



Tides and Volumes of Water Tidal Treats and Retreats

by Margaret Cullagh

Aim / Description:

Students can bake cookies while learning the principle of tides and the volume of water coming in and going out. Each student should seek to:

- Develop an understanding of the cycle of tides
- Calculate volumes of water during the tidal change and ingredients for baking.

The best time to go to the seashore to explore is during the two hours when the last bit of outgoing tide is still going out, and the two hours when the first bit of incoming tide is still coming in.

This gives a four-hour window for exploration, when the sand and rocks are at their most uncovered, and easiest to access. This is because there is less volume of water coming in and going out at this time.

Rule of Twelfths:

The tidal cycle is 24 hours and 52 minutes long. During this time, any point on the earth's surface experiences two high tides and two low tides each day.

Therefore, it takes just over six hours for a tide that is completely out to come completely in. Based on this, the water that comes in during an incoming tide can be divided into twelve volumes. It is important to remember that the twelve volumes of water come in and go out at different rates over the six hours.

RULE OF 12ths:

Number of hours for the tide to come in (and out)	1	2	3	4	5	6
NUMBER OF 12 ^{THS} OF WATER COMING IN PER HOUR	1/12	2/12	3/12	3/12	2/12	1/12
INGREDIENT RATIOS FOR TIDAL TREATS	BUTTER	CASTOR SUGAR	PLAIN FLOUR	PLAIN FLOUR	CASTOR SUGAR	BUTTER

Explorers Education Programme
Lesson Plan: Tides and Volumes of Water - Tidal Treats and Retreats
Strand: Cross curricular



YOU WILL NEED:

A mixing bowl
Butter
Castor sugar
Plain flour
A rolling pin
Some water
4 teaspoons
A baking tray
Cinnamon; or peanut butter; or chocolate.

Preheat the oven to 180 degrees

RECIPE:

The mixing bowl is the 'bay' and the ingredients are going to 'tide' into it.

Stick 1 teaspoon in the butter
Stick 1 teaspoon in the castor sugar
Stick 1 teaspoon in the flour
Stick 1 teaspoon in the water
DO NOT MIX UP THESE SPOONS!

AND NOW FOR THE TWELVE TIDAL STEPS:

If the ingredients were put in to a bowl at the same time it takes for the tide to come in, it would take six hours to make these treats. Since no-one should have to wait that long for a home baked cookie - lets speed things up.

- STEP 1** place 1 teaspoon of butter in the 'bay'
- STEP 2** place 2 teaspoons of castor sugar in the 'bay'
- STEP 3** place 3 teaspoons of plain flour in the 'bay'

This will be enough for one large cookie - but that might not be enough (they are VERY tasty) so you had better make another one.

- STEP 4** place 3 teaspoons of plain flour in the 'bay'
- STEP 5** place 2 teaspoons of castor sugar in the 'bay'
- STEP 6** place 1 teaspoons of butter in the 'bay'

Go through the 6 'tide steps' once *for each two large cookies you need.*

With clean hands, mush everything together until it feels like crumbly sand.

Dig a hole in the 'sand'

Explorer Education Programme
Lesson Plan: Tides and Volumes of Water - Tidal Treats and Retreats
Strand: Cross curricular



Using the teaspoon, place some water into the hole to make a small 'rock pool'

Mix it up well with your hands.

Keep adding teaspoons of water until the mixture is like plasticine. Divide the lump into as many 'biscuit-balls' as you wanted. Flatten, and roll the balls thinly (if you do not make them thin they are more chewy than crunchy when they are baked!)

Place the rolled 'biscuits' on a non-stick or greased tray.

Pop them into the oven (preheated to 180 degrees for 10 minutes)

When they are nice and brown take them out, and leave to cool before you touch them.

The biscuits are more likely to break when they are hot, and you are more likely to burn yourself when they are hot. So, go get yourself a big glass of cold milk and wait!

If you like cinnamon you could sprinkle some on top, or try peanut butter, or place a square of chocolate on each biscuit and let it melt!

ENJOY THE BEACH... AND THE BISCUITS.