

Building Blocks

Understanding Matrices

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Grade Level	11th Grade	**Time Frame**	70 min
Subject	Mathematics	**Duration**	2-3 Class Periods
Course	Algebra 2		

Essential Question

How are matrices used to organize information and solve real-world problems?

Summary

In this lesson, students explore the foundational concept of matrices through collaborative activities, real-world readings, and hands-on problem-solving. Students begin by brainstorming what they already know about matrices using the ABC Graffiti strategy, then dive into short articles that explain how matrices are used in different real-life contexts such as computer graphics, economics, or robotics. Each group shares what they learn, helping the class build a broader understanding of the concept. Through a puzzle-based activity and personal reflection, students reinforce key mathematical ideas and see how matrices serve as powerful tools for organizing and interpreting data.

Snapshot

Engage

Students activate prior knowledge of matrices using the ABC Graffiti strategy, collaboratively brainstorming related terms and ideas.

Explore

In groups, students read short articles on real-world applications of matrices, discuss their findings, and expand on the ABC Graffiti charts using newly learned vocabulary.

Explain

Each group shares a “30-Second Spotlight,” showing a summary of their matrix application. Students also watch a video on matrices in computer graphics to reinforce concepts.

Extend

Student pairs complete a square tile puzzle that challenges them to apply matrix knowledge to match equivalent expressions and reinforce understanding through problem-solving.

Evaluate

Students reflect on the most meaningful part of the lesson using the POMS (Point of Most Significance) strategy.

Standards

ACT College and Career Readiness Standards - Mathematics (6-12)

N 607: Use relations involving addition, subtraction, and scalar multiplication of vectors and of matrices

Oklahoma Academic Standards Mathematics (Algebra 2)

A2.N.2: Extend the understanding of numbers and operations to matrices.

Attachments

- ABC Graffiti Chart—Building Blocks.docx
- ABC Graffiti Chart—Building Blocks.pdf
- Lesson Slides—Building Blocks.pptx
- Matrix Mix—Building Blocks - Spanish.docx
- Matrix Mix—Building Blocks - Spanish.pdf
- Matrix Mix—Building Blocks.docx
- Matrix Mix—Building Blocks.pdf
- Square Puzzle—Building Blocks - Spanish.docx
- Square Puzzle—Building Blocks - Spanish.pdf
- Square Puzzle—Building Blocks.docx
- Square Puzzle—Building Blocks.pdf

Materials

- Lesson Slides (attached)
- ABC Graffiti posters (optional)
- ABC Graffiti Chart handout (attached; one per group)
- Markers (unique color set for each group)
- Matrix Mix handout (attached; see Teacher's Note: Printing Matrix Mix Handout)
- Square Puzzle handout (attached)
- Scissors
- Sticky notes or paper

15 minutes

Engage

Use the attached **Lesson Slides** to guide the lesson. Start by posing the essential question and explaining the learning objectives using **slides 3–4**.

Have students get into groups of four then pass out one copy of the **ABC Graffiti Chart** handout to each group and a set of four markers (each group should have four markers of the same color but different from other groups). The purpose of providing each group member a marker is to encourage all students to write their ideas and not rely on a group leader. Display **slide 5** and introduce students to the ABC Graffiti strategy. Explain that students will work as a group to write as many words that relate to matrices as they can within the time allotted before moving as a group to the next group's poster and adding more. Instruct students to keep their markers with them as they rotate to different charts. Start the 2-Minute K20 Timer and let students work. Once the timer ends, have students move to the next chart and restart the timer. Repeat for at least four rotations. If students seem to be lacking engagement, consider moving on. If they are still engaged, continue until they have visited each group's chart.

Afterwards have students return to their original chart and, if time allows, ask for volunteers to share some of their responses.

15 minutes

Explore

Teacher's Note: Printing Matrix Mix Handout

The Matrix Mix handout contains 8 pages, each page with the same introduction but highlighting a different real-world application of matrices. For the Explore activity, each group will become an expert on one application and share their understanding with the class.

Be sure to print enough copies so that each student in a group receives the same page. For example, if you have 8 groups of 4 students, print 4 copies of each of the 8 selected pages to create a set.

Create eight groups of students and pass out one set per group of the **Matrix Mix** handout. Move to **slide 6** and introduce the GramIt strategy. Explain to students that each group will read a different section of the handout to learn more about matrices and their real-world application. As they read they will create a hashtag or one-word summary that portrays the main idea. Assign each group a section following normal classroom procedure and allow students time to read.

After each group has had enough time to read their section, encourage students to summarize their reading with their groups by coming up with 1–2 hashtags that allude to the main idea or real-world connection from the article. After a while, transition to **slide 7** and invite students to add more words, based on their new understanding, to their original ABC Graffiti chart. Then instruct students to split their group up so that each student goes to a different ABC Graffiti chart and tries to add more words based on their reading and group discussion. Start the 1-Minute K20 Timer.

15 minutes

Explain

Move to **slide 8** and introduce students to the 30-Second Spotlight instructional strategy. Explain that each group had a unique article that described a real-world application for matrices. Give the class a few minutes to prepare a summary of their application to share with the class.

Once each group has had enough time to prepare, go around the room and allow each group time to share, ensuring the class gives the speaker their full attention and recaps or paraphrases the speaker each time.

After each group has shared what they learned from their article, transition to **slide 9** and play the K20 Center Matrices in Computer Graphics YouTube video. Ask the class to pay close attention to the real-world application described in the video.

Embedded video

https://youtube.com/watch?v=g8sMoZ2fgZw

Teacher's Note: Additional Resources

Depending on class engagement and time, consider showing some or all of these additional videos that highlight the history and applications of matrices.

History of Matrices - Usage of matrices in real-time situations.

Football + Matrices in 90 seconds | Don't Memories

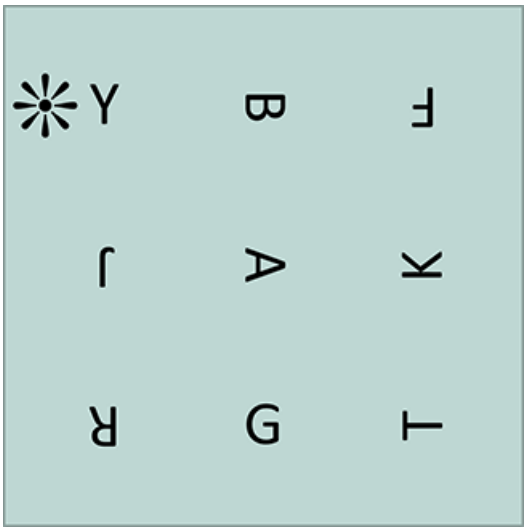
Matrices - Basics | Don't Memorise

20 minutes

Extend

Display **slide 10**. Pass out scissors and the attached **Square Puzzle** handout to each pair of students. Have students cut out the nine square tiles and rearrange them into one large square by matching each side with an equivalent value. Inform students that when they finish, every pair of touching sides should be equivalent.

As students work together to solve the puzzle, use the image below as a quick way to check students' work. The symbol in the top-left corner matches one of the tiles; once that symbol is oriented the same way on students' puzzles, the letters on their tiles will be oriented as shown below if placed correctly.



Teacher's Note: Guiding the Activity

Unhide **slides 11–12** to show students an optional first and second step to solving the puzzle. Show these slides to help jump-start their thinking process by modeling problem-solving skills and matching equivalent sides.

5 minutes

Evaluate

Display **slide 13** and have students use the POMS instructional strategy to reflect on something important they learned from the lesson. Instruct students to write their reflections on a scratch piece of paper, or pass out one sticky note per student.

Resources

- Aftertutor. (2021, Mar 8). *History of matrices - Usage of matrices in real-time situations*. YouTube [Video]. https://www.youtube.com/watch?v=srfzaMTYJqg
- Infinity Learn NEET. (2015, Nov 10). *Football + Matrices in 90 seconds | Don't memorise*. YouTube [Video]. https://www.youtube.com/watch?v=7vnfRPzAQ0g
- Infinity Learn NEET. (2016, Feb 17). *Matrices - Basics | Don't memorise*. YouTube [video]. https://www.youtube.com/watch?v=JMjbPh1Mjn8
- K20 Center. (n.d.). 30-second spotlight. Strategies. https://learn.k20center.ou.edu/strategy/3748
- K20 Center. (n.d.). ABC graffiti. Strategies. https://learn.k20center.ou.edu/strategy/96
- K20 Center. (n.d.). GramIt. Strategies. https://learn.k20center.ou.edu/strategy/2554
- K20 Center. (n.d.). POMS: Point of most significance. Strategies. https://learn.k20center.ou.edu/strategy/101
- K20 Center. (2021, September 21). *1 Minute Timer*. YouTube [Video]. https://www.youtube.com/watch?v=6ilD555O_RE&list=PL-aUhEQeaZXLMF3fltNDxiuSkEr0pq0c2&index=2
- K20 Center. (2021, September 21). *2 Minute Timer*. YouTube [Video]. https://www.youtube.com/watch?v=HcEEAnwOt2c&list=PL-aUhEQeaZXLMF3fltNDxiuSkEr0pq0c2&index=4
- K20 Center. (2022, July 21). *Matrices in computer graphics*. YouTube [Video]. https://www.youtube.com/watch?v=g8sMoZ2fgZw&t=1s