
# Math in Action

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**Time Frame** 1-2 minutes

## Essential Question(s)

- How can math concepts be supported in all content areas?

## Summary

Participants will use provided data to construct a viable argument using mathematical reasoning. Participants will also explore ways to incorporate math strategies in other content areas to support math achievement.

## Learning Goals

- Participants will identify parallels between problem solving and logical reasoning in math to other content areas.
- Participants will be introduced to math strategies that can reinforce math objectives in their subject areas.

## Attachments

- Authentic Learning and Teaching.pdf
- Everyday Math.docx
- Everyday Math.pdf
- Football Statistics.docx
- Football Statistics.pdf
- Instructional Strategy Note Sheet.docx
- Instructional Strategy Note Sheet.pdf
- Math in Action Powerpoint.pdf
- Math in Action Powerpoint.pptx

## Materials

- Blank paper
- Pens or pencils
- Math in Action PowerPoint (attachment)
- Authentic Learning and Teaching (attachment)
- Football Statistics (attachment)
- Everyday Math (attachment)

# Engage

Agreement Circles explained: Agreement Circles is a way to assess the prior knowledge of the participants and how they feel about the topic to be addressed.Begin by having participants form a circle.Read the statement on the PowerPoint slide, “It is easy to support math content in any subject area,” then give participants 5-10 seconds of think time.Ask participants to move to the center of the circle if they agree with the statement and stay on the outside if they disagree.Match participants up 1:2, 1:3, 1:4, 1:5, or whatever the proportion of agree/disagree indicates; or allow the middle to take turns convincing the group and give them a few minutes to defend their ideas in small groups.Use the discussion to transition to the objectives slide.

**Presenter's Note**

If no one moves to the middle of the circle, tell participants that this session hopes to change their mind about the feasibility of supporting math in other content areas. If everyone moves to the middle of the circle congratulate participants and tell them you hope to offer even more ways and strategies that add to their repertoire of supporting math.

Now that you have participants engaged, change to the "Learning Objectives" slide and share with them the objectives for the session using some examples from their discussion. Inform them that the session will offer even more strategies to help them reinforce math content in other subject areas. Move to the next slide, "Authenticity," and introduce the two components of authenticity that this session will highlight. All components are featured to varying degrees, however, the two that will be focused and reflected on are "value beyond school" and "student-centered learning."

# Explore

Change to slide five.

Participants should be given the instructions on slide five and use the "Football Statistics" handout for this next activity.

For the following activity, participants will be partnered up to answer the question “Who is the better team?” based on the data they have been given, their own prior knowledge, or the way in which they can manipulate said data. This activity reinforces logical thinking and construction of a reasoned argument, which are skills that can be easily transferred to other content areas.

To begin, make sure the PowerPoint is on slide five and that all participants have a hard copy of the information on slide seven.

**Presenter's Note**

Presenters can distribute use the "Football Statistics" handout, which is a printer-friendly version of slide seven in the PowerPoint, or can print out copies of slides seven and eight for session participants. Both the handout and the slides are edit-able, so if you wish, you can compare different stats in your session that may be more relevant to your participants (e.g., comparing players, different teams). All session activities would still have the same format.

- Find an elbow partner.
- During this activity, participants will construct viable arguements to address the essential questions.
- Participants will utilize the football statistics provided to support their arguments.

Move the the slide, "Who is the better team?"

Participants will then use the football statistics information for the two teams (or players) featured. For the OU vs. OSU football statistics provided (slide seven), we also found it helpful to include who each team played the weeks that are listed (slide eight). Activity can be differentiated by participants wanting to include other factors and statistics that they find, if they so choose. Groups can also be encouraged to represent their conclusions in the way they think is most helpful to support their arguments.

Once groups have had ample time to pick a team with supporting evidence, change to slide nine, "Share Out." Each group will share out their conclusion and the reasoning to support their decision.

# Explain

Change to the slide "Content Standards." Review the content standards for math, science, social studies, and ELA. Then, move forward to slide 11 to ask the questions on the reflection slide. Facilitate a discussion to point out that the activity just completed was based on logical thinking, reasoning, and supporting a claim and that when educators are doing these types of skill building in their content areas, they are supporting the formation of that skill in math as well.

Change to next slide, "Authenticity Connection," and ask participants to use the authenticity rubric to decide which components of authenticity they saw demonstrated in the mini lesson.

# Extend

Share the slide “Everyday Ideas” and discuss with participants the things they might already do in their classes (either featured on the slide or additional activities) that support math in other content areas. Pass out the “Everyday Math” card and encourage them to write down any additional ideas that were discussed in the session. Especially on the last idea: using basic math problems to designate a page number rather than telling students the page number flat-out. Highlight the power of building number sense if everyone was using this technique in every class, every day.

Now that you have discussed general, everyday ideas to support math in other content areas, move the discussion to the "DIY" slide. Give specific content examples of how other content areas can incorporate math concepts in their own material. Ask for other examples that participants have done, seen, or heard.

# Evaluate

**Presenter's Note**

TREK evaluations will be used in place of the evaluation activity when available. If you don't have access to a TREK evaluation continue with the activity below.

I Used to Think . . . but Now I Know explained: To close the session participants will reflect on what they learned using I Used to Think . . . but Now I Know. This strategy allows participants to apply the strategies discussed during the session to their own content areas and allows the session facilitators to check for understanding. It is used after instruction and asks participants to compare their ideas or thoughts from the beginning of a lesson to the ideas they have after completing the lesson.

Ask participants to use the back of their agendas or provide their own paper to draw two columns. Use this table to complete the I Used to Think . . . but Now I Know closing activity to answer the question: “How have your ideas about supporting math in all content areas changed (or become more detailed)?” The left column should be labeled “I Used to Think” and the right side labeled, “Now I Know." Give participants 1-2 minutes to complete the charts, then ask for share outs.

Lastly, show participants the slide with the instructional strategies website. Make sure they're aware that they can access any of the K20 instructional strategies they experienced today, and many more, at the URL found on the slide. Next, show them the next slide with the K20 LEARN website. Make sure they are aware that there are many lessons on this site that support authentic instruction and that utilize some of the instructional strategies used in the session today.

# Follow-up Activities

# Research Rationale

Not all teachers teach math, but all teachers can incorporate mathematical concepts (such as number sense) into their content areas. Doing so can greatly affect student understanding and skill (Höfer & Beckmann, 2009). Another important opportunity that can have a profound effect on student learning is the use of authentic instruction. Algebraic reasoning encourages students to reflect on their thinking, share their experiences, and assists them in developing different ways of thinking about problems (Windsor, 2010). By allowing students to wrestle with complex problems while encouraging group participation and relating content to the real world, teachers can improve not only the mathematical achievement of their students but also their overall ability think critically in other areas (Bell 2010).

## Resources


- Bell, S. (2010). Project-based learning for the 21st century: Skills for the future. The Clearing House, 83(2), 39-43.
- Höfer, T., & Beckmann, A. (2009). Supporting mathematical literacy: examples from a cross-curricular project. ZDM, 41(1-2), 223-230.
- Agreement Circles instructional strategy: K20 Center. (n.d.). Agreement Circles. Instructional Strategies. Retrieved from https://learn.k20center.ou.edu/strategy/d9908066f654727934df7bf4f50704ce
- I Used to Think . . . but Now I Know instructional strategy: K20 Center. (n.d.). I used to think, but now I know. Instructional Strategies. Retrieved from https://learn.k20center.ou.edu/strategy/d9908066f654727934df7bf4f50639f2
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- Sports Reference LLC. (2000-2016). 2013 Oklahoma Sooners. Copyright 2000-2016, Sports Reference LLC. Retrieved July 05, 2016, from http://www.sports-reference.com/cfb/schools/oklahoma/2013-schedule.html
- Windsor, W. (2010). Algebraic thinking: a problem solving approach. Paper presented at the Annual Meeting of the Mathematics Education Research Group of Australasia, Freemantle, Western Australia.