Eureka Math

4th Grade
Module 4
Lesson 9

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Directions for customizing presentations are available on the next slide.

Customize this Slideshow

Reflecting your Teaching Style and Learning Needs of Your Students

- ➢ When the Google Slides presentation is opened, it will look like Screen A.
- ➢ Click on the “pop-out” button in the upper right hand corner to change the view.
- ➢ The view now looks like Screen B.
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- ➢ Choose MAKE A COPY and rename your presentation.
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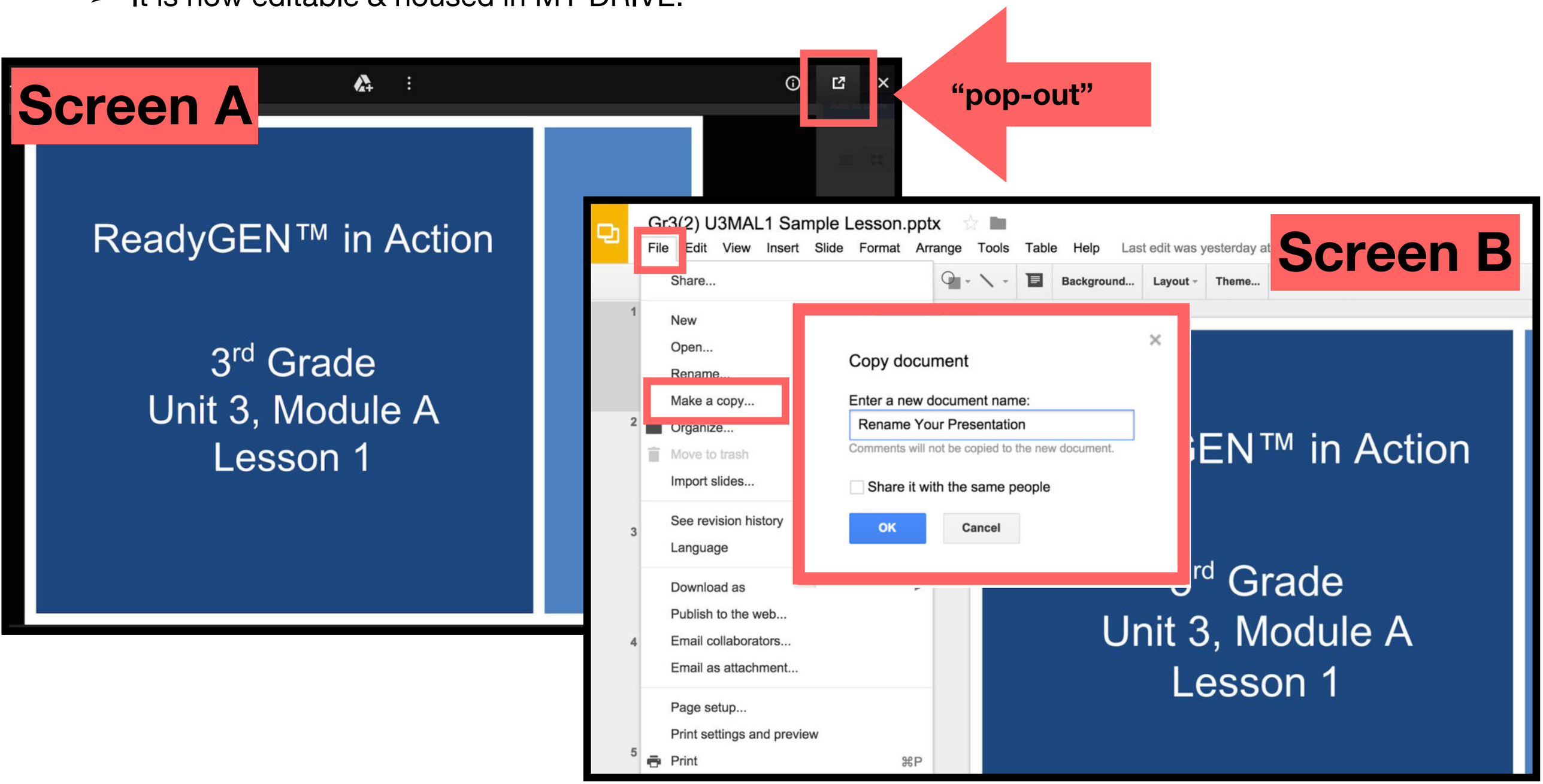
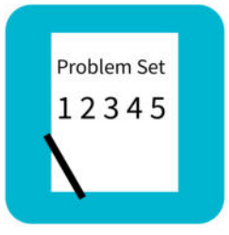


Icons

Read, Draw, Write

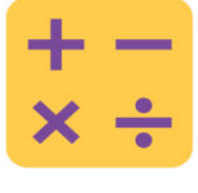
Learning Target

Personal White Board



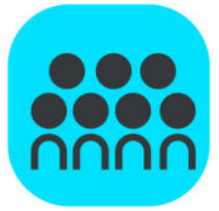
Problem Set

Manipulatives Needed



Fluency

Think Pair Share



Whole Class

Individual

Partner

Small Group

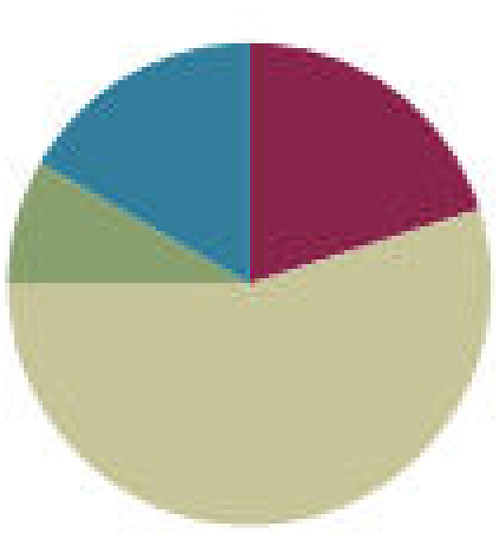
Small Group Time

Lesson 9

Objective: Decompose angles using pattern blocks.

Suggested Lesson Structure

Fluency Practice	(12 minutes)
Application Problem	(5 minutes)
Concept Development	(33 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



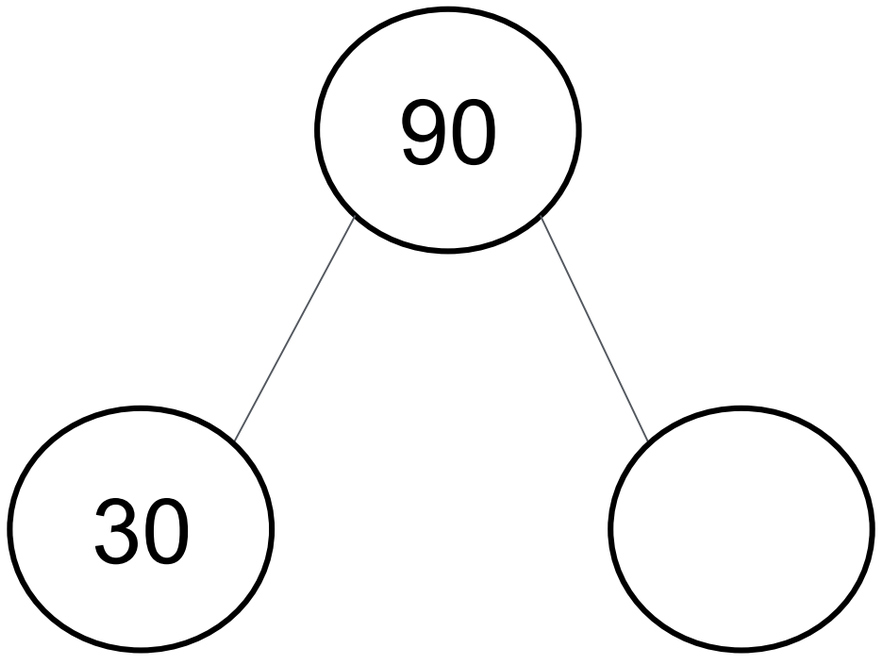
Objective: Decompose angles using pattern blocks.

Count by 90°

Count forward and backward, occasionally changing the direction of the count. Count by:

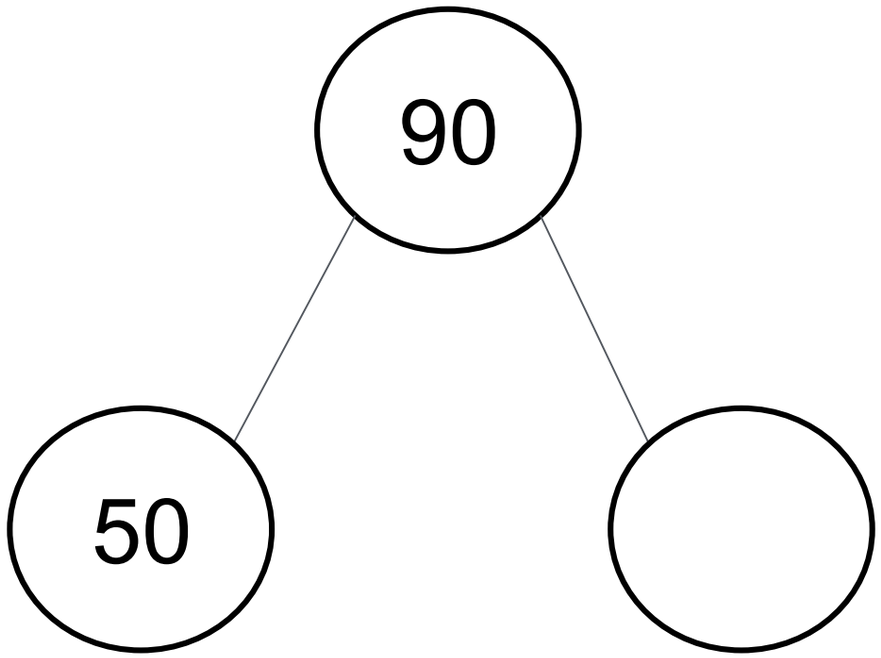
- Nines to 36
- 9 tens to 36 tens
- 90 to 360
- 90° to 360° (while turning)

Break Apart 90, 180, and 360



On your personal white boards, write the number bond, filling in the unknown part.

Break Apart 90, 180, and 360



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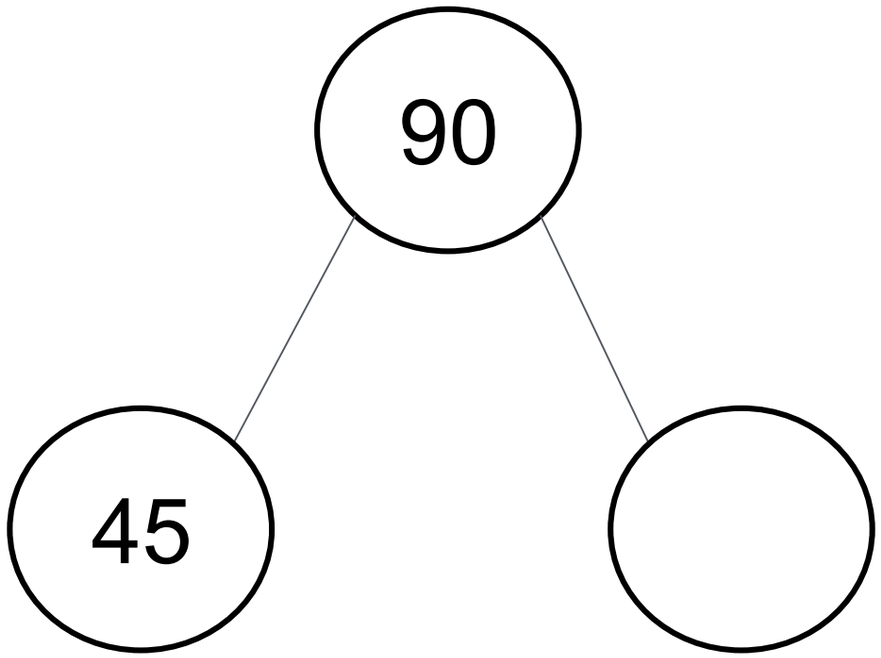

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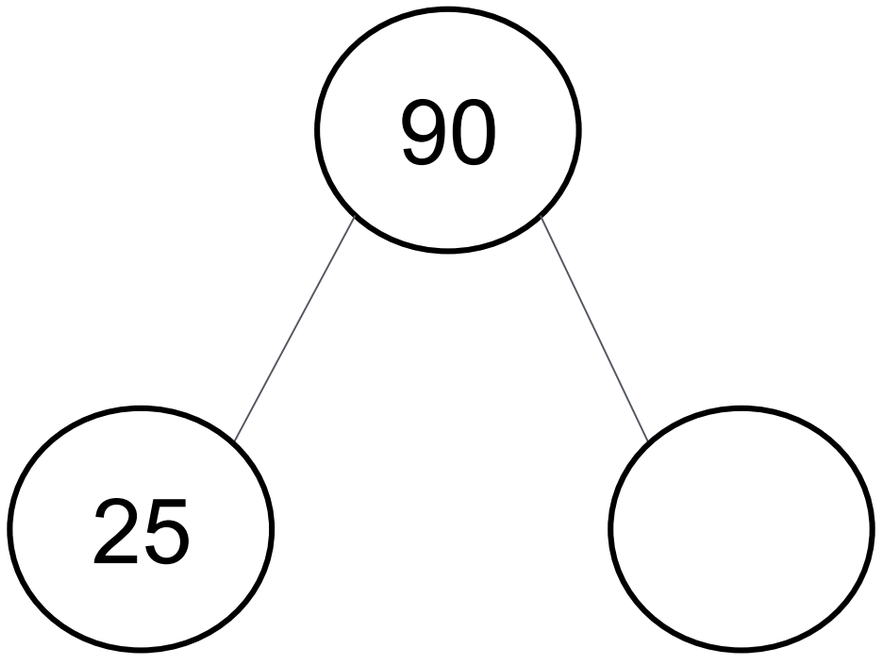

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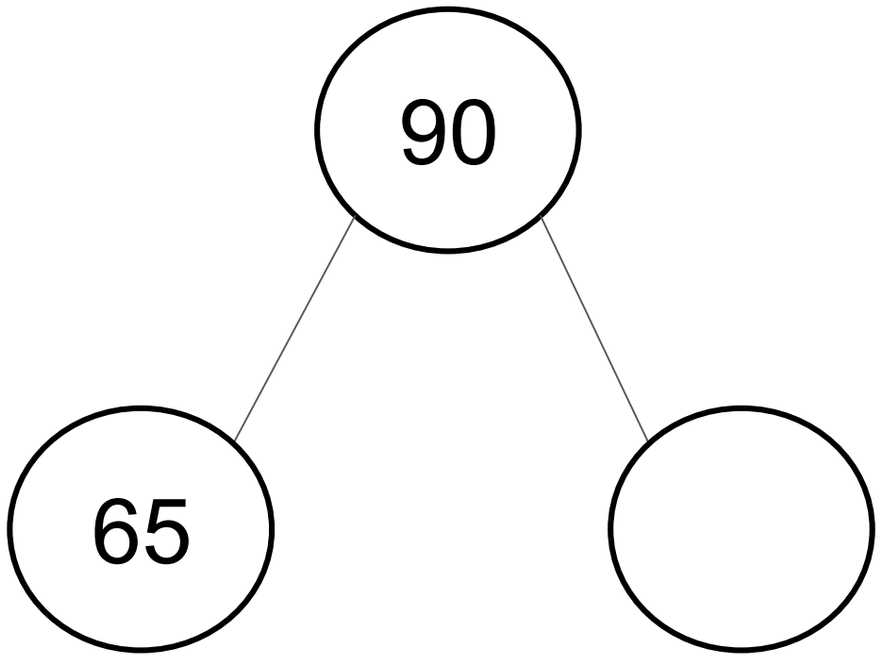

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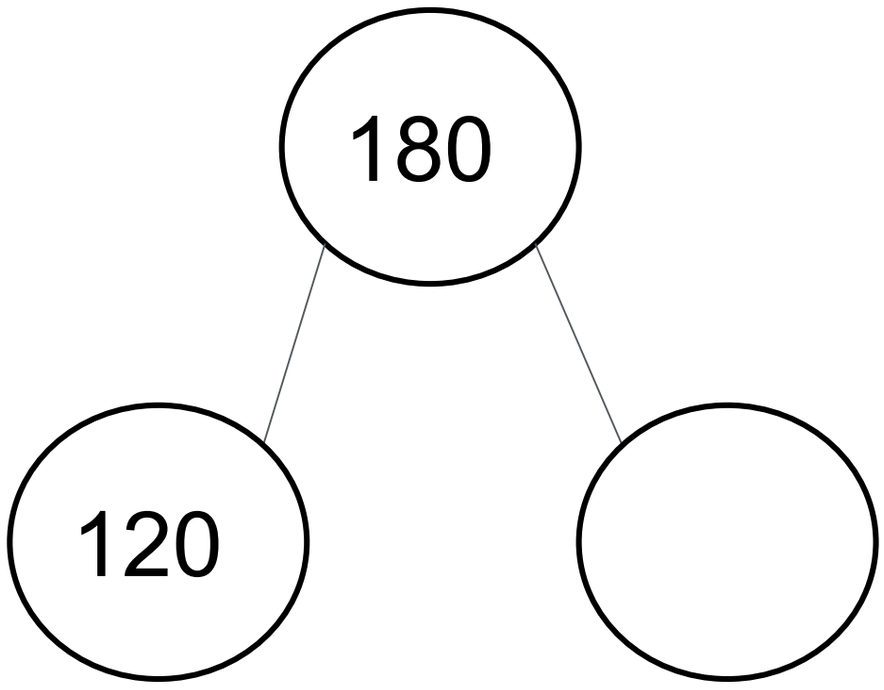
Break Apart 90, 180, and 360



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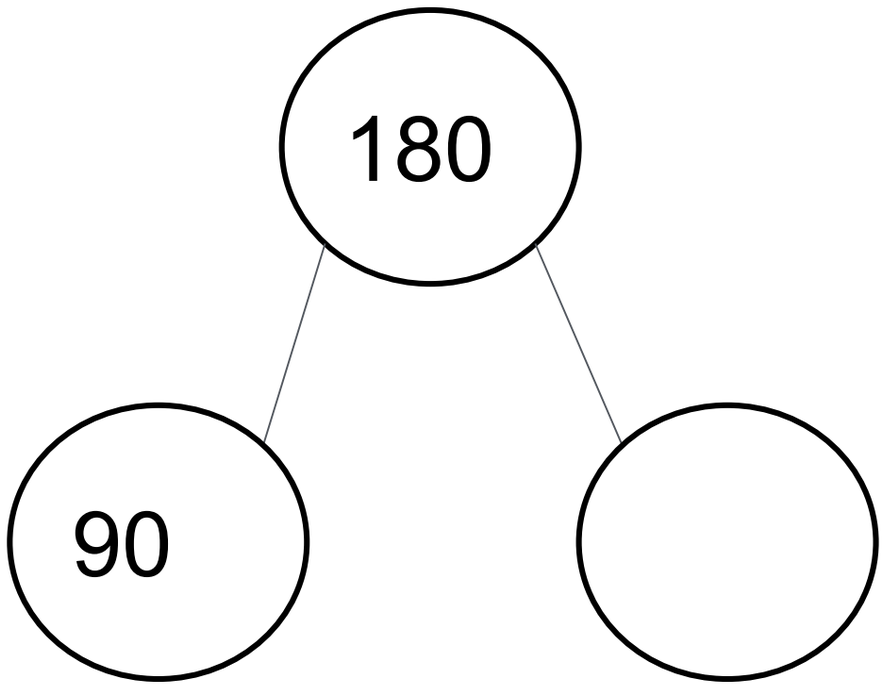

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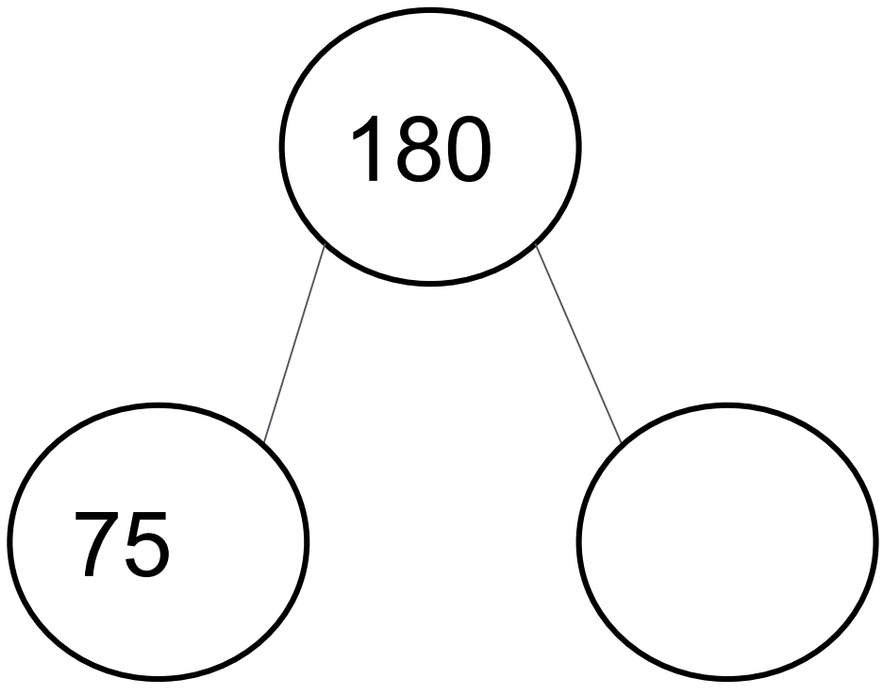

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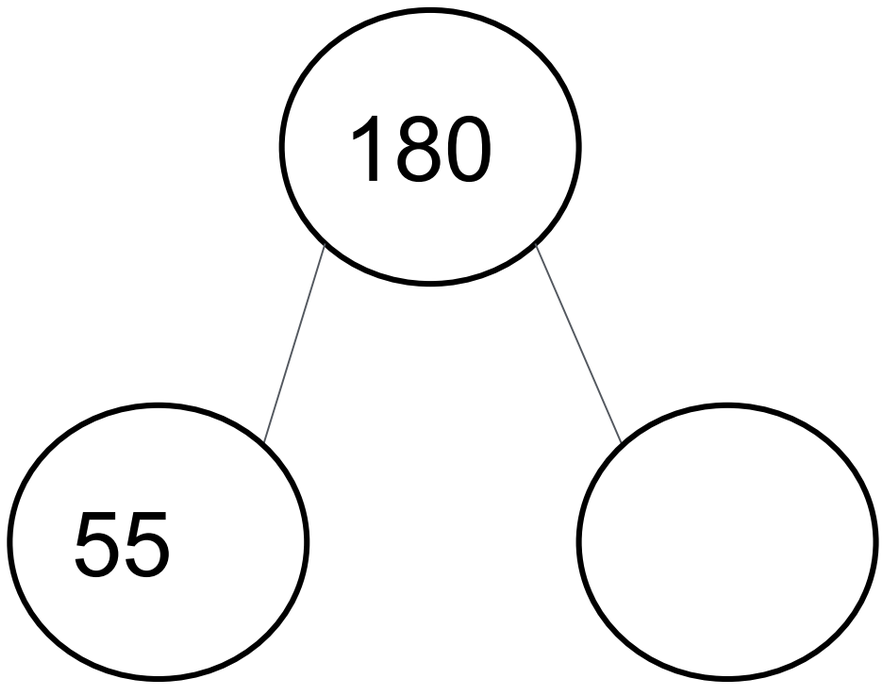
Break Apart 90, 180, and 360



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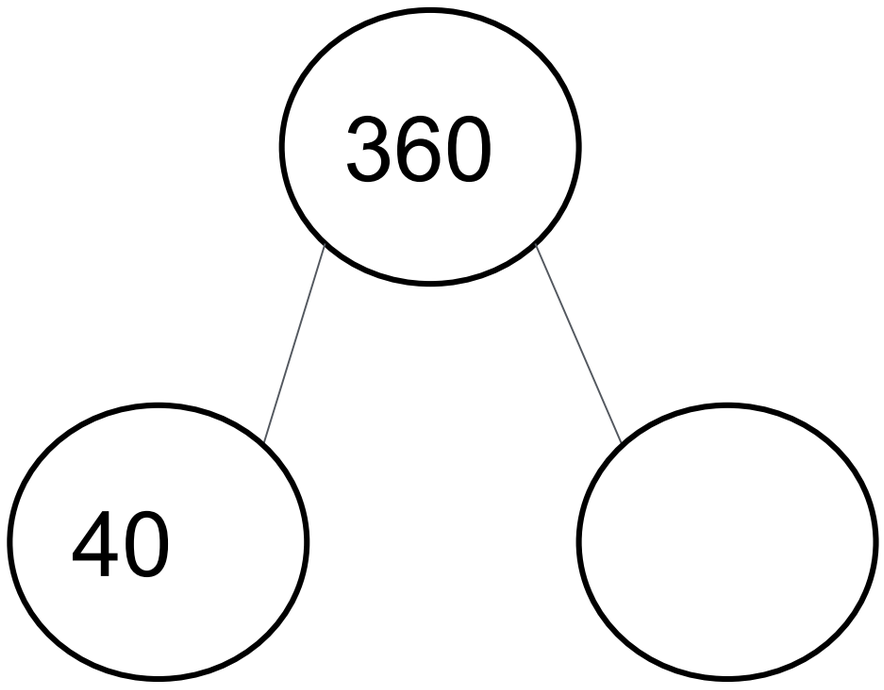

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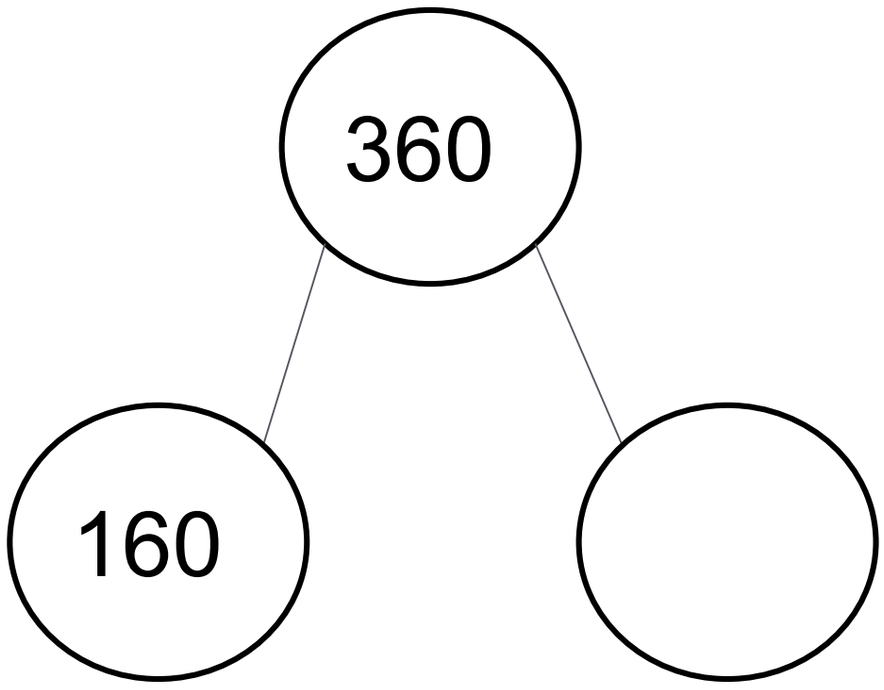

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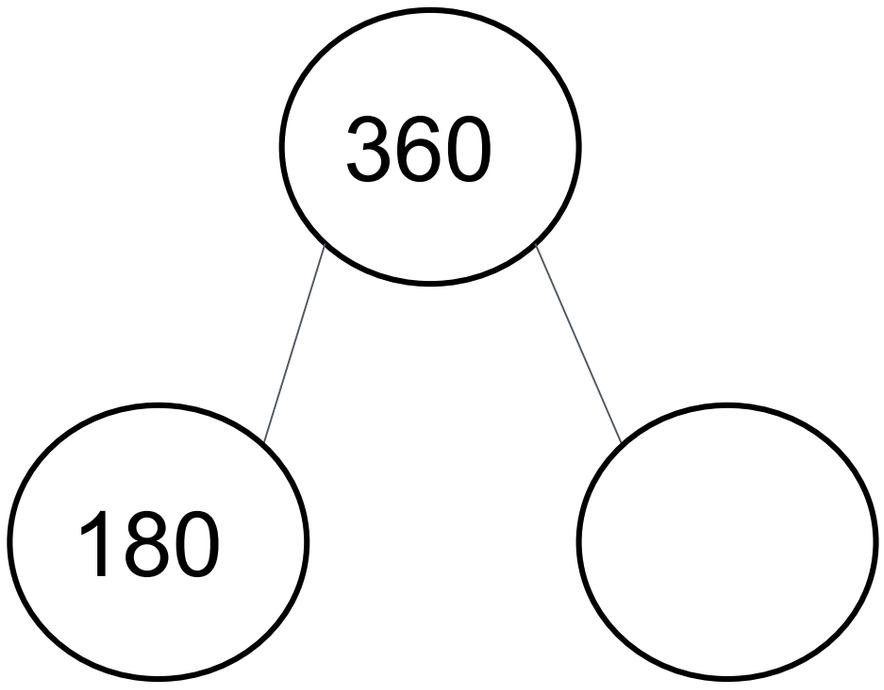
Break Apart 90, 180, and 360



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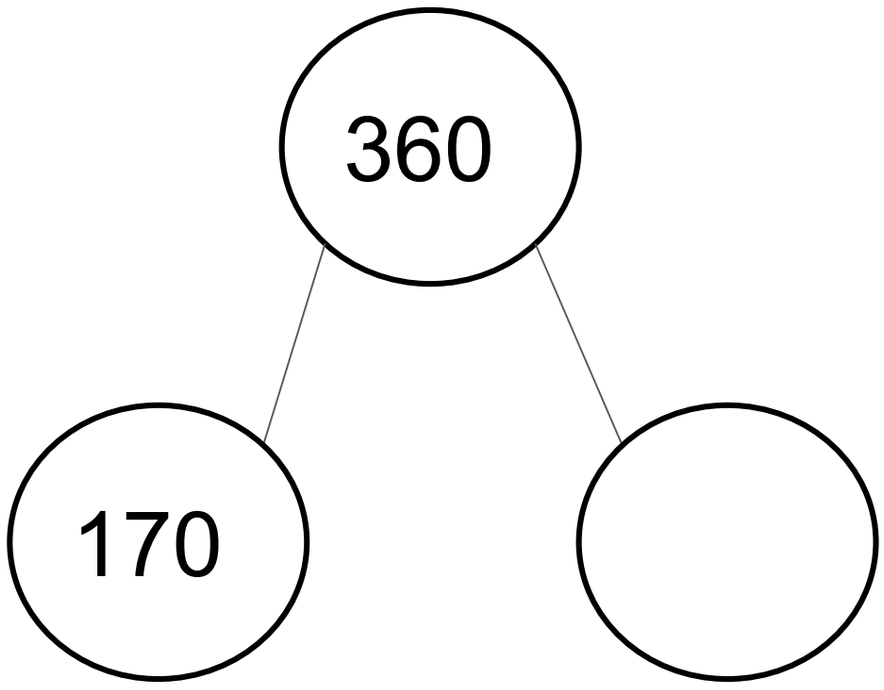
Break Apart 90, 180, and 360



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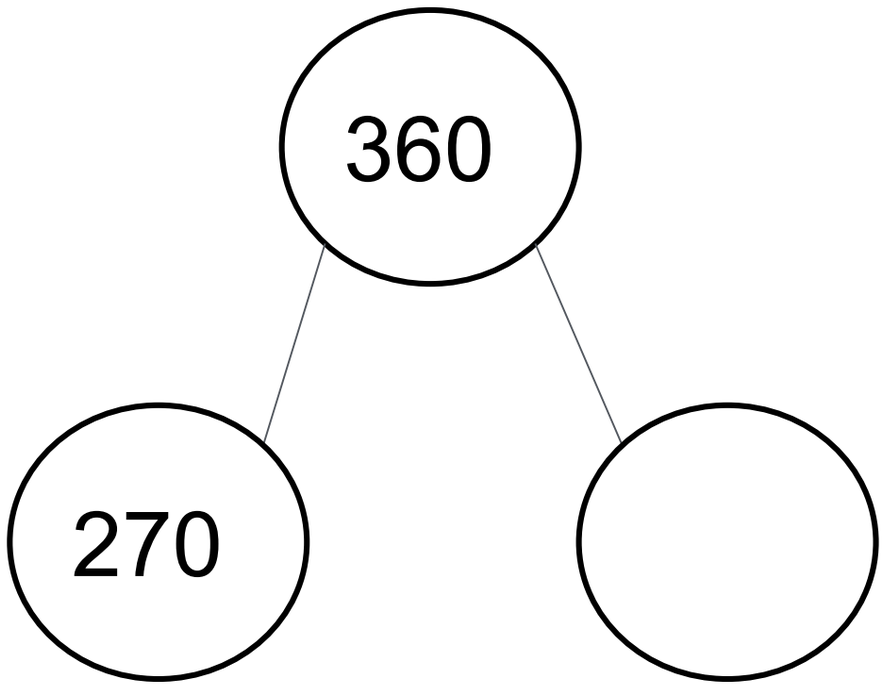
Break Apart 90, 180, and 360



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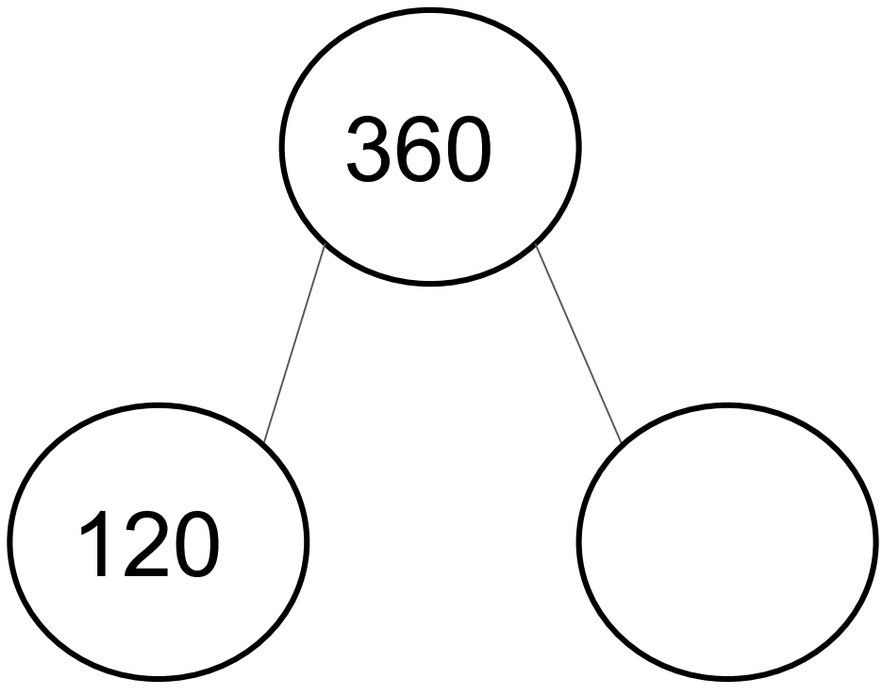

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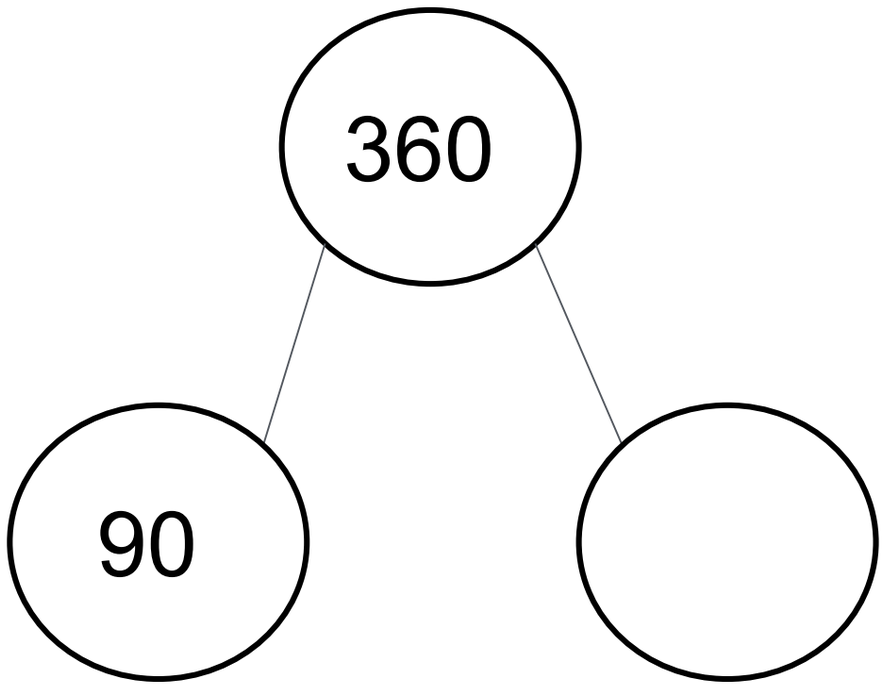

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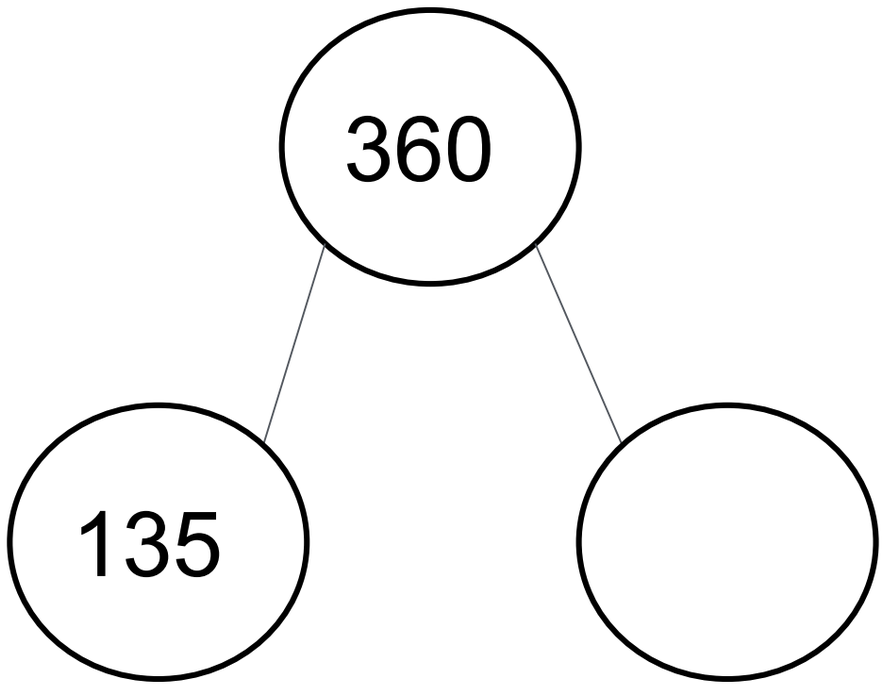


On your personal white boards, write the number bond, filling in the unknown part.

Sketch Angles

Sketch ∠ABC that measures 90°

Is a 90° angle a right angle, an obtuse angle, or an acute angle? T

Physiometry

Stretch one arm straight up, pointing at the ceiling. Straighten the other arm, pointing directly at a side wall.

What angle measure do you think I’m modeling with my arms?

Physiometry

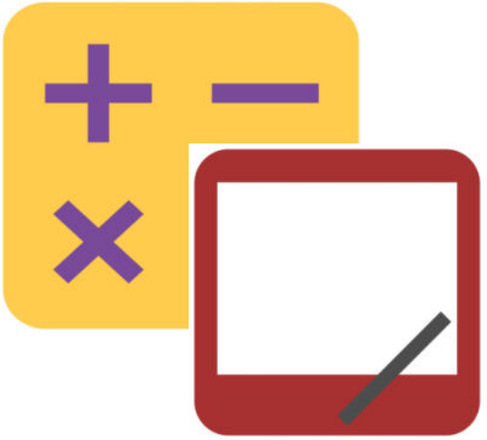
Straighten both arms so that they are parallel to the floor, pointing at both side walls. What angle measure do you think I’m modeling now?

What angle measure do you think I’m modeling with my arms?

Physiometry

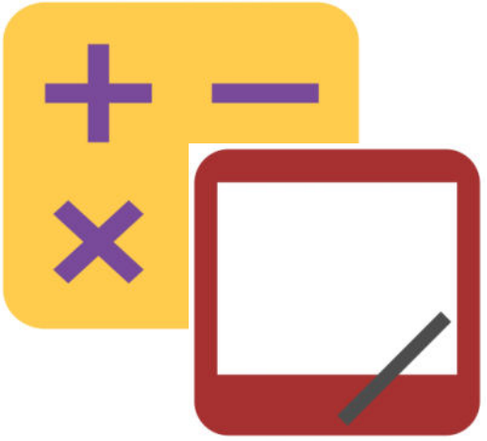
Keep one arm pointing directly to a side wall. Point directly down with the other arm.

What angle measure do you think I’m modeling with my arms?
It could be 90°, but the angle I’m thinking of is larger than 180°, so that would be?



Physiometry

Stand up.
Model a 90° angle.
Model a 180° angle.
Model a 270° angle.
Model a 360° angle.



Physiometry

Point to the walls that run perpendicular to the front of the room.
Turn 90° to your right.
Turn 90° to your right.
Turn 90° to your right.
Turn 90° to your right.
Turn 180°.
Turn 90° to your left.
Turn 180°.

Application Problem

List times on the clock in which the angle between the hour and minute hands is 90°. Use a student clock, watch, or real clock. Verify your work using a protractor.

Concept Development

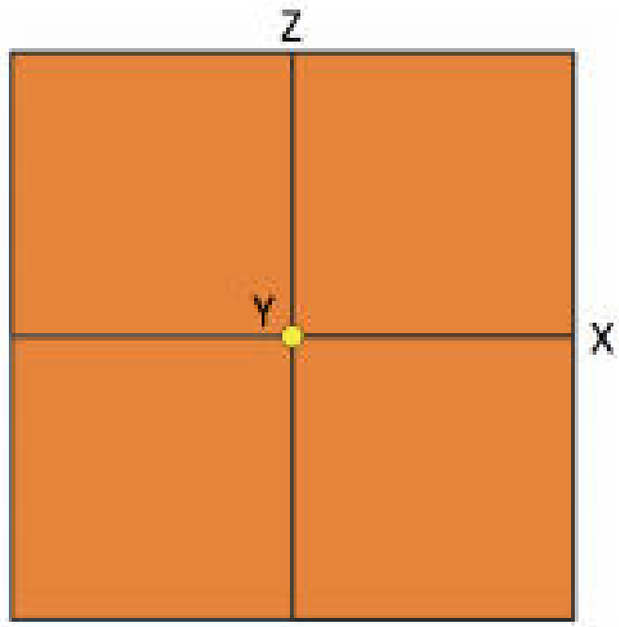
Materials

(T) Pattern blocks for the overhead projector or an interactive white board with pattern block images, straightedge, protractor

(S) Pattern blocks, Problem Set, straightedge, protractor

Angle Measures

Place squares around a central point.



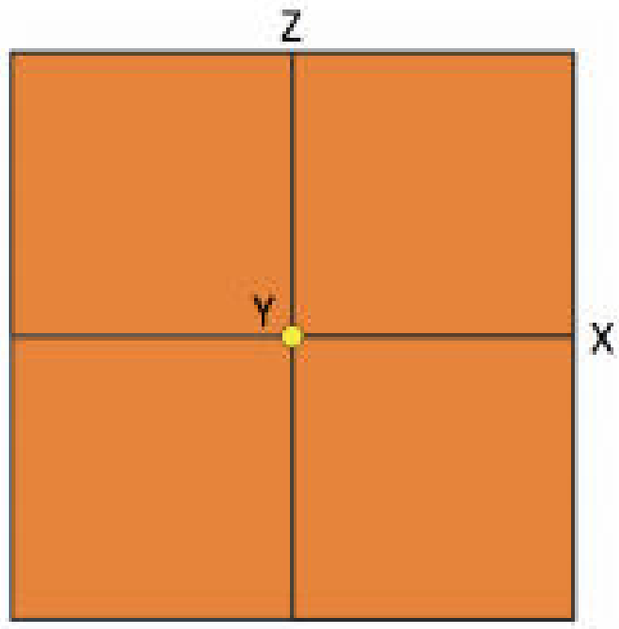
Fit them like puzzle pieces.
Point to the central point.

How many right angles meet at this central Point Y?

Angle Measures

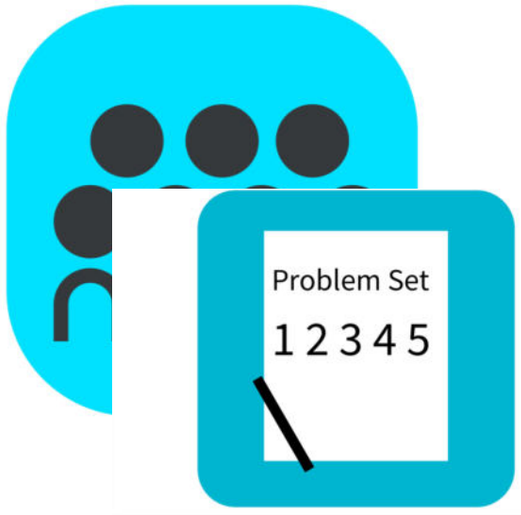
Trace ∠XYZ.

Tell your neighbor about it.



How many quarter-turns are there around the central point?

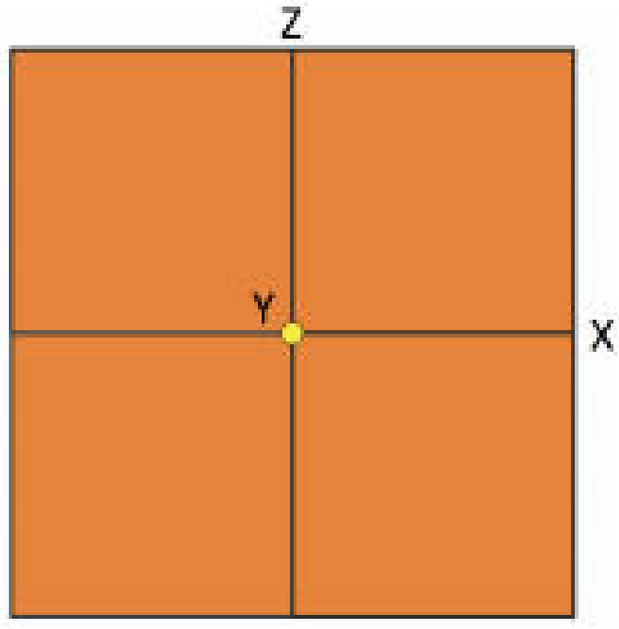
If we didn’t know that the number of degrees in a quarter-turn is 90, how could we figure it out?



Angle Measures

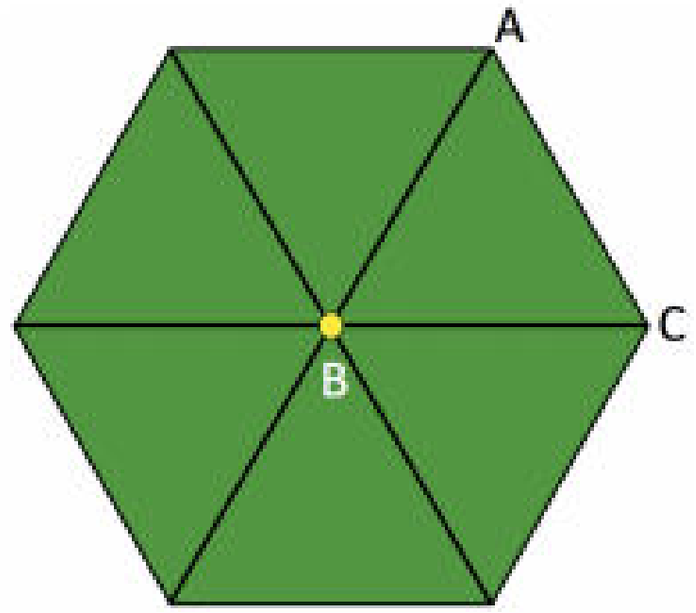
Tell your neighbor an addition sentence for the sum of all the right angles in degrees. Record your work on your Problem Set.

So, the sum of the angles around a central point is…?



Angle Measures

Arrange a set of green triangles around a central point.

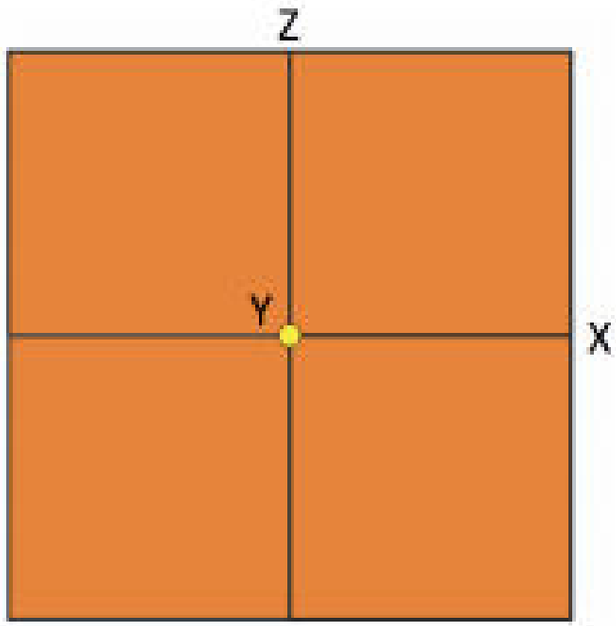


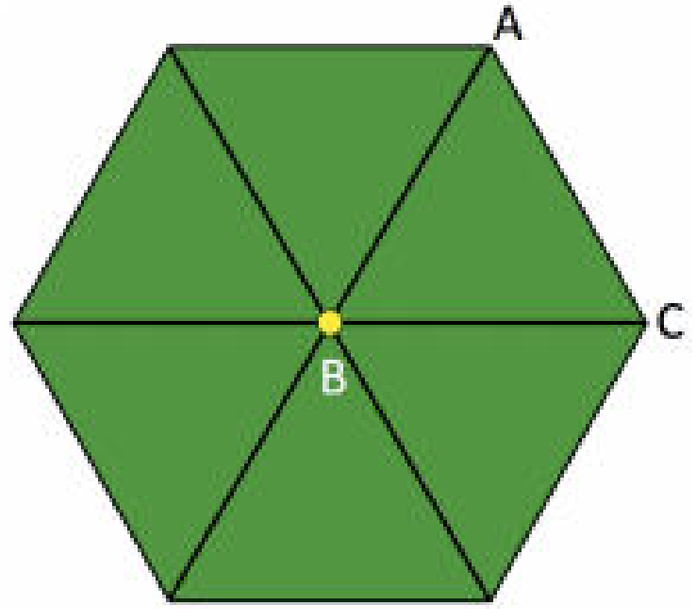
How many triangles did you fit around the central point?

Are all the central angles the same?

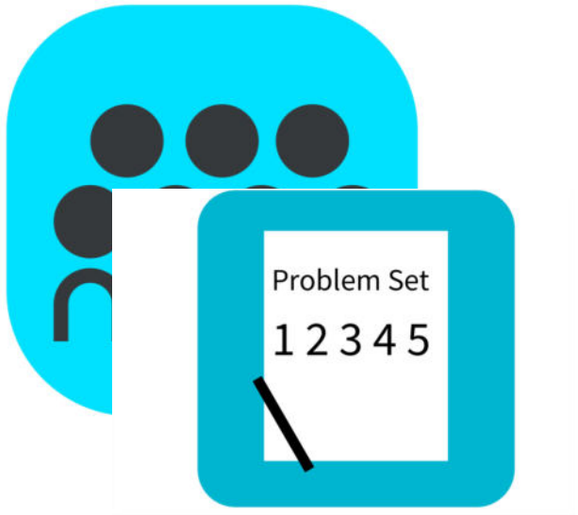
How do you know?

Angle Measures



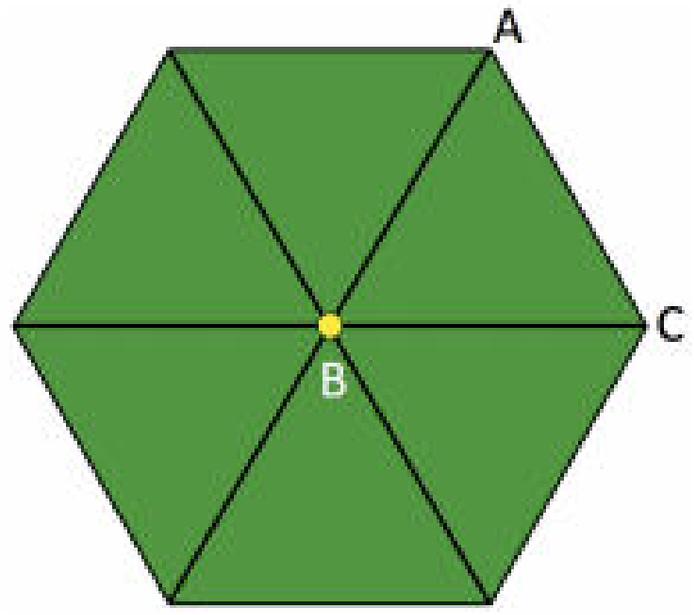


What is similar about the arrangement of squares and the arrangement of triangles?



Angle Measures

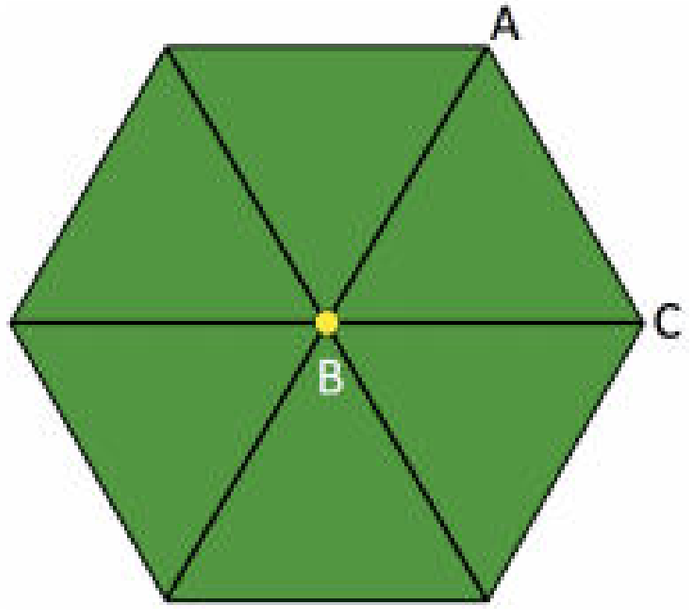
Work with your partner to find the angle measure of ∠ABC.



On your Problem Set, write an equation to show your thinking.

Angle Measures

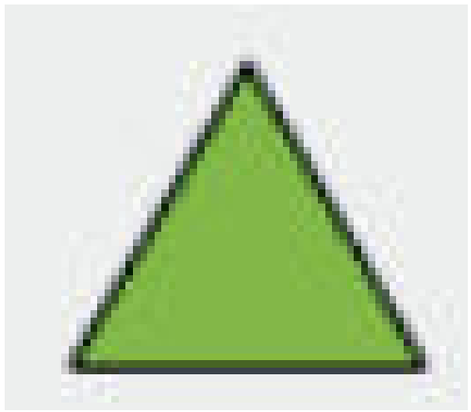
What about ∠BCA ?
∠BAC?



Discuss your thoughts with your partner.

Angle Measures

How can we prove the angle measures in the triangle are 60°?

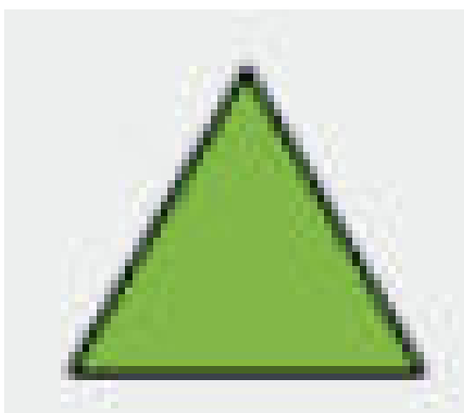


Angle Measures

Use your straightedge and protractor to draw a 60° angle.

Now, using your protractor, verify that the angle you drew is indeed 60°.

What angle measure do you read on the protractor?



Angle Measures

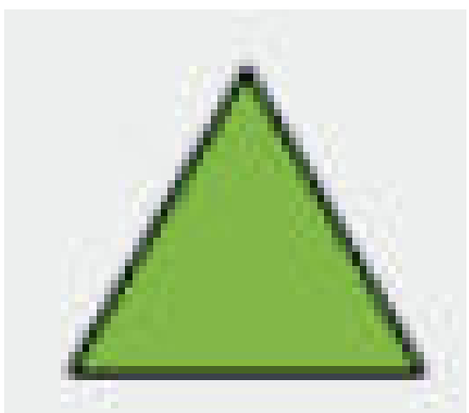
Align each angle of the triangle with this 60° angle.

What did you discover about the angles of this triangle?

Angle Measures

Would the angle measure change if I gave you the same triangle, just enlarged?

What about a larger square pattern block?

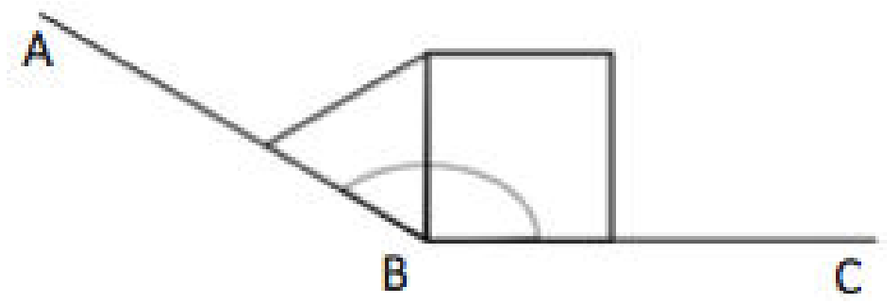


Angle Measures

Turn to Page 2 of your Problem Set. In Problem 2, find the measurement of obtuse ∠ABC.

Discuss your thoughts with your partner.

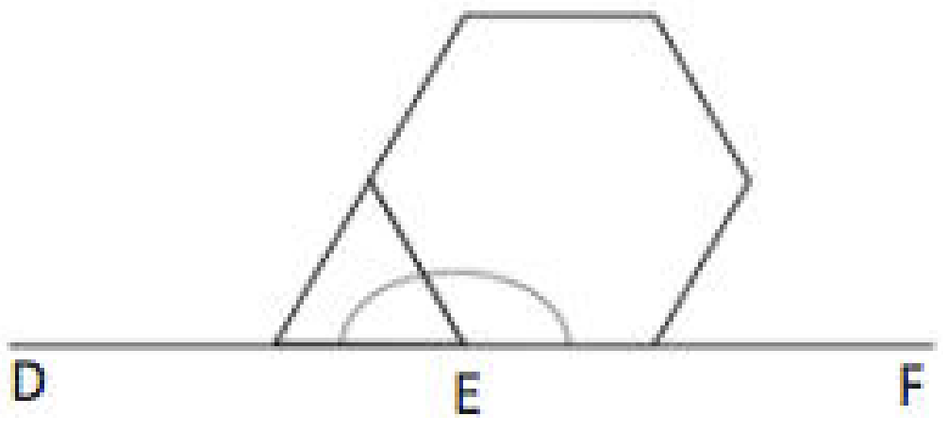
The six angles of the hexagon are the same. Use your pattern blocks to find the angle measure of one angle

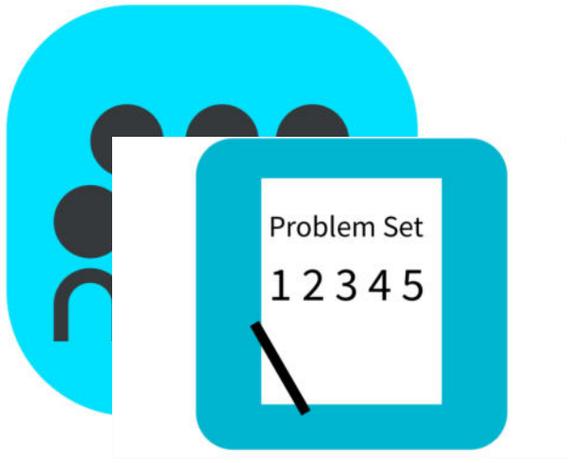


Angle Measures

In the margin of your Problem Set, record your observations about the relationship between the angles of the hexagon and the triangle.

Then, write an equation to solve for the obtuse angle measure of the hexagon. Verify your answer by measuring with a protractor.

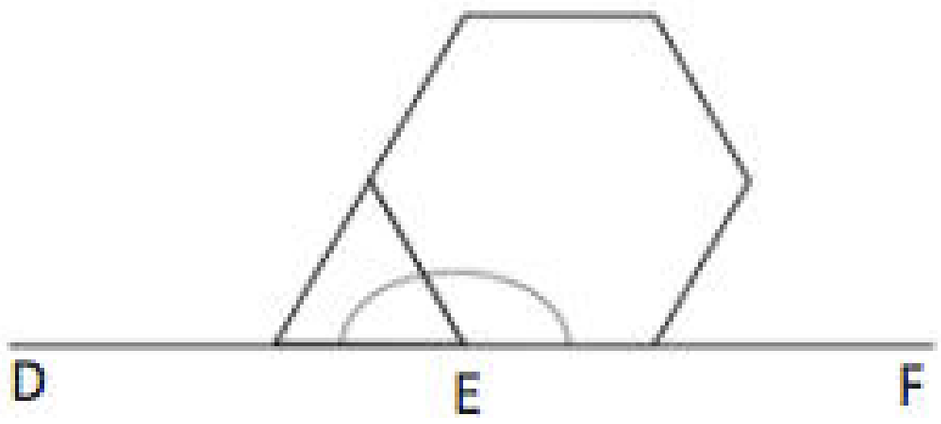




Angle Measures

Look on your Problem Set. What angle do you form when you combine the triangle and the hexagon?

Record the measurement of ∠DEF as an addition sentence on the Problem Set.

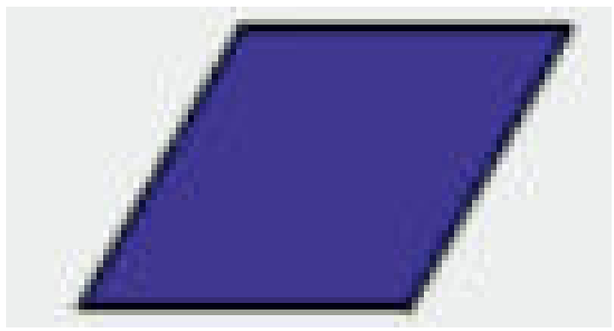


Angle Measures

Use your pattern blocks to find the angle measure for the obtuse and acute angles in the blue rhombus.

Discuss and share your equations with your neighbor.

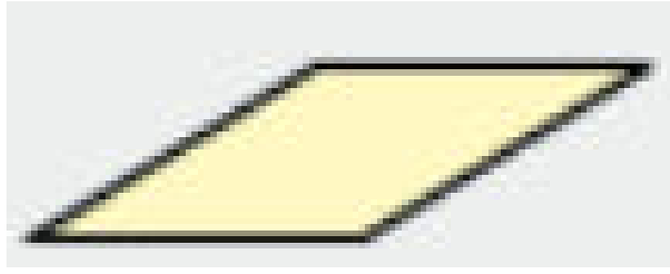
Record your work in Rows (d) and (e) of Problem 1 of the Problem Set.

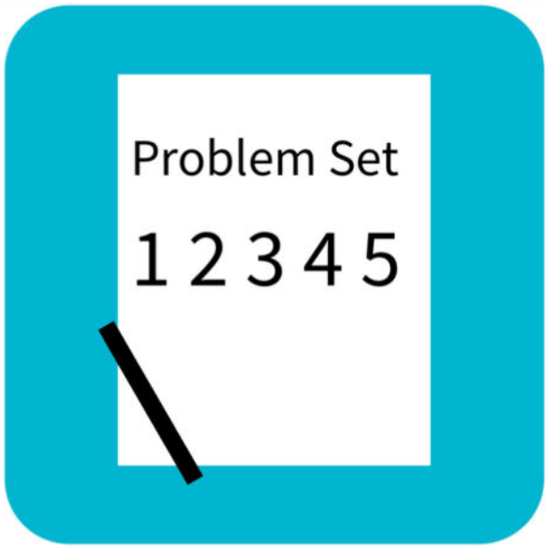


Angle Measures

Work with your partner to find the measurement of the unknown angles of the tan rhombus. Then, use your pattern blocks to find the measurements of the unknown angles in Tables 2 and 3 on the Problem Set.

Use words, equations, and pictures to explain your thinking.

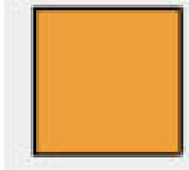
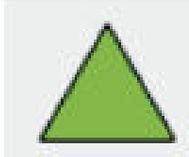




Problem Set

Name _____ Date _____

1. Complete the table.

Pattern block	Total number that fit around 1 vertex	One interior angle measures...	Sum of the angles around a vertex
a. 		360° ÷ ____ = ____	____ + ____ + ____ + ____ = 360°
b. 			

Debrief

Participate in the discussion by...

- Thinking about the question.
- Sharing your work.
- Explaining your strategy.
- Listening to others.

Debrief

- What are the measures for the acute and obtuse angles of the cream rhombus? What did you discover when you fit the acute angles around a vertex?
- How are the different angles in the pattern blocks related?
- What was the measure of $\angle HIJ$? $\angle L$? $\angle O$? $\angle R$? How did you find the angle measures? What combination of blocks did you use? How did your method compare with your neighbor's?
- What did you learn about adding angles?
- (Write $\angle s$ add.) The angle symbol with an *s* just means *angles*. It's the plural of *angle*. "$\angle$s add" translates as "we are adding these angles that share a side." (Write $\angle ADB + \angle BDC = \angle ADC$.) What are different methods for finding the sum of the pictured angles?

Exit Ticket

Name _____ Date _____

1. Describe and sketch two combinations of the blue rhombus pattern block that create a straight angle.