Measuring Angles with a Protractor

Apply the skill to decisions and designs

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QUICK REVIEW

Place the protractor center on the vertex. Align the base ray with the zero line. Start on the scale whose 0 is on that base. Read where the other ray points. Long marks are $10°$ apart; the short mark halfway between is $5°$ farther.

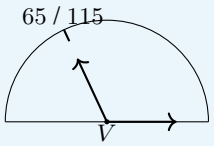
Worked example

The base points right. At the second ray, the outer reading is 65 and the inner reading is 115. Which measures the opening?

1. Put the center on V. The right-pointing base meets the inner 0 line.

2. Read the inner 115 at the second ray. This is greater than a right angle, so it fits the obtuse opening.

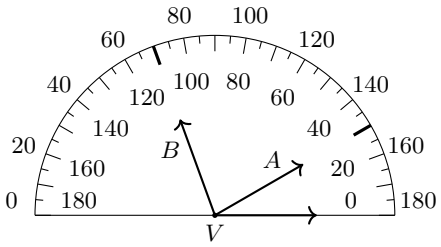
Answer: $115°$, an obtuse angle.



Practice Problems

Show your thinking.

1. Use the inner scale to read the two marked rays A and B. What is the angle between the rays, not from the horizontal base?

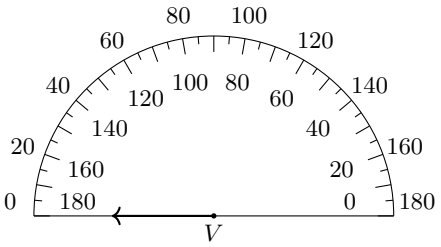


Inner: zero at right. Outer: zero at left.

2. Eli puts the protractor center one grid square to the right of the vertex and lines up the base at the 20 mark instead of zero. Can the second ray alone give the angle? Tell how to fix both mistakes.

3. A machine has a right-pointing base. The available second-ray ticks show 50, 70, or 90 on the outer scale. The opening must be obtuse but less than $120°$. Which tick should it use?

4. From the left base, draw a ray at a long tick. The opening must be greater than $100°$ but less than $120°$. Choose and label the angle. Aim the ray at the tick, but stop before the numbers.



Inner: zero at right. Outer: zero at left.

5. Two numbers at a tick add to 180. At one tick the inner and outer numbers match. Find both numbers and name the angle type.

6. A hinge reading is $125°$ from the left base. The hinge must use the same second ray but may use the right base instead. Is that enough to make the opening at most $60°$?

Answer Key

1. $80°$.
2. No. Center on the vertex and line up the base at zero.
3. Use the outer 70 tick, giving an inner reading of $110°$.
4. A ray from V toward the $110°$ mark on the outer scale.
5. 90 on both; a right angle.
6. Yes. The right-base opening is $55°$.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. From the right-pointing base, ray A reads 30 and ray B reads 110.

2. The opening between them starts at 30, not at 0. Subtract: $110 - 30 = 80°$.

Problem 2

1. Move the center one square left so it sits on the vertex, where the two rays meet.

2. Turn the protractor around that center until the base meets 0, not 20. Then read the second ray on the same scale.

Problem 3

1. A right-pointing base uses the inner scale. The two readings at a tick add to 180.

2. Outer 50, 70, and 90 give inner 130, 110, and 90.

3. $130°$ is too large and $90°$ is not obtuse. Only $110°$ meets both rules.

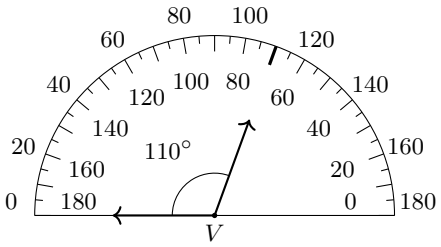
Problem 4

1. The long ticks are $10°$ apart. Only $110°$ is strictly between $100°$ and $120°$.

2. The baseline points left; its zero is on the outer scale.

3. Locate the long 110 tick halfway between 100 and 120 on that scale. The same position is 70 on the inner scale.

4. Use a ruler to line up V and that tick. Draw the ray in that direction without writing over the scale. Label the opening $110°$.



Inner: zero at right. Outer: zero at left.

Problem 5

1. The 180 is split between two equal readings.

2. $180 \div 2 = 90$. A $90°$ opening is a right angle, no matter which end is zero.

Problem 6

1. The two bases point in opposite directions, so the two openings together make $180°$.

2. From the right base: $180 - 125 = 55°$. Since $55 \leq 60$, the new opening fits.

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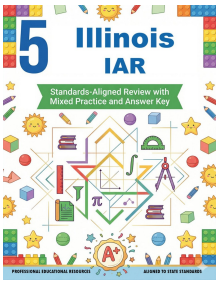

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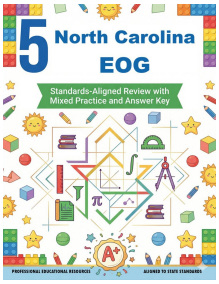

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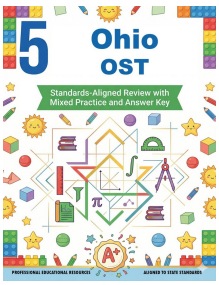

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