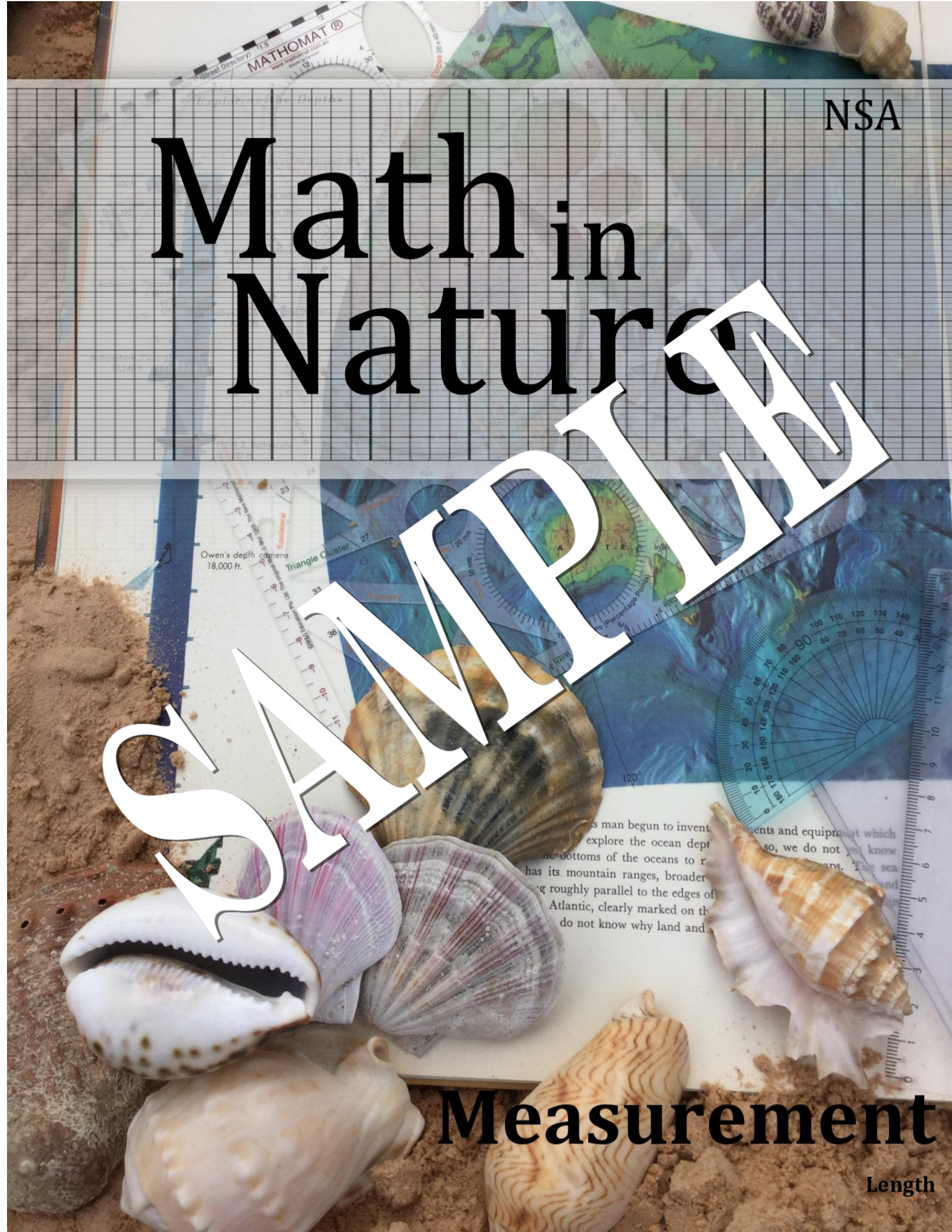
NSA

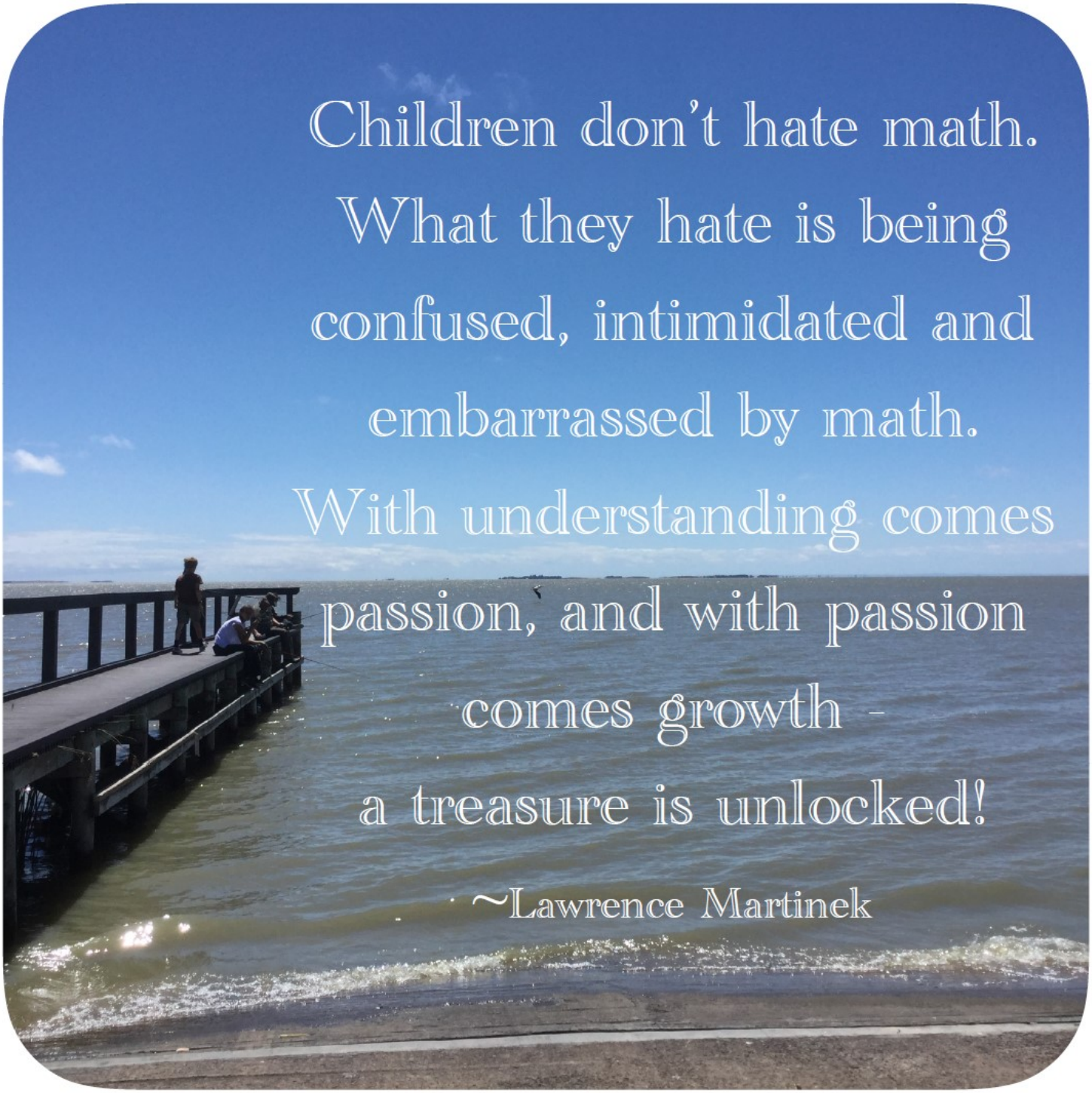
Math in Nature

SAMPLE



Measurement

Length



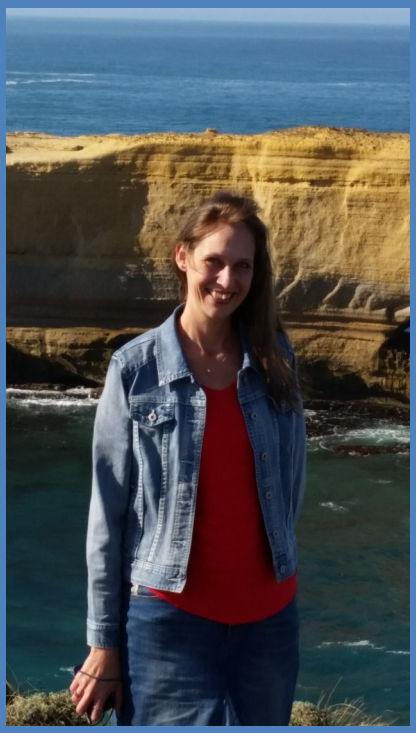
PHOTOCOPYING AND DISTRIBUTION POLICY

Contents

Welcome!

Hi!

I'm Johanna, a wife, mum to nine, mother-in-law to 2 and a proud Grandma to my first grandson! Our family has been home-educating for 17years.



I hope that I will be able to inspire you to love math and that in turn you will inspire your children to love math. If though, I don't convince you to love the subject, I hope that by the end of the guide you at least won't loathe it.

Come along with me and my children as we explore measurement…

I'm very excited to be able to share this guide with you!

About this guide

I have attempted to show the way that we explore math in our family. I hope it is a blessing to you!

This guide is NOT

- a comprehensive math curriculum.
- designed to teach your child everything about measurement or length.

You should not feel that you need to do everything in this guide. It is meant to be just that… a guide. Pick and choose what will work well for your children.

While you can have fun with measurement at any age and at any level most of the activities here assume that your child has a grasp of numbers up to 10 and is ready to explore larger numbers. These are the actual lessons that I did with my children (5,8,10 and 12yrs).

If you have any questions or need help with using this guide please feel free to email me at

jo.mathinnature@gmail.com

Or connect with me on Instagram

jo_mathinnature

Australian curriculum alignment

Below are listed some of the areas where this guide may align to the Australian Curriculum.

Year 1

- Measure and compare the lengths and capacities of pairs of objects using uniform informal units.
- Choose simple questions and gather responses and make simple inferences.
- Represent data with objects and drawings where one object or drawing represents one data value. Describe the displays.

Year 2

- Compare and order several shapes and objects based on length.
- Interpret simple maps of familiar locations and identify the relative positions of key features.
- Collect, check and classify data.
- Create displays of data using lists, table and picture graphs and interpret them.

Year 3

- Measure, order and compare objects using familiar metric units of length.
- Collect data, organise into categories and create displays using lists, tables, picture graphs and simple column graphs, with and without the use of digital technologies.
- Interpret and compare data displays.

Year 4

- Use scaled instruments to measure and compare lengths.
- Use simple scales, legends and directions to interpret information contained in basic maps.

Australian curriculum alignment

Year 5

- Choose appropriate units of measurement for length.
- Pose questions and collect categorical or numerical data by observation or survey.
- Construct displays, including column graphs, dot plots and tables, appropriate for data type, with and without the use of digital technologies.
- Describe and interpret different data sets in context.

Year 6

- Connect decimal representations to the metric system.
- Interpret secondary data presented in digital media and elsewhere.

Year 7

- Investigate, interpret and analyse graphs from authentic data.
- Round decimals to a specified number of decimal places.

More information on the mathematics strand in the Australian curriculum can be found here.

Resources

On the blue bar next to each lesson you will find a list of all the things you will need for that lesson and any book recommendations.

This is a master list for all lessons. Items in italics are optional.

Math Portfolio— a 3 ring binder works well, you can also use a manila folder, stapled at the sides to create an envelope for work done.

Various measuring tools in metric—ruler, tape measure (sewing), tape measure (woodworking), *set square, calipers, math measuring mat, metre rule, measuring wheel, digital measuring instrument.*

For lesson 2 you will need to put together a basket of measuring tools. The children will also love to receive their own ruler and tape measure especially for this unit.

Internet connections—Throughout the guide are links to various videos. While you can complete the activities without watching them they are included to enhance the lesson and be a help to you in teaching the concepts covered.

Stationery and Art supplies—Paper, pencils, rubber, scissors, glue, sticky tape, paint, magazines or old books for pictures, cardboard (recycled cereal boxes work well), manilla folder.

Printed and laminated Montessori style cards found in the appendix.

Printed Notebook Pages found in the appendix.

Small items for non-standard measurement (lesson 1) - shells, coins, paperclips, lego...

Ark model purchase here. (lesson 1)

A shell larger than 5cm for each child (lesson 3) If your children don't already have one you can buy one here.

An atlas with maps that have a metric scale. (lesson 5)

A canvas, acrylic pouring paint (blue, green, black and white), paper towel. (lesson 8)

Paper plate or carboard circle. (lesson 9)

Carboard box, carboard tubes or dowel. (lesson 9)

'Living' Math books to read and enjoy—see the list in the appendix

LESSON 8

Waves—Estimating

Estimating is NOT guessing!

It makes me wonder…

How high do you think that wave is? What else can you see in the picture?

I would be pretty scared if I was standing near that lighthouse when the wave came in!

Let's find out…

Sometimes when we are trying to work things out in math it is helpful to estimate. It gives us a good idea about what the answer might be. It would be very hard to measure the exact height of that wave but I could estimate the height.

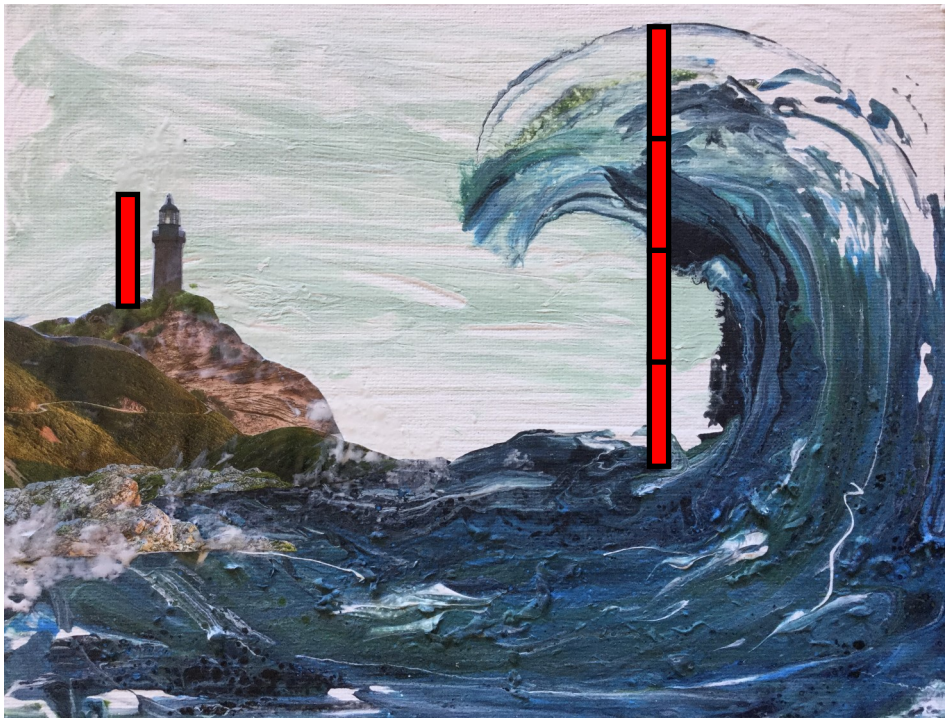
What information might help to work out the height of the wave?

I might like to know the height of the lighthouse. If I knew the height of the lighthouse I could work out the approximate height of the wave by thinking about how many lighthouses would make up the wave.

LESSON 8

Waves—Estimating

Estimating IS finding a value that is close to the right answer by using information and calculations.



Now when you look at the picture can you tell me how many lighthouses high the wave is?

Remember when we used non-standard measurement we used an object to measure something? Well in this picture the object is the lighthouse.

We would say the wave is 4 lighthouses high.

Now, if I told you my lighthouse is actually 10m high can you tell me how high my wave is?

This is the same method used by judges in surfing competitions to work out how high a wave is. Except instead of using the lighthouse as a measure they use the surfer. Watch this video to learn what they do.

On the next page you will find two more wave paintings. Can you estimate the height of these waves?

What other information do you need to work out the height of the wave?

Where could you go to find out the average length of a dolphin?

Would this information help you to work out the height of the first wave?

If I told you that the door of the *Red, White and Blue lighthouse* was 2m high would you be able to tell me the approximate height of that wave?

LESSON 8

Waves—Estimating

Materials Needed:

- A canvas, acrylic pouring paint (blue, green, black and white), paper towel, magazines to find pictures for your collage, glue.
- Paper, scissors, pencils, erasers.

What Can I Do …

- Make your own How Big is My Wave painting/collage.

You can watch a tutorial here to make the wave. Then add pictures from a magazine to complete your picture like the ones we made.

- Watch this video on scientists measuring waves. Here.
- Watch this video on estimation. Here
- Have some fun with estimation180 Here
- Learn more about estimating Here
- Think of some examples where knowing how to estimate the measurement of something would be helpful.

Look What I've Discovered …

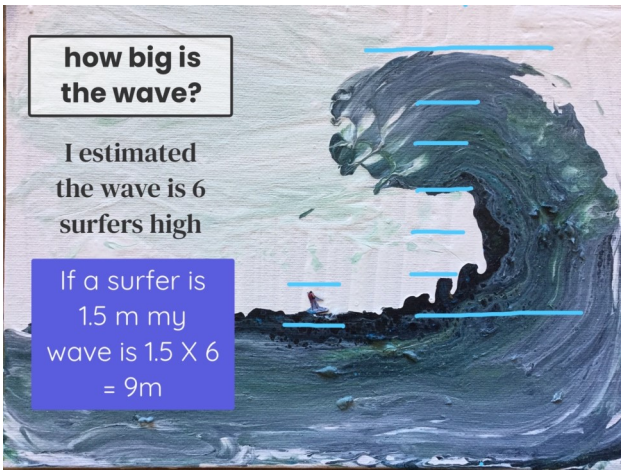
⇒ Take a digital picture of your wave and use the photo editing app on your iPad or computer to overlay with measurement details. (See the example in work from our home that my son did.)

⇒ Explain to someone how judges in surfing competitions will decide the height of a wave.

⇒ Explain to someone the difference between guessing and estimating.

⇒ Add work to your portfolio.

Examples of student work from our home:



C. USING THE '10X' CARDS

Materials Needed:

- 10x's cards, printed and laminated.
- Pipe cleaners, large wooden beads.
- Cuisenaire Rods, Base 10 blocks or Lego blocks
- A large mat to work on (I use a carpet square)

Using the counting by 10x's cards

Print out the 10s counting cards.

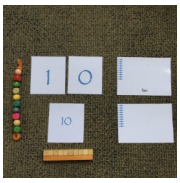
Using pipe cleaners and large wooden beads. Place ten beads on a pipe cleaner. Make 12 of these bead strings.

◊ Place one string of ten on a mat.

◊ Place the number 1 card next to it and say 'we have one string of ten beads.'

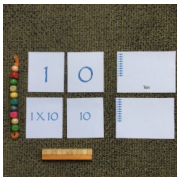
◊ Place a zero number card next to the 1 and say 'there are ten beads.'

◊ Find the card with 10 fish, place that on the mat.



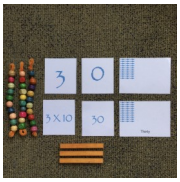
◊ Find the card with the 10 fish and the word 'ten', place that on the mat.

◊ You can also include Cuisenaire rods (or base ten blocks or Lego blocks) to show '10.'



◊ Find the 1 x 10 card and say '1 group of 10 equals 10' and then, '1 multiplied by 10 equals 10.'

◊ Continue in this way with the other cards.

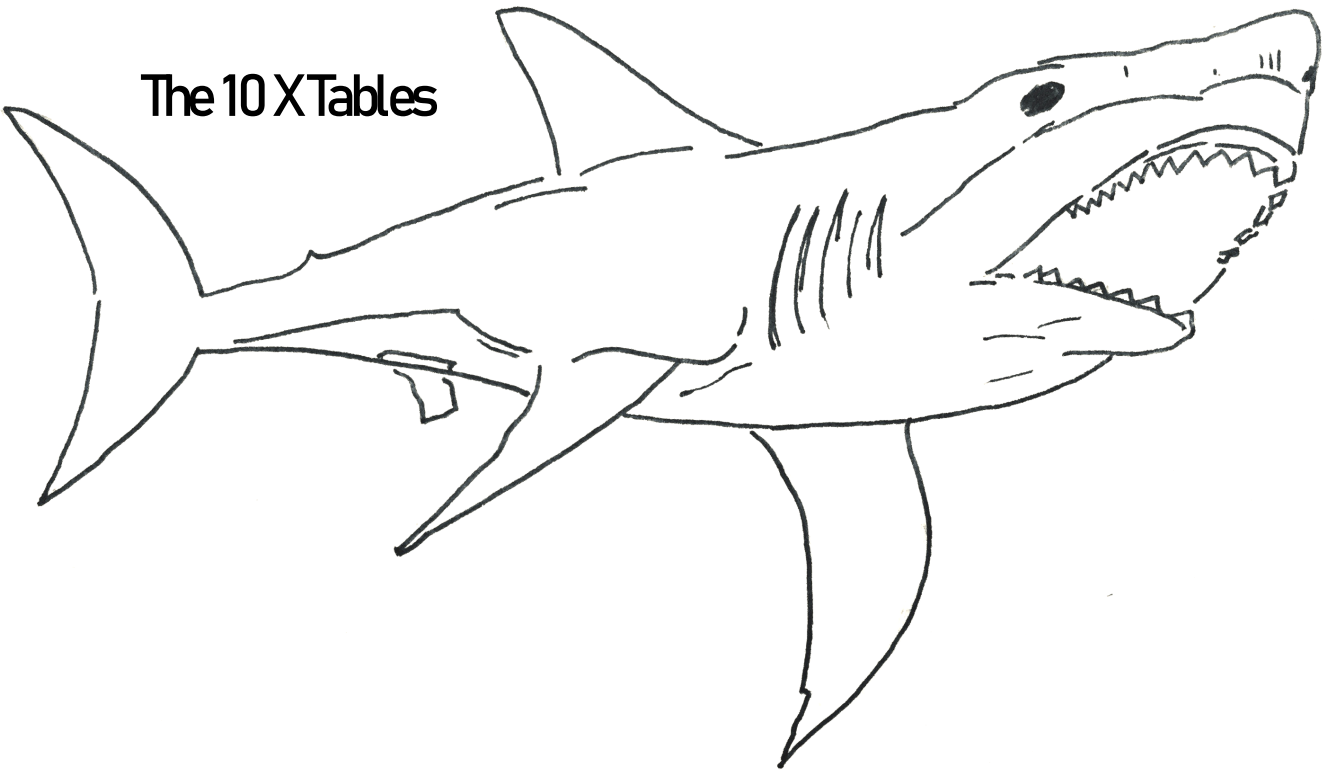


◊ Let the children work through the cards, matching the symbol, number and word cards with the right amount of bead strings.

Have the children practice counting in tens with the bead strings.

Have the children practice writing the number words by copying the cards or by using the copy-work sheets in the Notebook pack.

The 10 X Tables



1 x 10 = 10

2 x 10 = 20

3 x 10 = 30

4 x 10 = 40

5 x 10 = 50

6 x 10 = 60

7 x 10 = 70

8 x 10 = 80

9 x 10 = 90

10 x 10 = 100

11 x 10 = 110

12 x 10 = 120