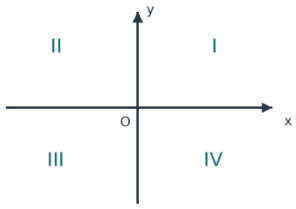
Standard Position

Interpret, sketch, and describe where an angle lies in standard position.

Quadrants:

I (upper-right),
II (upper-left),
III (lower-left),
IV (lower-right).



GeoGebra Investigation – Standard Position

https://www.geogebra.org/m/dn3qg5bf

Change the angle using the app. Answer each question from what you observe.

1. Set the angle to 40°, 150°, and 280°. Where do the two arms always meet? Give the coordinates.

2. As you change the angle, which arm stays along the positive x-axis? Which arm moves, and what does its position show?

3. Based on your observations, describe how an angle must be arranged to be in **standard position**. Include the vertex, starting arm, and ending arm.

4. Increase the angle gradually from 0° to 360°. In which direction does the moving arm rotate?

5. Set the angle to 90°, 180°, 270°, and 360°. Which axis and direction does the terminal arm point along each time?

6. Slowly increase the angle from 0° to 360°. In what order does the terminal arm pass through the four quadrants? How can you tell when it has entered a new quadrant?

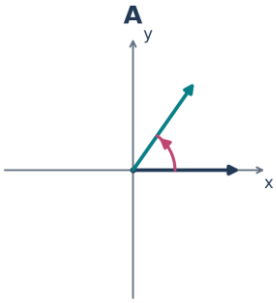
7. Two learners predict that 89° and 91° lie in the same quadrant because they are so close. Use the app to test their prediction. Repeat with 179° and 181°. Explain what happens at an axis.

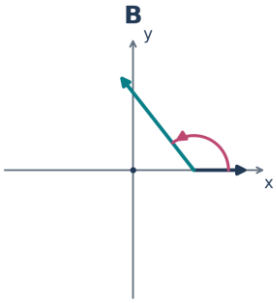
8. Compare 0° and 360°. What is identical about their terminal arms? What is different about the rotations?

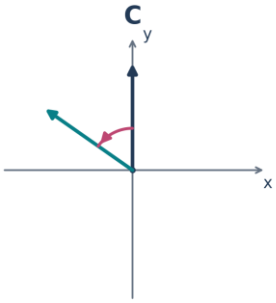
MILD

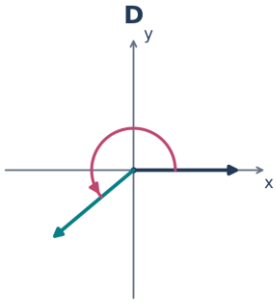
Recognize the geometry of standard position and construct simple angles.

9. Which diagrams show angles in standard position? For each incorrect diagram, describe what must change.

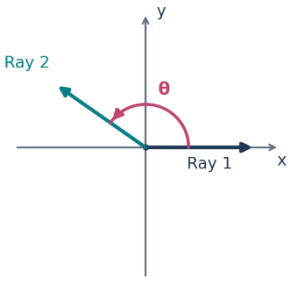




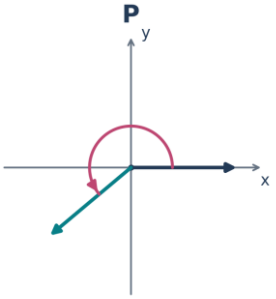


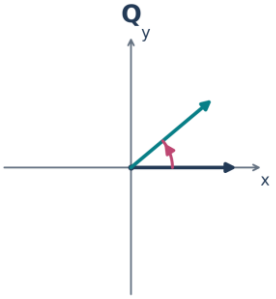


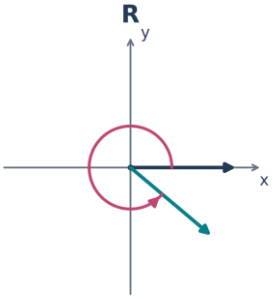
10. Identify the vertex, initial arm, terminal arm, and quadrant shown in this diagram.

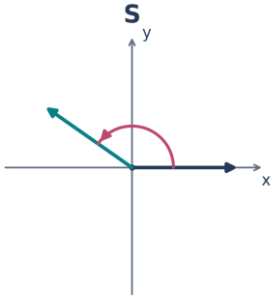


11. Match 40°, 145°, 220°, and 320° to the labelled terminal arms.









12. Sketch each angle in standard position and identify its quadrant: a) 70° b) 235°

MEDIUM

Predict locations, interpret axis boundaries, and describe possible angle ranges.

13. Without sketching, identify the quadrant for a) 94° b) 354°.

14. Sketch 270° in standard position, including the rotation arc. Explain why its terminal arm does not belong to a quadrant.

15. State the complete range of angle measures in a) Quadrant II and b) Quadrant IV. Explain why the boundary values are excluded.

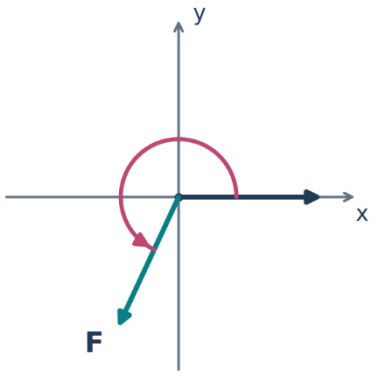
16. An angle has its terminal arm in Quadrant III. Its measure is increased by 25°. Must its terminal arm remain in Quadrant III? Identify **every possible final location** and give an example for each.

SPICY

Reconstruct possibilities, estimate angles, and diagnose errors.

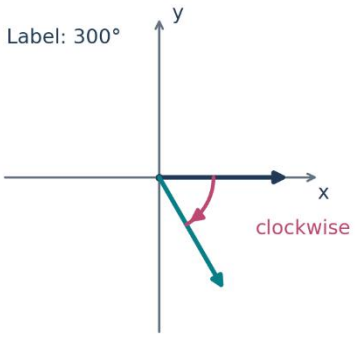
17. A learner draws a terminal arm in Quadrant III and labels the angle 145°. Describe two different ways to correct the mistake: a) keep the angle measure; b) keep the terminal arm in Quadrant III. Explain both corrections.

18. Estimate angle F: Explain why your choice is better than the other angle in the same quadrant.



19. An unknown angle θ satisfies $180° < \theta < 360°$, and its terminal arm lies strictly to the left of the y-axis. Determine its quadrant, give its complete range, and provide two possible measures.

20. A learner draws the following diagram for a **positive** 300° angle. The terminal arm is correctly located. Is the complete diagram correct? Explain what must change, then draw the correct rotation arc.



EXTRA SPICY

Combine constraints, reconstruct sketches, and defend conclusions.

21. An unknown angle θ satisfies all three conditions:
    - $65° \leq \theta < 310°$
    - Its terminal arm lies strictly to the right of the y-axis.
    - Its terminal arm does not lie on either coordinate axis.

    Determine **every possible interval** of angle measures. Sketch one angle from each interval and explain why no other values work.

22. Two angles are correctly drawn in standard position. Angle A ends in Quadrant II pointing nearly vertical; Angle B ends in Quadrant IV pointing nearly horizontal. A learner claims that A must be greater because its terminal arm appears more bent. Evaluate the claim. Which angle must represent the greater **counterclockwise rotation**? Explain, using two example angles with rotation arcs.