Measure and Sketch Angles with a Protractor

Teacher		**Class**	Grade 4
Subject	Math	**Topic**	Measuring angles
Date		**Room**	
Lesson length	60 minutes	**Country**	United States

Students learn to measure angles in whole-number degrees with a protractor. They sketch ordered angles and check them with a partner.

Curriculum links

- Draw points, line segments, rays, angles, and lines using a ruler or straightedge [1]
- Understand that geometric figures can be analyzed and classified based on their properties, such as having parallel sides, perpendicular sides, particular angle measures, and symmetry [2]

Learning objectives

- Students will measure angles in whole-number degrees using a protractor.
- Students will sketch angles of a specified measure using a ruler.

Success criteria

- I can line up the protractor on the vertex and zero.
- I can read the correct whole-number degrees for an angle.
- I can sketch an angle of a given size and label it.

What students already know

Show a corner of a book and an open door. Ask: Which opening is smaller? Which looks like a square corner? Listen for small/wide and right angle ideas in 2 minutes.

Key words

angle	an opening made by two straight rays meeting at a point [4]
vertex	the corner point where the two rays meet [4]
protractor	a half-circle tool marked from 0 to 180 for finding openings [4]
degree	a tiny unit that tells how big an opening is
right angle	a square corner opening that measures exactly 90 degrees [4]

Materials

- protractors
- rulers or straightedges
- blank paper
- pencils
- Slides 2-5, 7, 9-12 on the board
- starting-ray sheets with one ray already drawn for support
- mini-whiteboards and markers

Before the lesson

- Test Slides 2-5, 7, 9-12 on the board and have spare protractors ready.
- Print starting-ray sheets with a horizontal ray and endpoint marked for support.
- Set desks in pairs with protractors, rulers or straightedges, blank paper, and pencils.

Lesson outline

0–5 min **Starter** 5 min · Whole class

Recall small and wide openings and hook students for measuring and sketching.

YOU DO

1. Show Slide 2 and read the goals: measure in whole-number degrees and sketch angles of a given size.
2. Say the hook: Student A, pick a number. Student B, you have to draw it exactly. Then you switch and get revenge.
3. Show Slide 5 and ask pairs to name where they see a small opening and a wide opening.
4. Take 3 quick ideas and link small to acute and wide to obtuse.

STUDENTS DO

1. Listen to the goals and the challenge.
2. Think, then tell a partner one small opening and one wide opening.
3. Share ideas with the class.

Say: Today we will measure and sketch with a protractor. Student A, pick a number. Student B, you have to draw it exactly. Then you switch and get revenge. First, tell your partner where you see a small opening and a wide opening.

Ask: Where do you see a small opening and a wide opening? (Small: book corner, slice tip. Wide: open door, slide slope.) · What will you be able to do by the end? (Line up the protractor on the vertex and sketch an angle of a given size.)

Check understanding: Thumbs up if you can say the two goals. If not, repeat Slide 2 goals together.

Support: Point to a book corner and an open door while asking about small and wide. **Stretch:** Ask what number they would pick for a tricky small angle versus a tricky wide angle.

Use: Slides 2, 5

5–17 min **Teaching: measuring** 12 min · Whole class

Teach correct protractor placement and reading in whole-number degrees.

YOU DO

1. Show Slide 3 and explain an angle is formed when two rays share a common endpoint called a vertex [4].
2. Show Slide 4 and explain the protractor is a half-circle that shows degrees from 0° to 180° [4].
3. Model on a large acute angle: put the midpoint on the vertex, line up one ray with the 0° line, read where the second ray crosses the numbers [4].
4. Show Slide 7 checklist and classify the angle as acute, right, or obtuse.

STUDENTS DO

1. Watch the model and chant the three steps: middle, zero, read.
2. Hold up fingers for acute, L-shape for right, wide arms for obtuse.
3. Copy the 65° example and checklist into notebooks.

Say: An angle is two rays meeting at a point called the vertex. We measure the opening in degrees. Put the middle mark on the vertex, put one side on 0, then read the other side where it crosses the numbers.

Worked example: Measure this acute angle. Step 1: midpoint on the vertex. Step 2: bottom ray on 0° on the right scale. Step 3: top ray crosses at 65°. 65° is less than 90°, so it is an acute angle [4].

Ask: Where does the middle mark of the protractor go? (Exactly on the vertex, the corner point where rays meet.) · One ray is on 0°. The other ray is on 65. What is the measure and type? (65 degrees, acute because it measures less than 90 degrees [4].)

Check understanding: All hold up mini-whiteboards with 65° and acute. Reteach placement if many show the other scale.

Support: Use a protractor with midpoint and 0° line marked in color and start with one horizontal ray. **Stretch:** Show the same angle turned to open left and ask which 0° line to use now.

Use: Slides 3-4, 7

17–30 min **Teaching: zeros and sketching** 13 min · Whole class

Teach choosing the correct scale and sketching an ordered angle.

YOU DO

1. Show Slide 10 and explain the protractor has two rows of numbers and you start at 0 on the side your ray uses.
2. Remind the class an acute angle measures less than 90° and an obtuse angle measures greater than 90° but less than 180° [4].
3. Model sketching 120°: draw a ray with a ruler or straightedge [1], place midpoint on the endpoint, dot 120°, connect dot to endpoint.
4. Check the sketch by re-measuring and showing it is obtuse, not 60°.

STUDENTS DO

1. Compare 60° and 120° on the board and vote which matches an obtuse opening.
2. Watch the 120° sketch and copy the four steps.
3. Sketch a quick 90° angle that forms a perfect L shape [4] and hold it up.

Say: Protractors have two rows of numbers. Start at 0 on the side your ray uses. If it looks small, the answer must be under 90. To sketch, draw a ray, dot your number, then draw the second side with a ruler.

Worked example: Sketch 120°. Step 1: draw a straight ray with a ruler. Step 2: midpoint on the endpoint, ray on 0°. Step 3: make a small dot at 120°. Step 4: use the ruler to connect dot to endpoint and label 120°. Recheck shows obtuse, greater than 90° [4].

Ask: Your protractor shows 65 and 115. The opening looks small. Which wins? (65°, because an acute angle measures less than 90° [4].) · What do you do after you mark the dot at 120°? (Use a ruler or straightedge to draw the second ray from the endpoint to the dot [1].)

Check understanding: Hold up 90° sketches. If L-shapes are off, remodel dot placement before the main task.

Support: Pre-draw the first ray for each order so students only place the protractor and draw the second ray.
Stretch: Ask how the dot moves if the starting ray points up or left and which zero to use.

Use: Slide 10

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30–50 min **Main activity** 20 min · Pairs

Practice sketching requested whole-number angles and verifying by measuring.

YOU DO

1. Show Slide 9 task and explain Partner Mystery Draw roles for Student A and Student B.
2. Model one round: Student A says 45°, Student B draws a ray with a ruler or straightedge [1], marks 45°, draws second ray, Student A measures to check [4].
3. Set the rule: say a whole-number measure between 20° and 160°, sketch, measure, initial if within 2°.
4. Circulate, check middle, zero, read, and prompt partners to switch roles every 5 minutes.

STUDENTS DO

1. In pairs, take turns as Student A who orders and checks and Student B who sketches.
2. Sketch at least four angles, including 30°, 90°, and 120° from Slide 9.
3. Write target and actual whole-number degrees under each sketch.

Say: Student A says a number between 20 and 160. Student B draws a ray, puts the middle on the endpoint, marks the number, and draws the second side. Student A measures to check. If it is within 2 degrees, both initial it and switch.

Worked example: Student A says 45°. Student B draws a ray, midpoint on endpoint, dots 45°, connects with ruler, labels 45°. Student A checks: midpoint on vertex, one ray on 0°, other ray crosses at 46°. Within 2°, so both initial and write actual 46°.

Ask: How do you know you lined up the right zero? (The ray I drew sits on 0 on that scale, and the size matches acute or obtuse look.) · You ordered 120° but measured 60°. What went wrong? (Used the wrong scale; need the 120 mark that gives greater than 90° [4].)

Check understanding: Collect one sketch per pair and re-measure two. If errors, model that angle again on the board.

Support: Let students choose only from 30°, 60°, 90°, 120°, or 150° first, with the starting ray already drawn.
Stretch: Request angles that must open left or down so the drawer has to find the correct 0° line.

Use: Slide 9

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50–60 min **Plenary** 10 min · Whole class

Return to the goals and check measuring and sketching.

YOU DO

1. Show Slide 11 and take a vote on which angle is trickiest to sketch: 30°, 90°, or 150°.
2. Ask two students to explain their vote using middle, zero, and read.
3. Show Slide 12 exit ticket: sketch a 70° angle and label it.
4. Review I can statements and collect exit sketches.

STUDENTS DO

1. Vote and explain which sketch was trickiest and why.
2. On exit slips, write one thing learned and sketch and label a 70° angle.
3. Add one question they still have.

Say: Which was trickiest to sketch well, a sharp 30, a square 90, or a wide 150? Vote, then prove it with middle, zero, read. For your exit, sketch a 70 degree angle and label it.

Ask: Why is 150° trickier than 90° for many? (Wide angle needs the correct zero and dot; 90° is a familiar L shape [4].) · How do you prove your 70° sketch is correct? (Midpoint was on vertex, one side on 0, other side on 70.)

Check understanding: Check exit 70° sketches for dot accuracy and label. Reteach zero choice tomorrow if many use 110°.

Support: Give a starting ray on the exit slip so students only mark 70° and draw the second ray. **Stretch:** Ask students to also sketch 110° and explain how 70° and 110° look different.

Use: Slides 11-12

Common mistakes

Mistake	How to spot it	How to fix it
Reading the wrong scale, such as 115° for a 65° acute angle	Answer is over 90° but the angle looks small and acute [4]	Ask if it looks smaller than a right angle; if yes, use the scale that gives under 90° [4]
Not placing the protractor midpoint exactly on the vertex	Zero line floats above or below the ray and measures vary by 5-10°	Slide the protractor until the middle mark sits on the vertex and the ray runs through 0° [4]
Sketching freehand without a ruler or straightedge so sides are wobbly	Second side does not go through the dot or start at the endpoint	Redraw rays with a ruler or straightedge from endpoint through the dot [1]

Support

- Let students choose only from 30°, 60°, 90°, 120°, or 150° first, with the starting ray already drawn.

Stretch

- Request angles that must open left or down so the drawer has to find the correct 0° line.

For the LSE or teaching assistant

Sit with target pairs during Partner Mystery Draw. Hold the protractor midpoint on the vertex while they align zero, and hand starting-ray sheets to students who need them.

Check for understanding

Question	Answer
Where do you put the middle mark to measure 40°?	On the vertex, with one ray on 0° [4]
An angle looks acute but you read 125°. What should it be?	55°, because acute measures less than 90° [4]
Sketch a 70° angle and label it. How do you finish?	Draw ray with ruler, dot 70°, connect dot to endpoint and label 70° [1]

Homework

Measure two square corners at home and sketch a 50° angle to bring back.

Sources

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