Mathematical moments with 4 year olds

Maths topic: Angles

Title: Exploring and representing angles: Manipulating, drawing, and discussing angle changes

We explored angles as part of a long-term project, supported through the Young Minds Big Maths (YMBM) collaboration between nursery staff and mathematicians. (Read about YMBM's ramp play). As part of YMBM, staff worked closely with mathematicians, sharing children's observations into the project. In turn, the mathematicians upskilled practitioners' knowledge, enabling staff to further support children's playful exploration and understanding of maths in meaningful, engaging ways.

The children's investigations began with ramp play, where they noticed that a smaller angle at the top of the ramp produced a steeper slope. They progressed to rolling circular objects, with a period focused on rolling wheels. This sparked curiosity, particularly as one child demonstrated close, attentive observation of the angles formed between the spokes at the centre of wheels. This Mathematical Moment captures William's exploration of angles at the centre of circular shapes, using real-world objects and self-directed experimentation to understand how to create bigger and smaller angles. During a group discussion about circles and angles, William became intrigued by the idea of identifying angles within circular shapes. His curiosity led him to the garage space (one of our areas in provision), where he excitedly spotted shapes in the environment.

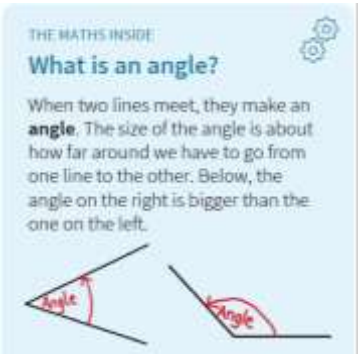
William began comparing the angles he saw at the centre of different circular objects, such as between the spokes of a wall-mounted wheel and a bike wheel.

"This one on the wall is a circle it has angles inside, big angles."

"This bike wheel is the same, but it has lots of little angles on, the angles are not the same as the wheel on the wall."

William's mathematical thinking came to life as he began carefully placing and arranging wooden blocks, a familiar resource that William has daily access to.

Inspired by his observations, William used the blocks to create and compare angles. He experimented with positioning to form acute and obtuse angles, demonstrating a growing understanding of how angles change in size. He was familiar with the terminology he used and applied and was drawing upon previous learning and combined it with new wonders. This became apparent when he pointed to the obtuse angles and said 'obtuse', demonstrating his growing understanding.



The mathematicians in the project provided these explanations about angles.

Angles smaller than a right angle are called **acute** and angles larger than a right angle are called **obtuse.**

"I'm lying them down, the point is at the top, sometimes it's a little point but if I move the bricks out it goes bigger, I can make it go bigger and smaller by moving the bricks in and out, watch me do it."

William's technique was impressive as he confidently demonstrated his understanding. He applied his knowledge of angles by observing and comparing their sizes.

William was proud of his work that morning. His enthusiasm extended his learning and thinking further as he chose to take on a self challenge, drawing from observation. This reflective process allowed him to explore his findings and newfound knowledge in a different way. His drawing clearly represented his observations and understanding of the angles he had identified in the wheels

This supported William's ability to communicate his inner thoughts on the appearance and comparison of the angles in the two wheels.

"I'm drawing, Joanne, the two wheels. The big wheel has big points, they look really big, I can see them. The bike wheels are all around, 1-2-3-4-5-6-7-8-9, they haven't got big points, remember I found them on the bike wheel, they were just tiny little triangles, like angles. You can't move them to make them bigger and smaller like I did with the bricks."
William confidently used some mathematical language to describe his discoveries. (However, he seems to mix up 'triangles' and 'angles': he may not yet understand that segments of a circle are not triangles, because they have a curved side.)

"This drawing shows you here. Can you see it? It has circle wheels and then the circle tyre with blocks. Pretend them small circles are the different ways that I could move the blocks to show the different angles. Go in and out and little and big. Well, that makes acute angles and obtuse."

Follow-Up Observation

Focus: Extending understanding of angles through measurement and classification.

Observation: Following William's exploration of acute and obtuse angles within circular shapes, he was invited to use a large protractor to measure angles he created with wooden blocks. William eagerly accepted the challenge, showing curiosity about **"how big"** the angles were. He predicted whether an angle was acute or obtuse before checking with the protractor.
"This one is little, so it's going to be acute. Let's see… it says 40! That's small, isn't it?"
He then created a larger angle and measured again:
"Now it's 120! That's big, so it's obtuse. I was right!"
His enthusiasm, over time, and opportunities to embed knowledge was valued, and this learning led him to ask about **"a square angle,"** which opened a discussion about right angles. William experimented with blocks to create a 90° angle, proudly announcing:
"This one is right in the middle, it's a right angle!"

Learning Intentions

- To deepen understanding of angle types (acute, obtuse, right).
- To introduce the concept of measuring angles using a protractor.

Next Steps
Create an 'Angle Hunt'

- Encourage William to find and photograph examples of acute, obtuse, and right angles in the environment.
- Compile findings into an "Angle Book."

Challenge Task

- Ask William to design a pattern or illustration/diagram using different angles, labeling each type.

For more about nursery children investigating angles in ramp play –see the booklet, available from: https://earlymaths.org/ramp-play

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