Geometry

April 6, 2023

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Say hello.

Share something from our sessions that you have used in your teaching this year.

Grades K-2

November 2022

Early Numeracy

- Counting principles
- Connecting number
- Comparison of numbers
- Addition and subtraction concepts

January 2023

Addition and Subtraction

- Addition computation
- Subtraction computation
- Addition and subtraction fluency
- Addition and subtraction word problems

March 2023

Place value and money

- Understanding tens and ones
- Representing thousands, hundreds, tens, and ones
- Money

April 2023

Geometry

- Identification of shapes
- Composing and decomposing shapes

Grades 3-5

November 2022

Operations

- Addition and subtraction concepts
- Multiplication and division concepts
- Computation with addition, subtraction, multiplication, and division

January 2023

Fractions

- Length, area, and set models
- Comparison of fractions
- Ordering of fractions
- Computation of fractions

March 2023

Word-Problem Solving

- Attack strategies
- Schemas

April 2023

Geometry

- Understanding two-dimensional shapes
- Lines and angles
- Understanding three-dimensional shapes

Two-dimensional shapes:
Identification of shapes

Two-dimensional shapes:
Composing and decomposing shapes

Lines and angles

Three-dimensional shapes

Instructional Platform

Geometry

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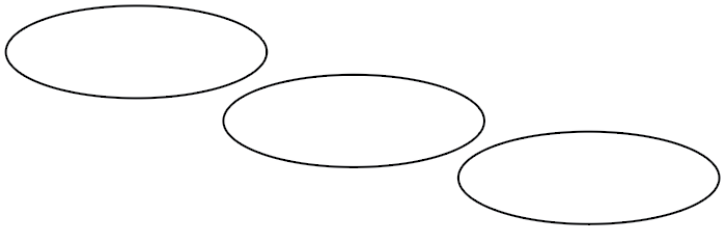
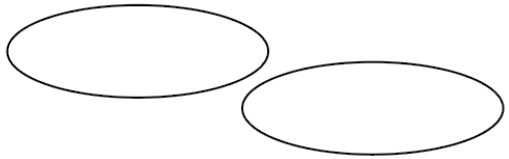
Instructional Platform

Instructional Delivery



Instructional Strategies



Instructional Platform

INSTRUCTIONAL DELIVERY

- Explicit instruction
- Precise language
- Multiple representations

INSTRUCTIONAL STRATEGIES

- Fluency building
- Problem solving instruction

MODELING

Step-by-step explanation

Planned examples

PRACTICE

Guided practice

Independent practice

SUPPORTS

Ask high-level and low-level questions

Eliciting frequent responses

Providing affirmative and corrective feedback

What is math content you have modeled in the last month?

MODELING

Step-by-step explanation

Planned examples

PRACTICE

Guided practice

Independent practice

SUPPORTS

Ask high-level and low-level questions

Eliciting frequent responses

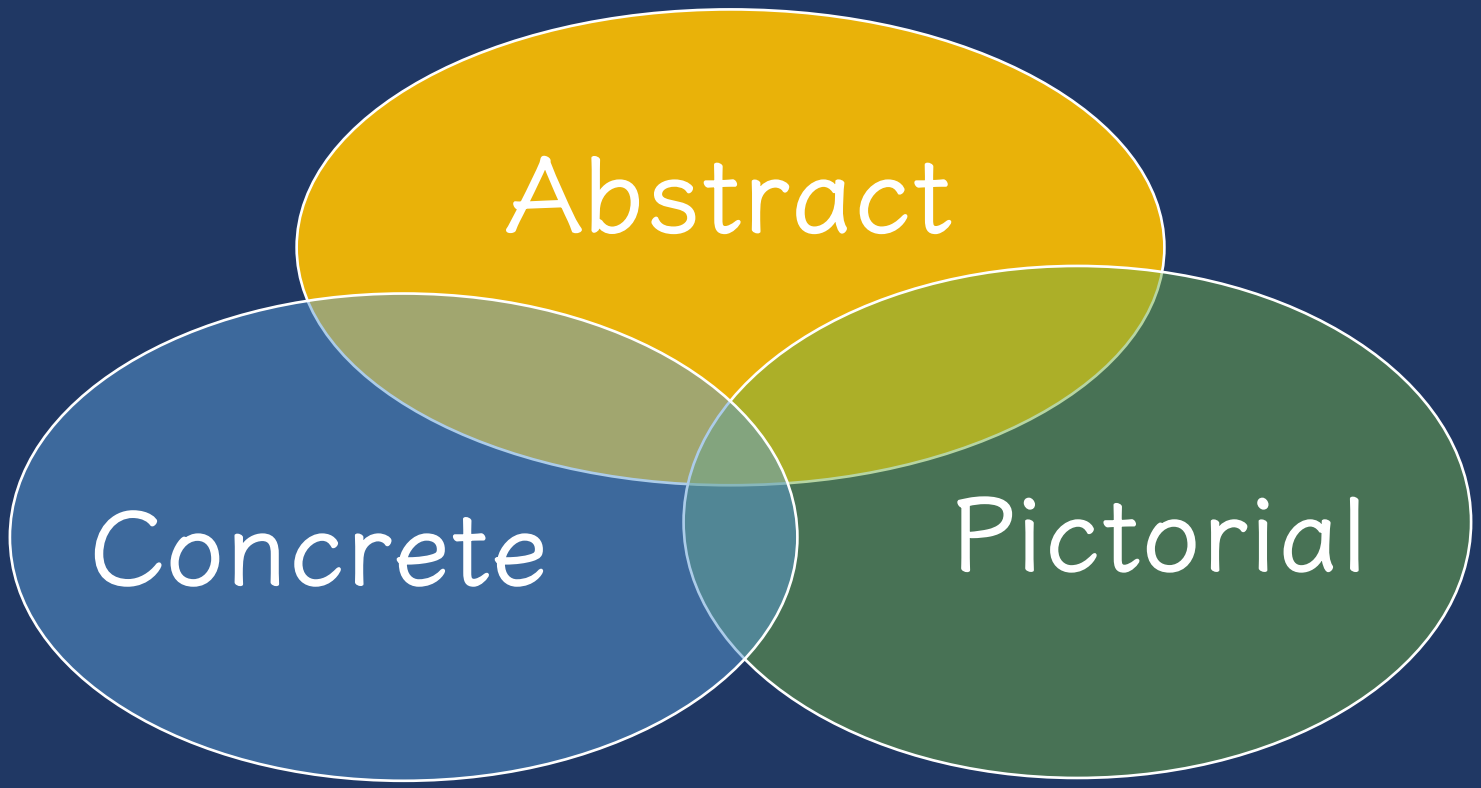
Providing affirmative and corrective feedback

What supports are most important for your students during modeling and practice?

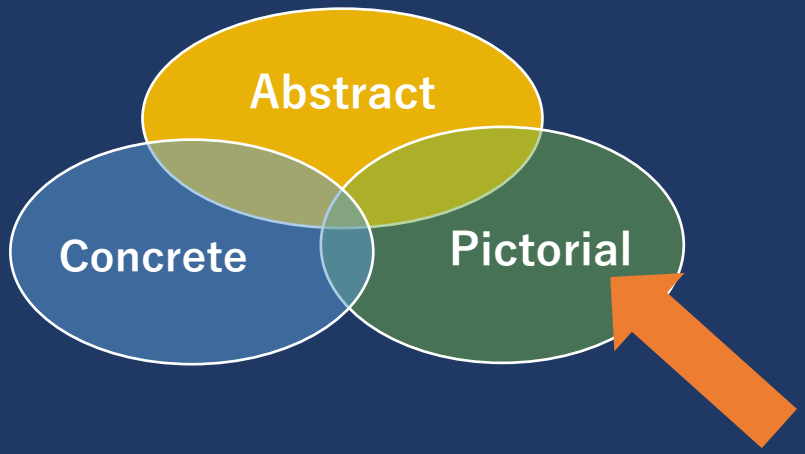
Use formal math language

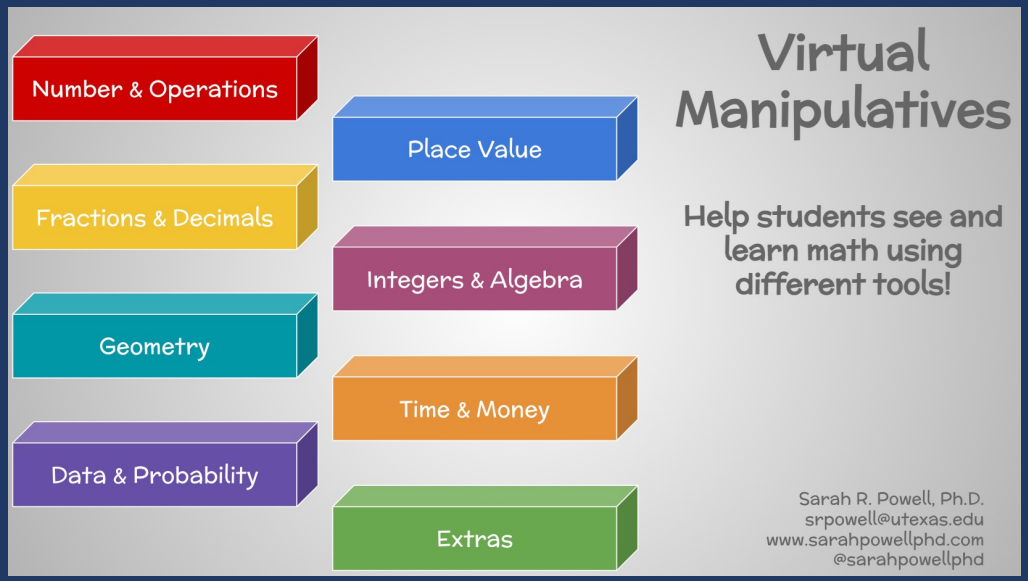
Use terms precisely

What is one way you support the math vocabulary of students?

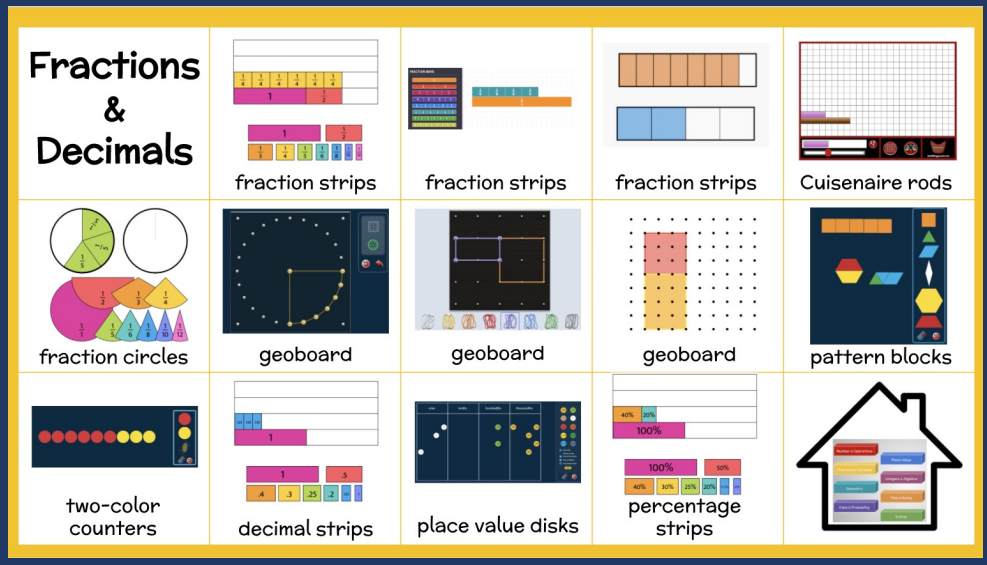


Share a virtual manipulative you use in your teaching.





bit.ly/srpowell



Addition	Subtraction
Multiplication	Division

Counting

Comparing numbers

Counting coins

Telling time

Identifying equivalent fractions

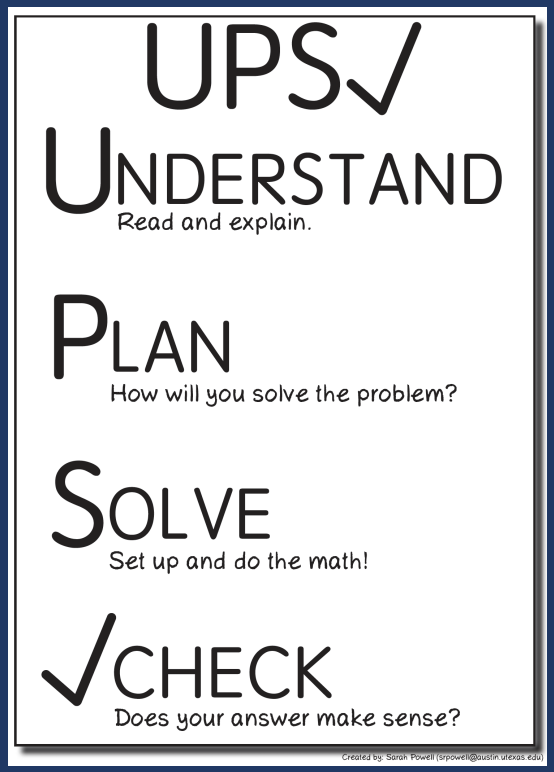
Knowing multiples

Identifying shapes

Knowing formulas

Addition	Subtraction
Multiplication	Division

How do you practice fact fluency with your students?



Total

Difference

Change

Equal Groups

Comparison

Ratios/Proportions

UPS✓

UNDERSTAND
Read and explain.

PLAN
How will you solve the problem?

SOLVE
Set up and do the math!

✓CHECK
Does your answer make sense?

Created by: Sarah Powell (srpowell@austin.utexas.edu)

Total

Difference

Change

Equal Groups

Comparison

Share your approach to word-problem solving.

Two-dimensional shapes:
Identification of shapes

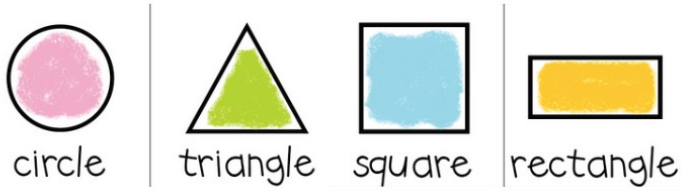
Two-dimensional shapes:
Composing and decomposing shapes

Lines and angles

Three-dimensional shapes

What difficulties do your students have with two-dimensional (2D) shapes?

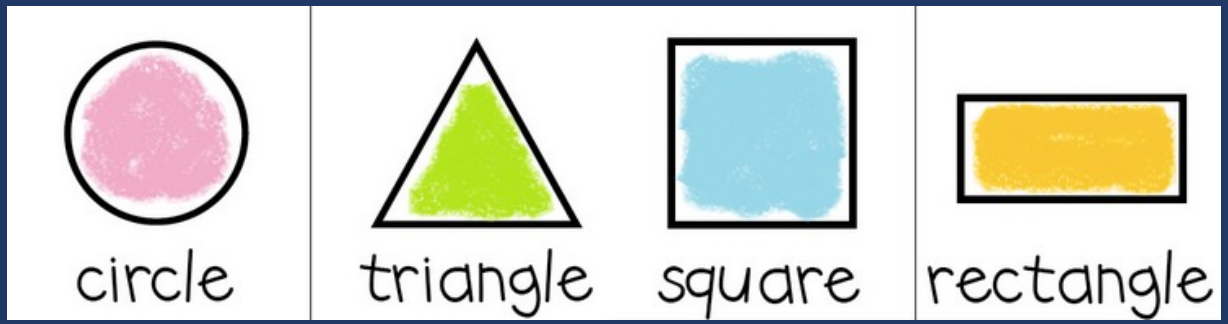
Shape Recognition



1. Identify
2. Name
3. Draw
4. Locate in environment

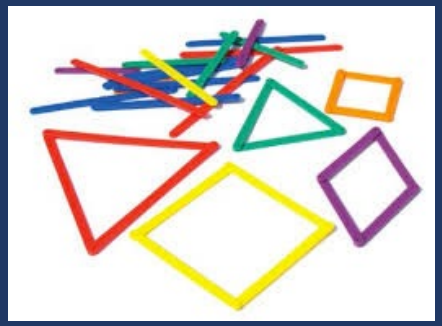
Identifying 2D Shapes

Two-dimensional (2D) figures first



Students need to learn to:

- Identify
- Name
- Draw
- Locate in environment

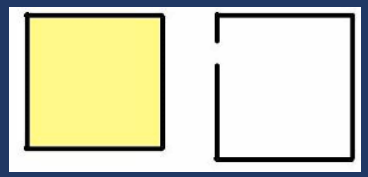


Anglegs

Pattern Blocks

2D Shape Vocabulary

Closed figure versus open figure



Polygon

- Regular
  - All angles equal and all sides equal
- Irregular

Line

- Line segment

Angle

- Space between 2 intersecting lines at the point where the lines meet

Describing Objects

Ask children to identify shapes in their environment.

- *On our walk to the park, let us identify objects that are rectangles. Call out when you see a rectangle!*

Students should also be familiar with spatial vocabulary, including terms such as: *above, below, beside, in front of, behind*, and *next to*.

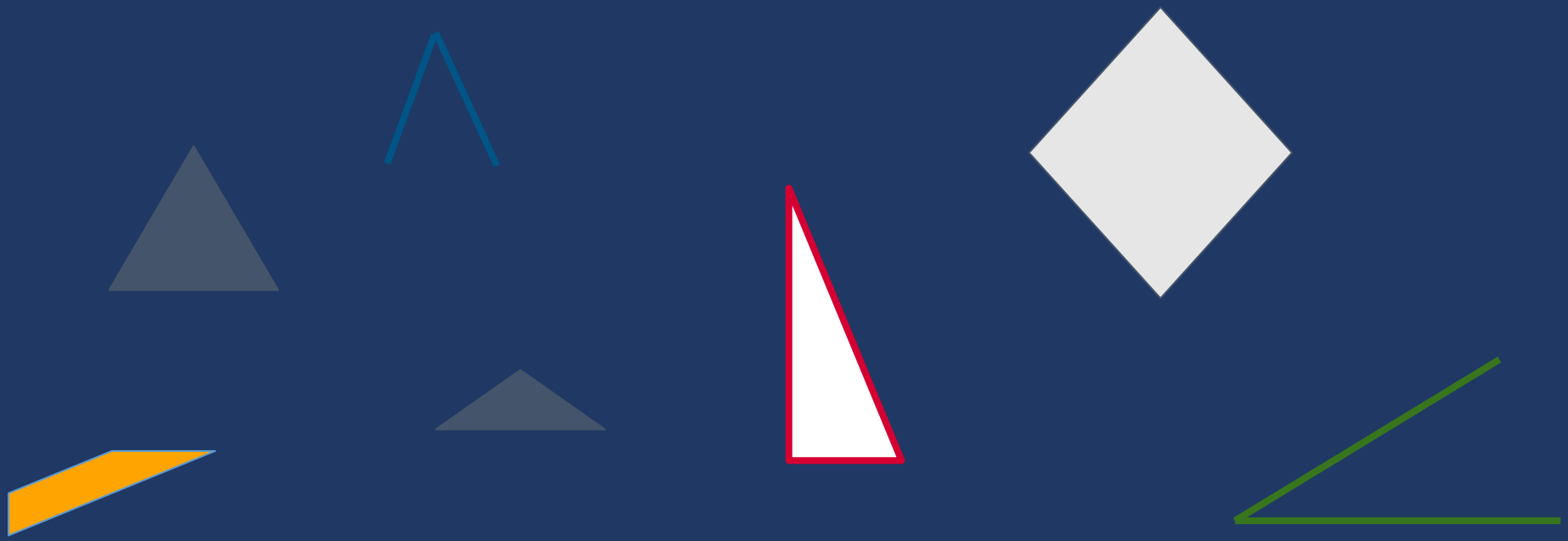
- *When asking questions during read-alouds, ask children to identify objects on the page using these terms*
- *Play "I spy" activities using these terms*

Naming Shapes

Students should be able to name shapes, regardless of other attributes such as size.

Recognize and Drawing Shapes

Circle all of the closed shapes with three sides



Hands-On Materials

Shapes

Pattern blocks

Polygons

Describe 1 activity to identify or name.

Describe 1 activity to locate in the environment.

Triangles

Name	Properties	Examples
Equilateral		
Isosceles		
Scalene		
Acute		
Obtuse		
Right		

Quadrilaterals

Name	Properties	Examples
Parallelogram		
Rectangle		
Rhombus		
Square		
Kite		
Trapezoid		

Understanding Triangles

Property of a triangle

- A closed figure with 3 line segments and 3 angles

Triangles

Name	Properties	Examples
Equilateral		
Isosceles		
Scalene		
Acute		
Obtuse		
Right		

Quadrilaterals

Name	Properties	Examples
Parallelogram		
Rectangle		
Rhombus		

Geoboard

Polygons

Understanding Quadrilaterals

Property of a quadrilateral

- A closed figure with four line segments

Types of quadrilaterals

		Examples
Obtuse		
Right		

Quadrilaterals

Name	Properties	Examples
Parallelogram		
Rectangle		
Rhombus		
Square		
Kite		
Trapezoid		

Geoboard

Polygons

Understanding Other Polygons

These shapes can be regular and irregular

Name	Sides	Example
Pentagon	5	
Hexagon	6	
Heptagon	7	
Octagon	8	
Nonagon	9	
Decagon	10	
Hendecagon	11	
Dodecagon	12	

Hands-On Materials

Shapes

Pattern blocks

Polygons

Which other polygons are most important for your students to understand?

What is a favorite polygon activity?

Two-dimensional shapes:
Identification of shapes

Two-dimensional shapes:
Composing and decomposing shapes

Lines and angles

Three-dimensional shapes

Composing and Decomposing - Spatial Reasoning

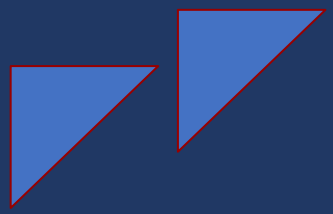
Tangrams

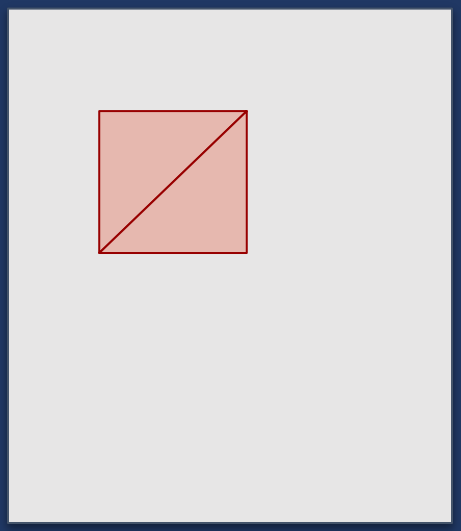
Tetrominoes/Pentominoes

Pattern Blocks

Composing Shapes and Figures

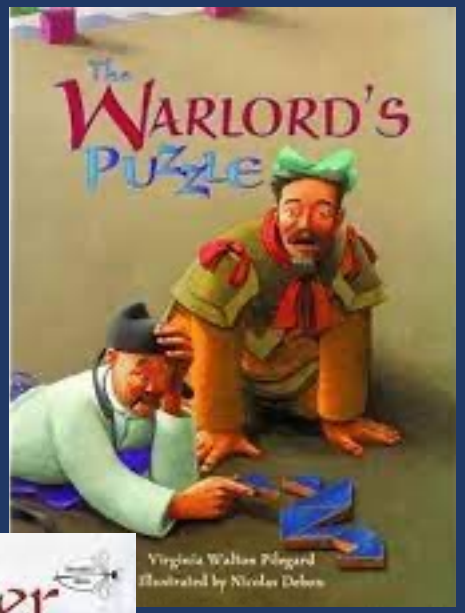
Can you join these triangles to create a square?

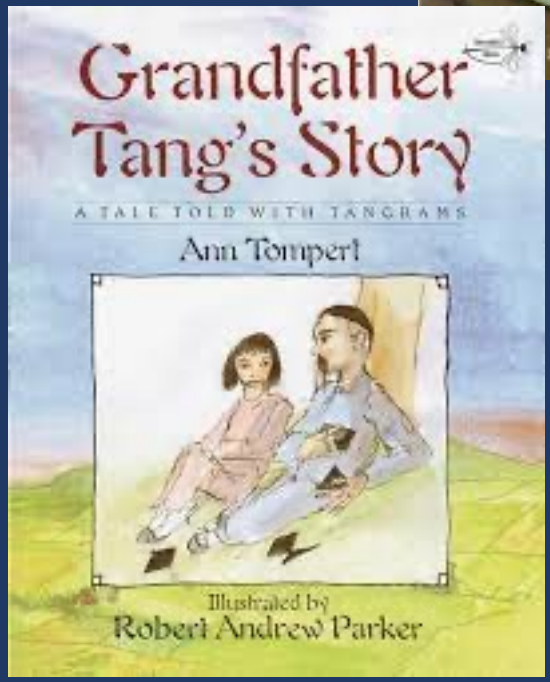




Tangrams

Use the shapes to make a square

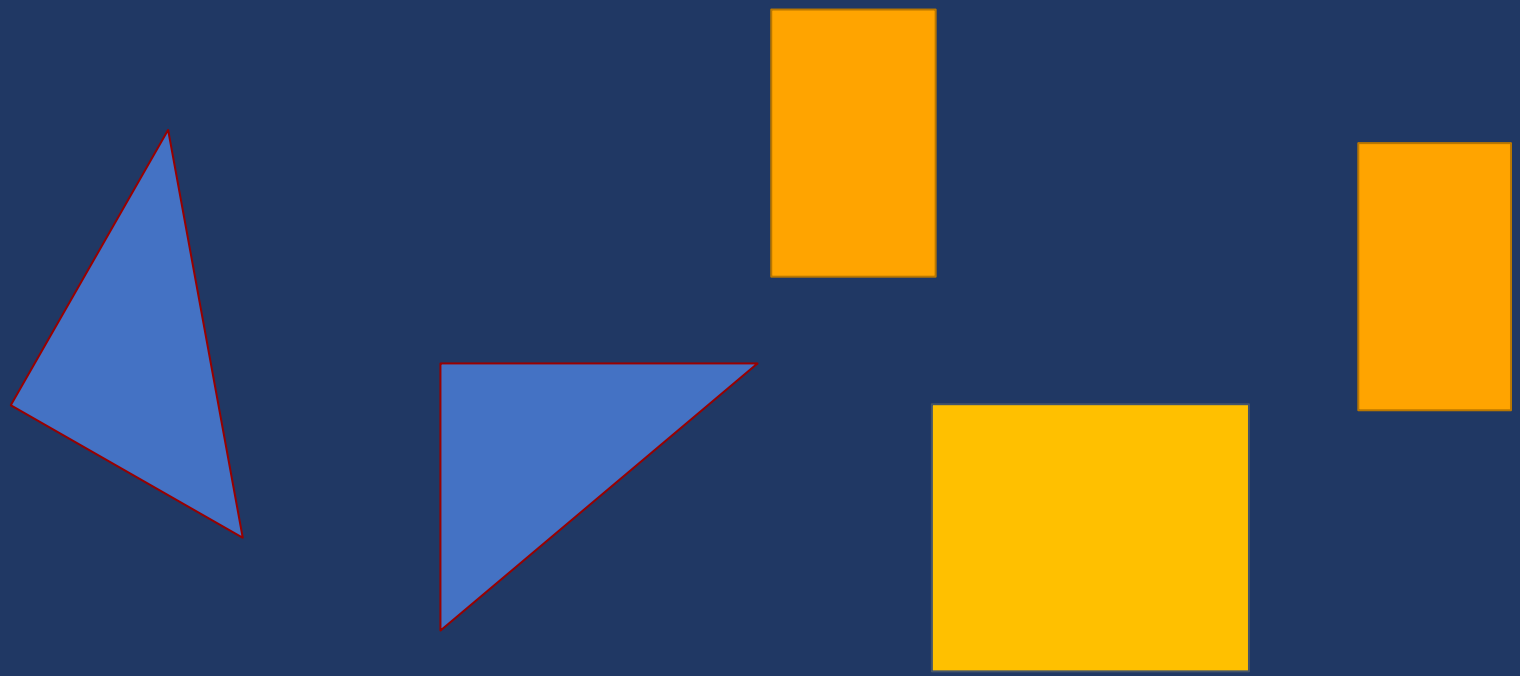




Tangram

Composing Shapes and Figures

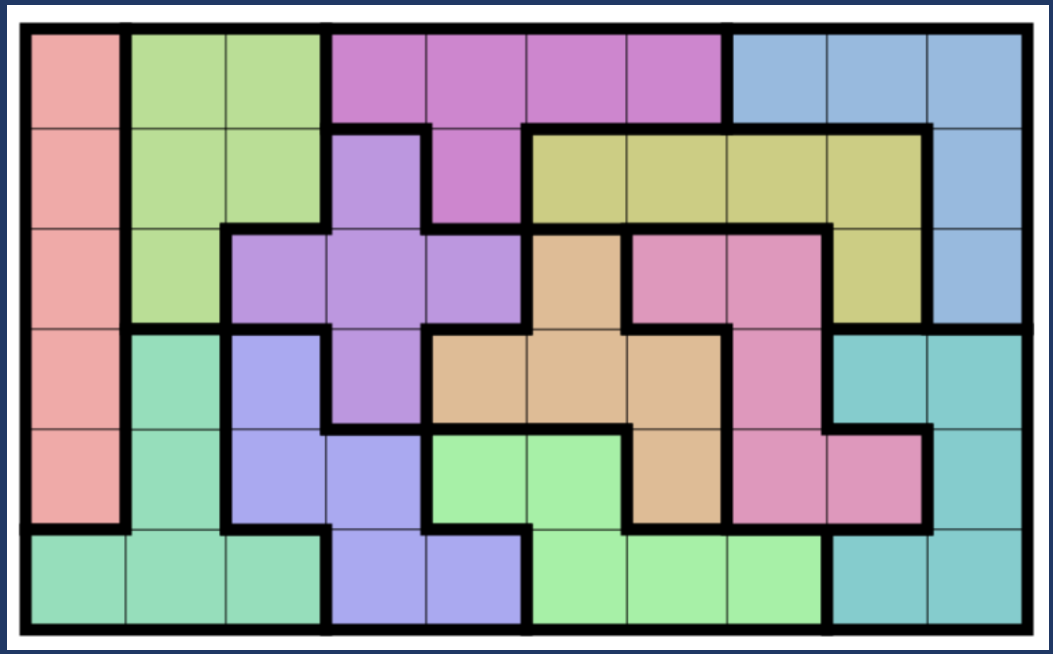
How many different shapes can you create using the shapes on your screen? Make sure to draw your shapes as a record of your thinking!



Tetrominoes and Pentominoes

Use the shapes to make a rectangle

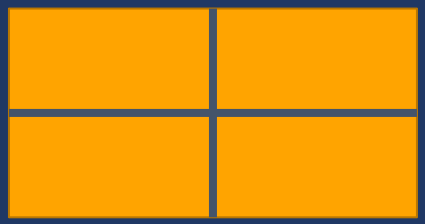
Pentominoes

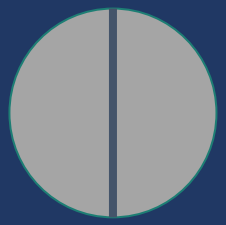


https://benhoyt.com/writings/python-pentomino/

Partitioning Shapes

First Grade



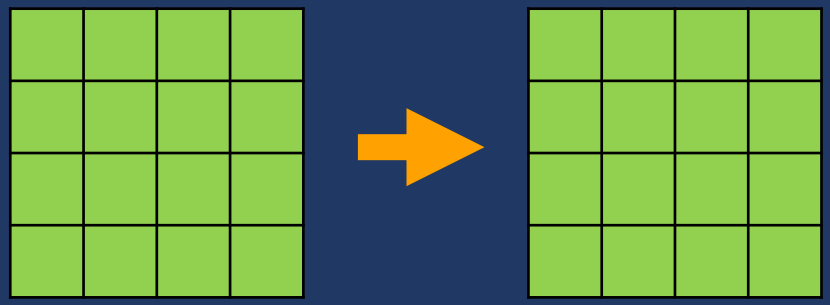


Second Grade

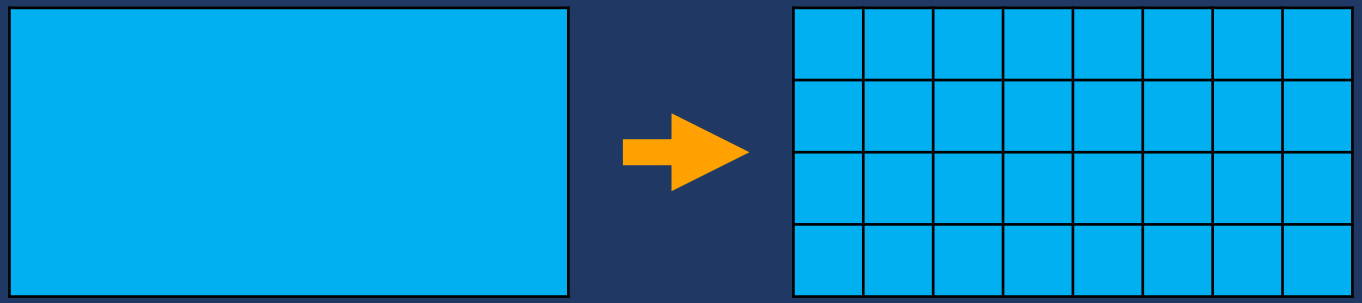
Pattern blocks

Rows and Columns

Students can explore dividing rectangles into same size squares, and then identifying the number of columns and rows.



How many squares?



How many squares?

Hands-On Materials

Tangram

Pattern blocks

Pentominoes

What is 1 activity for composing shapes?

What is 1 activity for decomposing shapes?

Two-dimensional shapes:
Identification of shapes

Two-dimensional shapes:
Composing and decomposing shapes

Lines and angles

Three-dimensional shapes

Lines

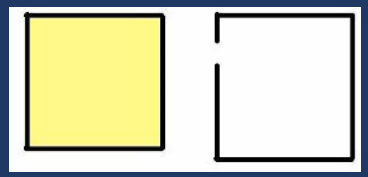
Name	Properties	Examples
Point		
Line		
Line Segment		
Ray		

Angles

Name	Properties	Examples
Right		
Acute		
Obtuse		
Straight		

2D Shape Vocabulary

Closed figure versus open figure



Polygon

- Regular
  - All angles equal and all sides equal
- Irregular

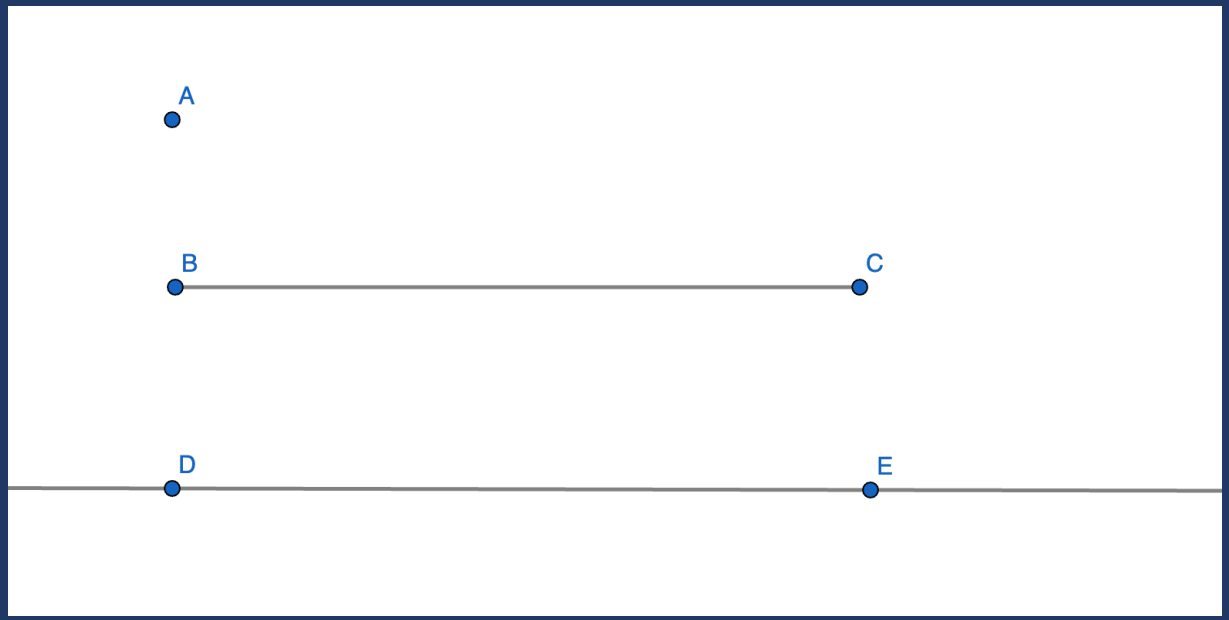
Line

- Line segment

Angle

- Space between 2 intersecting lines at the point where the lines meet

Lines



Lines

Lines

Name	Properties	Examples
Point		
Line		
Line Segment		
Ray		

Angles

Name	Properties	Examples
Right		
Acute		
Obtuse		
Straight		

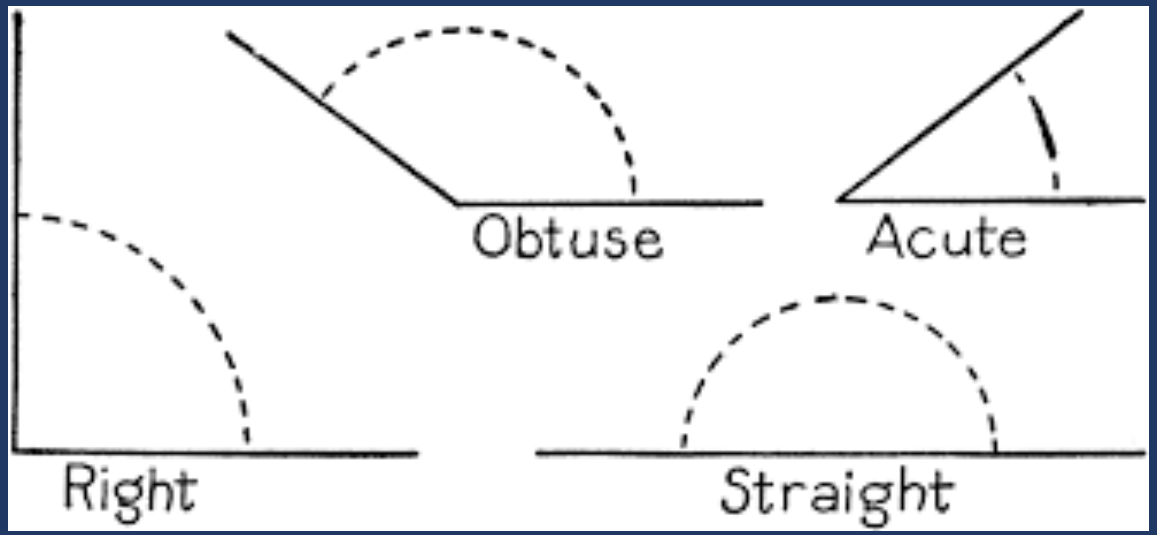
Hands-On Materials

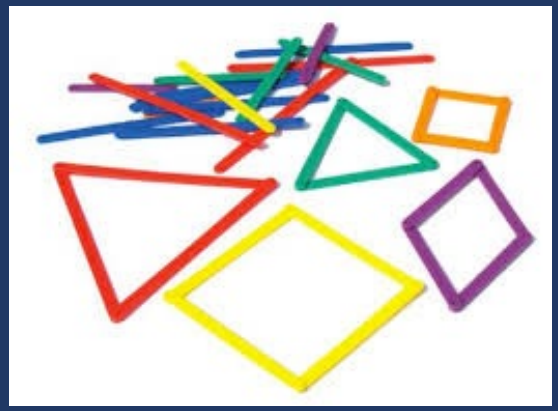
Lines

Utensils

At your grade level, what is important for students to understand about lines?

Angles





Anglegs

	Examples

Angles

Name	Properties	Examples
Right		
Acute		
Obtuse		
Straight		

Protractor

Lines

Two-dimensional shapes:
Identification of shapes

Two-dimensional shapes:
Composing and decomposing shapes

Lines and angles

Three-dimensional shapes

Three-Dimensional Shapes

Name	Properties (Faces, Edges, Vertices)	Examples
Rectangular Prism		
Cube		
Triangular Prism		
Hexagonal Prism		
Rectangular Pyramid		
Triangular Pyramid		
Hexagonal Pyramid		
Cylinder		
Cone		

What difficulties do your students have with three-dimensional (3D) shapes?

Identifying 3D Shapes

A three-dimensional (3D) figure has height, width, and depth

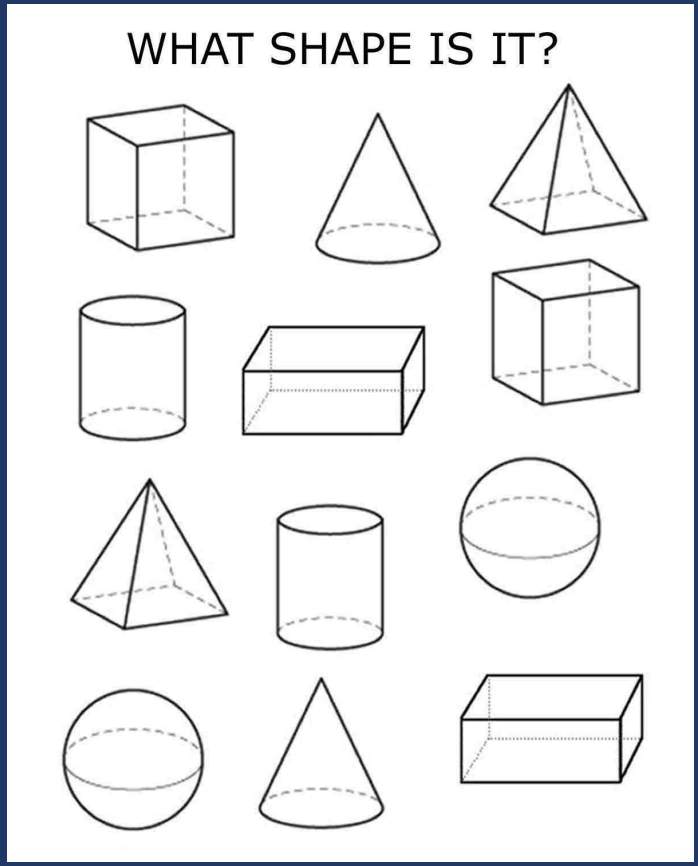
Students need to learn to:

- Identify
- Name
- Locate in environment

Identifying 3D Shapes

One of the trickiest aspects for students is interpreting pictorial representations

- Must teach dashed lines



3D Shape Vocabulary

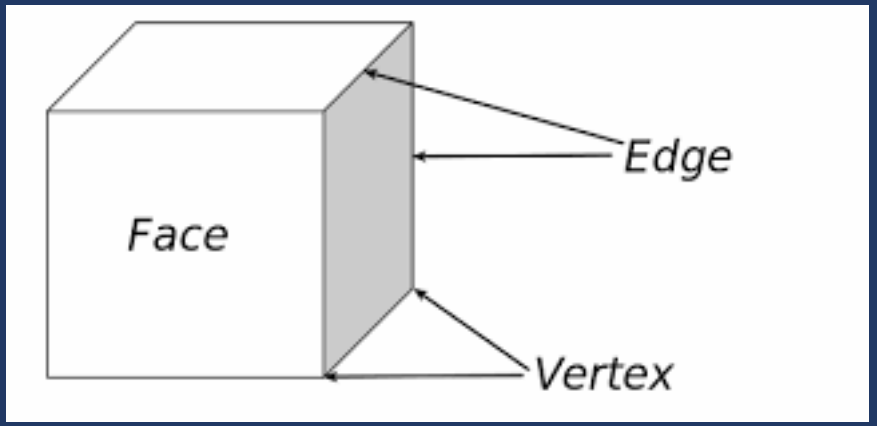
Solid figure

- A three-dimensional, closed figure

Face

Vertex/Vertices

Edge

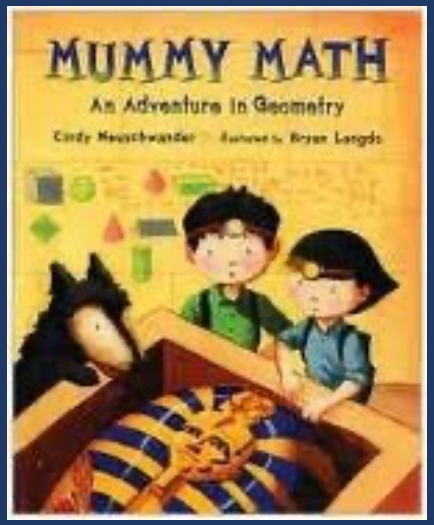


Identifying 3D Shapes

Manipulatives

- Sort and group
- Identify
  - Face
  - Vertex/Vertices
  - Edge

Books



Creating 3D Shapes

Identifying 3D Shapes

Objects in the home

What are 3D objects your students can use from their home?

Understanding 3D Shapes

Name	Faces	Edges	Vertices
Rectangular Prism	0	0	0
Cube	6	12	8
Cuboid			
Triangular Prism			
Hexagonal Prism			
Rectangular Pyramid			
Triangular Pyramid			
Hexagonal Pyramid			
Cylinder			
Cone			
Sphere			

Prism: Solid figure with two end faces that are equal and all sides are parallelograms

Pyramid: Solid figure with polygon base and triangular faces that meet at a common point

Hands-On Materials

Cube Builder

Geometric Solids

Three-Dimensional Shapes

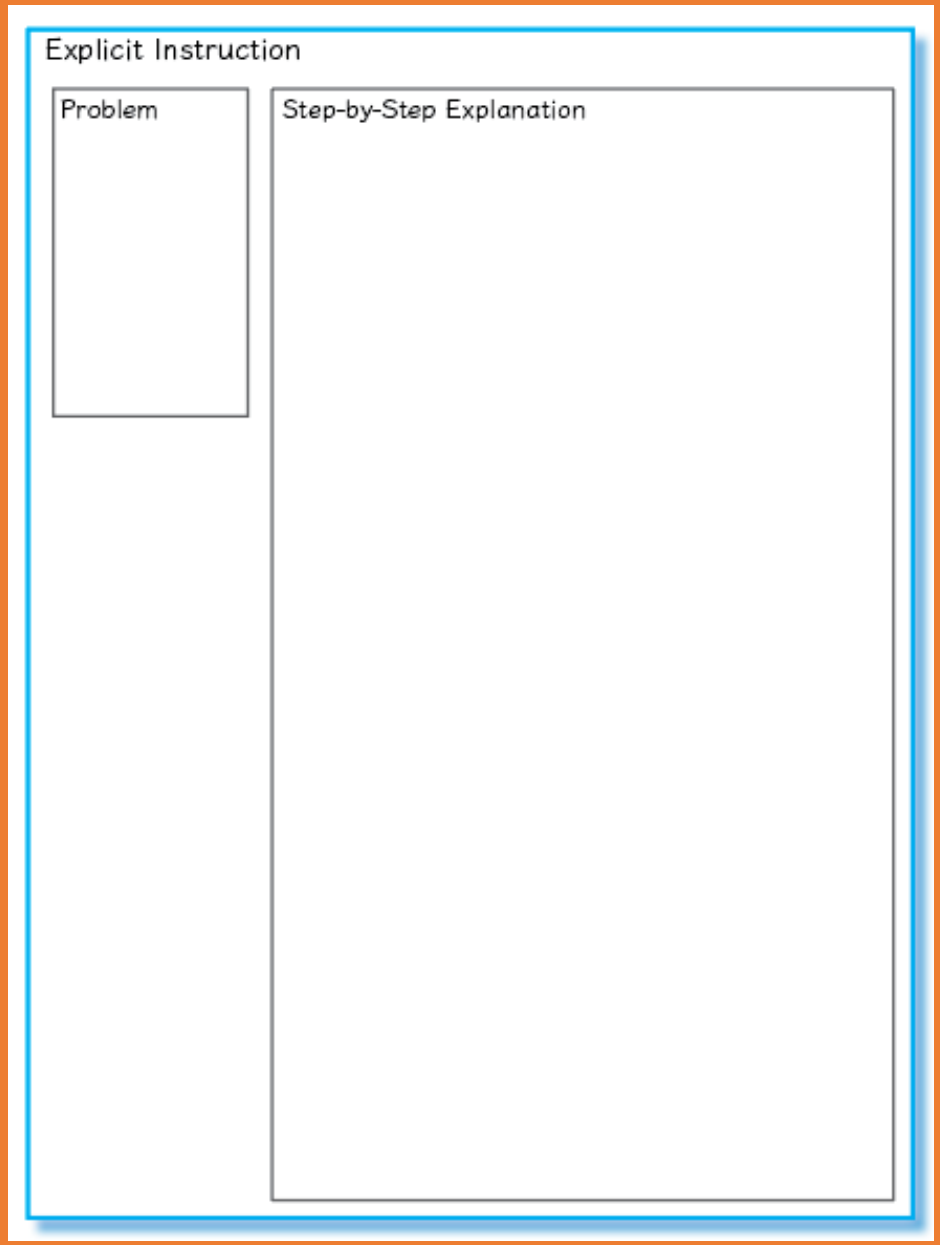
Name	Properties (Faces, Edges, Vertices)	Examples
Rectangular Prism		
Cube		
Triangular Prism		
Hexagonal Prism		
Rectangular Pyramid		
Triangular Pyramid		
Hexagonal Pyramid		
Cylinder		
Cone		

Two-dimensional shapes:
Identification of shapes

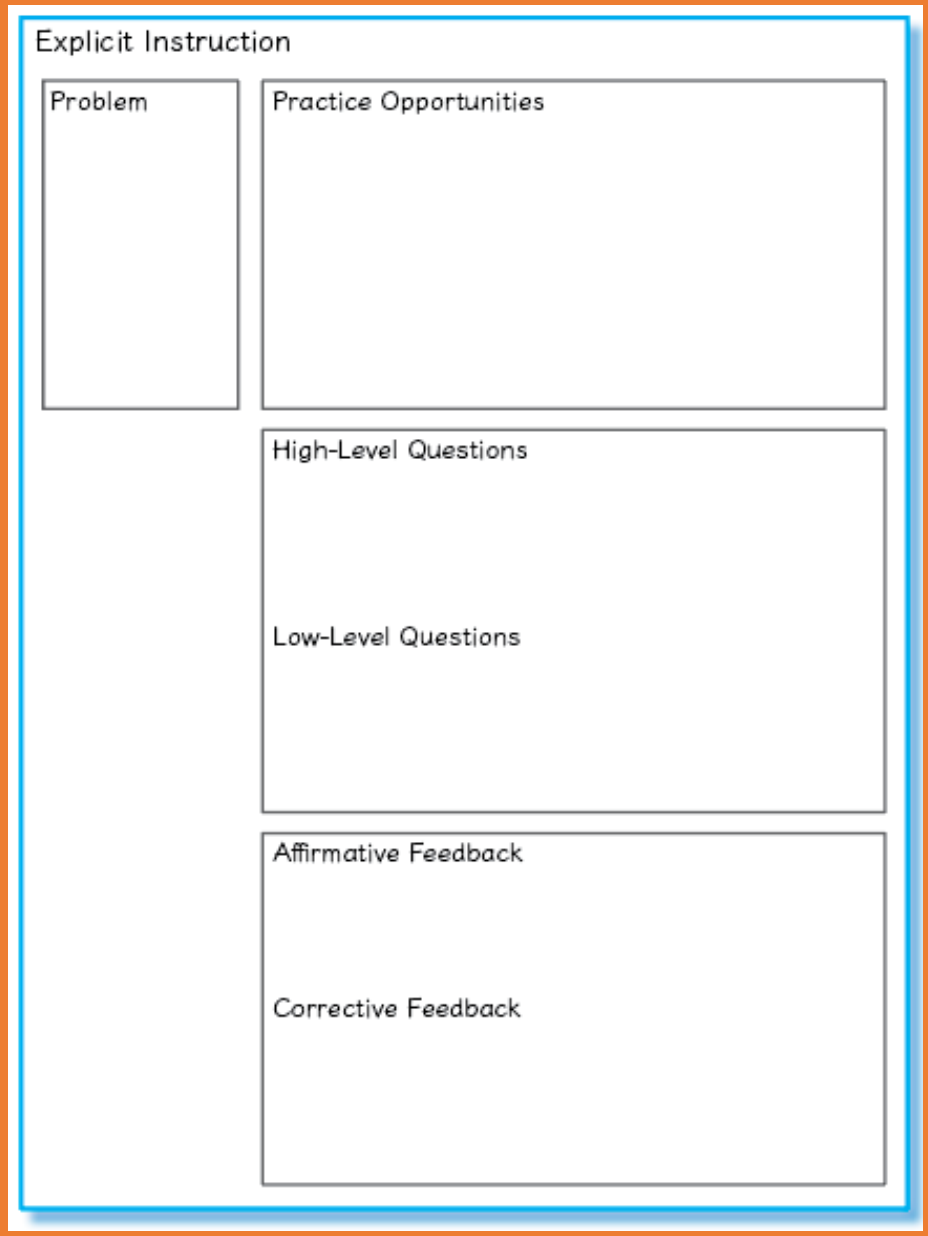
Two-dimensional shapes:
Composing and decomposing shapes

Lines and angles

Three-dimensional shapes



1. Choose a math problem.
2. Write a step-by-step explanation. Focus on the language of math in your explanation. Consider the representations you will use.



1. Describe the practice opportunities you will use.
2. Write 3 high-level questions.
3. Write 3 low-level questions.
4. Write 2 ways to provide affirmative feedback.
5. Write 2 ways to provide corrective feedback.

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