ELEMENTARY SCHOOL
Geometry
Lesson Plans
A Practical Guide For Educators
This is a set of lesson plans that complement the app ‘Shapes - 3D Geometry Learning’ on the iPad, Android tablet or desktop computer. These are suggested devices to use in the classroom, but teachers may use also other Android or iOS mobile devices. An experienced educator who has taught every single grade ranging from kindergarten to twelfth grade wrote the lesson plans. Too often teachers find an app they like but are unable to find the time to align it with the curriculum that they are required to teach. Our intent with these plans is to allow the teachers using them to be able to access the lesson plans and seamlessly integrate the plans into their teaching.

The ‘Shapes’ lesson plans are divided into two groups, one set of lesson plans for younger students and one set of plans for older students. This is the younger students set of plans which can be used with elementary children and these are lessons one through six. For the teachers of younger children there are lessons for kindergarten, grade one, grade two, grade three, grade four, and grade five.

The lesson plans are ready to use in the classroom. The purpose of these lessons is to encourage the acquisition of various math skills through creative play. These lessons cater to students who have a variety of learning styles and emphasize visual learning as well as hands-on kinesthetic activities. Each lesson plan has the same organizational structure. There is a lesson title. The next element in the lesson objective which is in the SWBAT format, students will be able to followed by an action verb related to learning. Most lessons in the set have more than one lesson objective with action verbs from Bloom’s Taxonomy. The third element of each lesson is the Common Core State Standards to which they are aligned. Next there is an activity title followed by a list of materials needed to teach the lesson and suggested amount of time/number of classes that the teachers should use to teach the lesson. After that there is an activity description which explains how to execute the lesson. Finally, each lesson ends with the supporting worksheet.

The benefit of using these lessons is not only that you will be teaching your students math lessons and skills that are aligned to the Common Core State Standards, but you will also see high levels of engagement in your classroom. This current generation of students who sit in our classrooms are digital natives and they respond well to instruction that infuses technology into the lesson plans.
If your classroom is equipped with iPADs using ARKit you may use Augmented Reality features with which students can place solids on their desks and examine them in 3D.

“Shapes - 3D Geometry Learning” app is integrated with Schoolwork app available on iPads. Schoolwork helps you easily distribute and collect assignments, keep an eye on student progress in educational apps, and collaborate one on one with students from anywhere, in real time.
LESSON ONE
Using Shapes in Kindergarten

Teachers using Shapes at the kindergarten level could use the following lesson objectives in their lesson plans:

- SWBAT develop math readiness skills as they are introduced to shapes and colors
- SWBAT recall the names of different basic shapes such as squares, circles and triangles
- SWBAT compare and contrast a 2d vs. a 3d shape

This lesson relates to the following Common Core State Standards:

Identify and name shapes.

**CCSS.Math.Content.K.G.A.2**
Correctly name shapes regardless of their orientations or overall size.

**CCSS.Math.Content.K.G.A.3**
Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").

Analyze, compare, create, and compose shapes.

**CCSS.Math.Content.K.G.B.4**
Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having sides of equal length).

**CCSS.Math.Content.K.G.B.5**
Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.

**CCSS.Math.Content.K.G.B.6**
Compose simple shapes to form larger shapes. For example, "Can you join these two triangles with full sides touching to make a rectangle?"
Activity One - What Color is the Shape?

Materials Needed:
- One teacher iPad, Android tablet or desktop computer
- Connectivity to project Shapes app onto a large screen
- What color is the shape worksheet? (see below)
- One writing utensil for every student in the class

Suggested Time Frame for the Activity: 30 Minutes
- Teacher spends first 10 minutes of the lesson passing out the materials and reviewing the 4 colors
- Teacher spends the middle 15 minutes of the lesson having students complete the worksheet and reviewing the shapes displayed on the whiteboard
- Teacher spends the last five minutes cleaning up and collecting papers

Activity description:
The teacher displays a shape on the large screen: the shape can be any of the 4 colors used within the Shapes app. The students will use the following space on their paper to record what color the shape is:
Activity One Worksheet

<table>
<thead>
<tr>
<th>What color is the shape</th>
<th>What color is the shape</th>
<th>What color is the shape</th>
<th>What color is the shape</th>
<th>What color is the shape</th>
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</thead>
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</tbody>
</table>
LESSON TWO
Using Shapes in 1st Grade

Teachers using Shapes at the first grade level could use the following lesson objectives in their lesson plans:

- SWBAT Compare and contrast the difference between a 2 dimensional shape and a 3- dimensional shape
- SWBAT Recall how many 2d shapes there are in a 3d shape (using the nets feature in the app) SWBAT Count how many faces and edges are in a 3d shape

This lesson relates to the following Common Core State Standards: Identify and name shapes.

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

CCSS.Math.Content.1.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.

CCSS.Math.Content.1.G.A.3
Partition circles and rectangles into two and four equal shares, describe the shares using the words halves, fourths, and quarters, and use the phrases half of, fourth of, and quarter of. Describe the whole as two of, or four of the shares. Understand for these examples that decomposing into more equal shares creates smaller shares.
Activity Two - Count the Vertices, Faces and the Edges in a Shape

Materials Needed:

- One teacher iPad, Android tablet or desktop computer
- Connectivity to project Shapes app onto a large screen
- Count the faces and the edges worksheet for each student in the class
- One writing utensil for every student in the class

Suggested Time Frame for the Activity: 40 Minutes

- Teacher spends first 10 minutes of the lesson passing out the materials and reviewing how to count to 20
- Teacher spends the middle 20 minutes of the lesson having students complete the work sheet; for the first two examples the teacher will complete the activity with the class, but the teacher will allow the students work whether in pairs or independently
- Teacher spends the last 10 minutes having a class discussion about the final column in the worksheet and collecting the materials

Activity description:

The teacher displays the Shapes app on the board and highlights the faces edges and the vertices in some of the basic grade level shapes. The students take turns counting how many faces and how many edges are in the shape. The activity can be taught at all elementary levels but I wrote this activity with first graders in mind.

If students have iPads with ARKit they can examine 3D shapes in Augmented Reality when completing the activity. They only need to click AR button when a displaying a 3D shape.

This activity may be managed easily with Schoolwork, so that students can add their Worksheet to the assignment handed out by teacher with a link to the Shapes app.
## Activity Two Worksheet

<table>
<thead>
<tr>
<th>The teacher will identify the name or the shape</th>
<th>The student will count how many edges the shape has</th>
<th>The student will count how many faces the shape has</th>
<th>The student will count how many vertices the shape has</th>
<th>This column can be used for any additional observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cube</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hexagonal Prism</td>
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<td></td>
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<tr>
<td>Right Trapezoidal Prism</td>
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<tr>
<td>Triangular Prism</td>
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<tr>
<td>Parallelepiped</td>
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<tr>
<td>Rhombic Prism</td>
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<tr>
<td>Isosceles Triangular Prism</td>
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<tr>
<td>Right triangular Prism</td>
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<td></td>
</tr>
<tr>
<td>Quadrilateral Prism</td>
<td></td>
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</tr>
</tbody>
</table>
LESSON THREE

Using Shapes in 2nd grade

Teachers using Shapes at the second grade level could use the following lesson objectives in their lesson plans:

- SWBAT replicate the Shapes within the app on a piece a paper
- SWBAT count forwards and backwards based upon the number of faces in the 3d figure
- SWBAT identify triangles, quadrilaterals, pentagons, hexagons, and cubes within the prism section of the Shapes application

This lesson relates to the following Common Core State Standards: Identify and name shapes.

CCSS.Math.Content.2.G.A.1
Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.

CCSS.Math.Content.2.G.A.2
Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.

CCSS.Math.Content.2.G.A.3
Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words halves, thirds, half of, a third of, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.
Activity Three - Screencasting Shape Lesson

Materials Needed:

- One teacher iPad, Android tablet or desktop computer
- Connectivity to project Shapes app onto a large screen
- This activity was designed to be completed in a class that has access to an iPad cart or is 1 to 1 in its iPad implementation
- Suggested screencasting apps to be used as part of the activity: Screen Chomp, Explain Everything, Educreations
- Teacher should keep in mind that this lesson is a form of assessment and they need some sort of workflow system to collect the student work: suggested methods of sharing work

Suggested Time Frame for the Activity: 40 Minutes

- Teacher spends first 10 minutes explaining the directions for the activity
- Teacher spends the middle 20 minutes having students complete the screencast of the shape
- Teacher spends the last 10 minutes of the lesson making sure that the students saved and submitted their screencasts

Activity description:

This activity is suggested for a teacher who has a 1 to 1 classroom or even an iPad cart where the students have access to screen casting materials.

- The teacher displays the following Shapes on the screen: 1- triangles, 2- quadrilaterals, 3- pentagons, 4- hexagons, and 5- cubes
- The students divide up into pairs and they are required to take a picture of the shape as the teacher displays it on the screen

If the Students have iPads with ARKit they can display a cube in AR and then take a screenshot
• The students are then required to import the image of the Shape into some sort of screencasting app on the iPad (Educreations, Explain Everything, or Show Me)

• The students then need to record what the name of the shape is and why they know and understand that the shape is a cube

• Not only is this a good strategy for students addressing what they know (the big word for this is metacognition, but it also helps the teacher understand what the students may be confused about (addressing their misconceptions)

• This type of work can also be used as a formative, ongoing, or summative Assessment
LESSON FOUR
Using Shapes in the 3rd Grade

Teachers using Shapes at the third grade level could use the following lesson objectives in their lesson plans:

- SWBAT understand common attributes between quadrilateral prisms and other four-sided prisms within the Shapes app (i.e. cube, parallelepiped, and rhombic prisms)
- SWBAT justify whether or not a prism is a quadrilateral prism
- SWBAT distinguish which faces of the prisms have equal areas and label those faces with the in app coloring feature

This lesson relates to the following Common Core State Standards: Reason with shapes and their attributes.

**CCSS.Math.Content.3.G.A.1**
Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.

**CCSS.Math.Content.3.G.A.2**
Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. For example, partition a shape into 4 parts with equal area, and describe the area of each part as 1/4 of the area of the shape.
Activity Four - Using Venn Diagrams to Compare and Contrast Quadrilateral Prisms

Materials Needed:

- One teacher iPad, Android tablet or desktop computer
- Connectivity to project Shapes app onto a large screen
- A Venn Diagram worksheet for each student in the class
- One writing utensil for every student in the class

Suggested Time Frame for the Activity: 40 Minutes

- Teacher spends first 10 minutes of the lesson reviewing the directions to complete the Venn Diagram and modeling examples within the Shapes app
- Teacher spends the middle 20 minutes of the lesson having students complete the worksheet; the students can work independently or in pairs
- Teacher spends the last 10 minutes reviewing the answers and taking time to address misconceptions concerning this important math concept and uses figures from the app to reinforce the standards

Activity description:

This is an activity in which the only requirement is that the teacher have a device connected to a large screen so it does not need to be done in a 1 to 1 classroom.

The teacher displays the following words on the whiteboard:

1 - Quadrilateral
2 - Parallelogram
3 - Rhombus
4 - Square
5 - Rectangle
6 - Trapezoid
The students then need to place the vocabulary words in the correct spots in the Venn Diagram. Once the students have completed the Venn Diagram worksheet, the teacher can display the following Prism figures from the Shapes App on the whiteboard to review misconceptions and continue the class discussion:

1 - Quadrilateral Prism
2 - Parallelepiped
3 - Rhombic Prism
4 - Cube
5 - Trapezoidal Prism

Teacher may easily hand out and collect the assignment with Venn diagram in Schoolwork.

Extension Activity: Teacher projects the iPad onto the Whiteboard and goes into the Prism Section of the App. The teacher pulls up the Quadrilateral Prisms and asks a student volunteer to come to the front of the room. The student volunteer uses the fill color option on the App to color all four faces of the quadrilateral prism that have the same area in the same color (i.e. red), another student volunteer is asked to color the two remaining faces which have a different color because they have a different area from the other four. The teacher repeats this activity with the other 10 prisms in the Shapes app which give the opportunity for each student in the class to have a chance to come to the front of the classroom to use in the in-app coloring feature.
Activity Four Worksheet
LESSON FIVE
Using Shapes in the 4th Grade

Teachers using Shapes at the fourth grade level could use the following lesson objectives in their lesson plans:

- SWBAT identify acute, right, and obtuse angles within various figures in the prism section of the Shapes app
- SWBAT identify the lines of symmetry in various faces of the prism figures (using the nets feature of the Shapes app)
- SWBAT draw points and lines that make up various platonic solid figures within the Shapes app

This lesson relates to the following Common Core State Standards: Draw and identify lines and angles, and classify shapes by properties of their lines and angles.

CCSS.Math.Content.4.G.A.1
Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.

CCSS.Math.Content.4.G.A.2
Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.

CCSS.Math.Content.4.G.A.3
Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.
**Activity Five - Using the Academic Vocabulary within the Shapes App**

Make a Poster, Diorama, iMovie, or Complete an Oral Presentation (this can be done solo, in pairs, or in groups)

**Materials Needed** (this depends upon how many choices are available to your students):
- Shoeboxes, scissors, glue
- Posterboard, markers, crayons
- iMovie, WeVideo or similar app on the student device
- Freedom to allow your students to be creative

**Suggested Time Frame for the Activity:** 40 Minutes
- This lesson is meant to take place during at the end of math unit
- It is our suggestion that this type of activity would be good for the time of year right before a school vacation
- Students can be given class time at the end of each math class to work on the Shapes project of their choice
- On the last two days of the cycle the students can complete their presentations

**Activity description:**
Using the Following Vocabulary Words to Show Your Teacher and Class What You Have Learned About Those Words Using the Shapes App

<table>
<thead>
<tr>
<th>Two dimensional figure</th>
<th>Three dimensional figure</th>
<th>Line of Symmetry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right triangle</td>
<td>Point</td>
<td>Line</td>
</tr>
<tr>
<td>Prism</td>
<td>Platonic Solid</td>
<td>Solids of Revolution</td>
</tr>
</tbody>
</table>

This is a Project Based Learning Shapes Lesson
LESSON SIX

Using Shapes in the 5th Grade

Teachers using Shapes at the fifth grade level could use the following lesson objectives in their lesson plans:

- SWBAT classify two dimensional shapes based upon properties
- SWBAT analyze common properties and attributes of squares, rectangles, triangles, trapezoids, and parallelograms

This lesson relates to the following Common Core State Standards:

Classify two-dimensional figures into categories based on their properties.

**CCSS.Math.Content.5.G.B.3**

Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.

**CCSS.Math.Content.5.G.B.4**

Classify two-dimensional figures in a hierarchy based on properties.
**Activity Six** - Using the faces feature in Prism Section of the Shapes App and the Side-Bar Feature to look at common properties of the 2d shapes that make up the 3d prisms, screencast could be used as an extension activity

**Materials Needed** (the way that the teacher executes this activity could be done on paper or on the iPad):

- Class set of worksheets
- Writing utensil for each students
- Teacher iPad, Android tablet or desktop computer displayed on the White Board
- If the teacher has access to at least five student devices they could be used for an extension/screen casting activity

**Suggested Time Frame for the Activity:**
Two 30-minute math blocks for a total of 60 minutes. If the teacher chooses the extension screen casting activity that would take another 30 minute block of time.

**Activity description:**
Teacher will provide background information about the common attributes of different 2d shapes (i.e. all triangles have 3 sides, all squares have 4 90 degree angles)

Then the teacher will model the Prism section of the Shapes App on the Whiteboard, for example the teacher will:
- Open up the prism section of the Shapes App
- Click the solid option button
- Click the faces option and have the class count the faces and record the data on the worksheet
- Click on the sidebar on the app that makes the 3d shape 2-dimensional

Then the teacher will ask the class what shapes they see – for example with the Hexagonal Prisms the students would record that the 2d shape was made up of 6 rectangles and 2 hexagons
Then based upon available technology the students can complete the Common Property Column on the Worksheet or do an analysis in the form of a screen cast.

If students have iPads with ARKit they can examine 3D shapes in Augmented Reality when completing the activity. They only need to click AR button when a displaying a 3D shape.

This activity may be managed easily with Schoolwork, so that students can add their Worksheet to the assignment handed out by teacher with a link to the Shapes app.
Activity Six Worksheet

<table>
<thead>
<tr>
<th>Name of the Prism</th>
<th>How Many Faces?</th>
<th>When i open up the shape and make it 2D – How many Shapes are there?</th>
<th>What are the names of the shapes that make-up the 2D</th>
<th>What are the common properties of these 2D shapes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cube</td>
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</tr>
<tr>
<td>Hexagonal Prism</td>
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<td>Pentagonal Prism</td>
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<td>Right Trapezoidal Prism</td>
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<td>Triangular Prism</td>
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<td>Parallelepiped</td>
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<td>Right Triangular Prism</td>
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<tr>
<td>Quadrilateral Prism</td>
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