

# Geometry

Primary Mathematics  
Study of 2D and 3D Figures & Solids  
(Grades 1 & 2)

## LEARNING LOG



<http://www.thisiscolossal.com/wp-content/uploads/2014/02/foster-1.jpg>

Name: \_\_\_\_\_

# Primary Geometry Learning Log

Copyright: Barbara J. Smith  
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This document edition will be used as a pilot resource to support innovative schools. The intent of sharing this first version with students, staff and families, is so we can gather further input for future revisions of this living curriculum. All we ask is that if you use these materials please give credit to the author(s) of this initial work, in your introduction.

**Acknowledgement:** Many thanks to Headwaters Academy for taking part in the initial pilot of this resource.

## **PURPOSE of LEARNING LOG RESOURCE:**

1. To support the Ontario Mathematics Curriculum
2. To support independent and paired study during station work or during home study (holiday or at-home interest/extended homework activities)
3. To add support as an enrichment or remedial resource (students can work at their own pace)
4. To provide a learning log (evidence of learning) built in to student resources

## **What's in each lesson/unit?**

- **Check In** – (screen test/diagnostic quiz – to reduce repeated teaching)
- **Essential Targets (ET)** – state or provincial expectations
- **Examples** (patterns for examining the math)
- **TECH CHECK** (more ways and examples for practicing the math)
- **REAL WORLD Problems** (context for math)
- **Fun and Games** (activities for making memories)
- **Reciprocal Teaching** (talking and demonstrating how to do math 'like a teacher')
- **GOT IT** (learning log/notebook evidence of learning)
- **Habit Check** (checking in on how students are doing the math)
- **Extensions** (students can extend where lesson leads next)
- **Master Quiz** (sample unit quiz)
- **Math Project** (culminating task revealing applied mastery of many ET's)

## The MATH Challenge!

Trailblazer (Expert)	180+ points
Pathfinder (Apprentice)	160-179 - points
Rookie (Novice)	< than 160 points

Challenge	Maximum Points
2D Quiz	30
3D Quiz	30
Perimeter Quiz	50
Grid Quiz	70
Learning Log Challenge (complete tasks in book)	10
Classroom Work	10
<b>TOTAL</b>	<b>200</b>



[http://payload128.cargocollective.com/1/4/143427/4874666/9748\\_geometry\\_primary\\_lsquare\\_fron\\_t\\_980\\_800.jpg](http://payload128.cargocollective.com/1/4/143427/4874666/9748_geometry_primary_lsquare_fron_t_980_800.jpg)

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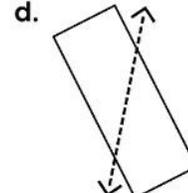
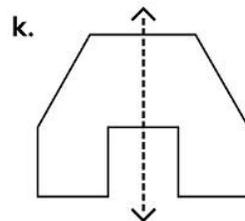
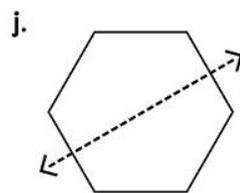
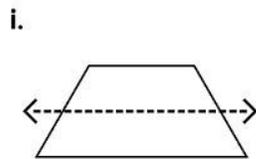
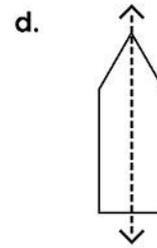
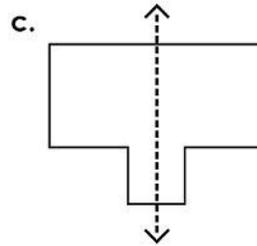
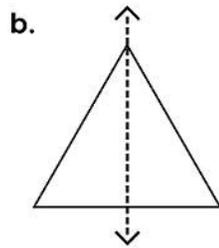
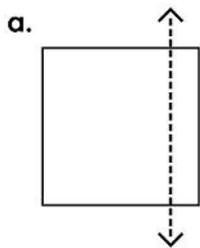
## A. 2D Shapes

**Check-In** (diagnostics)

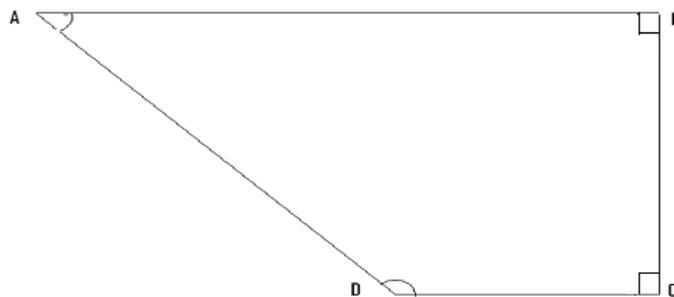
**Maybe you already know all this?**

**Show and tell your teacher what you know!**

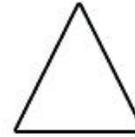
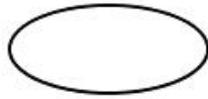
- Circle the images that show a line of symmetry.



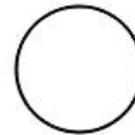
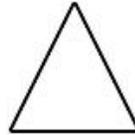
- Label each angle of the trapezoid as 'ACUTE', 'OBTUSE', or 'RIGHT'.



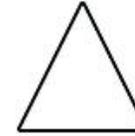
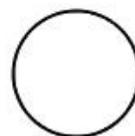
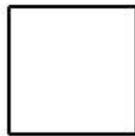
1. Color in a square.



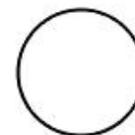
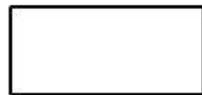
2. Color in triangle.



3. Color in a circle.



4. Color in a rectangle.



Draw a hexagon:

Explain why a square is a parallelogram, but a parallelogram is not a square to your teacher. <teacher will record>

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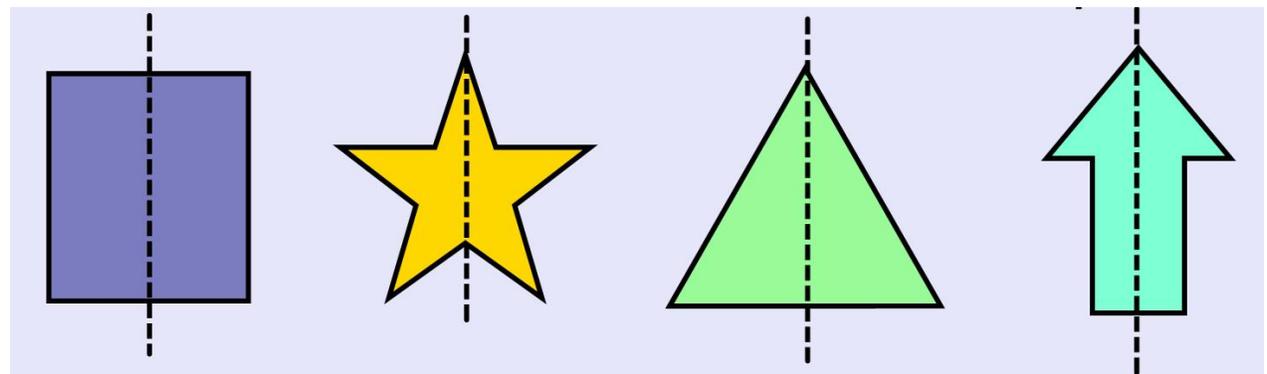
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Essential Target (ET) - Measure lines of symmetry in 2D figures using centimeters (cm).

## 1. Symmetry

**RULE:** The line of symmetry divides a shape or figure in equal halves (1/2's).

### EXAMPLES:



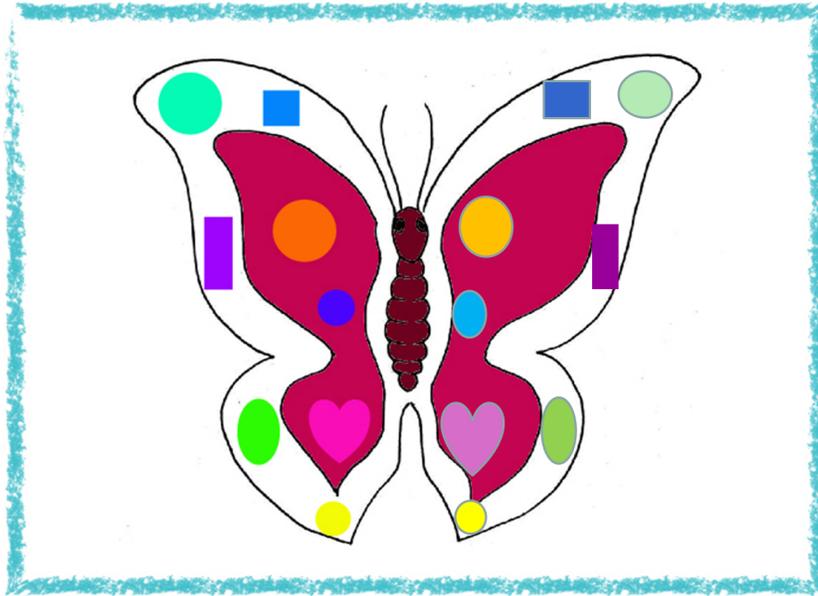
<http://www.jamesvilledewitt.org/tfiles/folder1123/symmetry.JPG>

- Fold a piece paper exactly in half - and explain to your teacher why the fold line is the line of symmetry.
- Create symmetrical designs using Lego to show symmetry.

### FUN & GAMES:

- Locate shapes in the environment that have symmetry, and describe the symmetry.

- Where would you draw the line of symmetry in the butterfly?
- Explain why you would not draw it horizontally.



<http://www.edubuzz.org/st-marys/wp-content/blogs.dir/731/files/2012/05/Ethan-and-Ava.png>

- Fold a piece of paper in 4 parts.
- Create and describe symmetrical designs you make that match on opposite corners, like this picture.



[http://1.bp.blogspot.com/-4rWSyzRAtNg/UUxft6uIN7I/AAAAAAAAAXg/2VIUQ5UbgQc/s1600/IMG\\_1687.JPG](http://1.bp.blogspot.com/-4rWSyzRAtNg/UUxft6uIN7I/AAAAAAAAAXg/2VIUQ5UbgQc/s1600/IMG_1687.JPG)

- Talk about how a mirror helps you design symmetrical shapes.

## RECIPROCAL TEACHING:

1. Explain what symmetry means and show a friend, math buddy, or parent an example of how to make add a symmetry line to an image.
2. Use scrap paper.
3. Have your friend or family member change places and replay what you taught.

## GOT IT!

Symmetry in Real-life

Sheet 1

Draw a line of symmetry on each one.  
(Some pictures may have more than one line of symmetry.)

1)



2)



3)



4)



5)



6)



7)



8)



<https://www.mathworksheets4kids.com/symmetry/real-life-large.png>

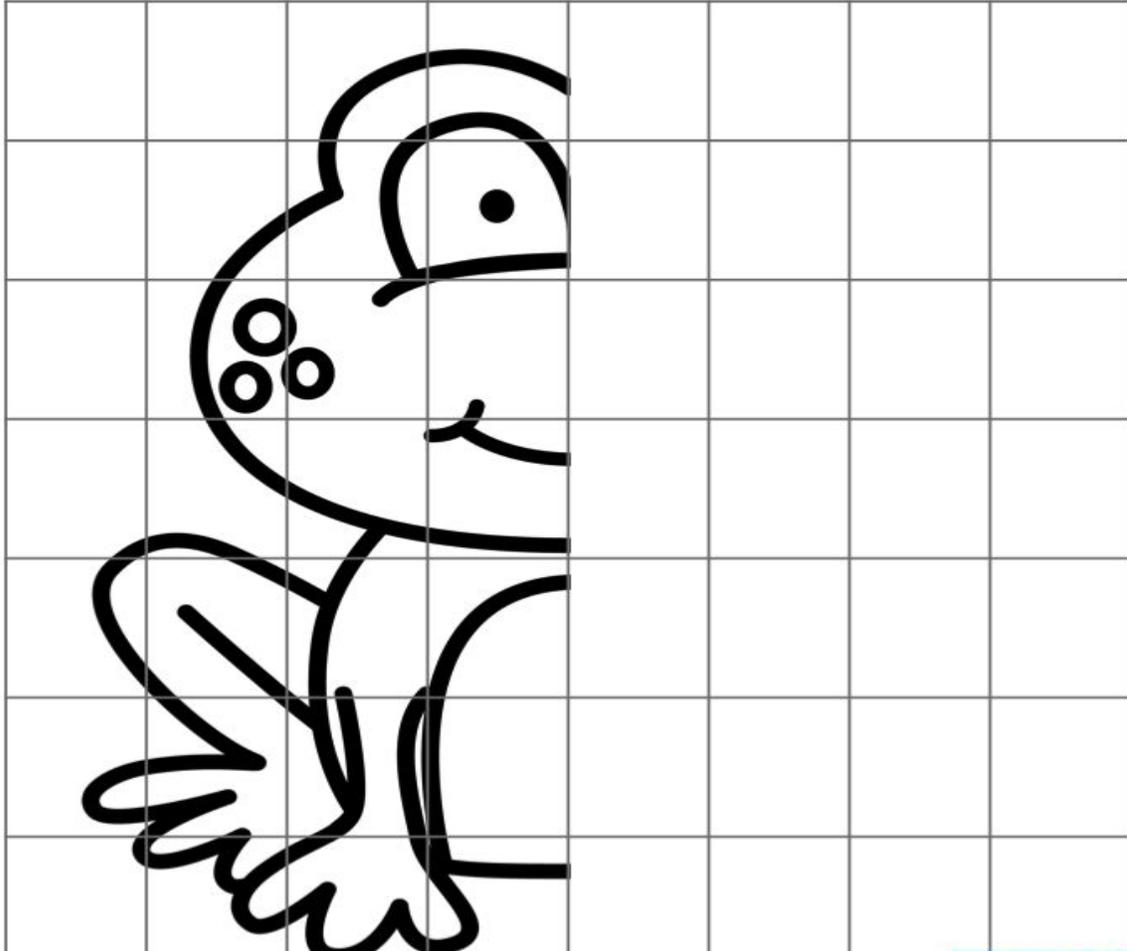
How well did I complete the symmetry tasks?	Like a Trailblazer (expert)	Like a Pathfinder (apprentice)	Like a rookie (need more help & practice)

**Extension:**

- Try to complete the picture of the frog to show symmetry.

## Symmetry

Directions: Use the grid lines to help you mirror the image of the frog.



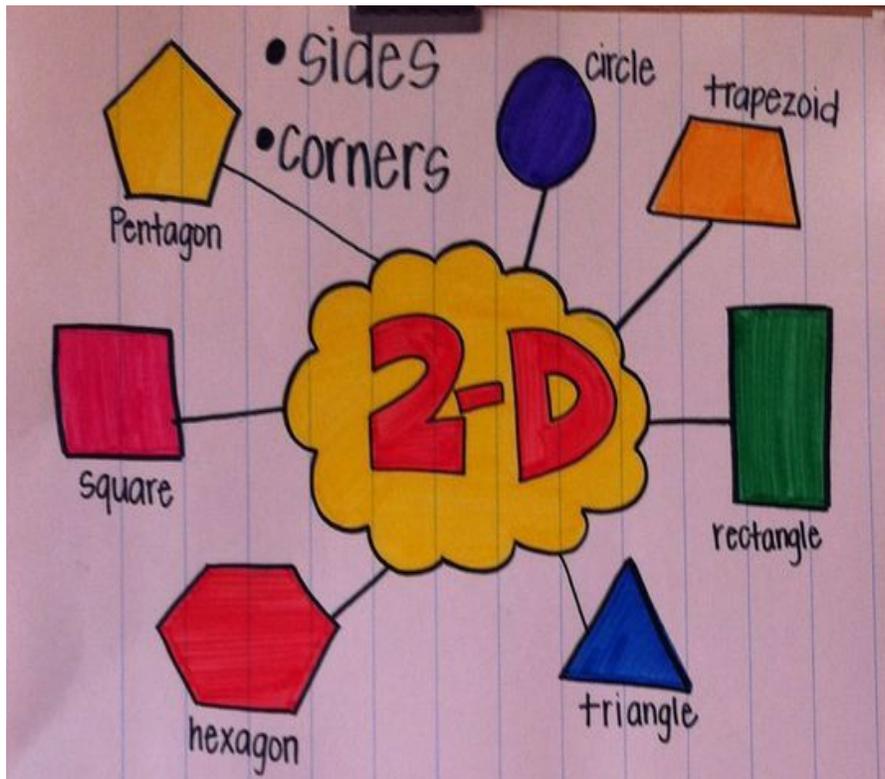
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ET - Trace & identify sides of 2D shapes.

## 2. What are 2D Shapes?

**RULE:** Different shapes have different numbers of sides and different lengths of sides.

### EXAMPLES:

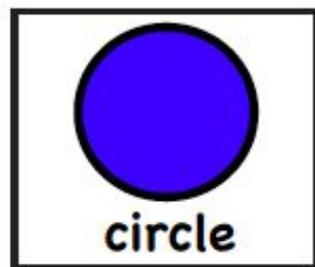


<https://s-media-cache-ak0.pinimg.com/736x/88/de/a9/88dea9b44b58af36e80379f5f51249a3--shoulder-bags-d-shapes-kindergarten.jpg>

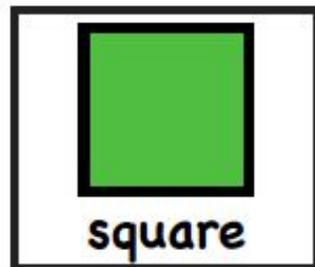
- Sort through images of different shapes and place them into piles.
- Explain what each pile means to your teacher.

## FUN & GAMES: "I am" Game

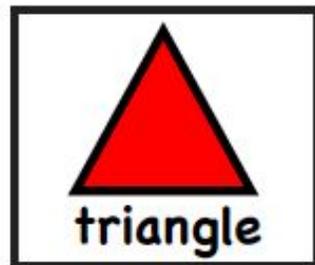
- Without looking at the picture, listen to your partner or teacher read the "I am" clues.
- Then say what shape you think is being described.
- Play the game until you can say them all!



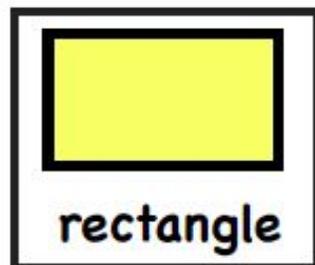
I have 1 side.  
My side is curved.  
I have no corners.



I have 4 sides.  
My sides are all  
the same size.  
I have 4 corners.



I have 3 sides.  
My sides are  
straight.  
I have 3 corners.



I have 4 sides.  
My opposite sides  
are equal.  
I have 4 corners.

<https://s-media-cache-ak0.pinimg.com/736x/defd/a4/defda46a9ddfbbd15c162d893e9b2ddb.jpg>

## TECH CHECK:

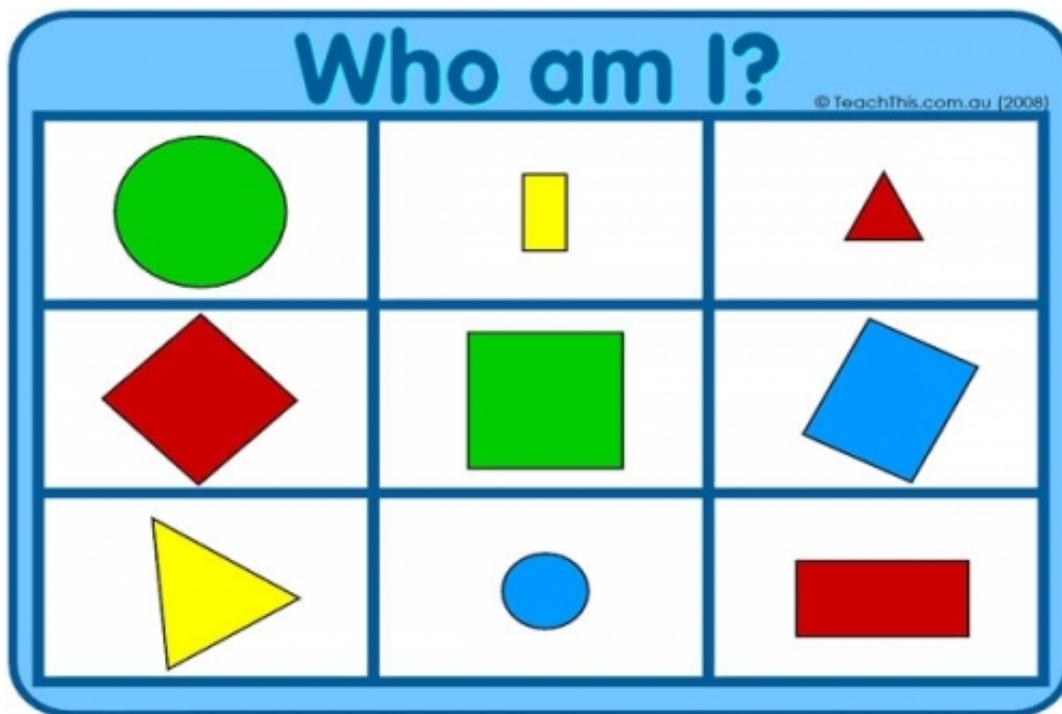
- <https://www.youtube.com/watch?v=svrkthG2950>
- <https://www.youtube.com/watch?v=kkqxqILLu2Y>
- <https://www.youtube.com/watch?v=E6qWBhEiP6g>
- <https://www.youtube.com/watch?v=mrG33P1lwdI>
- <https://www.youtube.com/watch?v=24Uv8CI5hvl>

## RECIPROCAL TEACHING:

1. Like a "teacher" explain and show a friend, math buddy, or parent the differences between different 2D shapes.
2. Use scrap paper.
3. Have your friend or family member change places and replay what you taught.

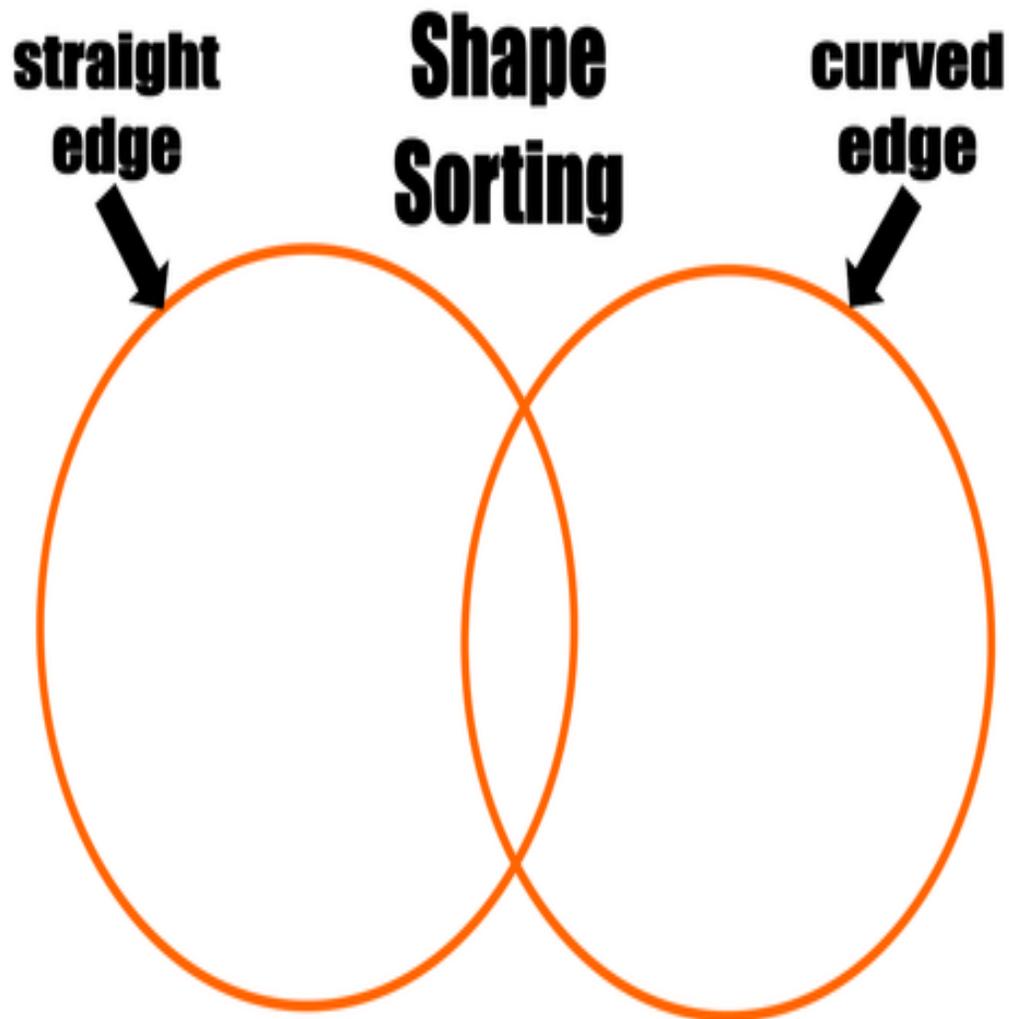
## GOT IT!

- Trace each shape and tell your teacher each name.



[http://questgarden.com/150/55/5/121112021553/images/2dshapes\\_t.jpg](http://questgarden.com/150/55/5/121112021553/images/2dshapes_t.jpg)

- Draw pictures of shapes that have straight or curved edges inside the two circles.

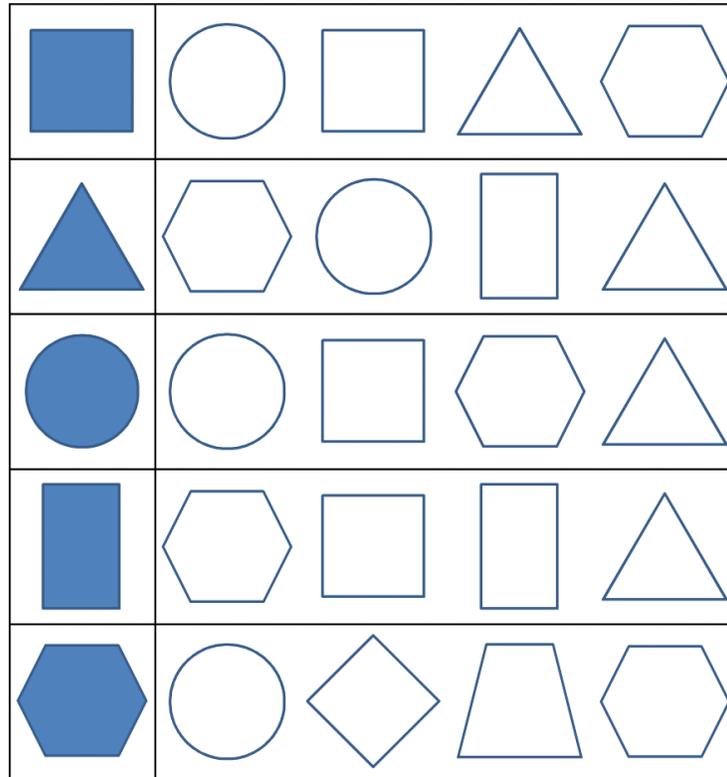


<https://dryuc24b85zbr.cloudfront.net/tes/resources/6142149/image?width=500&height=500&version=1390049890000>

- Can you draw a shape with both straight and curved edges?

• Complete the following task:

Shade the shape that matches the first one in each row.



<http://www.math-salamanders.com/image-files/free-printable-geometry-worksheets-match-the-shapes-1.gif>

How well did you trace and identify sides of 2D shapes?	Like a Trailblazer (expert)	Like a Pathfinder (apprentice)	Like a rookie (need more help & practice)

**Extension:**

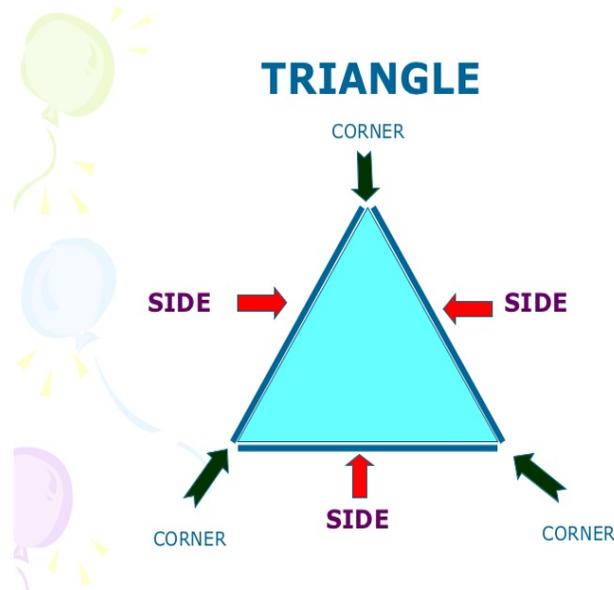
\*Identify parallel lines in other 2D shapes

ET - Make different kinds of triangles.

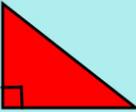
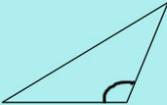
### 3. Types of Triangles

**RULE:** Triangles have different names if you look at the lengths of their sides and size of their angles.

**EXAMPLES:**



<https://image.slidesharecdn.com/lesson1-111207205140-phpapp02/95/2d-shape-6-728.jpg?cb=1323292360>

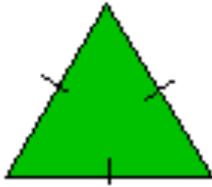
Classify by the measure of their angles		
Right Triangle		A triangle with a right angle
Acute Triangle		A triangle with 3 acute angles
Obtuse Triangle		A triangle with 1 obtuse angle

[http://terramar5thgrade.weebly.com/uploads/4/6/4/3/4643042/3245942\\_orig.jpg?0](http://terramar5thgrade.weebly.com/uploads/4/6/4/3/4643042/3245942_orig.jpg?0)

## BY SIDE

## BY ANGLE

Equilateral Triangle



-has three equal sides

Acute Triangle



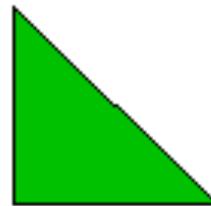
-three angles  $< 90$  degrees

Isosceles Triangle



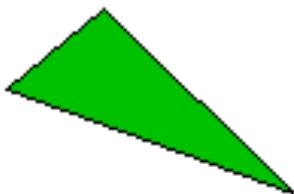
-has two equal sides

Right Triangle



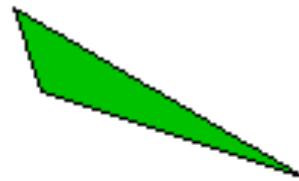
-has one right angle

Scalene Triangle



-has no equal sides

Obtuse Triangle



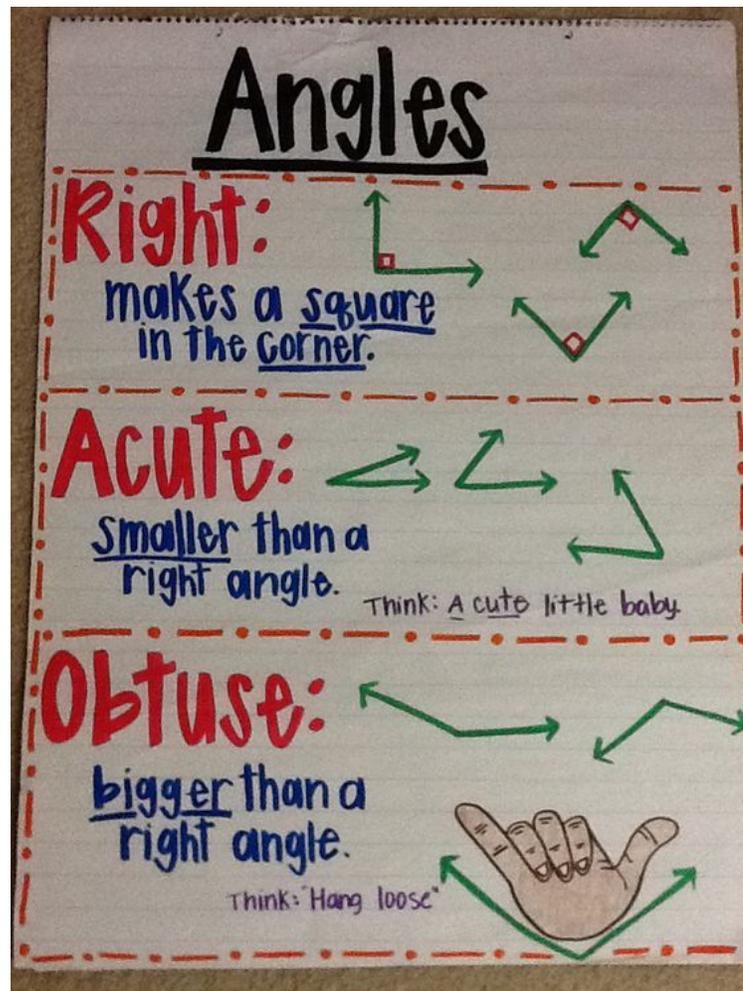
-has one angle  $> 90$  degrees

[http://piper3nc.weebly.com/uploads/2/8/9/6/2896100/5645436\\_orig.gif](http://piper3nc.weebly.com/uploads/2/8/9/6/2896100/5645436_orig.gif)

### Fun & GAMES: Going on a Triangle Hunt

- Look for examples of different kinds of triangles.
- Draw them, or take a picture to share with your classmates.

- Make different angles inside triangles with popsicle sticks.
- Use the words 'right', 'acute' and 'obtuse' to explain to your teacher what angles you think are inside your triangles.



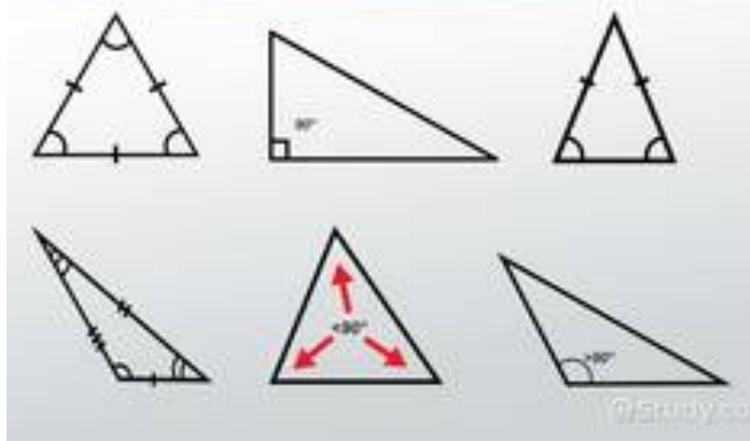
<https://s-media-cache-ak0.pinimg.com/564x/30/bc/fe/30bcfeaa6531fc593e26e54d4827ab39.jpg>

### RECIPROCAL TEACHING:

1. Like a "teacher" explain and show a friend, math buddy, or parent the differences between triangles and angles.
2. Use scrap paper.
3. Have your friend or family member change places and replay what you taught.

**GOT IT:**

- Tell your teacher the name of each triangle and the name .... of each angle.



- Draw 3 different kinds of triangles:

How well did you make different kinds of triangles?	Like a Trailblazer (expert)	Like a Pathfinder (apprentice)	Like a rookie (need more help & practice)

**Extension:**

- Compare and sort triangles, quadrilaterals, pentagons, hexagons, heptagons, octagons by their number of sides, side lengths, number of interior angles, and number of right angles.

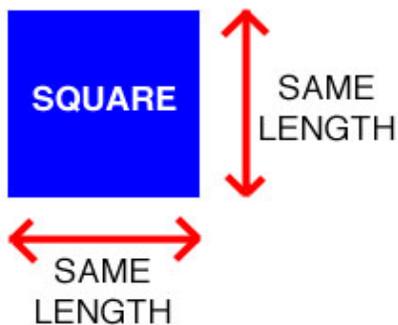
ET - Describe the difference between squares & rectangles.

#### 4. Rectangles and Squares

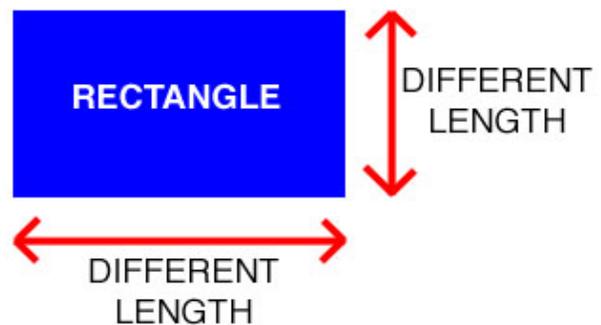
**RULE:** Squares have 4 equal sides and angles; Rectangles have equal angles and 2 pairs of equal sides.

#### EXAMPLES:

All four sides of a square are the same length.



A rectangle is like a stretched square.

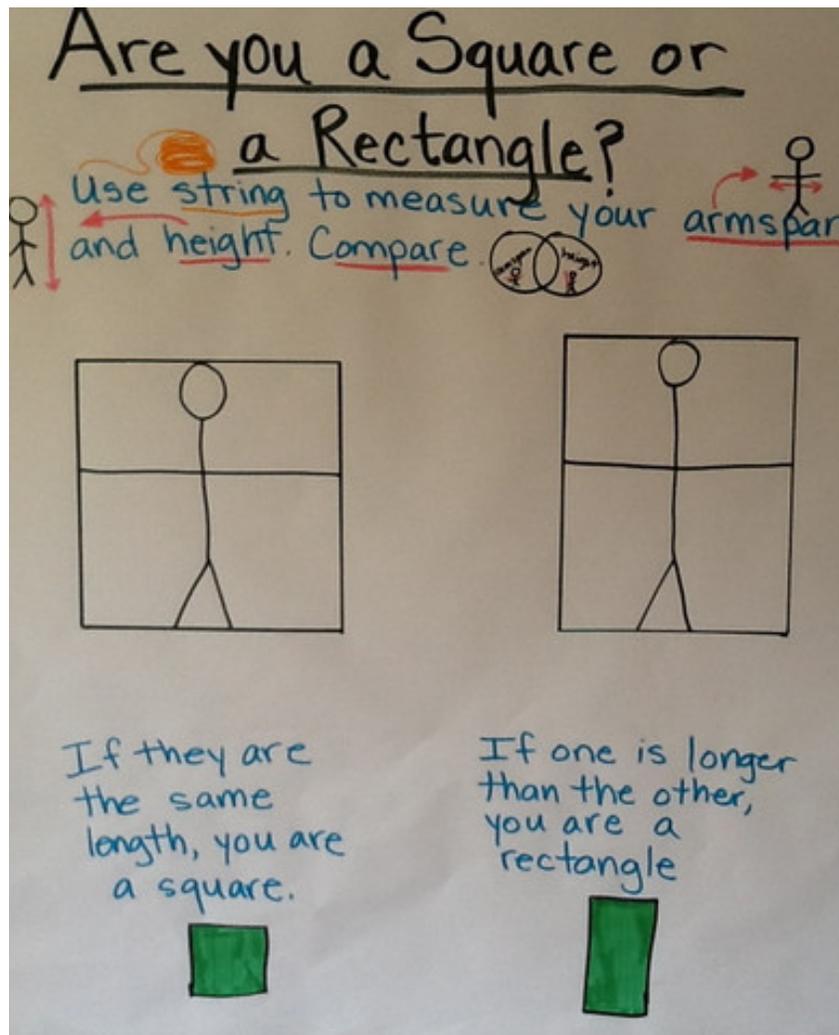


<http://www.rogersconnection.com/triangles/images/SquareAndRectangle.jpg>

- Talk about things in the classroom that are shaped like rectangles and squares.
- How can you check to make sure they are squares or rectangles?
- Can something that looks like a square be a rectangle? Check it out.

## FUN & GAMES:

- Let's use string to measure our arm span and body length to see if we are a square or a rectangle.



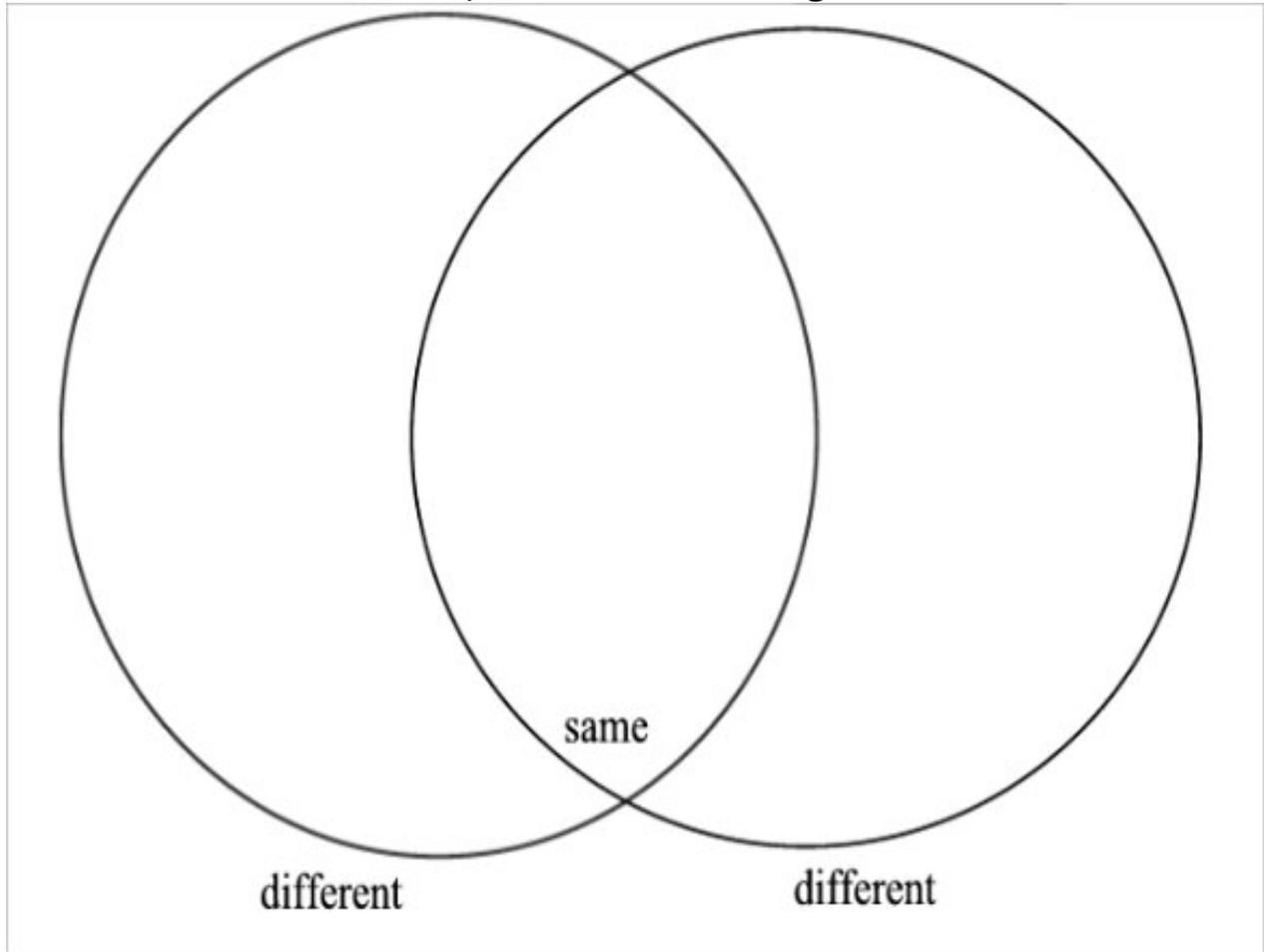
<https://s-media-cache-ak0.pinimg.com/originals/6c/83/57/6c83574030803c21fdaae304e50d5fc5.jpg>

## RECIPROCAL TEACHING:

1. Like a "teacher" explain and show a friend, math buddy, or parent the differences between squares and rectangles.
2. Have your friend or family member change places and replay what you taught.

## GOT IT!

- Use the Venn diagram to compare what is the same and different between squares and rectangles.



How well did you describe the difference between square and rectangles?	Like a Trailblazer (expert)	Like a Pathfinder (apprentice)	Like a rookie (need more help & practice)

### Extension:

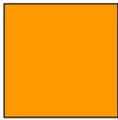
- Explain how a square is a rectangle because a square has four sides and four right angles.
- Explain how a rhombus is a parallelogram because opposite sides of a rhombus are parallel.

ET - Identify & classify 2D shapes using sides, points (up to 8-sided figure).

## 5. Sides and Points in Shapes

**RULE:** The number of sides and points (corners) can help you classify a shape.

### EXAMPLES:

I have 4 sides	I have 4 corners	I am a square	
I have 3 sides	I have 3 corners	I am a triangle	
I have 5 sides	I have 5 corners	I am a pentagon	
I have 6 sides	I have 6 corners	I am a hexagon	
I have 8 sides	I have 8 corners	I am an octagon	
I have infinite sides	I have no corners	I am a circle	

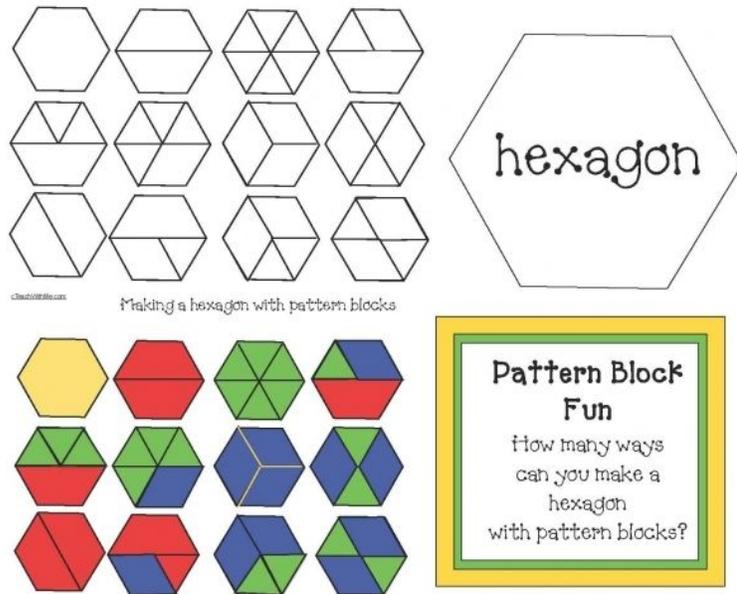
<http://misscampbell.global2.vic.edu.au/files/2016/07/119907688-21u4u0e.png>

You can join points or corners to make more shapes inside shapes.

- Say the word "hexagon".
- Look at the different ways you can join points on a hexagon.

- Talk about this image of a hexagon with your teacher. Make different shapes and join the corners with lines to see how many different shapes you can design.

<https://s-media-cache->

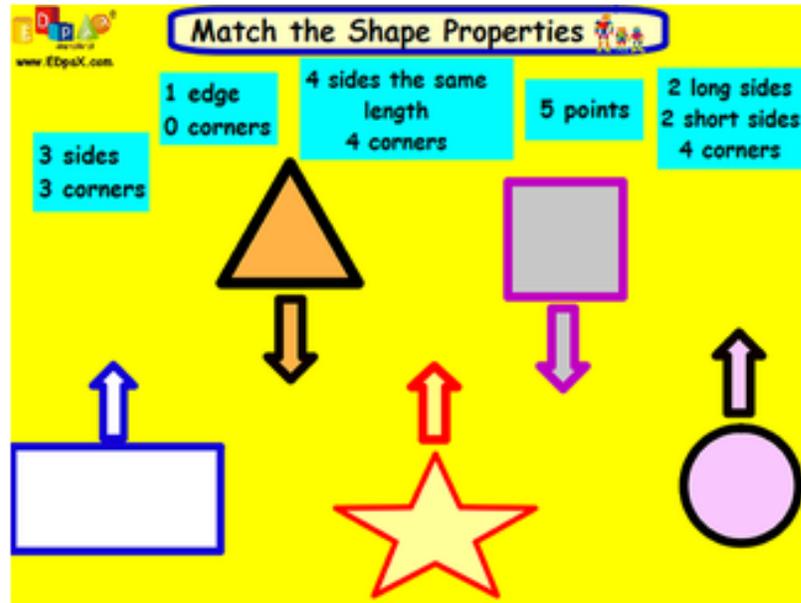


[ak0.pinimg.com/736x/41/53/71/415371f4e7c0ebc16710854af6f8b8b0--number-patterns-card-patterns.jpg](https://ak0.pinimg.com/736x/41/53/71/415371f4e7c0ebc16710854af6f8b8b0--number-patterns-card-patterns.jpg)

## RECIPROCAL TEACHING:

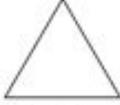
1. Like a "teacher" explain and show a friend, math buddy, or parent how to identify and classify shapes using sides and points.
2. Use scrap paper.
3. Have your friend or family member change places and replay what you taught.

GOT IT!



[http://www.edpax.com/media/managed/large/2dshape\\_grade1\\_3.png](http://www.edpax.com/media/managed/large/2dshape_grade1_3.png)

- Circle the number of sides in each shape below.

circle  1   0   2	square  2   3   4	triangle  3   1   2
rectangle  4   2   5	diamond  2   5   4	oval  0   1   2
pentagon  6   5   4	hexagon  9   8   6	star  8   10   6

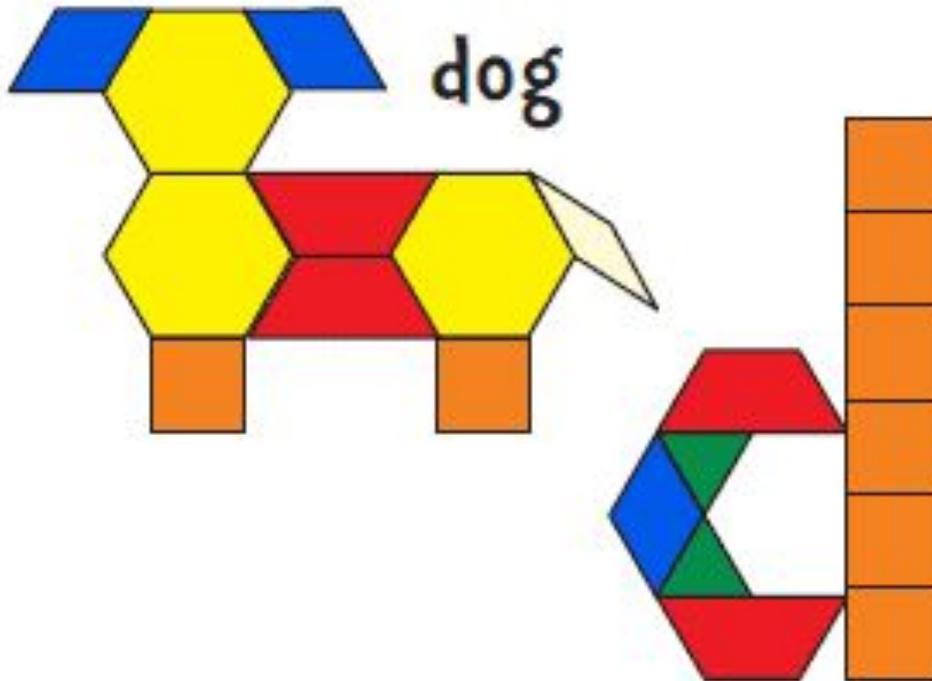
How well did you identify & classify 2D shapes using sides and points (to 8-sided figure)?	Like a Trailblazer (expert)	Like a Pathfinder (apprentice)	Like a rookie (need more help & practice)

## 6. Patterns from Shapes

**RULE:** Shapes are used every day to make many patterns. The tangram is a collection of shapes that can make many shapes.

### EXAMPLES:

- Look at the tangram of the dog below.

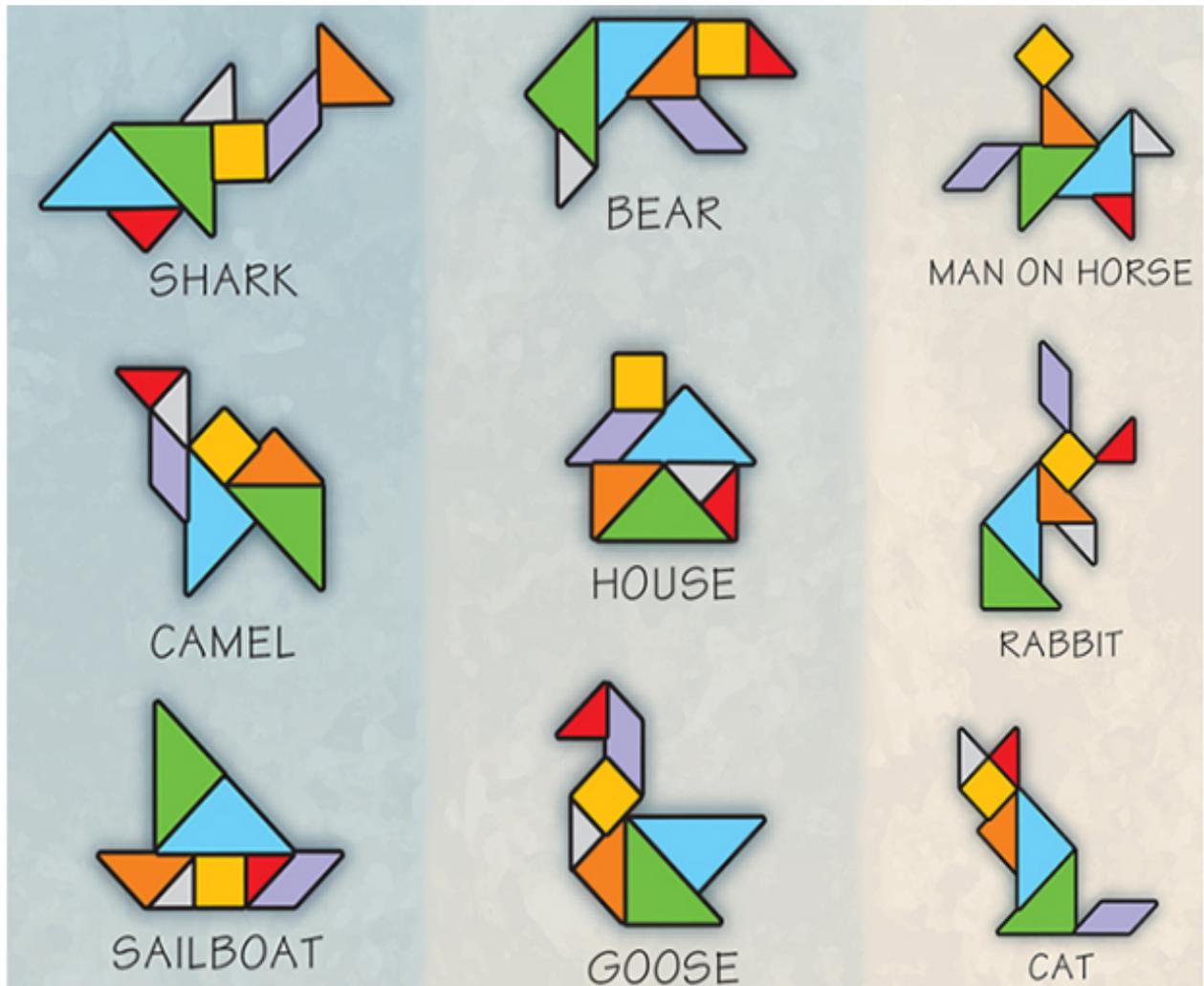


<https://s-media-cache-ak0.pinimg.com/736x/4c/8f/8e/4c8f8ebeca76e3b1649306246d3005dc.jpg>

### FUN & GAMES:

- Make your own images using a tangram.
- Explain how you combined different shapes.

- Now try to make some of these pictures:



<https://boyslifeorg.files.wordpress.com/2015/11/tangram-4.jpg?w=620&h=465>

- Try and make a rectangle from two triangles?
- Can you make a rectangle with two triangles that are different sizes?

# GOT IT!

- Make your own geometric village:



[http://www.gocruisers.org/GalleryImages/20161216111216757\\_image.jpg](http://www.gocruisers.org/GalleryImages/20161216111216757_image.jpg)

How well did I complete the tasks?	Like a Trailblazer (expert)	Like a Pathfinder (apprentice)	Like a Rookie (not yet, need more help)

## B. 3D Figures

### Check-In (diagnostics)

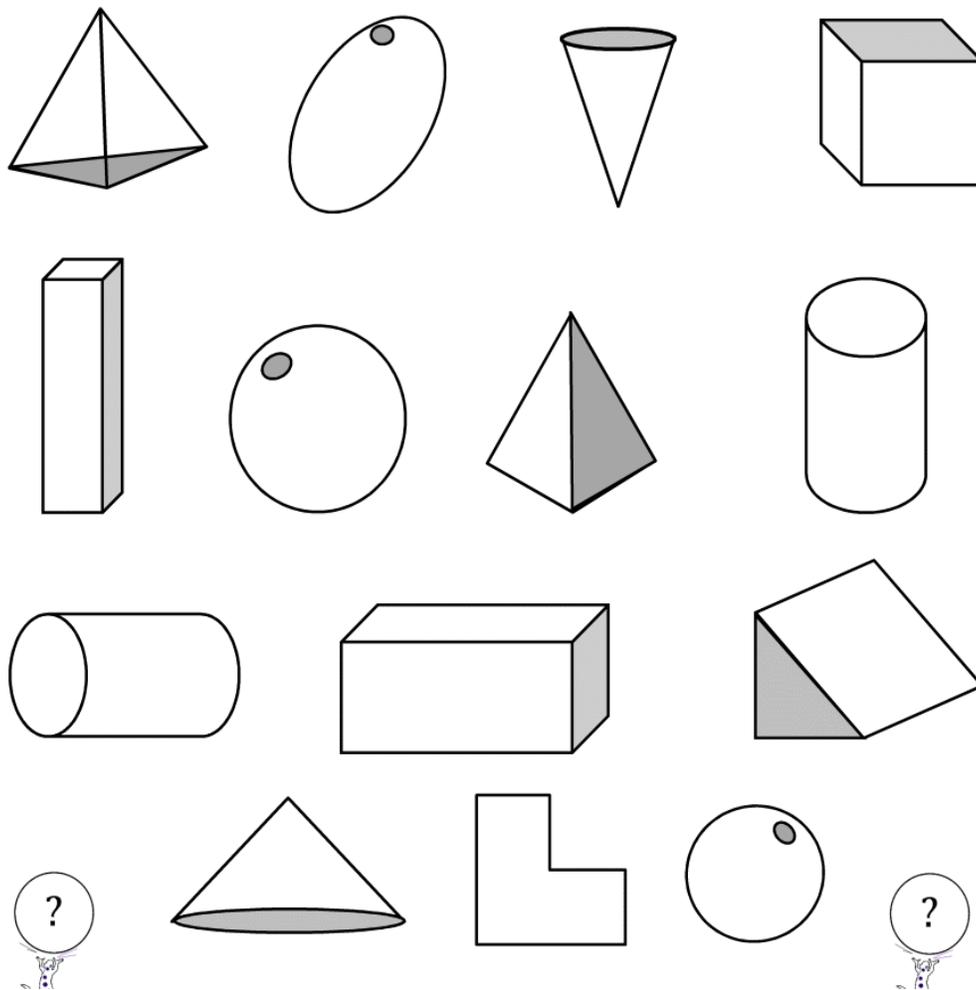
Maybe you already know all this?

Show your teacher what you know!

Shade in the 3d shapes as follows:

prisms - yellow, spheres - blue, cones - red, pyramids - green.

Remember - cubes and cuboids are types of prisms!

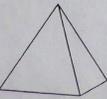


ET - Trace & identify sides and faces of 3D objects.

## 7. What makes a 3D Figure?

**RULE:** 3D figures can have at least one face that is a 2D shape. Faces are flat and help an object to slide or stack.

**EXAMPLE:**

<u>Figure</u>	<u>Slide</u>	<u>Stack</u>	<u>Roll</u>
cube 	yes	yes	no
sphere 	no	no	yes
cone 	yes	no	yes
cylinder 	yes	yes	yes
prism 	yes	yes	no
pyramid 	yes	no	no

<http://1.bp.blogspot.com/->

[WMcOq7YvmCE/TbWom1EiQwI/AAAAAAAAAEkk/0XYDBDPnNXM/s1600/P1130251.JPG](http://1.bp.blogspot.com/-WMcOq7YvmCE/TbWom1EiQwI/AAAAAAAAAEkk/0XYDBDPnNXM/s1600/P1130251.JPG)

### TECH CHECK:

- <https://www.youtube.com/watch?v=AcSUQlxJKjY>
- [https://www.youtube.com/watch?v=BPrVAT\\_x1f4](https://www.youtube.com/watch?v=BPrVAT_x1f4)

## RECIPROCAL TEACHING:

1. Like a teacher, explain and show a friend, math buddy, or parent how to identify sides and faces of 3D objects.
2. Have your friend or family member change places and replay what you taught.

## GOT IT:

# 3D SHAPES

Will It Roll?	Will It Slide?	Will It Stack?
 😊 😞	 😊 😞	 😊 😞
 😊 😞	 😊 😞	 😊 😞
 😊 😞	 😊 😞	 😊 😞
 😊 😞	 😊 😞	 😊 😞

<https://s-media-cache-ak0.pinimg.com/originals/ce/20/52/ce20525b2508520f06b54ac056143a32.jpg>

- Trace and identify the two-dimensional faces of 3D figures.
- Tell your teacher what faces you see in the objects.
- Sort cubes, prisms and pyramids and explain why you put them in different groups.

<b>How well did you trace and identify 3D objects?</b>	Like a Trailblazer (expert)	Like a Pathfinder (apprentice)	Like a rookie (need more help & practice)

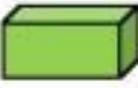
ET - Identify & classify 3D figures.

## 8. Different Kinds of 3D Solids

**RULE:** 3D Objects can be classified (grouped) based on faces, corners and whether they can stack or roll.

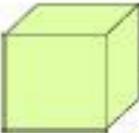
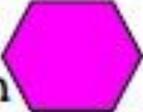
**EXAMPLE:**

### 3-Dimensional Geometric Shapes

Name	We See...	It looks like a....
 Cone	<ul style="list-style-type: none"><li>. Circle Base</li><li>. A Point</li><li>. Curve to connect</li></ul>	
 Cube	<ul style="list-style-type: none"><li>. 6 square faces</li><li>. 8 vertices (corners)</li></ul>	
 Cylinder	<ul style="list-style-type: none"><li>. 2 circle bases</li><li>. Big curve wrapped around</li></ul>	
 Sphere	<ul style="list-style-type: none"><li>. No flat areas</li><li>. A ball</li></ul>	
 Pyramid	<ul style="list-style-type: none"><li>. 4 square base</li><li>. 4 triangle faces</li></ul>	
 Rectangular Prism	<ul style="list-style-type: none"><li>. 2 square faces</li><li>. 4 rectangle faces</li></ul>	

<https://s-media-cache-ak0.pinimg.com/736x/14/bd/92/14bd92ab5e1d5acc6c8cacb7b865649a.jpg>

- Match the 2D shapes with the 3D shapes.

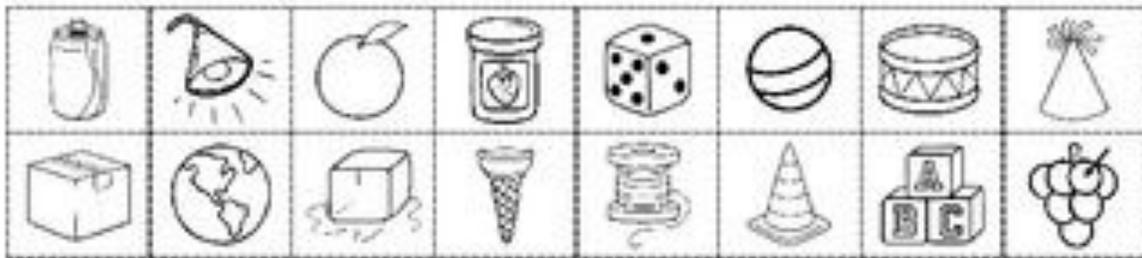
2-D Shapes	3-D Shapes
 circle	 cylinder
rectangle 	 cube
square 	 sphere
 trapezoid	 cone
triangle 	 triangular prism
hexagon 	 rectangular prism
 quarter circle	
 half-circle	 rectangular prism

<https://s-media-cache-ak0.pinimg.com/736x/53/28/7d/53287d689c104c0007925bd8e4566e8a.jpg>

## FUN & GAMES:

Directions: Sort and paste each 3-D shape below.

 SPHERE	 CYLINDER	 CUBE	 CONE



<https://s-media-cache-ak0.pinimg.com/736x/50/aa/4f/50aa4f5ff4685e9fd18138e415ec2e8c--d-shapes-names-d-shapes-song.jpg>

## RECIPROCAL TEACHING:

1. Like a "teacher" explain and show a friend, math buddy, or parent how to identify 3D solids.
2. Have your friend or family member change places and replay what you taught.

## TECH CHECK:

- <https://www.starfall.com/h/geometry/>
- <https://www.youtube.com/watch?v=2cg-Uc556-Q>
- <https://www.youtube.com/watch?v=ZnZYK83utu0>
- <https://www.nctm.org/Classroom-Resources/Illuminations/Interactives/Geometric-Solids/>
- <https://www.themeasuredmom.com/free-3d-shape-games/>

# GOT IT!

- Complete the following.

A) Choose the correct name of each shape.

1)  <input type="checkbox"/> Rectangular prism <input type="checkbox"/> Cylinder <input type="checkbox"/> Cone	2)  <input type="checkbox"/> Pyramid <input type="checkbox"/> Sphere <input type="checkbox"/> Cone
3)  <input type="checkbox"/> Cube <input type="checkbox"/> Rectangular prism <input type="checkbox"/> Cylinder	4)  <input type="checkbox"/> Cylinder <input type="checkbox"/> Sphere <input type="checkbox"/> Cube
5)  <input type="checkbox"/> Rectangular prism <input type="checkbox"/> Cylinder <input type="checkbox"/> Pyramid	6)  <input type="checkbox"/> Cube <input type="checkbox"/> Rectangular prism <input type="checkbox"/> Cone

B) Choose the correct choice that best describes each object.

1)  <input type="checkbox"/> Pyramid <input type="checkbox"/> Cylinder <input type="checkbox"/> Cone	2)  <input type="checkbox"/> Sphere <input type="checkbox"/> Cube <input type="checkbox"/> Cylinder
3)  <input type="checkbox"/> Rectangular prism <input type="checkbox"/> Cube <input type="checkbox"/> Pyramid	4)  <input type="checkbox"/> Cone <input type="checkbox"/> Rectangular prism <input type="checkbox"/> Cube
5)  <input type="checkbox"/> Cone <input type="checkbox"/> Cylinder <input type="checkbox"/> Sphere	6)  <input type="checkbox"/> Pyramid <input type="checkbox"/> Rectangular prism <input type="checkbox"/> Cone

<https://www.mathworksheets4kids.com/solid-shapes/multiple-choice-large.png>

How well did you identify & classify 3D figures?	Like a Trailblazer (expert)	Like a Pathfinder (apprentice)	Like a rookie (need more help & practice)

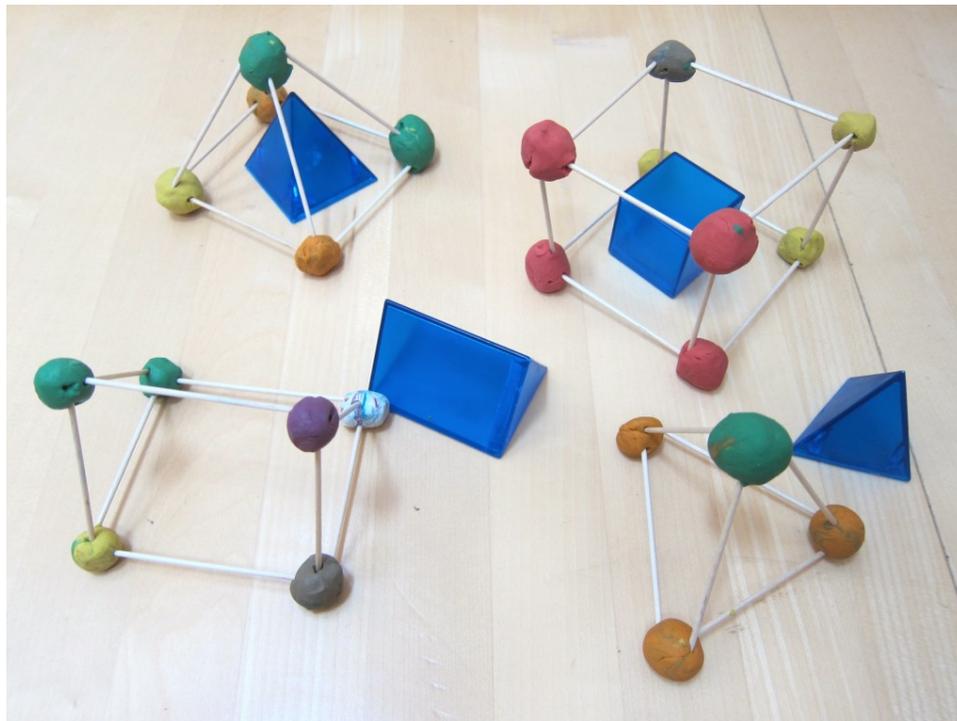
## Extension:

- \* Identify objects using edges, sides & corners of 3D objects.
- Compare and sort prisms and pyramids by shape of faces, number of edges, number of vertices.
- Make rectangular prisms and describe the number and shape of faces, edges, and vertices.
- Describe and name prisms and pyramids by the shape of their base (e.g., rectangular prism, square-based pyramid).

## 9. Making 3D Models

**RULE:** Many 3D figures are used in the design of many structures.

### EXAMPLES:



[https://2.bp.blogspot.com/--j3c2ERN0R0/V0wUcGzd7wI/AAAAAAAAABBY/BrghDTeGVBlEPOzt34PnYicbKelpqqbqACLcB/s1600/IMG\\_34511-1024x768.jpg](https://2.bp.blogspot.com/--j3c2ERN0R0/V0wUcGzd7wI/AAAAAAAAABBY/BrghDTeGVBlEPOzt34PnYicbKelpqqbqACLcB/s1600/IMG_34511-1024x768.jpg)

### GOT IT!

- Make these shapes and more using modelling clay and toothpicks or straws.
- Talk about the number of faces and edges in each object.

- What figures can you find in Canada's Parliament building?



## Canada's Parliament

printed with permission granted by the office of the Prime Minister <http://www.pm.gc.ca/>

- Build a model School Parliament building with different kinds of objects.

### Extension:

- Describe the 2D shapes that can be found in a three-dimensional figure.
- Build a structure from blocks, toothpicks, or other concrete materials, and describe it using geometric terms, so that your partner will be able to build your structure without seeing it.

## C. Measuring 2D Shapes & 3D Figures

### Check-In (diagnostics)

...

- Show your teacher how you measure the perimeter of a table top, computer screen or book.

## 10. Perimeter Around a Shape

**RULE:** The perimeter around a shape is the distance around it. You can use a rope or string around an object that may not have straight edges or flat surfaces to measure the perimeter.

### EXAMPLE:

**Perimeter**

The **perimeter** is the total distance around the outside of a 2D shape.



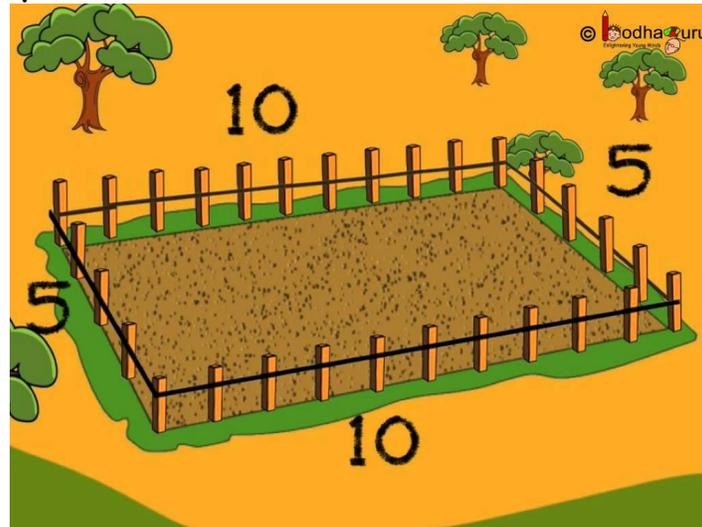
You calculate the perimeter of a 2D shape by adding together all the lengths of the shape.

© 2012, Teacher's Pet www.tpet.co.uk

[http://class4408.weebly.com/uploads/2/3/7/5/23752179/6945528\\_orig.jpg](http://class4408.weebly.com/uploads/2/3/7/5/23752179/6945528_orig.jpg)

## REAL WORLD PROBLEM:

- This picture shows a fence around a garden. If each post is a meter apart, how many meters of fence is needed to replace the perimeter with new a new fence.



<https://i.ytimg.com/vi/Tx4q2KbXxH4/maxresdefault.jpg>

## FUN & GAMES:

- Find something outside that you can use to trace on grid paper.
- Estimate the distance around your object.

I predict the perimeter of the object will be about \_\_\_\_\_cm.

- Places a string around the picture you traced.
- Then place the string on a meter stick or measuring tape to see the perimeter around your object.

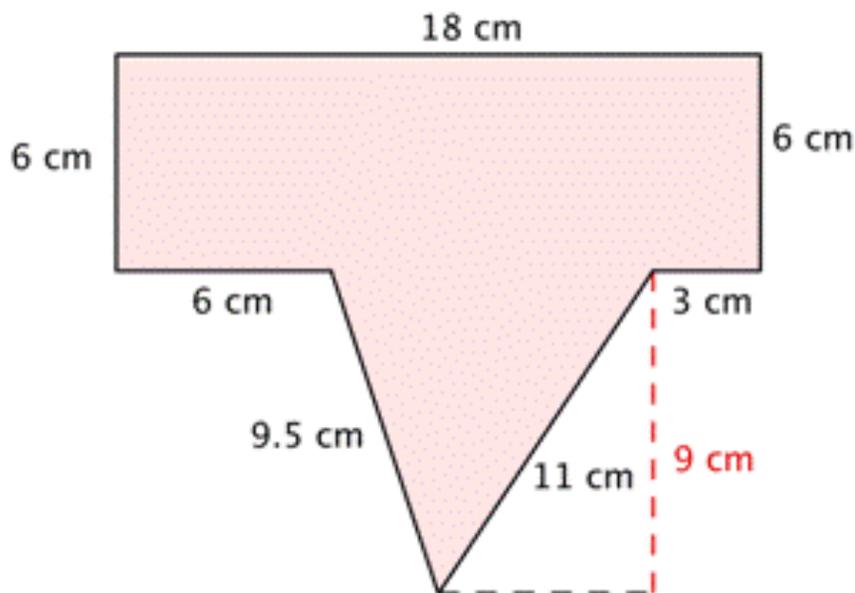


## RECIPROCAL TEACHING:

1. Like a "teacher", explain and show a friend, math buddy, or parent how to find the perimeter.
2. Use scrap paper.
3. Have your friend or family member change places and replay what you taught.

## GOT IT!

- Then add up the distance around it to find the perimeter:



[https://www.montereyinstitute.org/courses/DevelopmentalMath/TEXTGROUP-1-8\\_RESOURCE/U07\\_L2\\_T2\\_text\\_final\\_3\\_files/image025.gif](https://www.montereyinstitute.org/courses/DevelopmentalMath/TEXTGROUP-1-8_RESOURCE/U07_L2_T2_text_final_3_files/image025.gif)

The perimeter of this miniature building is \_\_\_\_\_ cm.

How well did you find the perimeter of a polygon?	Like a Trailblazer (expert)	Like a Pathfinder (apprentice)	Like a rookie (need more help & practice)

## 11. Measuring Spaces Inside Figures and Solids

**RULE:** You can fill a 2D figure with smaller figures to find out how much space is inside.

- Cover a table with index cards in more than one way to see how many index cards are the size of the space inside a 2D shape.
- If you change how you lay out the cards, does it change the number of cards needed to fill the space?
- Which would you think you need more of to cover the table - hexagon shapes or triangle shapes?

• **RULE:** You can fill an object with smaller objects to find out how much space is inside.

- Find out the number of cubes you will need to fill a box of cereal or other container:

<https://s-media-cache->



[ak0.pinimg.com/originals/65/43/fb/6543fb77ec598e2d3fa6f0090998248d.jpg](https://s-media-cache-ak0.pinimg.com/originals/65/43/fb/6543fb77ec598e2d3fa6f0090998248d.jpg)

How well did complete the tasks?	Like a Trailblazer (expert)	Like a Pathfinder (apprentice)	Like a rookie (need more help & practice)

**Extension:**

\*Find area using length & width, & compare area to perimeter.

- Solve problems requiring the greatest or least number of 2D shapes needed to compose a larger shape, in a variety of ways.
- Compose a hexagon using different numbers of smaller shapes.

## D. Navigation Masters

### 12. Direction Words

**RULE:** To find a location you need to use words carefully to give people precise information.

#### EXAMPLES:

- Look at this picture of a fitness course.



[http://buckscountyrunning.com/yahoo\\_site\\_admin/assets/images/obstacle\\_course.275184733\\_large.jpg](http://buckscountyrunning.com/yahoo_site_admin/assets/images/obstacle_course.275184733_large.jpg)

- Use these words to describe what actions you would take using the equipment.

over	below	inside	between
under	in front of	outside	along
above	behind	beside	up

## FUN & GAMES:

- Set up a small barefoot walk obstacle course outside for your partner to go through blindfolded.
- See if s/he can feel figure out how to get from the start to the end with your good instructions.
- Ask the blindfolded partner to talk about what it felt like under his/her feet.



<http://woodlandsprites.co.uk/wp-content/uploads/2014/11/Barefoot.jpg>

- Create a map of the classroom using smaller objects to represent the classroom objects.
- Talk about where objects are in the classroom (right, left, beside, two steps to the right of...)

### 13. Locating Treasures and Other Cool Things

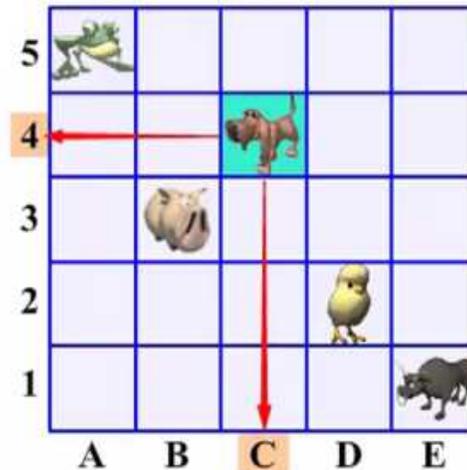
**RULE:** A grid marks the location of pairs of items. A grid location is marked by letters and numbers, or numbers and numbers (A,2) or (1,2).

#### GRID CO-ORDINATES

*Example*

Write the co-ordinates of the following creatures:

(a) the dog **C4**



<https://i.ytimg.com/vi/6mm77KbD2hc/hqdefault.jpg>

The location of the:

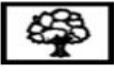
- (a) bird is (D2)
- (b) pig is (B3)
- (c) bull is (E1)
- (d) frog is (A5)

# GOT IT!

- Complete the following

## Map Skills: Location on a Grid

Direction: Use the map and key to complete the grid and answer the questions.

<b>5</b>					
<b>4</b>					
<b>3</b>					
<b>2</b>					
<b>1</b>					
	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>

<b>KEY</b>	
tree.....	
ice cream...	
park bench...	
play area...	
trash can...	
fountain...	
bridge...	

Name the location of each item on the map:

<b>play area: B4, E2</b>	<b>ice cream:</b>
<b>trash can:</b>	<b>fountain:</b>
<b>park bench:</b>	<b>tree:</b>

Add the following items to the map key by drawing a picture and labeling them. Draw the items anywhere on the map and name the location.

<b>restroom:</b>	<b>bike trail:</b>
<b>cotton candy:</b>	<b>balloons:</b>



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<https://s-media-cache-ak0.pinimg.com/736x/b2/af/02/b2af02f1f3459a4a86a0ad09fd3f6604--grid-map-activities-grade-three.jpg>

### Extension:

- Describe movement from one location to another using a grid map (i.e., to get from the swings to the sandbox, move three squares to the right and two squares down).
- Identify congruent 2D shapes by manipulating and matching concrete materials (e.g., by translating, reflecting, or rotating pattern blocks).
- Identify flips, slides, and turns, through investigation using concrete materials and physical motion, and name flips, slides, and turns as reflections, translations, and rotations (e.g., a slide to the right is a translation; a turn is a rotation).

# BIG THINK

**Date:** \_\_\_\_\_

*Dear Math Teacher,*

*I have completed my first year of Primary Geometry.*

*Did I make any mistakes? \_\_\_\_\_*

*Did I learn from making mistakes? \_\_\_\_\_*

*I am proudest about the work I did on page \_\_\_\_ because....*

*I think the trickiest part of this Math was....*

*because....*

*I enjoyed working (with others or on my own) because....*

Yours in mathematics,

\_\_\_\_\_ (name)



### Your Math Learning Log:

\_\_\_ You used a ruler to underline steps.

\_\_\_ You did rough work in spaces easy to find.

\_\_\_ You did work that was neat and easy to read.

\_\_\_ You tried using the examples as patterns.

\_\_\_ You drew at least three pictures of "doing math" in your learning journal.

<b>Classroom Work</b>	
Worked well on task with other students during paired or group activity	
Worked on own without disruption	
Helped others when needed	
Contributed well to classroom discussions	
Opted to do optional activities	
<b>TOTAL (up to 10 points)</b>	

## Appendix A: Ontario Ministry of Education and Training Expectations

1C.1.1 identify and describe common two-dimensional shapes (e.g., circles, triangles, rectangles, squares) and sort and classify them by their attributes (e.g., colour; size; texture; number of sides), using concrete materials and pictorial representations (e.g., "I put all the triangles in one group. Some are long and skinny, and some are short and fat, but they all have three sides.")

1C.1.2 trace and identify the two-dimensional faces of three-dimensional figures, using concrete models (e.g., "I can see squares on the cube.")

1C.1.3 identify and describe common three-dimensional figures (e.g., cubes, cones, cylinders, spheres, rectangular prisms) and sort and classify them by their attributes (e.g., colour; size; texture; number and shape of faces), using concrete materials and pictorial representations (e.g., "I put the cones and the cylinders in the same group because they all have circles on them.")

1C.1.4 describe similarities and differences between an everyday object and a three-dimensional figure (e.g., "A water bottle looks like a cylinder, except the bottle gets thinner at the top.")

1C.1.5 locate shapes in the environment that have symmetry, and describe the symmetry.

1C.2.1 compose patterns, pictures, and designs, using common two-dimensional shapes (Sample problem: Create a picture of a flower using pattern blocks.)

1C.2.2 identify and describe shapes within other shapes (e.g., shapes within a geometric design)

1C.2.3 build three-dimensional structures using concrete materials, and describe the two-dimensional shapes the structures contain; – cover outline puzzles with two-dimensional shapes (e.g., pattern blocks, tangrams) (Sample problem: Fill in the outline of a boat with tangram pieces.)

1C.3.1 describe the relative locations of objects or people using positional language (e.g., over, under, above, below, in front of, behind, inside, outside, beside, between, along); \* For the purposes of student learning in Grade 1, "attributes" refers to the various characteristics of two-dimensional shapes and three-dimensional figures, including geometric properties. (See glossary entries for "attribute" and "property (geometric)".) Students learn to distinguish attributes that are geometric properties from attributes that are not geometric properties in Grade 2.

1C.3.2 describe the relative locations of objects on concrete maps created in the classroom (Sample problem: Work with your group to create a map of the classroom in the sand table, using smaller objects to represent the classroom objects. Describe where the teacher's desk and the bookshelves are located.)

1C.3.3 create symmetrical designs and pictures, using concrete materials (e.g., pattern blocks, connecting cubes, paper for folding), and describe the relative locations of the parts.

2B.1.5 estimate, measure, and record the distance around objects, using non-standard units (Sample problem: Measure around several different doll beds using string, to see which bed is the longest around.)

2B.1.6 estimate, measure, and record area, through investigation using a variety of non-standard units (e.g., determine the number of yellow pattern blocks it takes to cover an outlined shape) (Sample problem: Cover your desk with index cards in more than one way. See if the number of index cards needed stays the same each time.)

2B.2.1 describe, through investigation, the relationship between the size of a unit of area and the number of units needed to cover a surface (Sample problem: Compare the numbers of hexagon pattern blocks and triangle pattern blocks needed to cover the same book.)

2C.1.1 distinguish between the attributes of an object that are geometric properties (e.g., number of sides, number of faces) and the attributes that are not geometric properties (e.g., colour, size, texture), using a variety of tools (e.g., attribute blocks, geometric solids, connecting cubes)

2C.1.2 identify and describe various polygons (i.e., triangles, quadrilaterals, pentagons, hexagons, heptagons, octagons) and sort and classify them by their geometric properties (i.e., number of sides or number of vertices), using concrete materials and pictorial representations (e.g., "I put all the figures with five or more vertices in one group, and all the figures with fewer than five vertices in another group.")

2C.1.3 identify and describe various three-dimensional figures (i.e., cubes, prisms, pyramids) and sort and classify them by their geometric properties (i.e., number and shape of faces), using concrete materials (e.g., "I separated the figures that have square faces from the ones that don't.")

2C.1.4 create models and skeletons of prisms and pyramids, using concrete materials (e.g., cardboard; straws and modelling clay), and describe their geometric properties (i.e., number and shape of faces, number of edges)

2C.1.5 locate the line of symmetry in a two-dimensional shape (e.g., by paper folding; by using a Mira).

2C.2.1 compose and describe pictures, designs, and patterns by combining two-dimensional shapes (e.g., "I made a picture of a flower from one hexagon and six equilateral triangles.")

2C.2.2 compose and decompose two-dimensional shapes (Sample problem: Use Power Polygons to show if you can compose a rectangle from two triangles of different sizes.)

2C.2.3 cover an outline puzzle with two dimensional shapes in more than one way;

2C.2.4 build a structure using three-dimensional figures, and describe the two-dimensional shapes and three-dimensional figures in the structure (e.g., "I used a box that looks like a triangular prism to build the roof of my house.").

2C.3.1 describe the relative locations (e.g., beside, two steps to the right of) and the movements of objects on a map (e.g., "The path shows that he walked around the desk, down the aisle, and over to the window.")

2C.3.2 draw simple maps of familiar settings, and describe the relative locations of objects on the maps (Sample problem: Draw a map of the classroom, showing the locations of the different pieces of furniture.)

2C.3.3 create and describe symmetrical designs using a variety of tools (e.g., pattern blocks, tangrams, paper and pencil).

**Extension:**

**3C. GEOMETRY AND SPATIAL SENSE**

3C.1.1 use a reference tool (e.g., paper corner, pattern block, carpenter's square) to identify right angles and to describe angles as greater than, equal to, or less than a right angle (Sample problem: Which pattern blocks have angles bigger than a right angle?)

3C.1.2 identify and compare various polygons (i.e., triangles, quadrilaterals, pentagons, hexagons, heptagons, octagons) and sort them by their geometric properties (i.e., number of sides; side lengths; number of interior angles; number of right angles)

3C.1.3 compare various angles, using concrete materials and pictorial representations, and describe angles as bigger than, smaller than, or about the same as other angles (e.g., "Two of the angles on the red pattern block are bigger than all the angles on the green pattern block.")

3C.1.4 compare and sort prisms and pyramids by geometric properties (i.e., number and shape of faces, number of edges, number of vertices), using concrete materials;

3C.1.5 construct rectangular prisms (e.g., using given paper nets; using Polydrons), and describe geometric properties (i.e., number and shape of faces, number of edges, number of vertices) of the prisms.

3C.2.1 solve problems requiring the greatest or least number of two-dimensional shapes (e.g., pattern blocks) needed to compose a larger shape in a variety of ways (e.g., to cover an outline puzzle) (Sample problem: Compose a hexagon using different numbers of smaller shapes.)

3C.2.2 explain the relationships between different types of quadrilaterals (e.g., a square is a rectangle because a square has four sides and four right angles; a rhombus is a parallelogram because opposite sides of a rhombus are parallel)

3C.2.3 identify and describe the two-dimensional shapes that can be found in a three-dimensional figure (Sample problem: Build a structure from blocks, toothpicks, or other concrete materials, and describe it using geometric terms, so that your partner will be able to build your structure without seeing it.)

3C.2.4 describe and name prisms and pyramids by the shape of their base (e.g., rectangular prism, square-based pyramid)

3C.2.5 identify congruent two-dimensional shapes by manipulating and matching concrete materials (e.g., by translating, reflecting, or rotating pattern blocks).

3C.3.1 describe movement from one location to another using a grid map (e.g., to get from the swings to the sandbox, move three squares to the right and two squares down)

3C.3.2 identify flips, slides, and turns, through investigation using concrete materials and physical motion, and name flips, slides, and turns as reflections, translations, and rotations (e.g., a slide to the right is a translation; a turn is a rotation)

3C.3.3 complete and describe designs and pictures of images that have a vertical, horizontal, or diagonal line of symmetry (Sample problem: Draw the missing portion of the given butterfly on grid paper.).

## **Appendix B:**

### **Alberta Education Mathematics Expectations**

#### **Grade 1**

MA1C.1 Demonstrate an understanding of measurement as a process of comparing by:

- identifying attributes that can be compared
- ordering objects
- making statements of comparison
- filling, covering or matching.

MA1C.2. Sort 3-D objects and 2-D shapes, using one attribute, and explain the sorting rule.

MA1C.3. Replicate composite 2-D shapes and 3-D objects.

MA1C.4. Compare 2-D shapes to parts of 3-D objects in the environment.

#### **Grade 2**

MA2C.5. Demonstrate that changing the orientation of an object does not alter the measurements of its attributes.

MA2C.6. Sort 2-D shapes and 3-D objects, using two attributes, and explain the sorting rule.

MA2C.7. Describe, compare and construct 3-D objects, including:

- cubes
- spheres
- cones
- cylinders
- pyramids.

MA2C.8. Describe, compare and construct 2-D shapes, including:

- triangles
- squares
- rectangles
- circles.

MA2C.9. Identify 2-D shapes as parts of 3-D objects in the environment.

## Appendix C: Headwaters Connections to US Common Core State Standards

### Grade 1

MCC1.G.A.1 - Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); build and draw shapes to possess defining attributes.

MCC1.MD.A.2 Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps

MCC1.G.A.1 Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); build and draw shapes to possess defining attributes

MCC1.G.A.2 Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape

### Grade 2

MCC2.MD.A.2 Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen

MCC2.G.A.1 Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces.<sup>1</sup> Identify triangles, quadrilaterals, pentagons, hexagons, and cubes

MCC2.G.A.1 Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces.<sup>1</sup> Identify triangles, quadrilaterals, pentagons, hexagons, and cubes



