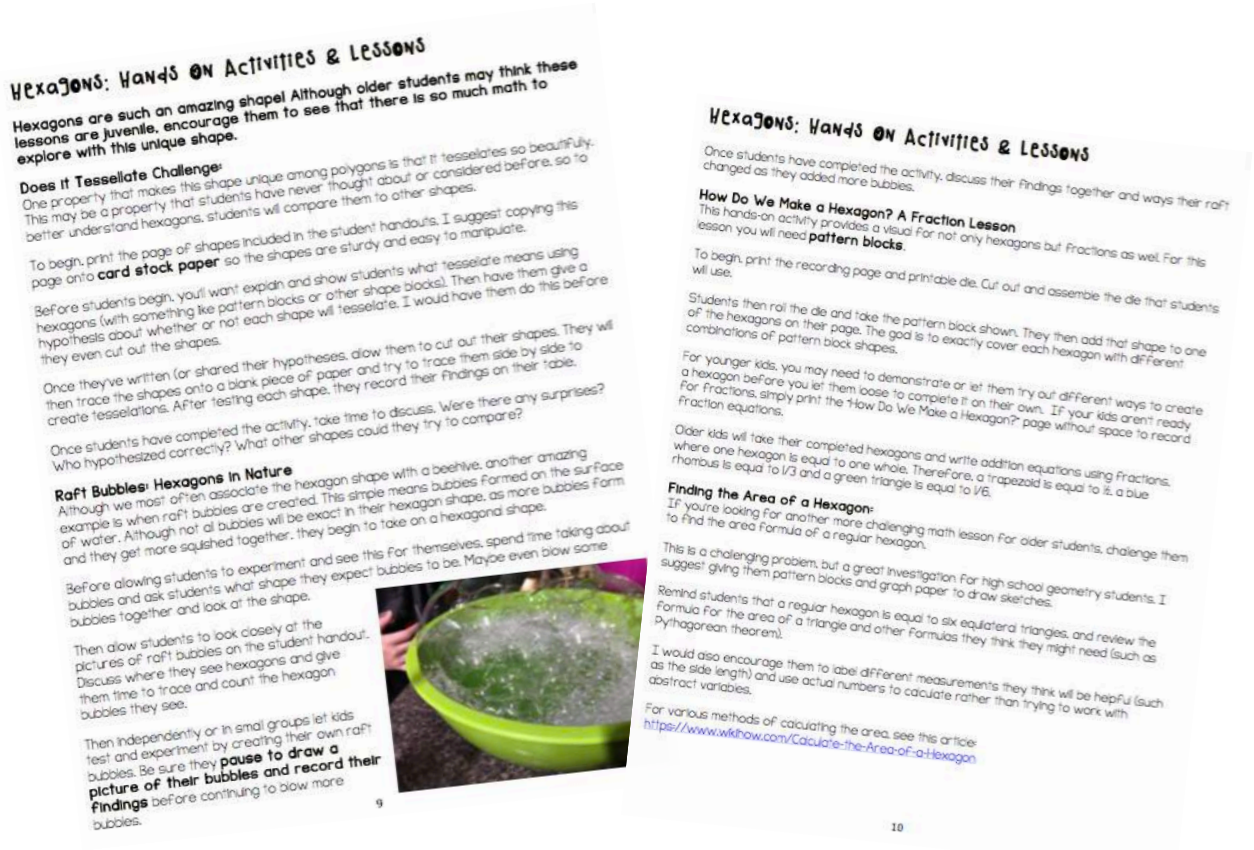
Math in Nature:

Sample

Included in this Curriculum:

Colorful posters so kids can see examples of math in nature:

Full teacher manual with activity directions, book suggestions and links to fun crafts to do along with the lessons:



Hexagons: Hands On Activities & Lessons

Hexagons are such an amazing shape! Although older students may think these lessons are juvenile, encourage them to see that there is so much math to explore with this unique shape.

Does it Tessellate Challenge:
One property that makes this shape unique among polygons is that it tessellates so beautifully. This may be a property that students have never thought about or considered before, so to better understand hexagons, students will compare them to other shapes.

To begin, print the page of shapes included in the student handouts. I suggest copying this page onto **card stock paper** so the shapes are sturdy and easy to manipulate.

Before students begin, you'll want explain and show students what tessellate means using hexagons (with something like pattern blocks or other shape blocks). Then have them give a hypothesis about whether or not each shape will tessellate. I would have them do this before they even cut out the shapes.

Once they've written (or shared their hypotheses, allow them to cut out their shapes. They will then trace the shapes onto a blank piece of paper and try to trace them side by side to create tessellations. After testing each shape, they record their findings on their table.

Once students have completed the activity, take time to discuss. Were there any surprises? Who hypothesized correctly? What other shapes could they try to compare?

Raft Bubbles: Hexagons in Nature
Although we most often associate the hexagon shape with a beehive, another amazing example is when raft bubbles are created. This simple means bubbles formed on the surface of water. Although not all bubbles will be exact in their hexagon shape, as more bubbles form and they get more squished together, they begin to take on a hexagonal shape.

Before allowing students to experiment and see this for themselves, spend time talking about bubbles and ask students what shape they expect bubbles to be. Maybe even blow some bubbles together and look at the shape.

Then allow students to look closely at the pictures of raft bubbles on the student handout. Discuss where they see hexagons and give them time to trace and count the hexagon bubbles they see.

Then independently or in small groups let kids test and experiment by creating their own raft bubbles. Be sure they **pause to draw a picture of their bubbles and record their findings** before continuing to blow more bubbles.

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Hexagons: Hands On Activities & Lessons

Once students have completed the activity, discuss their findings together and ways their raft changed as they added more bubbles.

How Do We Make a Hexagon? A Fraction Lesson
This hands-on activity provides a visual for not only hexagons but fractions as well. For this lesson you will need **pattern blocks**.

To begin, print the recording page and printable die. Cut out and assemble the die that students will use.

Students then roll the die and take the pattern block shown. They then add that shape to one of the hexagons on their page. The goal is to exactly cover each hexagon with different combinations of pattern block shapes.

For younger kids, you may need to demonstrate or let them try out different ways to create a hexagon before you let them loose to complete it on their own. If your kids aren't ready for fractions, simply print the "How Do We Make a Hexagon?" page without space to record fraction equations.

Older kids will take their completed hexagons and write addition equations using fractions, where one hexagon is equal to one whole. Therefore, a trapezoid is equal to it, a blue rhombus is equal to 1/3 and a green triangle is equal to 1/6.

Finding the Area of a Hexagon:
If you're looking for another more challenging math lesson for older students, challenge them to find the area formula of a regular hexagon.

This is a challenging problem, but a great investigation for high school geometry students. I suggest giving them pattern blocks and graph paper to draw sketches.

Remind students that a regular hexagon is equal to six equilateral triangles, and review the formula for the area of a triangle and other formulas they think they might need (such as Pythagorean theorem).

I would also encourage them to label different measurements they think will be helpful (such as the side length) and use actual numbers to calculate rather than trying to work with abstract variables.

For various methods of calculating the area, see this article:
https://www.wikihow.com/Calculate-the-Area-of-a-Hexagon

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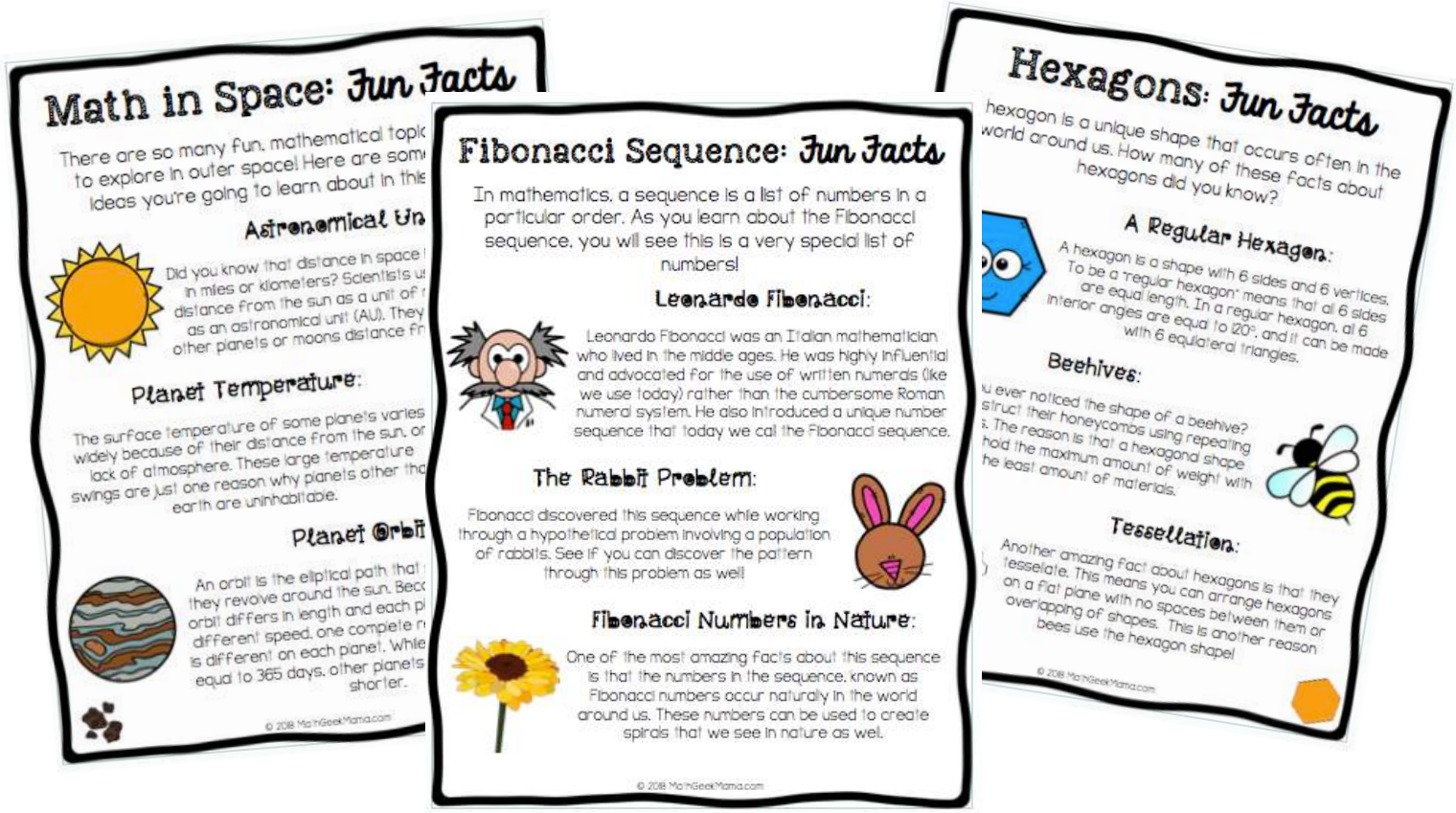
Fun Fact pages for each topic of study to use as a take home summary page:

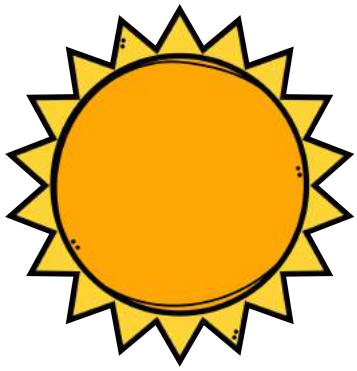


Plus, engaging student handouts and printable activities to accompany each topic of study.

Find samples of the 'Fun Fact' pages and some of the student handouts on the following pages.

Math in Space: Fun Facts

There are so many fun, mathematical topics to explore in outer space! Here are some ideas you're going to learn about in this unit.

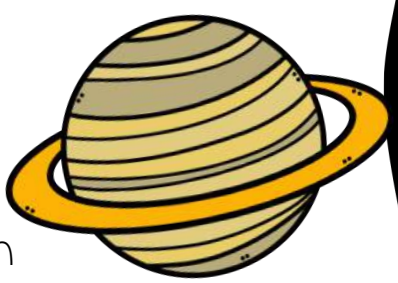


Astronomical Units:

Did you know that distance in space is not measured in miles or kilometers? Scientists use the earth's distance from the sun as a unit of measure, known as an astronomical unit (AU). They then measure other planets or moons distance from the sun in AU.

Planet Temperature:

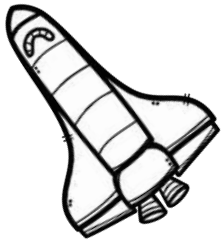
The surface temperature of some planets varies widely because of their distance from the sun, or lack of atmosphere. These large temperature swings are just one reason why planets other than earth are uninhabitable.



Planet Orbits:

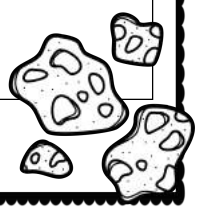
An orbit is the elliptical path that planets travel as they revolve around the sun. Because each planet's orbit differs in length and each planet revolves at a different speed, one complete revolution (a "year") is different on each planet. While a year on earth is equal to 365 days, other planets might be longer or shorter.

Math in Outer Space: Planet Orbits

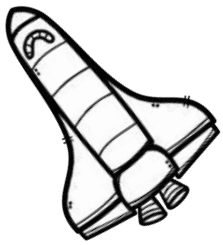


Because each planet is a different distance from the sun and travels at different speeds, a year on other planets is not the same as a year on earth. Use the information below to figure out how many "earth years" it takes each planet to revolve around the sun.

Planet	Number of Months	Total "Earth Years" (in decimal form)
Mercury	3 earth months	
Venus	7 earth months	
Mars	23 earth months	
Jupiter	142 earth months	
Saturn	354 earth months	
Uranus	1009 earth months	
Neptune	1979 earth months	



Math in Outer Space: Planet Orbits



Now that you know how many "earth years" it takes each planet to revolve around the sun, answer the discussion questions below.

1. Explain how you converted the number of months to earth years in your table. _____

_____

2. How many more years does it take Neptune to travel its orbit than Mars? _____

_____

3. Explain in your own words why some planets take so much longer to travel around the sun. _____

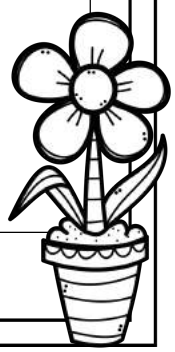
_____

_____

4. How old would you be if you spent one year on Saturn (one complete orbit)? _____

Math in Nature: Fibonacci Numbers

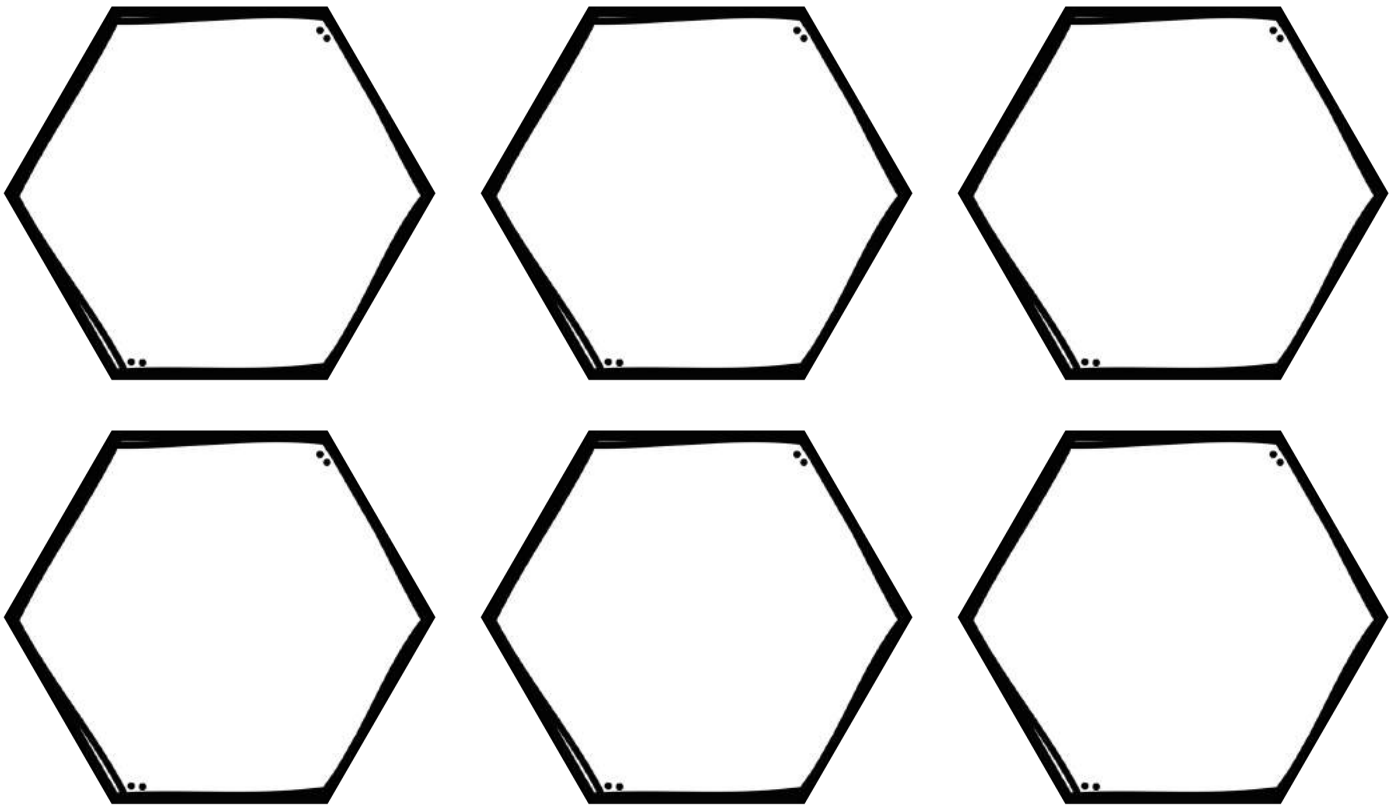
Although Fibonacci's rabbit problem is a little unrealistic, the pattern he discovered is actually found frequently in nature. Go on a Fibonacci number hunt in your yard or garden. **Draw pictures** of what you find and the **Fibonacci number** they represent below.



How Do We Make a Hexagon?

How many different shapes and combinations can we use to make a hexagon?

Using pattern blocks, you will roll the die & select the pattern block shown. Then use the blocks to fill in the hexagons below. Once all hexagons are filled, write a fraction equation to represent each hexagon (where a hexagon represents one whole, a trapezoid ½, etc.)



Fraction Addition Equations:

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____