

Angle Adventure

Measure, construct, and explain angles.

GRADE 4 • TEKS 4.7

4.7 "Geometry and measurement. The student applies mathematical process standards to solve problems involving angles less than or equal to 180 degrees. The student is expected to: illustrate the measure of an angle as the part of a circle whose center is at the vertex of the angle that is "cut out" by the rays of the angle. Angle measures are limited to whole numbers; illustrate degrees as the units used to measure an angle, where $1/360$ of any circle is one degree and an angle that "cuts" $n/360$ out of any circle whose center is at the angle's vertex has a measure of n degrees. Angle measures are limited to whole numbers; determine the approximate measures of angles in degrees to the nearest whole number using a protractor; draw an angle with a given measure; and determine the measure of an unknown angle formed by two non-overlapping adjacent angles given one or both angle measures."

NAME _____

DATE _____

Materials: a 180-degree protractor; a ruler; a pencil. Measure and draw on the printed canvases. Use the protractor scale that starts at zero on OA. Write degrees with every angle answer.

Degrees describe a turn

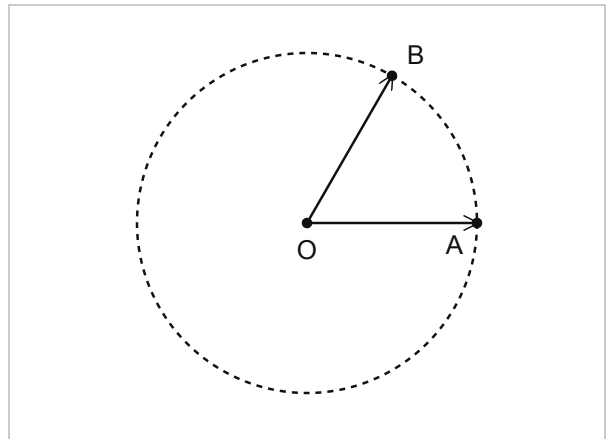
A full circle is 360 degrees. One degree is $1/360$ of a circle; n degrees cuts out $n/360$ with the vertex at the center. Measure the smaller angle, at most 180 degrees. Adjacent non-overlapping parts add to the whole.

Try it together

Use a protractor to measure angle AOB. Explain its part of the circle.

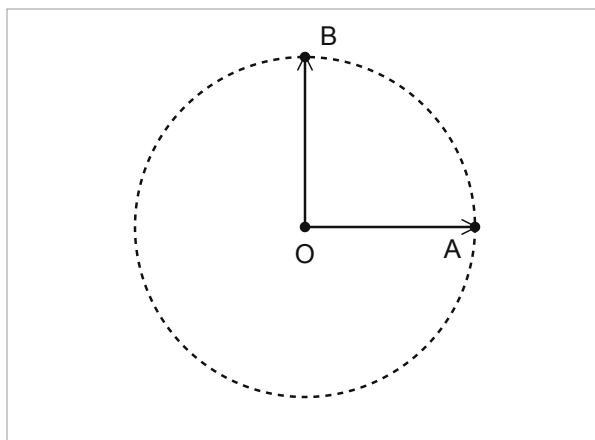
1. Put the protractor center on O and align its zero line with OA. Read the scale starting at that zero.
2. OB is at 60 degrees: $60/360$ of the circle, or one sixth.

60 degrees; one sixth of a full circle.

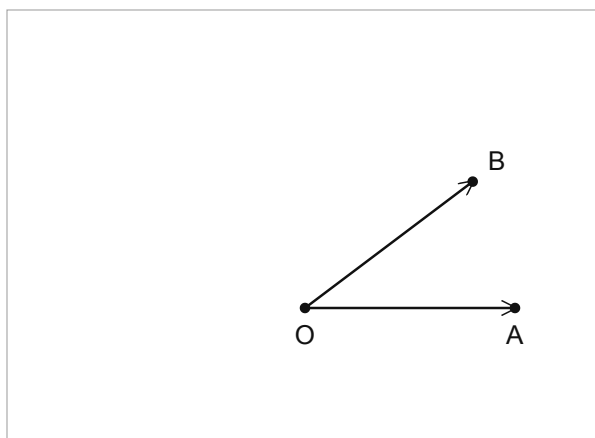


1. Mark a circle cut

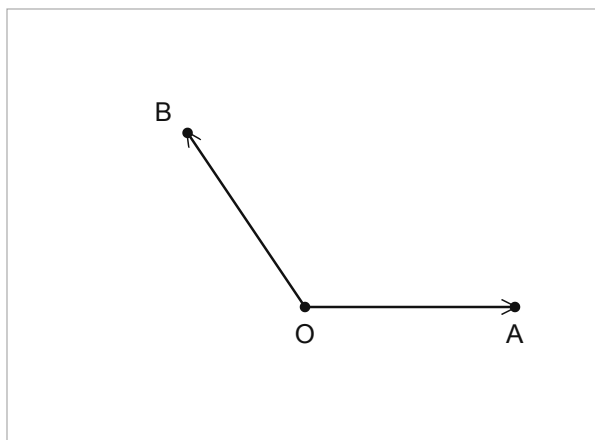
The rays cut out a 90-degree angle at the circle center. Shade the smaller region between OA and OB. Write its fraction of a full circle with denominator 360. Explain how many such parts fill the circle.

**2. Estimate, then measure**

Estimate angle AOB first. Then use a protractor to measure it to the nearest whole degree. Record both and explain how you aligned the protractor.

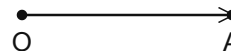
**3. Read the correct scale**

Estimate angle AOB, then measure it to the nearest whole degree. Explain why your reading is obtuse rather than acute.

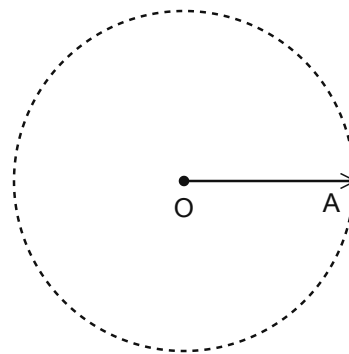


4. Construct an angle

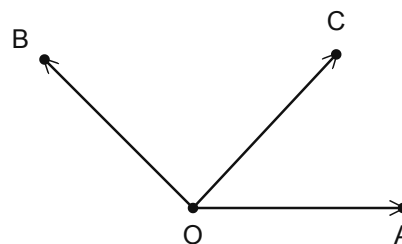
Use OA as the first ray. With a protractor and ruler, draw OB above OA so angle AOB measures 65 degrees. Label B and the angle measure. Explain your steps.

**5. Draw a circle cut**

A spinner needs a sector that cuts out $120/360$ of its circle. Draw OB above OA at the correct measure and shade the smaller sector. Write the angle in degrees and the fraction in simplest form.

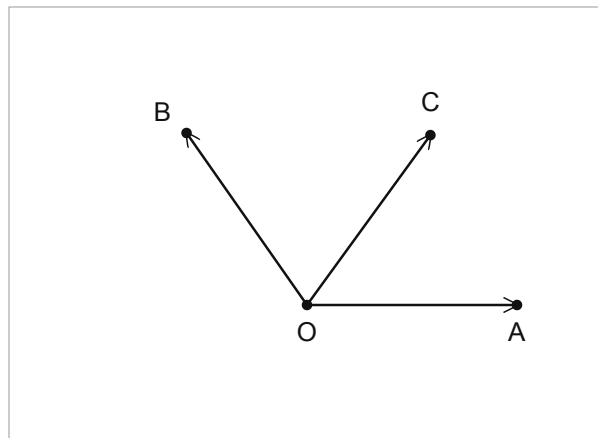
**6. Find the missing part**

Ray OC lies between OA and OB. AOB is 135 degrees and AOC is 47 degrees. Find COB without measuring. Write an equation and check by addition.



7. Add adjacent parts

In the diagram, AOC is 54 degrees and COB is 71 degrees. Find AOB by calculation. Write what fraction of a full circle it cuts out, using denominator 360. Check the total approximately with a protractor.

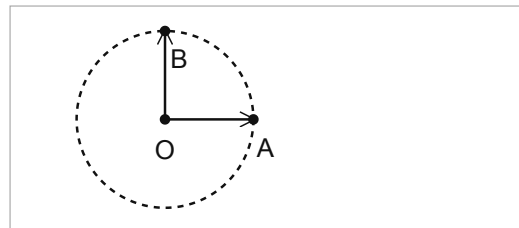


Teacher notes

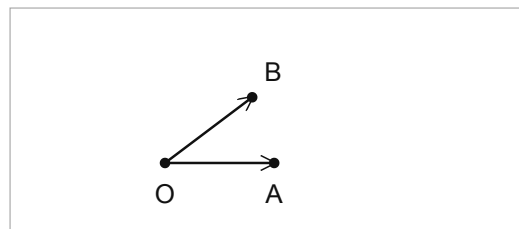
Use a clear 180-degree protractor and ruler. Accept measurement or construction within 2 degrees of the exact key. Estimates vary. No degree answer is preprinted inside a measurement or construction task. Student circles are intentionally blank for shading; key rays identify the required sector. Preserve aspect ratio when printing: uniform scaling does not change angles. Angle names put O, the vertex, in the middle.

Task 1

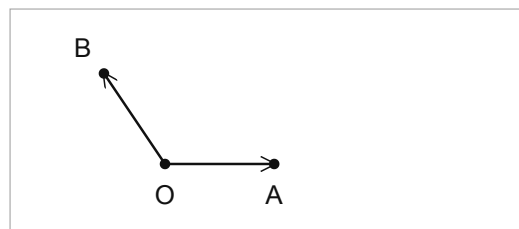
$90/360 = 1/4$. Shade the quarter-circle between OA and OB.
Four equal parts fill the circle.

**Task 2**

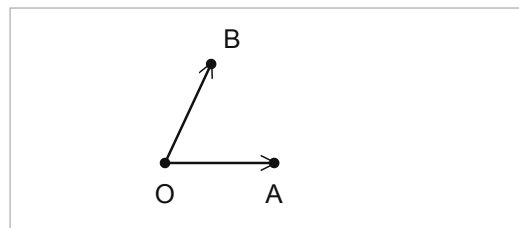
Estimates vary; measurement about 37 degrees. Center on O, baseline on OA, and read from zero at A.

**Task 3**

Estimates vary; measurement about 124 degrees. The angle is greater than 90 degrees; 56 is the wrong scale.

**Task 4**

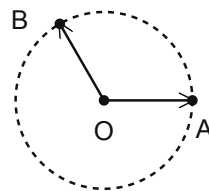
Mark 65 degrees from OA, draw the ray from O through the mark, and label B. $\angle AOB = 65$ degrees.



Task 5

$AOB = 120$ degrees; $120/360 = 1/3$. Shade the sector between OA and OB .

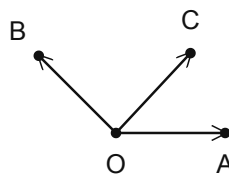
The circle center O must also be the angle vertex. Three copies fill a circle.



Task 6

$COB = 135 - 47 = 88$ degrees. Check: $47 + 88 = 135$.

OC is the common side; the two parts have no overlap.



Task 7

$AOB = 54 + 71 = 125$ degrees, or $125/360$ of a full circle.

Protractor reading should be about 125 degrees.

