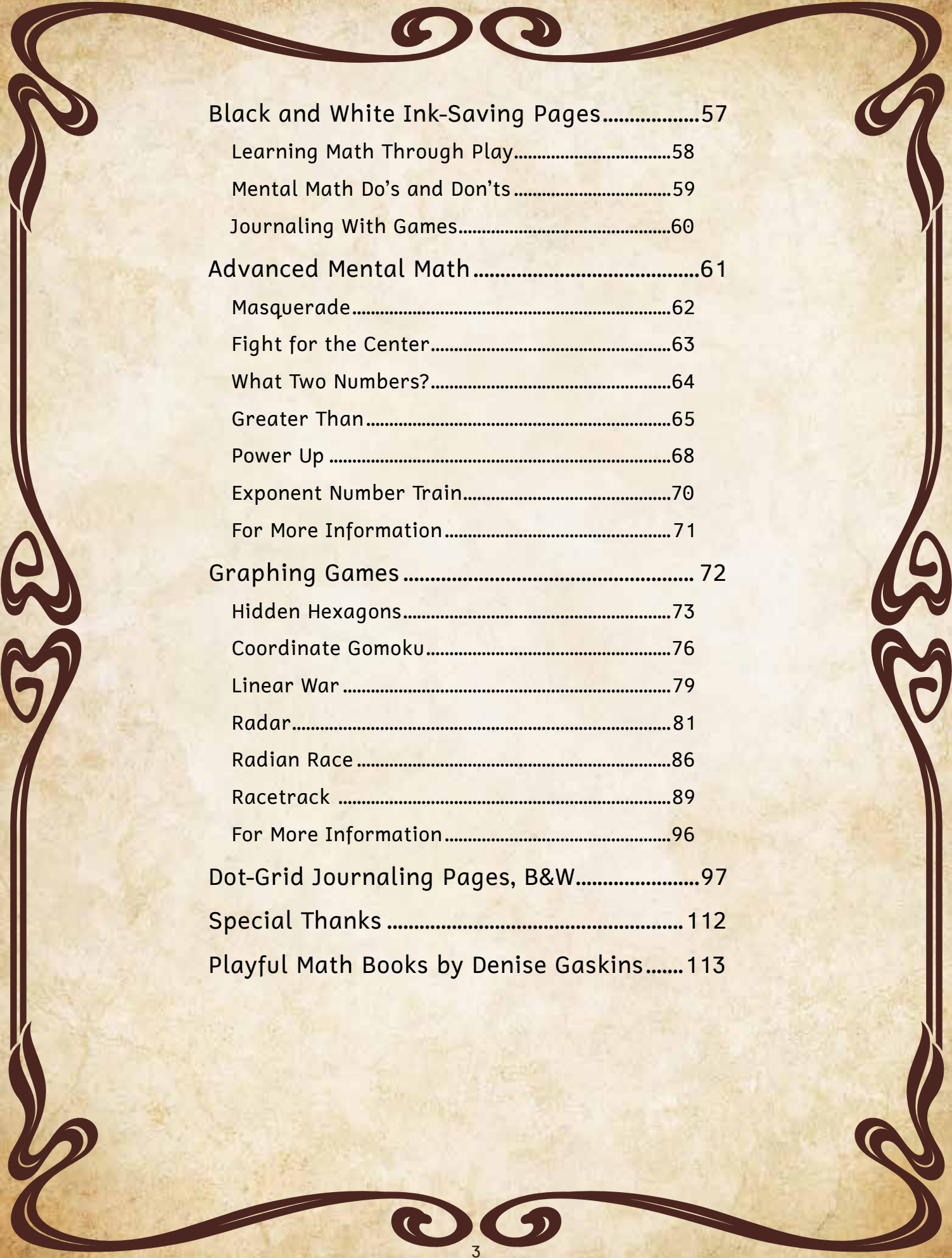
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EDUCATIONAL USE: You have permission to copy the math games in this book for personal, family, or single-classroom use only. Please enjoy them with your homeschool students, math circle, co-op, or other small local group.

ABOUT THE FONT: The Cadman font was designed by P.J. Miller to be as reader-friendly as possible. Letters are distinct and easy to distinguish, especially those most often confused by children and adults with dyslexia.



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Learning Math Through Play

Clear off a table, find some dice or a deck of cards, and you're ready to enjoy playing math. Keep these tips in mind:

- ◆ Game rules are a social convention, easy to change by agreement among the players. Feel free to invent your own rules, and encourage your children to modify the games as they play. As players tinker with the game, it prompts them to think more deeply about the math concepts involved.
 - ◆ Rating math games by grade level is inherently arbitrary. Children may eagerly play a game with advanced concepts if the fun of the challenge outweighs the work involved. On the other hand, don't worry that a game is too easy for anyone—even adults—as long as they find it interesting. Everyone benefits from a little extra practice in math, but it's the logic of strategy that makes a game fun.
 - ◆ If you are a parent, these games provide opportunities to enjoy quality time with your children. If you are a classroom teacher, use the games as warm-ups and learning center activities or for a relaxing review day at the end of a term. If you are a tutor or homeschooler, make games a regular feature in your lesson plans to build your students' mental math skills.
 - ◆ Try to let children learn by playing. Explain the rules as simply as possible and jump into the fun. You can add details, exceptions, and special situations as they come up during play or before starting future games.
 - ◆ **Be warned:** Although children can play these games on their own, they learn much more if adults play along. When adults join the game, they reinforce the value of mathematical play.
 - ◆ Talk as you play, especially with kids. As you watch your children's responses and listen to their comments, you'll discover what they understand about math. Where do they get confused? What do they do when they're stuck? Can they use the number patterns they've mastered to figure out something they don't know? How easily do they give up?
- Real education, learning that sticks for a lifetime, comes through person-to-person interactions. Children absorb more from the give and take of discussion with an adult than from even the best workbook or teaching video.

Advanced Mental Math

**6 WAYS TO PLAY MATH
WITH OLDER STUDENTS**

Greater Than

MATH CONCEPTS: integer addition, integer multiplication, inequalities.

PLAYERS: two players or two teams.

EQUIPMENT: gameboard, one deck of playing cards, pencils or markers.

Set-Up

Players share a single gameboard. Choose a player to deal the first hand. Agree on which color represents negative numbers. Face cards count as ten, aces as eleven. The suits also represent operations:

- ♦ Spades and hearts = add the number.
- ♦ Clubs and diamonds = multiply by the number.

How To Play

Deal four cards to each player or team. Players each choose one card as their initial value, holding the card face down in front of them. At the dealer's signal, both players reveal their cards. If the two cards played have the same value, players return them to their hands and choose a different starter card.

Write the players' initial numbers in their columns. In the middle column, draw an inequality symbol ($<$ or $>$) with its open end toward the greater value.

The non-dealer plays first. Choose one card from your hand and lay it on the table. Write the operation represented by that card in the first box of the next line on the gameboard (or beside the next line of the scoresheet). Then do the indicated calculation:

- ♦ For a spade or heart, add the value to each player's current score.
- ♦ For a club or diamond, multiply each player's score by that number.

Write the new sum or product in each player's column on the scoresheet. Finally, draw the correct inequality symbol in the middle column.

A hand consists of two turns for each player, beginning with the non-dealer. So the dealer takes the next turn, playing a card, writing it at the start of the third line, and doing the calculations based on the values in the previous line. The non-dealer fills the next line, and the dealer plays the final line of that hand. Players do not draw new cards after each turn.

After the dealer's second turn, whoever has the greater value wins that hand. Circle the winning score. Mix all cards back into the deck and pass it to the other player to deal the next hand.

The first player to win three hands wins the game.

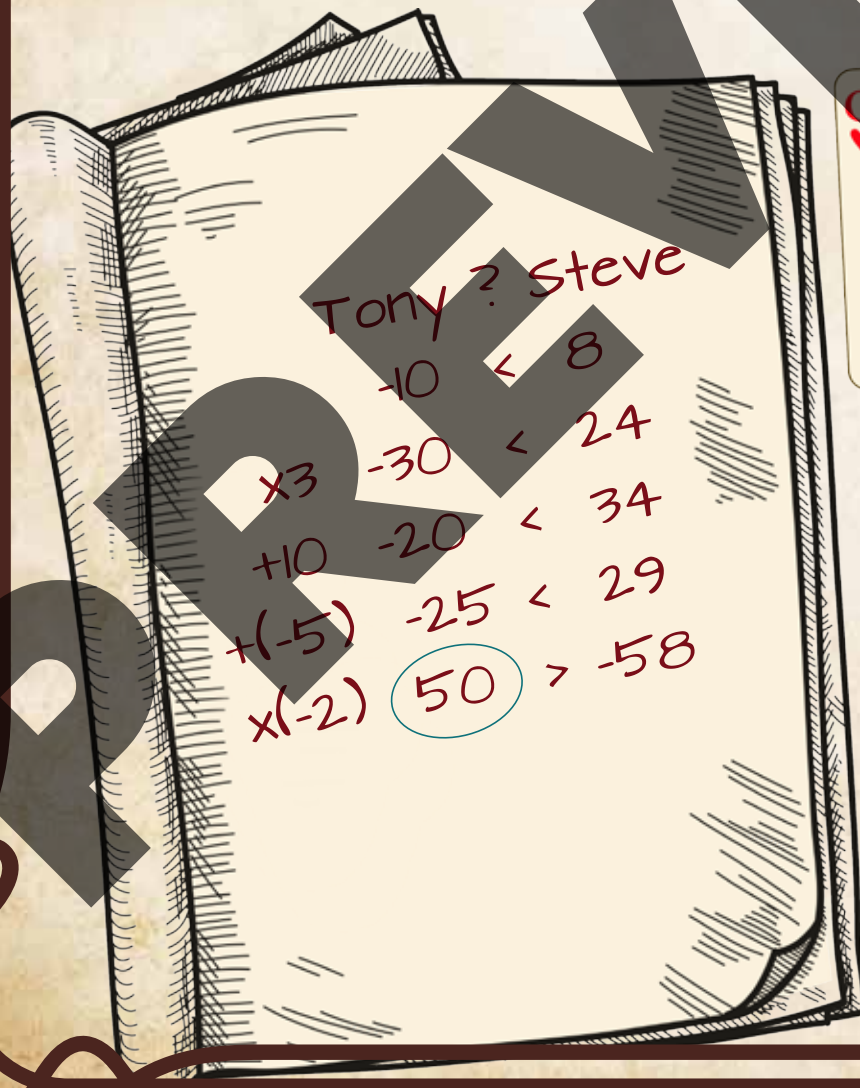
Greater Than Sample Game

Tony challenges Steve to a game of Greater Than. Tony deals the first hand, and the players reveal their initial cards. Tony plays the queen of hearts, for a value of -10 . Steve has the eight of spades, for a value of $+8$.

As the non-dealer, Steve goes first. He plays the three of clubs and writes " $\times 3$ " on the next row. Then he multiplies both scores by three and writes each product in that player's column. He writes the less-than sign " $<$ " to show that he's in the lead.

Tony lays down the ten of spades, adding 10 to each score. Steve chooses the five of hearts, adding -5 to the scores. Steve still has the greater value, but Tony gets one more turn.

Tony plays the two of diamonds, which multiplies both scores by -2 . Multiplying by a negative number changes the sign of the scores, and Tony wins the hand with 50 points.



♠ ♥ → add (+)

♣ ♦ → multiply (x)

HAND	+ / x	NAME:	> ? <	NAME:
1	INITIAL VALUES			
2	INITIAL VALUES			
3	INITIAL VALUES			
4	INITIAL VALUES			
5	INITIAL VALUES			

Graphing Games

6 WAYS TO PLAY MATH
WITH OLDER STUDENTS

Hidden Hexagons

MATH CONCEPTS: coordinate graphing (first quadrant), simple linear equations, irregular polygons.

PLAYERS: two players or two teams.

EQUIPMENT: gameboard or square grid paper for each player, pencils, ruler or other straightedge.

Set-Up

To make your own gameboards, give each player a sheet of square grid paper. Players outline two 10×10 grids and label the x and y axes $0-10$. Label one grid Top Secret and the other grid Clues.

On your secret grid, draw a closed shape with six straight sides, with vertices on the grid intersection points (the points with whole-number coordinates) and at least one grid point entirely inside the shape. Use a ruler or straightedge for precise lines. Don't let the sides of your shape cross each other. This is your hidden hexagon. Record the ordered pairs for each vertex beside the grid.

How To Play

Players alternate turns asking for information so they can guess their opponent's secret shape. On your turn, name an equation for a horizontal, vertical, or diagonal line. For example:

- ◆ The equation $x = 3$ represents the vertical line that includes such points as $(3, 0)$ and $(3, 5)$.
- ◆ The equation $y = 10$ indicates the top horizontal line on the gameboard, including points like $(1, 10)$ and $(7, 10)$.
- ◆ The equation $y = x$ is the diagonal line from the origin slanting up at a 45° angle. It passes through such points as $(2, 2)$ and $(9, 9)$.

Your opponent checks that line against their hidden hexagon and tells whether each grid intersection point is a vertex, on the perimeter, inside the shape, or outside.

After you discover all six vertices of the hidden hexagon, you may guess right away. Or you may keep playing to collect more information on the secret shape.

When you're ready, connect the vertices on your Clues grid. Make sure the shape fits properly around all the marked points. Reveal your drawing and compare it to the hexagon on your opponent's gameboard.

The first player to guess ends the game.

If your drawing matches the hidden hexagon, you win the game. But if your guess is wrong on any point, the other player wins.

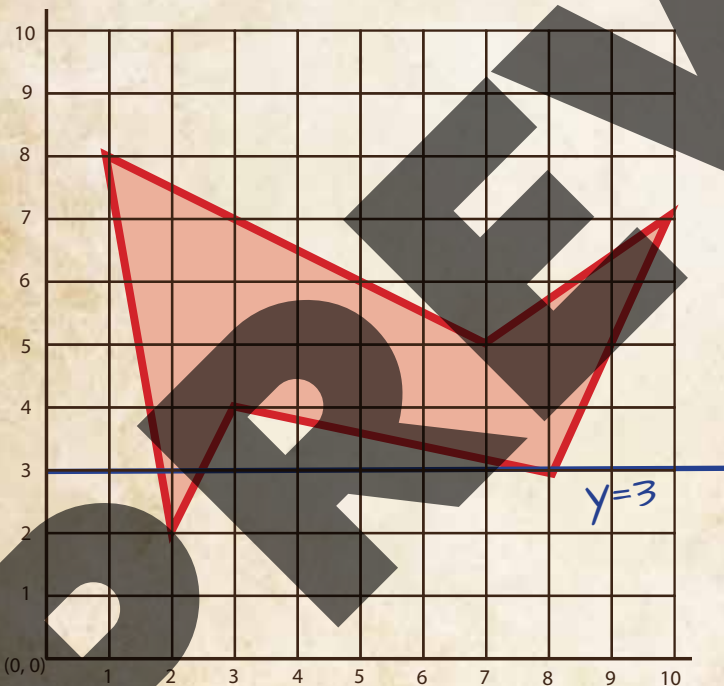
Hidden Hexagons Example

*Imagine you drew the hexagon shown below,
and your opponent asks for the $y = 3$ clues.*

*Point $(2, 3)$ is inside the shape,
and $(8, 3)$ is a vertex.*

All the other points are outside your hexagon.

TOP SECRET:



vertex = (1 , 8)

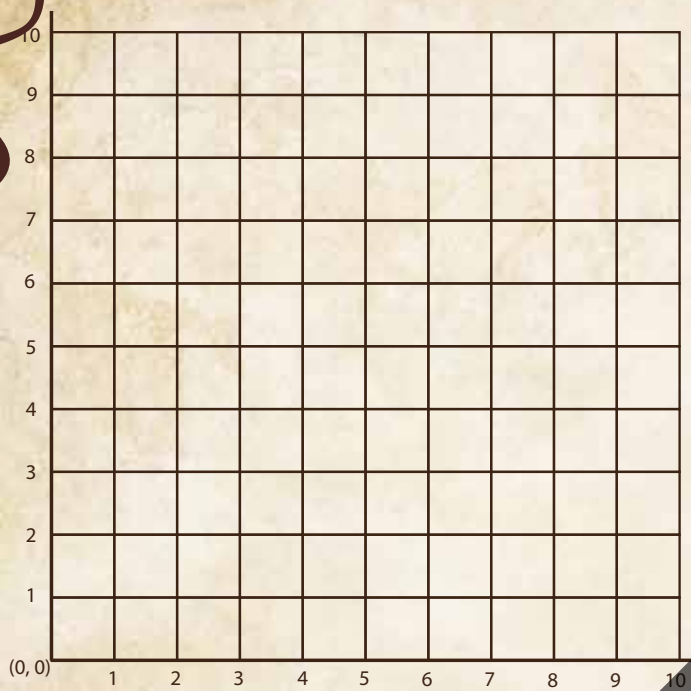
vertex = (2 , 2)

vertex = (3 , 4)

vertex = (8 , 3)

vertex = (10 , 7)

vertex = (7 , 5)



TOP SECRET!

vertex = (_____ , _____)

vertex = (_____ , _____)

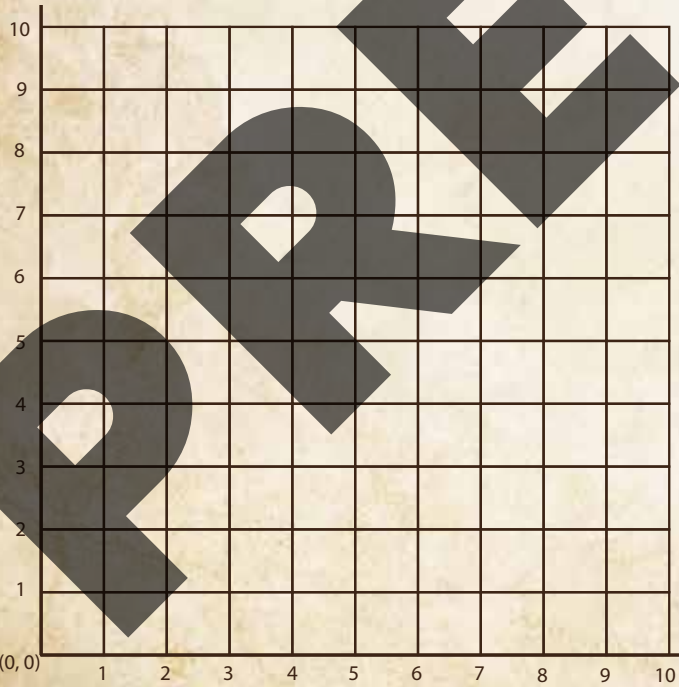
vertex = (_____ , _____)

vertex = (_____ , _____)

vertex = (_____ , _____)

vertex = (_____ , _____)

(Fold the paper to hide your secret hexagon.)



CLUES:

vertex = (_____ , _____)

vertex = (_____ , _____)

vertex = (_____ , _____)

vertex = (_____ , _____)

vertex = (_____ , _____)

vertex = (_____ , _____)

A decorative border with ornate, symmetrical flourishes at the corners and midpoints, framing the central text.

Dot-Grid Journaling Pages, Color

PREVIEW

A decorative black border with ornate, symmetrical flourishes at the corners and midpoints of the top and bottom edges, framing the central text.

Black and White Ink-Saving Pages

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The illustration shows a hand of cards and a score sheet. The cards are: Queen of Hearts, 8 of Spades, 3 of Clubs, 10 of Spades, 5 of Hearts, and 2 of Diamonds. The score sheet is a grid with two columns: 'Tony' and 'Steve'. The initial scores are -10 for Tony and 8 for Steve. Steve plays the 3 of Clubs, multiplying both scores by 3. Tony plays the 10 of Spades, adding 10 to both scores. Steve plays the 5 of Hearts, adding -5 to both scores. Tony plays the 2 of Diamonds, multiplying both scores by -2. The final scores are 50 for Tony and -58 for Steve. The 50 is circled, and a greater-than sign is between them.

	Tony	?	Steve
	-10	$<$	8
$\times 3$	-30	$<$	24
$+10$	-20	$<$	34
$+(-5)$	-25	$<$	29
$\times(-2)$	50	$>$	-58

♠ ♥ → add (+)

♣ ♦ → multiply (×)

HAND	+ / ×	NAME:	> ? <	NAME:
1	INITIAL VALUES			
2	INITIAL VALUES			
3	INITIAL VALUES			
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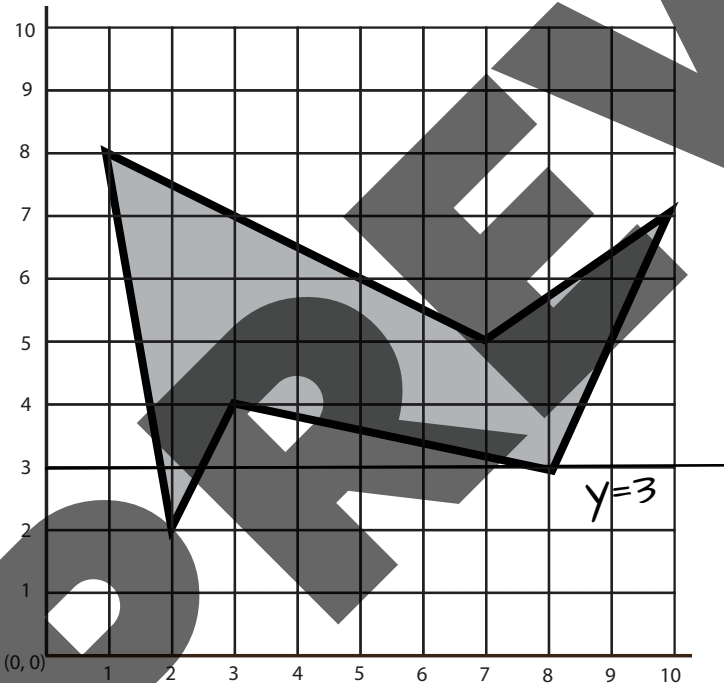
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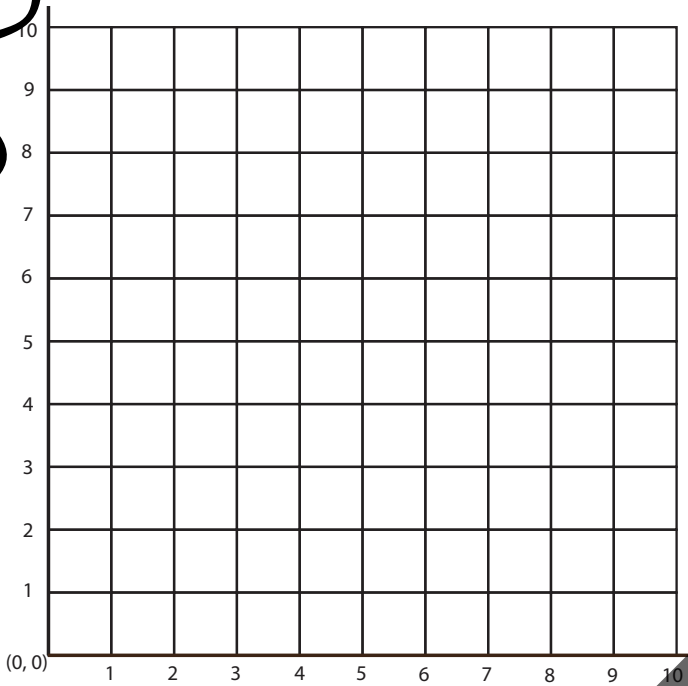
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vertex = (7 , 5)



TOP SECRET!

vertex = (_____ , _____)

vertex = (_____ , _____)

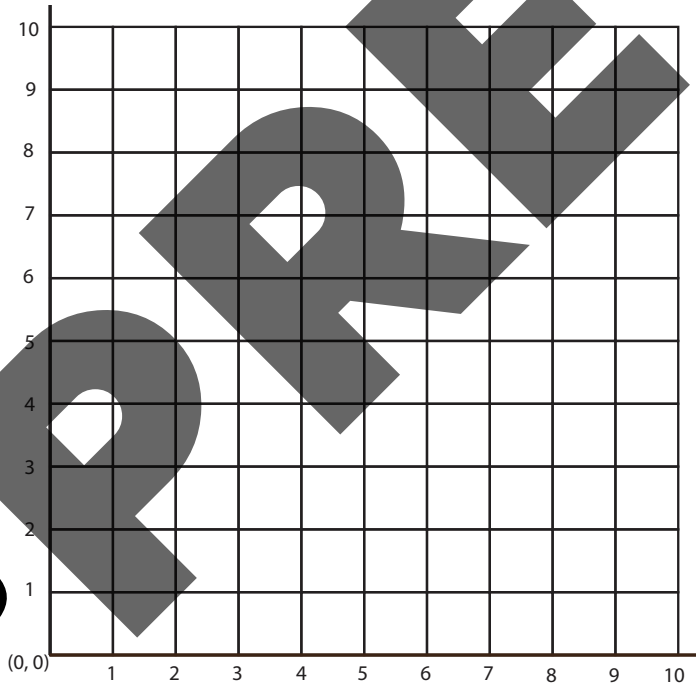
vertex = (_____ , _____)

vertex = (_____ , _____)

vertex = (_____ , _____)

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CLUES:

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vertex = (_____ , _____)

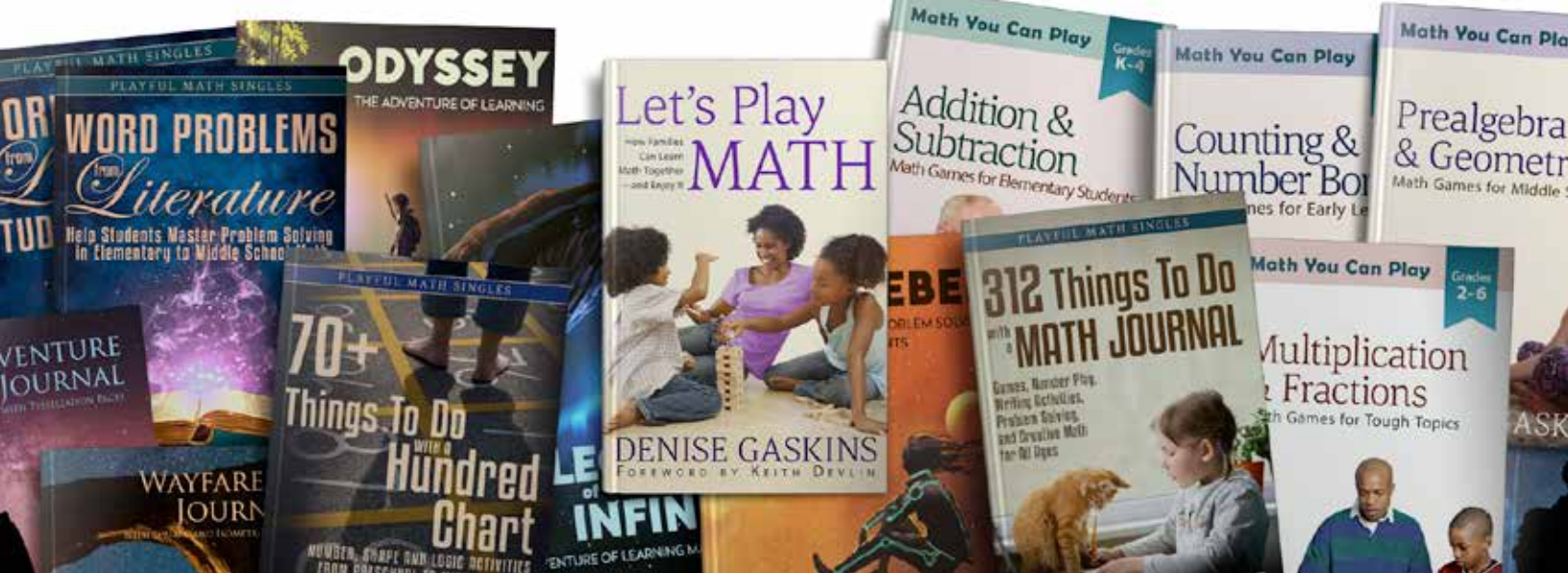
vertex = (_____ , _____)

vertex = (_____ , _____)

vertex = (_____ , _____)

vertex = (_____ , _____)





Playful Math Books by Denise Gaskins

TABLETOPACADEMPRESS.COM

“Denise has gathered up a treasure trove of living math resources for busy parents. If you’ve ever struggled to see how to make math come alive beyond your math curriculum (or if you’ve ever considered teaching math without a curriculum), you’ll want to check out her books.”

—Kate Snow, author of *Multiplication Facts That Stick*

Then Explore the *Math You Can Play* Series

You’ll love these math games because they give your child a strong foundation for mathematical success.

By playing these games, you strengthen your child’s intuitive understanding of numbers and build problem-solving strategies. Mastering a math game can be hard work. But kids do it willingly because it’s fun.

Math games prevent math anxiety. Games pump up your child’s mental muscles, reduce the fear of failure, and generate a positive attitude toward mathematics.

So what are you waiting for? Clear off a table, grab a deck of cards, and let’s play some math.

Or Try a Playful Math Single

Denise’s *Playful Math Singles* series features short, topical books loaded with clear explanations and ready-to-play activities.

70+ Things To Do with a Hundred Chart shows you how to take your child on a mathematical adventure through playful, practical activities. Who knew math could be so much fun?

312 Things To Do with a Math Journal includes number play prompts, games, math art, story problems, mini-essays, geometry investigations, brainteasers, number patterns, and research projects for all ages.

More titles coming soon. Watch for them at your favorite online bookstore.

Start Here: *Let’s Play Math Sampler*

Do you want your family to enjoy learning math? Then learn how to play!

In excerpts from author Denise Gaskins’s most popular books, the *Let’s Play Math Sampler* features ten kid-tested games covering math concepts from counting to prealgebra.

Get the *Let’s Play Math Sampler* and discover how to make math a playful family adventure.

Or Go Directly to *Let’s Play Math*

Transform your family’s experience of math! Even if you struggled with mathematics in school, you can help your children enjoy learning and prepare them for academic success.

Denise makes it easy with this mixture of math games, low-prep project ideas, and inspiring coffee-chat advice from a veteran homeschooling mother of five. Drawing on more than thirty years of teaching experience, she provides helpful tips for parents with kids from preschool to high school, whether your children learn at home or attend a traditional classroom.

Don’t let your children suffer from the epidemic of math anxiety. Pick up your copy of *Let’s Play Math: How Families Can Learn Math Together and Enjoy It*, and start bringing math alive today.

