CONTEXT

- This lesson will build on students' learning about parts of a circle, circumference + the proportional relationship between pi and diameter, and area (6th grade) in order for them to begin constructing the formula for area of a circle (A= πr^2). Students will practice working together and sharing + building on each other's ideas in group work. This is part one of what probably will take 2 class periods.
- 60 min period = about 52 min for lesson
- Focus students will be in the role of notetaker during group work.

RESEARCH QUESTION & THEORY OF ACTION

Our Team's Research Question:
How can we cultivate students' confidence in math discussion and group work so that they are willing to share their thinking and support one another?

Our Team's Theory of Action:
If we as teachers provide students with UDL structures such as sentence stems, group work roles, and multiple modes of access to communication (chat, sharing screen, using pictures, and verbal), then students will feel empowered and willing to lead discussions in math, resulting in deeper discussions and more positive math identities.

GOALS

Content Goals
- Students will be able to connect understanding of parts of a circle, pi, and circumference to describe how they think they could find the area of a circle in their own words
  Students will use the role of COACH to guide their breakout room discussion, building on practice from previous week

Equity Goals
- Students will be able to see each other by turning on camera
- Students will be able to build on one another's ideas about circles during breakout room discussion
- Students use role of SCRIBE to document their breakout room discussion, giving them a way to contribute to group work and feel they belong
- Students will listen to, value, and build off of each other's mathematical ideas during group work.

STANDARDS

Working toward:
CCSS.MATH.CONTENT.7.G.B.4
Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.

Building on:
CCSS.MATH.CONTENT.6.G.A.1
Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.

ANTICIPATORY PLANNING

Warm up part 1:
- Word bank for activating prior knowledge about parts of a circle
- Encourage students to find a way each one could not belong/could belong

Warm up part 2:
- If it doesn't surface, prompt students to find area of the triangles

Group share out
- Practice wait time and think→ share out

Breakout Room work:
- Role descriptions and sentence stems built into Desmos screens so they're accessible to all
- Check for understanding before students go to breakout rooms

PROCEDURE

Framing or Launching the lesson:
-   Warm up: Which One Doesn't Belong to activate prior knowledge and give students a chance to practice using new vocab
-   In this lesson, we will use what we've learned about the parts of a circle and the relationship between them to learn more about the area of circles.

During the lesson:
-   Show students Ayaan's claim: He said the area is between 32 and 64 square units. Why might he think this?
    -   How did he come up with 32 and 64?
    -   Where do we see those numbers in this diagram?
-   Estimate number of squares it would take to cover a circle. Write down your strategy. In your breakout rooms, share strategies.
    -   COACH pick sharing order. SCRIBE write down different estimates and strategies that your group shares out.
-   Radius square:
    -   Why do you think we call it a radius square? Students take a moment to write, then share out. Share focus students' answers if possible.

Closing the lesson:
-   Ask "Lesson synthesis" problem
    -   What do you think $3 \times r^2$ means? Where do we get that idea?

UDL Components of Differentiation

Focus Student H: Will be notetaker. Has been stepping up in class.
-   Sentence starters
-   Reading out awesome contributions in the chat
-   Preferred grouping
-   Visual (drawing pad) + written explanations
-   Opportunity to activate prior knowledge

Focus Student X:
-   Sentence starters
-   Preferred grouping
-   Visual (drawing pad) + written explanations
-   Opportunity to activate prior knowledge

Focus Student A:
-   Sentence starters
-   Preferred grouping
-   Visual (drawing pad) + written explanations
-   Opportunity to activate prior knowledge

Focus Student J
-   Sentence starters
-   Preferred grouping
-   Visual (drawing pad) + written explanations
-   Opportunity to activate prior knowledge

CULTURALLY RELEVANT PEDAGOGY

Academic Achievement
- Building their own vocabulary before learning Tier 3: domain- specific "academic" language, like radius, diameter, circumference, center.
- Giving roles to students with low status to elevate voices and provide entry points

Cultural Competency
- Warm up gives opportunity for students to see circles in everyday objects
- Allow students to express their knowledge in whatever language they are most comfortable using

FORMATIVE ASSESSMENT

Warm Up
- Know parts of a circle and what makes a shape a circle (surface vocab and definitions)
- Use prior knowledge about area to estimate in 2 different ways
    - Why do you think we call it a radius square?
        - It's because the side of the radius can form a perfect square
- Informally check that students are sharing either in chat or by talking to each other in breakout room
- Know the formula for area of a square

SUMMATIVE ASSESSMENT

"Lesson synthesis" problem
- Ask students: What do you think $3 \times r^2$ means? Where do we get that idea?

MATERIALS & PREP

Desmos lesson
[Slides](#)
Computer
Zoom Meeting
Breakout groups (preferred groupings)