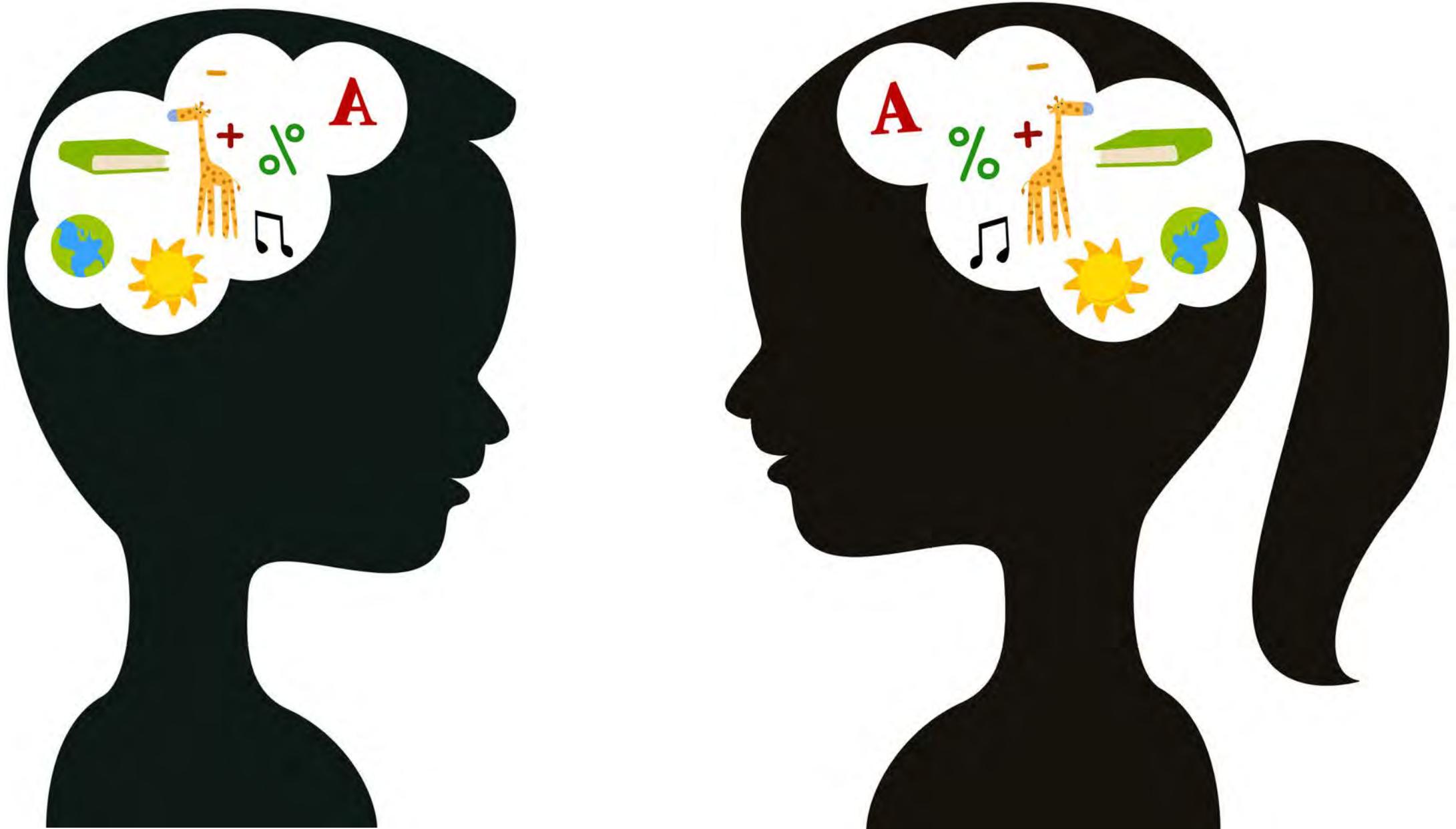


Improve executive function
in 5 minutes a day!



Working memory
BRAIN GAMES

by Angela Watson

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Angela Watson
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15 Working Memory Brain Games for Kids:

5 minute daily exercises
to improve executive functioning

What is working memory?

Working memory is the information you can consciously hold in your mind in any given moment. It's like a workspace where we temporarily keep information we'll need only for a short time. Having a strong working memory is having the ability to retain fresh information long enough to do something with it.

Our working memory is quite limited—if we try to remember a lengthy sentence or a number with a lot of digits (like someone's phone number), it can be very difficult. People with strong working memories find it easier to recall and manipulate information they hear without needing to write it down: for example, they can solve a math problem in their heads, remember driving directions they read several minutes earlier, and recall the names of each person in a group they've just met.

Working memory is one aspect of executive function, a collection of the brain's cognitive processes. The two other core executive functions are flexibility and self-control/self-regulation.

Why is working memory important?

Poor working memory is the cause of many common concerns teachers have about students' behavior in class. Have you ever complained that your students can't follow directions and struggle with multi-step directions? That they forget things they were just taught, or have trouble copying information and taking notes? Or that they lose their place in tasks, need constant reminders about what to do, and have difficulty retelling stories and explaining strategies they used?

These are all indications of poor working memory. And not surprisingly, kids who exhibit these behaviors fall behind in their academics, especially in reading and math.

Most of the time, we never make the connection that working memory is part of the problem. We don't realize that when kids appear to be daydreaming and not attending to a task, it's sometimes because their working memory is full. Their brains simply cannot hold any additional information, and because they literally can't follow along, they just tune out.

If we support children in developing a strong working memory, they'll be able to:

- ✓ apply previously learned information to new situations
- ✓ stay focused and on-task
- ✓ reorganize their thoughts to accommodate new information
- ✓ take better notes and copy information more accurately
- ✓ follow complex and multi-step directions

Working memory is proven to be a better indicator of later student success than IQ scores, test scores, and even student attitude!

A study by Monica Melby-Lervag and Charles Hulme found that children under age 10 showed significantly larger benefits from verbal working memory training than older children (ages 11-18 years of age.) Working memory is something we need to address with PreK, Kindergarten, and elementary-aged children.

Why is working memory a challenge for many kids?

Toddlers and young preschoolers generally have a limited working memory, which is why you need to give them one-step directions and use simple vocabulary. As kids grow older, their working memory increases. So, part of the challenges around working memory are simply developmental.

However, other conditions can cause our working memory to suffer. Three of the main circumstances include when we are distracted, when we're trying to hold too much information in our heads at one time, and when we're engaged in difficult tasks.

For many kids, that describes almost every moment of their day in school! And once information is lost from working memory, it can't be recalled, because it was never stored in long-term memory.

If you've wondered why you have to repeat yourself so many times with kids who are truly unable to recall what you've said...mystery solved! They got distracted or over-stimulated when you were giving directions or teaching, and the information you said slipped from their working memories...and it's gone forever unless you provide the information again.

Additionally, working memory (like all brain function) suffers when we are hungry, tired, overheated, severely cold, and under extreme stress. Since many of our students grapple with those issues on a daily basis, it's no wonder that their working memory is so limited.

It's especially an issue for children who have experienced trauma. When the brain is always preoccupied with trying to meet basic needs, less mental energy is available for processing other decisions. Emotion self-regulation suffers, as does academic performance.

How do we know working memory training is effective?

There have been number of studies proving this. For example: every day for two months, researchers in Japan conducted 10 minutes of working memory training with eight-year-old children. The training involved tasks such as giving a series of 4 numbers and asking the children to identify which number came second.

IQ scores for eight-year olds increased 6% in the control group and 12% in the memory trained group, and the children with the lowest initial scores made the greatest gains. This same article cites similar (though slightly less dramatic) results with 6 and 7 year old children—and even adults who participated in memory training showed gains.

What's most remarkable to me is the short amount of time it takes to see a difference. Salminen, Strobach, and Schubert confirmed in a 2012 study that building a strong working memory takes only 5 to 10 minutes of practice a day for 8 to 12 weeks.

How do these working memory games fit with the research?

When I first came across these studies a decade ago, I immediately did a Google search to find working memory games for children. I was shocked to find that very few such resources existed. There were some online “cognitive enhancement” programs available for a subscription, but none specifically for working memory...and there was nothing designed specifically for classroom use. I read many resources which recommended playing recall games, but there was no ready-to-use system available.

I decided to do the research myself and create games that could be played in 5-10 minutes per day in PreK-6 classrooms. I studied articles and books on working memory, looked at the type of games that were played with children in the research studies, and considered developmental best practices. I tried to create games that covered visual-spatial memory, auditory skills, letters and words, and also numbers.

How should I use these games?

- **Play the games for 5-10 minutes each school day for around 9 weeks.** Research shows working memory training produces results when conducted for short periods of time. Because children can show benefits from only a few weeks of this daily practice, and because I think the games would become less fun and engaging after many months, I recommend implementing the working memory practice for just one quarter in the school year (approximately 9 weeks.)
- **Have students play the same game for the entire week, Monday through Friday.** The following Monday, introduce a new game. Since you only need 9 games and I have included 15 games in the PDF, you can select the ones you think your students would enjoy and benefit from the most. You can choose a variety of games (letters, numbers, words, auditory recall, and visual-spatial recall) or focus on the areas in which your students need the most practice. Once students are familiar with the games, you can also allow them to choose which game to play.
- **Pair students of similar ability.** Though a formal evaluation to determine students' working memory skills could be helpful, I don't believe it's truly necessary. You can tell from everyday observation in your classroom which students have sharp memories and the ability to focus and stay on task. Pair those students up, and pair up your students who are struggling with working memory. This way, struggling students will not feel pressure to work as quickly or accurately as their peers with stronger working memory, and hopefully both students in each pair will advance to the challenge activity at about the same time. Re-partner students as needed.
- **Wait to encourage students to attempt the challenge activity that's on each game card until the second or third day of game play,** as many students will "bite off more than they can chew" and therefore won't benefit from the practice. Emphasize that they must consistently be able to remember 4 numbers, for example, before trying to remember 5.
- **You do not necessarily need to make a copy of the game instructions for each pair of students.** You can project the instructions on your interactive whiteboard or just explain the game verbally. Younger students and emergent readers will benefit most from this approach. Observe students carefully as they play and provide guidance as needed: if the task is too hard, simplify it by reducing the number of items they need to remember.
- **After the nine weeks of game play, you may choose to continue the daily practice with certain students** if you feel that they are still struggling or have made significant gains that you don't want to lose. This could be a great warm-up activity in reading groups or other small group/differentiated instructional periods. Your students might also find it valuable to revisit the games periodically throughout the year.

How do I introduce the games to students?

1. **Pick the game that you think is most engaging, and play it in front of the whole class using student volunteers.** Invite a pair of students up and introduce the directions, then have them play for a minute or two while the other students watch.
2. **Tell students that the game seems like it's all for fun, but it's actually helping to improve their memory. Ask what kinds of things they need to remember, and take a few volunteers' responses.** Guide students to consider purposes such as directions you give in class, information they just read in a text, and other functions of working memory.
3. **Introduce the term *working memory* and describe it as a temporary workspace in our minds where we hold information we just need for a few moments.** You may want to show students [this short video from Learning Works for Kids](#).
4. **Tell students that they will have the opportunity to play one of these fun games with a partner for 5-10 minutes every day for the next few weeks.** At that point, they should find it a little easier to solve math problems in their heads, keep their place in a book when reading, and experience all kinds of other great benefits in school and in their daily lives!
5. **Explain the designated time in your schedule that they will get to play** (such as a morning warm-up, right after lunch, just before dismissal, etc.)
6. **Introduce the similar-ability partner pairings you selected, and provide several minutes for students to try out the game you just modeled.**
7. **Debrief afterward.** Ask students, "What was most challenging about this game? Did it get easier the more you played? Why do you think that is?"

Throughout the school year, continue to model and reinforce appropriate game play practices as well as cooperative learning strategies (taking turns, being supportive and kind to your partner, encouraging each other, working through frustration, etc.)

How do I know if the games improved students' working memory?

Observe your students during the first day of game play and note how well they did (how many letters/numbers they were able to remember in sequence, etc.) If you want more controlled data, play the game for a minute or two with each child yourself, and use that as your baseline data.

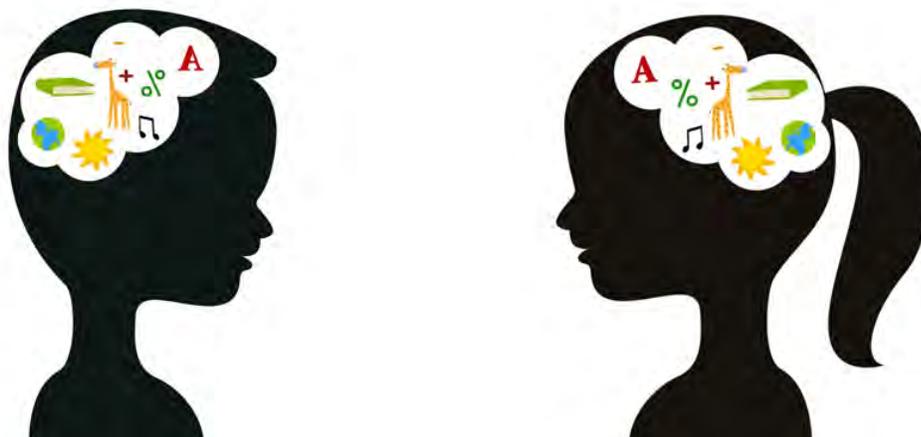
After the nine weeks (or however many weeks you choose to use the games in your classroom), have students play the same game again and record how well they perform.

What else can I do to improve my students' working memory?

There is some evidence that the brain can be trained to process information more efficiently through activities such as:

- riddles
- crossword puzzles
- word scrambles
- mindfulness training
- listening games like Simon Says

I highly recommend the free PDF [Understanding working memory: a classroom guide](#) for additional ideas about how your classroom routines and daily practices can support working memory development.



Where can I learn more about working memory?

I used the following resources to help me create these games (cited links are embedded throughout the document), and highly recommend them to others who want to learn more about helping kids develop their working memory:

Online references

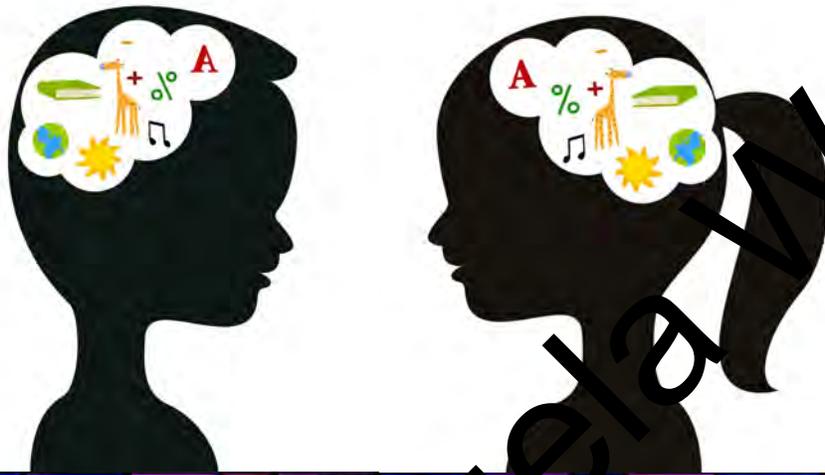
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- [Working Memory](#), *Learning Works for Kids*.
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Books

- [Working Memory and Learning: A Practical Guide for Teachers](#) Susan Gathercole & Tracy Packiam Alloway, SAGE Publications, January 9, 2008.

Working Memory Brain Games

Improve kids' **executive functioning** with
5 minutes of partner games a day!



My 3 Facts

Materials: none

Directions: Tell your partner 3 things you did when you first arrive at school this morning. Be sure to say them in order! Have your partner repeat them back to you. Then switch roles! Play again telling 3 other things: 3 things you did over the weekend, 3 things you would like to do after school, 3 steps for playing your favorite game, 3 facts about your favorite book or TV show, and so on.

Challenge: Try telling each other 4 facts! If you get really good at remembering what your partner said, try 5!

Taking a Trip

Materials: none

Directions: Say a place you would like to go to and something you would bring with you. For example: "I'm going to the beach and I'm taking a beach bag." Your partner then repeats your sentence and adds their own item: "I'm going to the beach and I'm taking a beach bag and some flip-flops." You then repeat the list and keep adding to it. When the list gets too long to remember, start again with a new place and items you would bring!

Challenge: Can you remember 10 items in the list?

What Comes After?

Materials: number cards

Directions: Draw 4 number cards from the stack and place them in order, where only you can see them. Say the numbers to your partner and then ask a question about them. For example: "6, 2, 3, 9. What number was after 3?"

Here are some other questions you can ask: Which number came second? What number was last? Which was the first number? Which number was before ___?

Challenge: Use 5 number cards, or even 6!

Name That Number

Materials: number cards

Directions: Put the cards in a face down stack. Take the top card off, look at it, and place the card face down. Say the number that was on it out loud. Then have your partner take the next card from the stack, place it face down next to yours, and say the number you said AND the number on his or her card. Keep taking turns trying to remember and say all the numbers you and your partner have drawn from the stack. When someone makes a mistake, shuffle the cards and play again!

Challenge: Can you remember 10 numbers? See how close you can get!

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Number Talk

Materials: number cards

Directions: Flip over four number cards but don't let your partner see them! Read them aloud to your partner and have him or her repeat those numbers back in the same order you said them. Take turns flipping over number cards, saying them to each other, and repeating them back.

Challenge: How many numbers can you remember and repeat? Try practicing with 4, then 5...and keep going!

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Build It

Materials: timer, shape cards

Directions: Set a timer for 30 seconds and make any design you want using 7 shape cards. When time is up, you and your partner should look at each other's designs. Try to create an exact replica of their work: use your pieces to make a design that looks just like theirs! When you're done, play again and create new designs for each other to copy.

Challenge: Try using more shape cards: 8 this time, then 9, then 10. Can you still correctly copy each other's designs?

Remember My Design

Materials: shape cards, piece of construction (or other thick) paper

Directions: Make any design you want using 4 shape cards. Count silently to 10 when you're done to give your partner time to remember your design. Then put the piece of paper over your design to cover it. Can your partner remember your design and use his or her pieces to make one just like yours? Remove the paper from your design and compare them to see! When you're done, switch roles and try to copy your partner's design.

Challenge: Try using 5 shape cards. If you and your partner are successful several times in a row, try using more cards!

What's Missing?

Materials: picture cards

Directions: Take 4 cards from the stack and place them face down in a row. Flip them over slowly for your partner to see and memorize, then flip the cards back over face down. Now turn 3 of the cards face up again, but leave one face down. Can your partner guess which picture is not shown?

Challenge: After your partner has memorized the cards, mix them up before turning them face up again so that they're in a different order! You can also try playing with 5 cards, or even 6!

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Sort It

Materials: picture cards

Directions: Turn all your cards face down and take the top 5 cards. Your partner should do the same with 5 cards of his or her own. You each flip over your own cards and sort them any way you want (by color, size, shape, alphabetically, etc.) When you're done, see if you and your partner can guess how each other sorted the cards. Then mix the cards up and play again!

Challenge: Add in the word cards, letter cards, and/or number cards.

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Find the Rhythm

Materials: none

Directions: Make a rhythm for your partner to copy! You can softly clap, snap, tap your foot on the floor, tap your hand on the table, etc. Start with 5 beats, mixing up slow and fast sounds. Your partner should do the same thing right afterward. After a few minutes, switch roles and copy your partner's rhythm!

Challenge: Try adding more than 5 beats to your rhythm. To really practice your memory skills, you can also try making a rhythm, counting to five, and THEN having your partner copy!

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What's the Word?

Materials: word cards

Directions: Flip over 3 word cards and ask your partner to memorize them. Then have your partner close his or her eyes and try to say all three words in order. Flip over a fourth card for your partner and see if she or he can memorize 4 words in a row. Keep adding more cards until your partner forgets the words. Then, switch roles so that your partner flips over the word cards and you try to memorize!

Challenge: Try adding in picture, letter, and/or number cards!

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Letter Memory

Materials: letter cards

Directions: Flip over 3 letter cards and ask your partner to memorize them. Then have your partner close his or her eyes and try to say all three letters in order. Flip over a fourth card for your partner and see if she or he can memorize 4 letters in a row. Keep going until your partner forgets the letters. Then, switch roles so that your partner flips over the letter cards and you try to memorize!

Challenge: Can you remember 10 letters?

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Say My Letters

Materials: letter cards

Directions: Flip over four letter cards but don't let your partner see them. Read them aloud to your partner and have him or her repeat those letters back in the same order you said them. Take turns flipping over letter cards, saying them to each other, and repeating them back.

Challenge: How many letters can you remember and repeat? Try practicing with 4, then 5...and keep going!

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Recall 3

Materials: your choice of cards (picture, word, letter, or number)

Directions: Take 3 cards from the stack and show them to your partner. Count silently to 10, then flip the cards back over. Can your partner recall (remember) what was on all 3 cards? Take turns flipping over cards for one another and trying to remember what was on them.

Challenge: Add in a fourth card. If you and your partner can consistently remember all four, you could try even more.

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All Mixed Up

Materials: picture, word, letter, and number cards

Directions: Mix up all the cards and place them in one face down stack. Take 5 cards from the stack and place them face up for your partner to see and memorize. Flip the cards back over face down and mix them up. Now turn 4 of the cards face up again, but leave one face down. Can your partner guess which card is not shown?

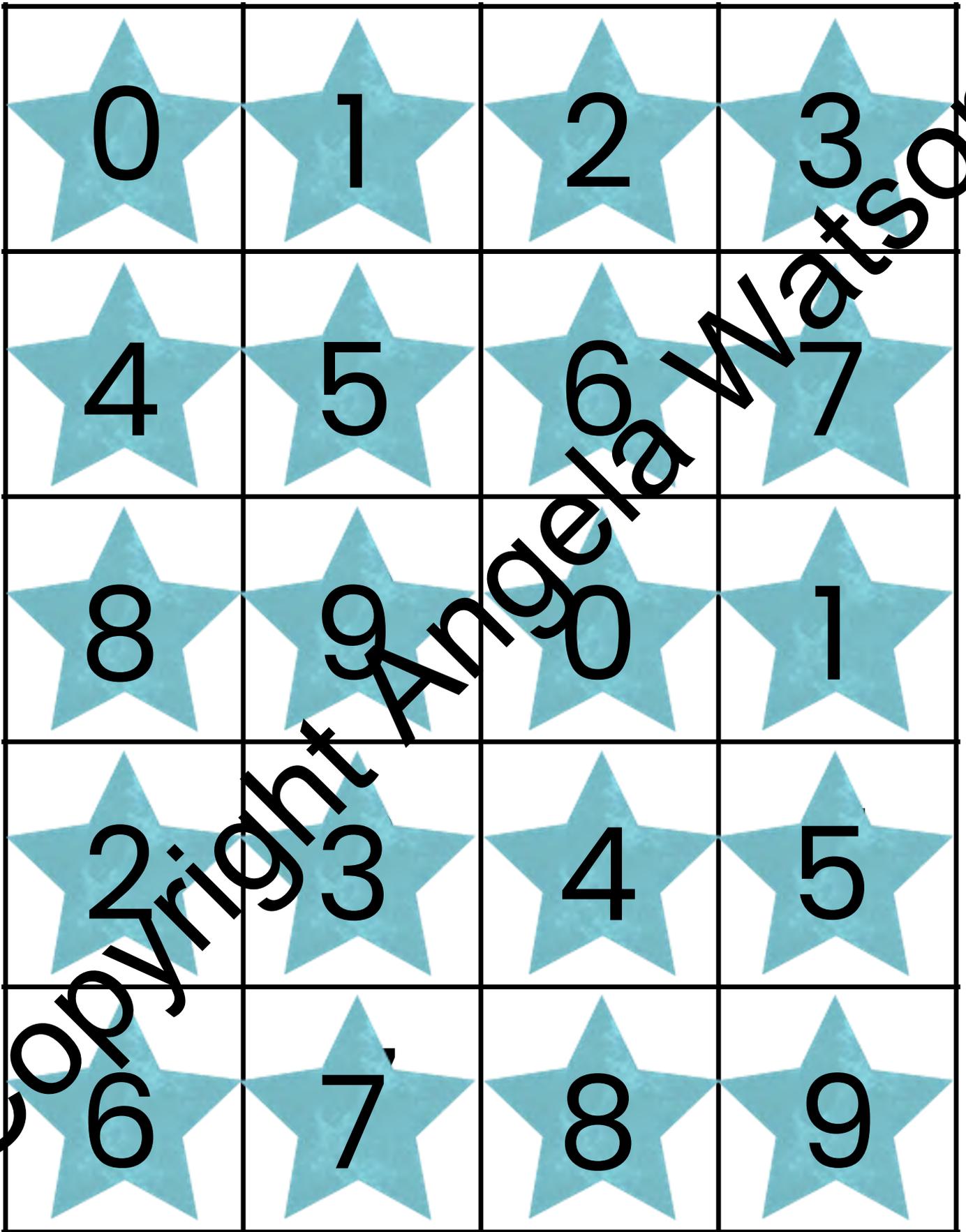
Challenge: Try leaving 2 cards face down and see if your partner can remember them both! You can also try playing with 6 cards, or even more.

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Picture Cards: make one copy for each PAIR of students



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Word Cards: make one copy for each PAIR of students

apple

bat

zoo

water

fox

grape

hat

jar

kite

map

egg

pet

dog

star

tent

lemon

cat

queen

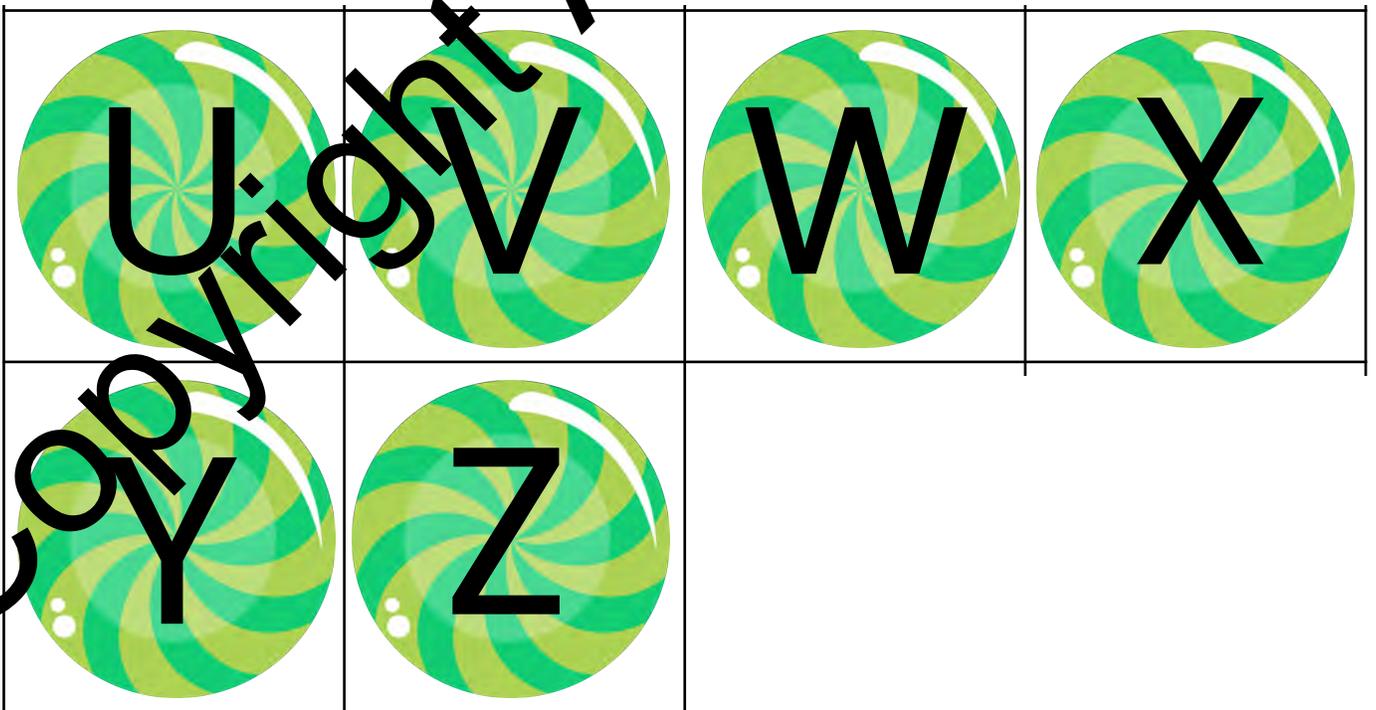
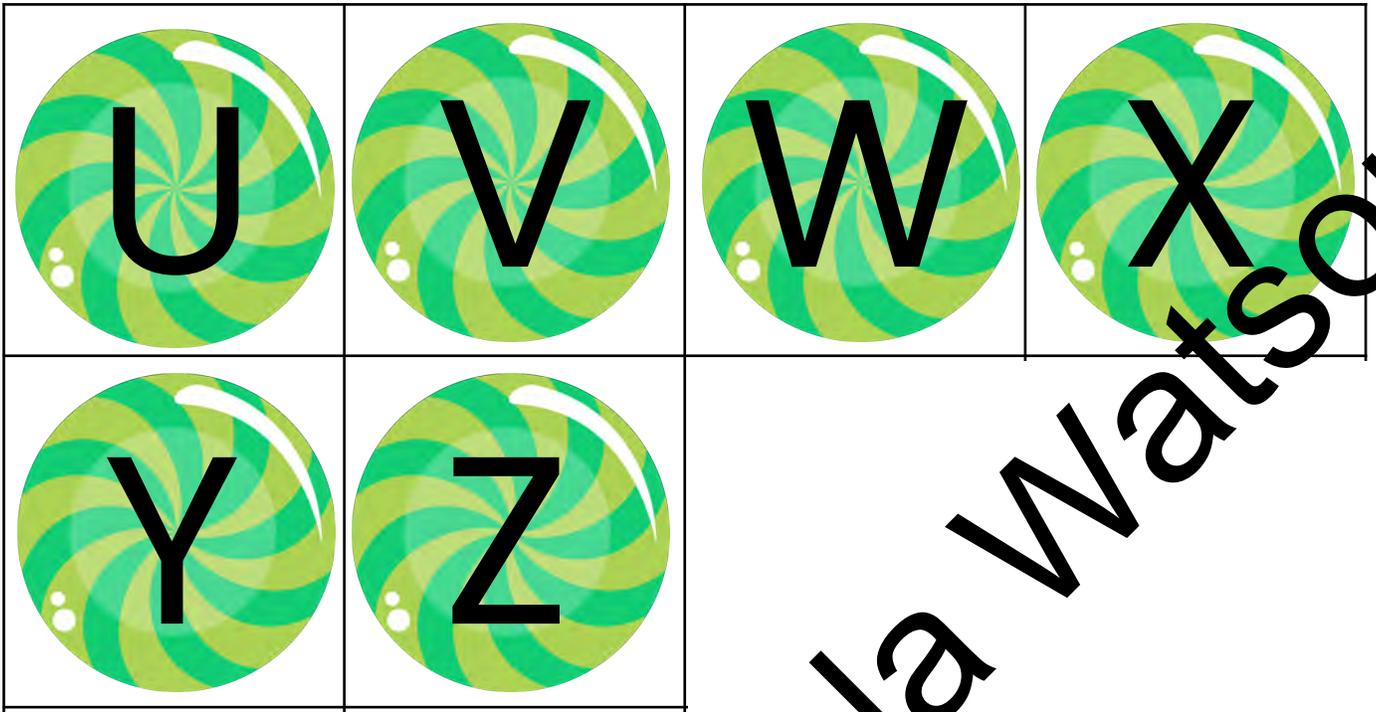
red

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Letter Cards: make one copy for each PAIR of students

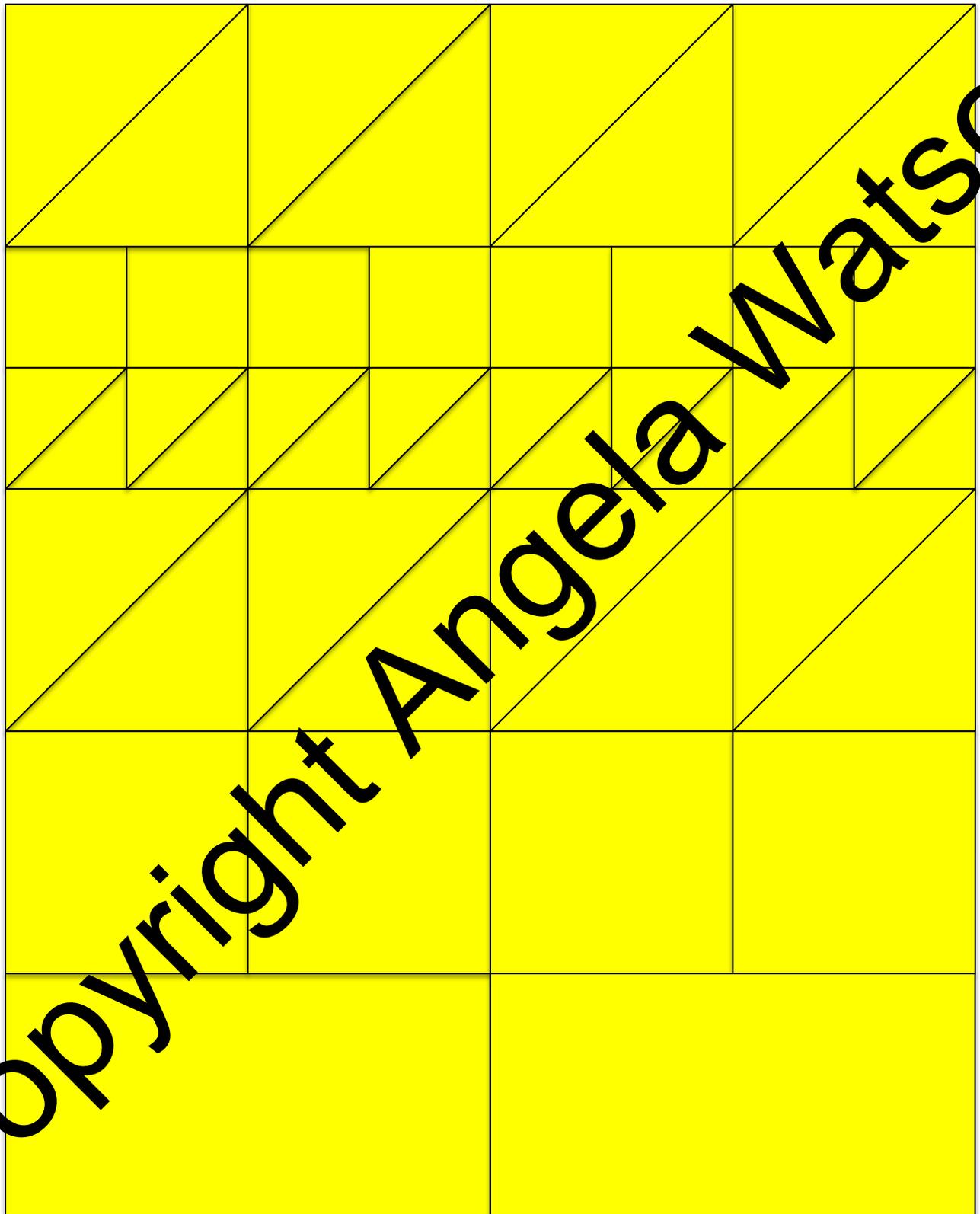


Letter Cards, Continued:
Each PAIR of students needs one half of this sheet to have the complete alphabet



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Shape Cards: Make TWO copies for each student



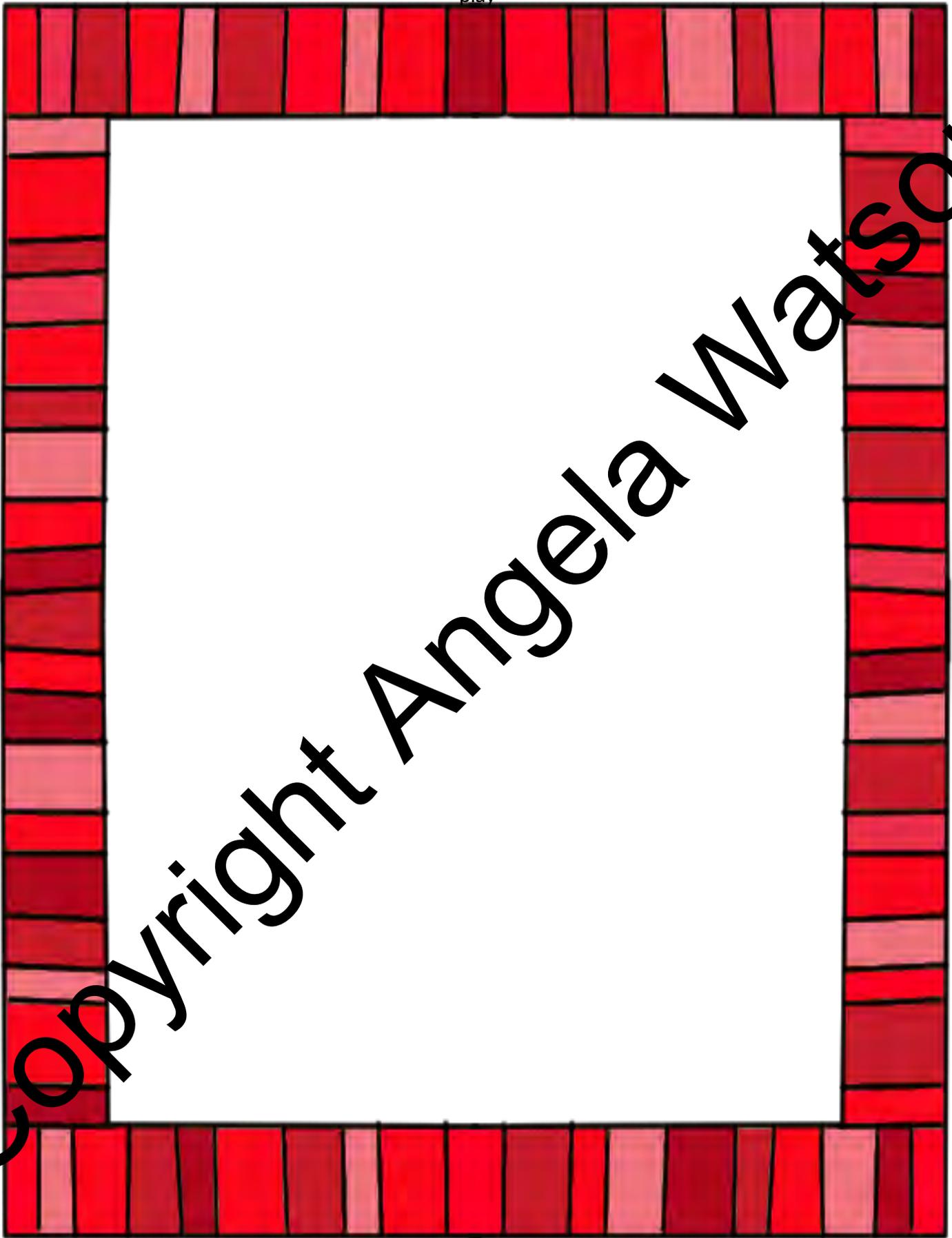
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Optional Work Mat for Partner #1: students may use this to help organize their cards during game play



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Optional Work Mat for Partner #2 : students may use this to help organize their cards during game play





BUT WAIT! THERE'S MORE...

I'm **Angela Watson**, the creator of this resource. I'm a National Board Certified Teacher with a masters degree in Curriculum and Instruction, and have 11 years of classroom teaching experience and over a decade of experience as an instructional coach. I currently work as a Productivity and Mindset Specialist in the area of educational consulting. In practical terms, this means I author books, design curriculum, and provide professional development services. Everything I do is centered on sharing more effective, efficient, and enjoyable ways of teaching and learning!

I founded my website ([TruthforTeachers.com](https://www.truthforteachers.com)) in 2003 to connect with other educators. You can now find thousands of ad-free articles and resources there from me and our K-12 teacher-writer's collective.

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