# TABLE OF CONTENTS

Comparing Shapes ........................................ 1
How Many Sides? ........................................... 3

Am I Right?—Pythagoras .................................. 5
Am I Right?—Euclid ........................................ 11
Angles Eat, Too! ............................................ 17

*The Greedy Triangle* ..................................... 19
Design Your Own Shape Story ............................. 23
The Annual Shape Party .................................... 29

Play: The Rectangles Only Club! ......................... 31
The Rectangles Only Club—Euclid ....................... 33
The Rectangles Only Club—Hypatia ...................... 35
More Shapes, More Sides .................................. 37
Check Up #1 ............................................... 39

Turn, Turn, Turn .......................................... 41
Flipping, Turning, and Sliding ......................... 43
Flipping, Turning, and Sliding Directions 1 .......... 45
Flip, Turn, and Slide to the Finish ..................... 47
Flipping, Turning, and Sliding Directions 2 .......... 49
Create Your Own: Flip, Turn, Slide .................... 51
Flipping, Turning, and Sliding Directions 3 .......... 53

One Inch Tall .............................................. 55
If I Were ____ Tall—Pythagoras ......................... 59
If I Were ____ Tall—Hypatia ............................. 61
Segment Addition ........................................... 63

Fractional Paths .......................................... 65

What If... ................................................ 67
It Depends on the Number of Humans ................. 75

Are You My Twin? ......................................... 79
Triangle Sum Theorem ..................................... 83

Spot the Impostors ......................................... 85
Making a Circle My Way .................................. 87
Three Methods for Making a Circle .................... 89
From Radius to Diameter and Back Again .......... 91
Check Up #2 ............................................... 93
Table of Contents (continued)

Exercising Ants—Hypatia 95
Exercising Ants—Euclid 99
Which Pool Has the Biggest Perimeter? 103

Who Built My House? 105
Ruler Without a Ruler 107

The ?-Inch “Ruler” 109

That’s Another Dimension! 111
Perimeter Seeker 113
Check Up #3 115

A Fair Way to Shade 117
Non-counter 123
Area Estimator 125

How Many Square Units? 127
Area Agreement From the Committees 131

A Scavenger Hunt Findings 135
Scavenger Hunt Findings 136
A Shapely Living Room 137
Some “Shapely” Furniture Ideas 143

Geometry & Measurement for All Shapes & Sizes Mathematical Language 145
Comparing Shapes

Directions: For each shape, write the number of sides, angles, and vertices.

Number of Sides: ______
Number of Angles: ______
Number of Vertices: ______

Number of Sides: ______
Number of Angles: ______
Number of Vertices: ______

Directions: Use the two shapes above to tell whether each statement below is TRUE or FALSE.

<table>
<thead>
<tr>
<th>Statement</th>
<th>True or False?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Both shapes have four sides.</td>
<td></td>
</tr>
<tr>
<td>2. Both shapes have four angles.</td>
<td></td>
</tr>
<tr>
<td>3. Both shapes have six vertices.</td>
<td></td>
</tr>
<tr>
<td>4. All sides are the same length on both shapes.</td>
<td></td>
</tr>
</tbody>
</table>
Directions: For each shape, write the number of sides, angles, and vertices.

Number of Sides: ______
Number of Angles: ______
Number of Vertices: ______

Directions: Use the two shapes above to tell whether each statement below is TRUE or FALSE.

<table>
<thead>
<tr>
<th>Statement</th>
<th>True or False</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Both shapes have six sides.</td>
<td></td>
</tr>
<tr>
<td>2. Both shapes have six angles.</td>
<td></td>
</tr>
<tr>
<td>3. Both shapes have more than four vertices.</td>
<td></td>
</tr>
<tr>
<td>4. One shape has fewer than six sides.</td>
<td></td>
</tr>
</tbody>
</table>
How Many Sides?

For each problem below, fill in the blanks. Then represent the problem with pictures and with a multiplication problem.

Example: This shape has 3 sides. If I drew 4 of these shapes, I would have 12 sides all together.

Represent with pictures:

Represent with multiplication: 3 sides x 4 shapes = 12 sides all together

1. This shape has _____ sides. If I drew 2 of these shapes, I would have _____ sides all together.

   Represent with pictures:

   Represent with multiplication:
   _____ sides x _____ shapes = _____ sides all together

2. This shape has ______ sides. If I drew 8 of these shapes, I would have ______ sides all together.

   Represent with pictures:

   Represent with multiplication:
   _____ sides x _____ shapes = _____ sides all together.
AM I RIGHT?

Directions: Next to each angle, write whether it is RIGHT or NOT RIGHT.

1. ____________________
2. ____________________
3. ____________________
4. ____________________
5. ____________________
6. ____________________
Draw each shape and circle whether or not it has right angles.

7. RECTANGLE: Right Angles? YES NO

8. SQUARE: Right Angles? YES NO

9. CIRCLE: Right Angles? YES NO

10. Draw a triangle with 1 right angle if possible, or write NOT POSSIBLE.

11. Draw a triangle with no right angles if possible, or write NOT POSSIBLE.
12. Draw a triangle with 2 right angles if possible, or write NOT POSSIBLE.

13. DESIGN TEAM TIME:

- Draw the front of a house. Do not use ANY RIGHT ANGLES in your drawing.
- Write 3 sentences about the person who lives in this house.

_______________________________________________________
_______________________________________________________
_______________________________________________________

_______________________________________________________
_______________________________________________________
_______________________________________________________

_______________________________________________________
Angle Expert: _________________________________________

**AM I RIGHT?**

*Directions:* An angle measure tells how open an angle is. For example, if it is not open at all, it is $0^\circ$. If it is open all the way, it is $180^\circ$. The pictures below show some angles and their measures. Use these angles to estimate the measures of the angles below.

- $0^\circ$
- $45^\circ$
- $90^\circ$
- $135^\circ$
- $180^\circ$

1. _________

2. _________

3. _________

4. _________

5. _________

6. _________

7. Acute angles are less than $90^\circ$. Which angles are acute?
   ______________________________________________________

8. Obtuse angles are greater than $90^\circ$. Which angles are obtuse?
   ______________________________________________________

9. Right angles are exactly $90^\circ$. Which angles are right?
   ______________________________________________________
Draw each shape and circle whether or not it has right angles.

10. RECTANGLE: Right Angles? YES NO

11. SQUARE: Right Angles? YES NO

12. CIRCLE: Right Angles? YES NO

13. Draw a triangle with 1 right angle if possible, or write NOT POSSIBLE.

14. Draw a triangle with no right angles if possible, or write NOT POSSIBLE.
15. Draw a triangle with 2 right angles if possible, or write NOT POSSIBLE.

16. DESIGN TEAM TIME:

- Draw the front of a house. Do not use ANY RIGHT ANGLES in the drawing.
- Write 3 sentences about the person who lives in this house.

_______________________________________________________

_______________________________________________________

_______________________________________________________

_______________________________________________________

_______________________________________________________

_______________________________________________________
Angles Eat, Too!

Hungry Angle Postulate: When an angle eats another angle, it gains that many degrees. (It is similar to people eating food to grow taller.)

Use the Hungry Angle Postulate to figure out how big each angle will be after it eats the smaller angle. Write an addition problem and a sentence. Then, draw the new angle formed by combining both.

EXAMPLE:

Addition Problem:

\[115^\circ + 38^\circ = 153^\circ\]

Sentence:
When a 115\(^\circ\) angle eats a 38\(^\circ\) angle, it becomes a 153\(^\circ\) angle.

Addition Problem:

Sentence:

Addition Problem:

Sentence:

Addition Problem:

Sentence:
Shape Author: ____________________________________________

**The Greedy Triangle**  
*Burns, 1995*

*Directions*: Write the names of the shapes you know and then fill in the rest as your teacher reads the story.

<table>
<thead>
<tr>
<th>Name of Shape</th>
<th>Number of Sides</th>
<th>Number of Angles</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>
Directions: Use your table and details from the story to answer each question.

1. What is a shape with 8 sides called? _____________________

2. How many sides does a pentagon have? ________________

3. How many angles does a heptagon have? _______________

4. What is true about the number of sides and the number of angles in a shape?

5. Why do you think the book is called *The Greedy Triangle*?

Design Your Own Shape Story

Directions:

1. Write a story about the quadrilateral in the picture below. (Don’t forget to give your shape a name!)

2. In your story the quadrilateral must change into each of the 5 different quadrilaterals at the top of this page.

3. As the quadrilateral changes, tell what makes it similar or different from its previous shape using terms like sides, angles, and vertices.

4. You may cut the pictures out to use in your story, or you may draw your own.

5. In the beginning of your story, tell why the quadrilateral is not happy and wants to change.
Use the lined pages to write your story and the blank pages for illustrations. Staple your pages together.

Shape Author: ____________________________________

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
Angle Accountant: ______________________________________

The Annual Shape Party

At the annual shape party, shapes gather to have fun. This year's host, Helena Heptagon, has offered a prize to the first person who figures out how many angles are in the room. No guessing!! Helena wants to see how you got your answer.

The guests include:

2 circles, 4 triangles, 3 quadrilaterals, 7 pentagons, 1 hexagon, 2 heptagons (including Helena), and 3 octagons

Use the space below to calculate the total number of angles in the room. You may draw pictures to help you.

There are ______ angles in the room all together.
Play: The Rectangles Only Club!

Characters:
Rosie Rectangle
Robert Rectangle
Rashawn Rectangle
Sally Square

How to Read a Play:
1. The name in front of the colon tells who should read the line.
   EXAMPLE—Rosie would read this line without reading her name:
   Rosie: I’m bored.
2. The italicized words ARE NOT read out loud! They tell the reader WHAT to do.

Play: The Rectangles Only Club!

Rosie: I’m bored. School is over and I have nothing to do. Being a rectangle is so boring. Maybe I’ll call Robert.
   (Holds up pretend phone and calls Robert.)

Robert: Hello.
   (Holds up pretend phone.)

Rosie: Hi, Robert. I’m just calling because I’m bored. What should rectangles like us do on such an afternoon?

Robert: I’m bored, too. Let me call Rashawn, and we can all meet at my house to decide what to do.

Rosie: Good idea. I’ll see you there.
   (Robert calls Rashawn.)

Rashawn: Hello.
   (Holds up pretend phone.)
Robert: Hi, Rashawn. Rosie is coming over and we want you to come, too. That way, we’ll have three rectangles together, and we can find something to do.

Rashawn: Good idea. I’ll be right over.

(The three rectangles meet at Robert’s house.)

Rosie: So, what should we do?

Rashawn: How about building a clubhouse?

Robert: Yeah! What should we call it?

Rosie: How about the Rectangles Only Club?

Robert: That’s a great name!

(The 3 rectangles begin building their clubhouse. Sally Square walks by.)

Sally: Hey, what are you doing?

Rashawn: We’re building a Rectangles Only Club. Do you want to help?

Sally: Wow, that sounds fun, but I’m just a square.

Rosie: You’re not just a square! You’re a rectangle, too!

Sally: What do you mean? My sides are all the same length and yours are different.

Robert: Yeah, but to be a rectangle, all you need are 4 sides and 4 right angles!

Sally: Wow! Does that mean you are squares?
1. How should Robert answer Sally at the end of the play? Why?

___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________

2. The Rectangles and the Rhombuses have decided to have their own baseball teams. The rules for joining are:
   - To be on the Rectangle team, you must fit the definition of Rectangle.
     
     \textit{Rectangle—A quadrilateral with 4 right angles.}
   - To be on the Rhombus team, you must fit the definition of a Rhombus.
     
     \textit{Rhombus—A quadrilateral with 4 sides the same length.}

Samuel Square would like to join one of the teams. Which team can he join? Explain your answer.
Quadrilateral Judge: ____________________________________________

The Rectangles Only Club!

1. A rectangle has to have 4 sides and 4 right angles. Circle all of the rectangles you see.

2. A square has to have 4 sides that are the SAME LENGTH and 4 right angles. Circle all of the squares you see.

3. Is it possible to draw a square that is not a rectangle?
   Yes  No

4. Is it possible to draw a square that is not a rhombus?
   Yes  No

5. Is it possible to draw a rectangle that is not a square?
   Yes  No

6. How should Robert answer Sally at the end of the play? Why?

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________
More Shapes, More Sides

**Directions:** Fill in the columns below so that the number of triangles matches the total number of sides.

<table>
<thead>
<tr>
<th>Number of Triangles</th>
<th>Total Number of Sides</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>18</td>
<td>24</td>
</tr>
</tbody>
</table>

**Directions:** Fill in the columns below so that the number of quadrilaterals matches the total number of sides.

<table>
<thead>
<tr>
<th>Number of Quadrilaterals</th>
<th>Total Number of Sides</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>28</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>5</td>
<td>28</td>
</tr>
<tr>
<td>1</td>
<td>28</td>
</tr>
<tr>
<td>12</td>
<td>28</td>
</tr>
<tr>
<td>8</td>
<td>28</td>
</tr>
<tr>
<td>15</td>
<td>28</td>
</tr>
<tr>
<td>8</td>
<td>28</td>
</tr>
<tr>
<td>16</td>
<td>28</td>
</tr>
</tbody>
</table>

Draw pictures to help you fill in the boxes!

2 triangles have 6 sides

Explain why you cannot have a group of quadrilaterals with a total of 13 sides.
Check Up #1

Fill in the missing parts of the table.

<table>
<thead>
<tr>
<th>Name of Shape</th>
<th>Number of Sides</th>
<th>Number of Angles</th>
<th>Drawing of Shape</th>
</tr>
</thead>
<tbody>
<tr>
<td>Triangle</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quadrilateral</td>
<td></td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

Draw an example of each type of angle.

<table>
<thead>
<tr>
<th>Acute</th>
<th>Obtuse</th>
<th>Right</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Mathematical Transformer: ________________________________

Flipping, Turning, and Sliding

START

1

2

3

4
Mathematical Transformer: ________________________________

**Flipping, Turning, and Sliding Directions 1**

My directions from START to Triangle 4:

1. ______________________________________________________

2. ______________________________________________________

3. ______________________________________________________

4. ______________________________________________________
Flip, Turn, and Slide to the Finish

Can you find another way to get your triangle from START to END? Write your directions using terms like FLIP, TURN, SLIDE, UP, DOWN, LEFT, and RIGHT.
Mathematical Transformer: ________________________________

Flipping, Turning, and Sliding Directions 2

My *different* directions from START to END:

1. _______________________________________________________

   _______________________________________________________

2. _______________________________________________________

   _______________________________________________________

3. _______________________________________________________

4. _______________________________________________________

5. _______________________________________________________

6. _______________________________________________________
Mathematical Transformer: ________________________________

Create Your Own: Flip, Turn, Slide
Mathematical Transformer: ________________________________

Flipping, Turning, and Sliding Directions 3

My different directions from START to END:

1. _______________________________________________________
   _______________________________________________________

2. _______________________________________________________
   _______________________________________________________

3. _______________________________________________________
   _______________________________________________________

4. _______________________________________________________
   _______________________________________________________

5. _______________________________________________________
   _______________________________________________________

6. _______________________________________________________
   _______________________________________________________
One Inch Tall

If you were only one inch tall, you'd ride a worm to school.
The teardrop of a crying ant would be your swimming pool.
A crumb of cake would be a feast
And last you seven days at least,
A flea would be a frightening beast
If you were one inch tall.

If you were only one inch tall, you'd walk beneath the door,
And it would take about a month to get down to the store.
A bit of fluff would be your bed,
You'd swing upon a spider's thread,
And wear a thimble on your head
If you were one inch tall.

You'd surf across the kitchen sink upon a stick of gum.
You couldn't hug your mama, you'd just have to hug her thumb.
You'd run from people's feet in fright,
To move a pen would take all night,
(This poem took fourteen years to write—
'Cause I'm just one inch tall).

Shel Silverstein

1. Draw a vertical segment that is one inch long. Next to that segment, draw a one-inch tall person.

2. Would a one-inch tall person fit under the door of your classroom? Explain why or why not.

___________________________________________

_________________________________________________

_______________________________________________________

3. Choose one other line from the poem. Explain whether or not the line makes sense for a one-inch tall person.

___________________________________________

_________________________________________________

_______________________________________________________

4. Draw a person who is only 1/2 inch tall.
Height Adjuster: ________________________________

If I Were ____ Tall

Under each measurement, draw a person with the given height.

<table>
<thead>
<tr>
<th>2 inches</th>
<th>3 1/2 inches</th>
<th>5 inches</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Choose one of the people you drew above and write a poem about what life is like for that person.
If I Were ____ Tall

Under each measurement, draw a person with the given height.

<table>
<thead>
<tr>
<th>2 1/2 inches</th>
<th>3 1/4 inches</th>
<th>4 3/4 inches</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Choose one of the people you drew above and write a poem about what life is like for that person.
Segment Addition

Recall: A line segment is a part of a line with two endpoints.

The Segment Addition Postulate says that if you add two pieces of a segment, you can find the length of the whole segment.

EXAMPLE: Combine a 1 inch segment and a 2 inch segment.

What is the length of the whole segment? \(1 \text{ inch} + 2 \text{ inches} = 3 \text{ inches}\)

1. Combine a 2 inch segment and a 3 inch segment.

   What is the length of the whole segment? ______________________

2. Combine a 2 inch segment and another 2 inch segment.

   What is the length of the whole segment? ______________________

3. Combine a 2 1/2 inch segment and a 3 1/2 inch segment.

   What is the length of the whole segment? ______________________
   (Hint: Measure the length if you cannot find it by adding!)
Fractional Paths

Follow the steps below.

1. The WALKER starts on the mark labeled “HOME.”
2. The WALKER counts each mark from HOME to SCHOOL.
3. The RECORDER records the number of marks counted.
   Number of marks counted: _____________
4. The WALKER walks along the path again. The whole group counts the marks starting with zero.
5. Put a sticky note on each of the marks along your path.
6. At the top of each sticky note, write the number for that mark. Underline the number. This is called the numerator of your fraction.
7. Under the numerator, write the denominator. This is the total number of marks counted from question 3. The denominator is the same for all of your fractions.

BE THE EXPERT: Why is the denominator the same for all of the fractions?
8. Finish the picture below so that it looks like your path. Write the correct fraction above each mark in the picture.

![Diagram of a line segment from HOME to SCHOOL]

9. Choose FOUR of the fractions from your path and write them in the first column. Then tell how to say each fraction and what it means. An example is given to help you.

<table>
<thead>
<tr>
<th>FRACTION</th>
<th>HOW I SAY IT</th>
<th>WHAT IT MEANS</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXAMPLE:</td>
<td>Three-eighths</td>
<td>The third mark out of eight</td>
</tr>
<tr>
<td>3/8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10. Write five questions to ask another group, about your group’s fractional path.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
What If…

**Problem 1:** Your teacher tells the class that she is going to give each student a candy bar.

What if your teacher gave all the girls in class 1 of these?

Then, all of the boys in class got 1 of these.

a. Explain why the teacher is being unfair.

________________________________________________________________________

________________________________________________________________________

b. What should the teacher do to make it fair?

________________________________________________________________________

________________________________________________________________________
Problem 2: Andrea’s mom just bought a new car and she got a really good deal.

The two tires on one side of the car looked like this:

![Tires on one side of the car](image1)

The two tires on the other side of the car looked like this:

![Tires on the other side of the car](image2)

a. What is wrong with the tires on the new car?

b. What should Andrea’s mom do to fix the car?
Problem 3: Tyrell is helping his father install the new door they bought.

The empty space where the door goes looks like this:

The new door looks like this:

a. Explain what is wrong with the door they bought.

b. What should they do before they go to buy another door?
Problem 4: DESIGN TEAM TIME: Making a new human. Make a list of body parts that come in 2s.

a. LIST: We all have 2…

_____________
_____________
_____________
_____________
_____________
_____________
_____________

b. THINK about which of the body parts you listed are supposed to be the same size and shape.

c. DRAW a person making the body parts you listed different sizes, different shapes, or both.

d. WRITE a story about why life is harder for the person you drew.
It Depends on the Number of Humans

For each problem below, write the number of body parts for the given number of humans. Then, write the multiplication problem you can use to figure out the total number of body parts for the given number of humans.

EXAMPLE: If I see 3 humans, then I see 3 noses, 6 eyes, and 30 fingers.

**Multiplication problems:**

**Noses**

3 humans x 1 nose each = 3 noses all together

**Eyes**

3 humans x 2 eyes each = 6 eyes all together

**Fingers**

3 humans x 10 fingers each = 30 fingers all together

1. If I see 5 humans, then I see ____ eyebrows, ____ tongues, and ____ toes.

**Multiplication Problems:**

**Eyebrows**

___ humans x ___ eyebrows each = ___ eyebrows all together

**Tongues**

___ humans x ___ tongue each = ___ tongues all together

**Toes**

___ humans x ___ toes each = ___ toes all together
2. If I see 7 humans, then I see ____ knees, ____ elbows, and ____ nails (fingers and toes).

**Multiplication Problems:**

**Knees**

___ humans x ___ knees each = ___ knees all together

**Elbows**

___ humans x ___ elbows each = ___ elbows all together

**Nails**

___ humans x ___ nails each = ___ nails all together

3. If I see 4 humans, then I know that they have ____ heart chambers, about ___ teeth, and about ____ bones.

(HINT: Each human has 4 heart chambers, about 28 teeth, and about 208 bones.)

**Multiplication Problems**

**Heart Chambers**

___ humans x ___ heart chambers each = ___ heart chambers all together

**Teeth**

___ humans x ___ teeth each = ___ teeth all together

**Bones**

___ humans x ___ bones each = ___ bones all together

Why do you think the term “about” must be used when talking about teeth and bones?
Are You My Twin?

1. Let’s define “congruent figures.”

CONGRUENT FIGURES:

________________________________________________________________
________________________________________________________________

2. Do the triangles you and your partner made look the same?

________________________________________________________________
________________________________________________________________

3. Look at the third side that you drew. Which triangle has a LONGER third side, ACUTE or OBTUSE?

________________________________________________________________
________________________________________________________________

4. Are the two triangles CONGRUENT FIGURES? Why or why not?

________________________________________________________________
________________________________________________________________

5. COMPARE your acute triangle to the acute triangle of another group. Are they CONGRUENT FIGURES? Why or why not?

________________________________________________________________
________________________________________________________________
6. COMPARE your obtuse triangle to the obtuse triangle of another group. Are they CONGRUENT FIGURES? Why or why not?

________________________________________________________________
________________________________________________________________

7. Give directions for making two triangles that are CONGRUENT FIGURES.

______________  ____________________________________________________
______________  ____________________________________________________
## Triangle Sum Theorem

In Geometry, a **theorem** is something that can be proven. One theorem is called the **Triangle Sum Theorem**.

ADD THE 3 ANGLES in each triangle then predict what you think that theorem might say.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>59°</td>
<td>72°</td>
</tr>
<tr>
<td></td>
<td>49°</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>29°</td>
<td>57°</td>
</tr>
<tr>
<td></td>
<td>94°</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>19°</td>
<td></td>
</tr>
<tr>
<td></td>
<td>142°</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>19°</td>
<td></td>
</tr>
<tr>
<td></td>
<td>19°</td>
<td></td>
</tr>
</tbody>
</table>

4. What do you think the Triangle Sum Theorem says about the sum of the three angles in a triangle?
Circle Spotter: __________________________________________

**Spot the Impostors**

There are only 3 REAL circles on this page. Can you spot the impostors? Color the 3 circles.

Explain how you were able to tell which shapes were NOT circles.

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________
Making a Circle My Way

Develop a way to make a perfect circle using the materials provided. Write instructions for how to make a circle the way you invented.

HOW TO MAKE A PERFECT CIRCLE:

1. ____________________________________________________________
2. ____________________________________________________________
3. ____________________________________________________________
4. ____________________________________________________________
Inventors: ____________________________________

Three Methods for Making a Circle

There are three different methods for making a circle below. Test each method and decide which works the best.

Method #1

1. Draw a point in the middle of a blank piece of paper.
2. Place a toothpick so that one end touches the point.
3. Make another point at the other end of the toothpick.
4. Rotate the toothpick a little bit and make another point.
5. Continue rotating and making more points until you can draw your circle.

Method #2

1. Put one pencil through a rubber band so that the point is in the middle of a piece of paper.
2. Put another pencil at the other end of the rubber band with its point also on the paper.
3. Ask a partner to turn the paper while you hold the pencils steady.

Method #3

1. Use the same method you used for the rubber band, but this time use a PAPER CLIP.

Which method do you think made the best circle? Explain your thinking.

_______________________________________________________

_______________________________________________________

_______________________________________________________
From Radius to Diameter and Back Again

A circle has special parts called the Radius and the Diameter. Use patterns to help you complete the table below.

Circle A shows a line segment that is the radius. Circle B shows a line segment that is the diameter.

<table>
<thead>
<tr>
<th>A circle with radius…</th>
<th>Has diameter…</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 inch</td>
<td>2 inches</td>
</tr>
<tr>
<td>2 inches</td>
<td>4 inches</td>
</tr>
<tr>
<td>3 inches</td>
<td>6 inches</td>
</tr>
<tr>
<td>4 inches</td>
<td>_____ inches</td>
</tr>
<tr>
<td>5 inches</td>
<td>_____ inches</td>
</tr>
<tr>
<td>_____ inches</td>
<td>12 inches</td>
</tr>
<tr>
<td>7 inches</td>
<td>_____ inches</td>
</tr>
<tr>
<td>_____ inches</td>
<td>_____ inches</td>
</tr>
<tr>
<td>_____ inches</td>
<td>_____ inches</td>
</tr>
</tbody>
</table>

Questions

1. Find the diameter of a circle with radius 24 inches.

2. Find the radius of a circle with diameter 100 inches.
Check Up #2

1. Measure the height of each person in inches. Record your answer below.

2. Circle the triangles that are congruent to the triangle in the box.

3. Explain how you know the picture IS NOT a perfect circle.

______________________________  __________________________

______________________________  __________________________

______________________________  __________________________

______________________________  __________________________

Geometry & Measurement for All Shapes & Sizes—Student Page 93
Exercising Ants

Task 1
Annie the ant wants to start exercising. She decides to do one lap around the rectangular pool each day.

24 feet

12 feet

How many feet will Annie walk if she goes all the way around the edge of the pool? Explain your answer.

Task 2
Annie’s brother, Arthur Ant, decides that he, too, will start exercising. He decides to walk around the pool twice. How many feet does he walk?
(Hint: Use your answer from Task 1 to help you.)
Task 3
Angela Ant brags that she walked around the pool many times and went 360 feet, but she forgot how many times she went around. Help Angela figure out how many laps she did. Show your work below.

1 time around the pool is ______ feet.

2 times around the pool is ______ feet.

3 times around the pool is ______ feet.

4 times around the pool is ______ feet.

5 times around the pool is ______ feet.

6 times around the pool is ______ feet.

Using the information above, I can tell that Angela went around the pool _____ times.
Exercising Ants

Task 1
Annie the ant wants to start exercising. She decides to do one lap around the rectangular pool each day.

24 feet

How many feet will Annie walk if she goes all the way around the edge of the pool? Explain your answer.

Task 2
Annie’s brother, Arthur Ant, decides that he, too, will start exercising. He decides to walk around the pool twice. How many feet does he walk?
Task 3
Angela Ant brags that she walked around the pool many times and went 360 feet, but she forgot how many times she went around. Help Angela figure out how many laps she did. Show your work below.

Challenge Task
If Annie can walk 3 feet in 1 minute, how many minutes will it take her to get around the pool one time? Explain your answer.
Which Pool Has the Biggest Perimeter?

Directions: Find the distance around the outside edge of each pool below.

Which of the pools above has the biggest perimeter?

Do you think the pool with the biggest perimeter holds the most water? Explain.
Who Built My House?

I wonder who built my house
One side is three inches high
The other side three and a half
I cannot figure out why

One side of my door is one and a half
And the other one and three-fourths
From the ground to the top of each side
Measured in inches of course

I need a ladder to measure my roof
I’m worried that it will be wrong
One side measures _______ inches
The other is ________ inches long
1. Draw a picture of the house described in the poem using a ruler to make your measurements match those in the poem.

2. The length of each side of the roof is not given in the poem. Measure the sides of your roof in inches and write your answers in the blanks in the poem.

3. Explain why it is important for house builders to measure accurately.

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________
Ruler Without a Ruler: ____________________________

**Ruler Without a Ruler**

The line segment in the box is 1 inch long. Use that segment to ESTIMATE the lengths of the other segments. (You may cut the segment out and use it as a ruler to help you.)

<table>
<thead>
<tr>
<th>A.</th>
<th>B.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>C.</td>
<td>G.</td>
</tr>
<tr>
<td></td>
<td>H.</td>
</tr>
<tr>
<td></td>
<td>I.</td>
</tr>
<tr>
<td>D.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>E.</td>
<td></td>
</tr>
</tbody>
</table>

F. ___________________________________________________________________
Master of the Mystery Ruler: ________________________

**The ?-Inch “Ruler”**

*Directions:* Use the strip of paper provided by your teacher to estimate the perimeter of the 10 objects around the room.

- WRITE the name of the object in the table.
- ESTIMATE the perimeter of each object using the strip of paper provided.
- RECORD your estimates in the table.
- DESCRIBE the process your group used to estimate each perimeter.

**MY RULER SIZE IS ________ INCHES.**

<table>
<thead>
<tr>
<th>Object</th>
<th>Perimeter (in.)</th>
<th>Describe the process used to estimate the perimeter of this object.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
That’s Another Dimension!

1. Label the dimensions of each figure in units.
2. Find the perimeter of each figure.

   Perimeter A = ___________________
   Perimeter B = ___________________
   Perimeter C = ___________________
   Perimeter D = ___________________
   Perimeter E = ___________________

3. Draw another figure that has the SAME perimeter as Rectangle A but DIFFERENT dimensions. Label it A also.
4. Repeat step 3 for Rectangles B, C, D, and E. (If you need more graph paper, ask your teacher.)
Directions: Find the perimeter of Figures A, B, C, D, and E. Then find the perimeter of the shape going around all of those figures.

Perimeter A = ________________

Perimeter B = ________________

Perimeter C = ________________

Perimeter D = ________________

Perimeter E = ________________

Outside Perimeter = ________________
Check Up #3

1. Find the perimeter of each figure in the diagram.

![Diagram with figures A, B, C, and D]

Perimeter A = ___________________
Perimeter B = ___________________
Perimeter C = ___________________
Perimeter D = ___________________

2. Draw a line segment each length.

3 inches:
2 1/2 inches:
4 1/4 inches:
A Fair Way to Shade

1. You have been given a grid covered with squares. Without counting one-by-one, figure out how many squares are on the grid.

   How many did you get? __________

   Explain how your group determined the number of squares.

   _____________________________________________________________
   _____________________________________________________________
   _____________________________________________________________
   _____________________________________________________________

2. Each group member will shade a piece of the grid. You must use the following rules for shading.

   ▪ Each group member must choose his or her own color.
   ▪ The group must determine how many squares each person will shade so that everyone has the same number.
   ▪ Each part that you shade must be connected. You MUST be able to shade your whole section without lifting your pencil.

3. How many squares did each student in your group shade?

   Student 1: ______________  Student 2: ______________
   Student 3: ______________  Student 4: ______________
4. Calculate the sum of your answers to #3. Show your work below.

5. What do you notice about the sum you calculated in #4?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
SQUARE GRID: HOW MANY SQUARES?
1. a. Without counting one-by-one, tell how many squares are in this grid.

   ![Grid Image]

   b. Explain how you found the number of squares.

2. If you were playing a game with a friend and each of you had to color the same number of squares to fill the grid, how many would each of you color?

3. If 4 people were playing the game, how many squares would each person color?

4. If 7 people were playing the game, how many squares would each person color?

5. Explain what would happen if 10 people tried to color the same number of squares each.
Area Estimator

To complete this activity you may need: A ruler and calculator.

1 inch = 800 kilometers.
Use this information and a ruler to estimate the perimeter of the 48 contiguous United States in kilometers. You may draw on the map to show your work.

1 square inch = 640,000 square kilometers
Use this information to estimate the area of the 48 contiguous United States in square kilometers.

(A square inch is a square that is one inch on each side.)
(Contiguous means the States are adjacent, or next to, each other.)

How Many Square Units?

Task #1

How many “square units” are in the head and body of this bug?
Task #2

Estimate the area of each figure. Write your answers in "square units."

Figure A: ________________
Figure B: ________________
Figure C: ________________
Figure D: ________________
Figure E: ________________
Figure F: ________________
Area Agreement From the Committees

Directions: In your committee, determine which estimate was highest and which was lowest. Record these estimates. Then, come up with a fair estimate for your group and record this on the “Committee’s Decision” line.

1. Figure A
   High Estimate: ____________________
   Low Estimate: ____________________
   Committee’s Decision: ______________

2. Figure B
   High Estimate: ____________________
   Low Estimate: ____________________
   Committee’s Decision: ______________

3. Figure C
   High Estimate: ____________________
   Low Estimate: ____________________
   Committee’s Decision: ______________
4. Figure D
   High Estimate: __________________
   Low Estimate: __________________
   Committee’s Decision: ____________

5. Figure E
   High Estimate: __________________
   Low Estimate: __________________
   Committee’s Decision: ____________

6. Figure F
   High Estimate: __________________
   Low Estimate: __________________
   Committee’s Decision: ____________

7. Which area was easiest to agree on? Why?

8. Which area was the hardest for your committee to agree on? Why?
A Geometry Scavenger Hunt

Search your school, home, or other locations to find examples of each of the following:

- A right angle
- An obtuse angle
- An acute angle
- A pentagon
- A hexagon
- An octagon
- Something that is between 3 1/2 and 4 1/2 inches long
- Two congruent rectangles
- A pair of congruent figures that are not quadrilaterals
- Something with a perimeter that you might measure in inches
- Something with a perimeter that you might measure in feet
- An object with a circumference
- Student’s choice: Choose your own object related to geometry
- Student’s choice: Choose your own object related to geometry
## Scavenger Hunt Findings

<table>
<thead>
<tr>
<th>OBJECT</th>
<th>Where we found it...</th>
<th>How I know what it is...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right angle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obtuse angle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute angle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pentagon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hexagon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Octagon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Object between 3 1/2 and 4 1/2 inches long</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pair of congruent rectangles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pair of congruent figures (not quadrilaterals)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Something with perimeter in inches</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Something with perimeter in feet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Object with a circumference</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Your choice:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Your choice:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
A Shapely Living Room

You are creating a new room in your house. In this project, you will tile the floor, put trim around the edge, and furnish the room. Follow the directions to create your room.

DAY 1 Materials
- Blueprint of floor (1 per group)
- Small tile sheet (Hypatia level) or Large tile sheet (Pythagoras level)
- 2 different color crayons, markers, or colored pencils
- Inch ruler
- Ribbon or yarn (teacher holds this and cuts to order)
- Glue stick
- Scissors

DAY 2 Materials
- Construction paper
- Scissors
- Glue/Tape
- Inch ruler
- Other materials students bring in to build mini furniture
- Toothpicks or straws

I. Tiling the floor
1. With your group, decide how you will tile the floor using the tiles provided.
2. Use scissors and glue to lay the tile on the floor.
3. Estimate the total number of tiles used.

How many tiles are on your floor? ____________________
Explain how your group worked together to agree on the number of tiles.

4. Color the tiles using 2 different colors.
II. Trimming the room
1. As a group, you must find a way to estimate the perimeter of the room in inches.
2. Once you have an estimate, ask your teacher for border. Tell the teacher how many inches you need to go around your room.
   ✤ Explain the method your group used to find the perimeter.

3. Glue the border around the perimeter of the room.

III. Mini furniture design (Day 2)
1. Create mini furniture to go in your room. Use these directions:
   ✤ Each person in the group must make at least 1 piece of furniture alone. (Once you have finished your own, you can work with somebody else to create more.)
   ✤ The furniture in the room must contain at least 5 different shapes. Decide as a group what shapes will be used.
   ✤ Look at the pictures for ideas but use the ideas of your group also.
The floor of your room: All furniture must be small enough to fit in this room.
Some “Shapely” Furniture Ideas
Complete the table below about the shapes you used in designing your furniture.

<table>
<thead>
<tr>
<th>Name of Shape</th>
<th>Which piece of furniture has that shape?</th>
<th>How do you know it is that shape?</th>
<th>How tall (in inches) is the piece of furniture containing that shape?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Geometry & Measurement for All Shapes & Sizes

Mathematical Language

Acute Angle: An angle that is greater than $0^\circ$ but less than $90^\circ$.

Adjacent: To share a side.

Angle: A figure that is formed by two sides of a polygon with a common endpoint.

Area: Number of square units covering a surface.

Asymmetric: Not symmetric.

Circle: Set of points a fixed distance from a center.

Circumference: Distance around a circle.

Clockwise: A rotation in the same direction that the hands of a clock move.

Congruent Figures: Figures that have the same size and shape.

Congruent Sides: Sides of equal length.

Counter clockwise: A rotation in the opposite direction that the hands of a clock move.

Decagon: A polygon with ten sides.

Denominator: The part of a fraction that is below the line and divides the numerator.

Diagonals of a Polygon: Line segments in a polygon connecting non-consecutive vertices.

Diameter: Line segment passing through the center of a circle and has end points on the circle.

Dimensions: The length and width of a rectangular figure.

Endpoints: The points on a line segment that show where it begins and ends.
Equivalent Fractions: Fractions that are equal, line 1/2 and 2/4.

Estimate: An answer that is as mathematically close to the real answer as possible.

Flip (reflect): To turn over.

Fraction: Part of a group, number, or whole.

Heptagon: A polygon with seven sides.

Hexagon: A polygon with six sides.

Horizontal Line Segment: A line segment drawn in the left-right direction.

Inch: A unit of standard measurement.

Line Segment: Part of a line with two endpoints.

Nonagon: A polygon with nine sides.

Numerator: The part of a fraction that is above the line and is divided by the denominator.

Obtuse Angle: An angle that is greater than 90° but less than 180°.

Octagon: A polygon with eight sides.

Pentagon: A polygon with five sides.

Perimeter: The distance around a figure.

Point: An exact location in space, usually represented by a dot.

Polygon: A closed figure formed by three or more line segments.

Quadrilateral: A polygon with four sides.

Radius: Line segment that starts from the center of a circle to any point on the circle.

Ray: Part of a line with one endpoint that goes on forever in one direction. (The sun’s rays begin at the sun and go on in one direction.)

Rectangle: A quadrilateral with four right angles.
**Regular Polygon:** A polygon with all sides and angles congruent.

**Rhombus:** A quadrilateral with four congruent sides.

**Right Angle:** An angle that is $90^\circ$.

**Sides:** The line segments that make up a polygon.

**Slide (translate):** To move an item in any direction without rotating it.

**Square:** A quadrilateral with four congruent sides and four right angles.

**Square units:** Units used to measure area (two-dimensional).

**Symmetry:** An object is symmetrical when one half is a mirror image of the other half.

**Transform:** To change the position of something.

**Triangle:** A polygon with three sides.

**Triangle Sum Theorem:** The sum of the interior angles of any triangle equals $180^\circ$.

**Turn (rotate):** To rotate around a point.

**Unit:** A standard of measurement.

**Vertex (vertices):** The point where the rays of an angle meet. The point(s) where the sides of a polygon meet.

**Vertical Line Segment:** A line segment drawn in the up-down direction.
Research Team

**University of Connecticut**
Dr. Joseph S. Renzulli, Director
Dr. E. Jean Gubbins, Associate Director
University of Connecticut
2131 Hillside Road Unit 3007
Storrs, CT 06269-3007
860-486-4676

Dr. D. Betsy McCoach

**University of Virginia**
Dr. Carolyn M. Callahan, Associate Director
Curry School of Education
University of Virginia
P.O. Box 400277
Charlottesville, VA 22904-4277
434-924-0791

Dr. Tonya R. Moon
Dr. Kimberly Landrum
Dr. Amy Azano

Series Editor
Dr. E. Jean Gubbins

Production Team
Siamak Vahidi
Shelly E. DeSisto
Jennifer Savino