

Teacher's Resource Pack

Stage 4 &
Stage 5

Mathematics



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AQUARIUM



Welcome to SEA LIFE Sydney Aquarium's Mathematics Student Resources



Teacher Notes

A trip to SEA LIFE Sydney Aquarium complements integrated learning across a multitude of subject areas.

Taking learning out of usual school environments offers students a more diverse approach to tackling mathematical problems in a real life setting.

The following Teacher Resource contains worksheets to aid the teaching of mathematics whilst you visit SEA LIFE Sydney Aquarium. All are closely aligned to both the key objectives of the NSW Syllabus and can also be implemented within the new Australian National Curriculum.

Stage 4 Measurement and Geometry Area and Volume

Outcomes A Student:

- 4.1 represent mathematical ideas using appropriate terminology, diagrams and symbolism
- 4.2 applies appropriate mathematical techniques to solve problems
- 4.3 calculates time durations, lengths and areas of plane shapes and volumes of prisms and cylinders

Number and Algebra Fractions, Decimals and Percentages

- 4.3 Recognises and explains mathematical relationships using reasoning.

Stage 5 Number and Algebra Financial Mathematics

Outcomes A Student:

- 5.1.1 communicates mathematical ideas using appropriate terminology, diagrams and symbolism
- 5.1.2 selects and uses appropriate strategies to solve problems
- 5.1.3 provides reasoning to support conclusions which are appropriate to the context

Stage 4 : Averages

Whilst visiting SEA LIFE Sydney Aquarium, find an exhibit that has a large number of fish displayed. There may be one or more species of fish present. Select the species of fish which appear to have the largest number.

What is the name of this fish?

Try to count the number of these fish present. Do this three times and record your answers below. The average (or mean) is calculated by finding the total of the three counts and dividing by 3.

1st count: _____

2nd count: _____

3rd count: _____

Total: _____

Average (mean): _____

Convert this to the nearest whole number: _____

Why can't you be sure that you have the correct number each time?

Why do we find the mean to estimate the number?

Why is it easier to estimate the numbers of fish rather than count them all?



Stage 4: Shape, Space & Measurement

This activity will require you to find certain animal species within SEA LIFE Sydney Aquarium, and look at them closely.

Find the octopus. Why is the octopus given its name? _____

What is the shape of the octopus' suckers? _____

Find the sea horse. Which letter of the alphabet does the sea horse resemble? _____

Is it symmetrical? If so, what type of symmetry? _____

What shape are its body segments? _____

Find two other animals that are symmetrical. What are their names? _____

When visiting the Great Barrier Reef exhibit at SEA LIFE Sydney Aquarium, read the information panel about the reef. Imagine that the Great Barrier Reef is continuous and rectangular in shape. Given the area of the Great Barrier Reef and its length, calculate its width:

Find a sea star. How many arms does it have? _____

Do all sea stars have the same number of arms? _____

In the box, sketch it as if its arms were evenly spaced out.

Join the tip of each arm to the tip of the next arm with a straight line.



Is the polygon a regular polygon or not? Give a reason for your answer.

Draw in the axes of symmetry on your sketch. How many are there?

What is the other type of symmetry that you can see in the sea star, and of what order is this type of symmetry?

Stage 4: Volume

Using the dugong exhibit, you will use your estimation/measuring skills to calculate the volume of the pool they live in.

By pacing, measurement or estimation, calculate the dimensions of the dugong pool.

Length (m): _____

Width (m): _____

Depth (m): _____

Find the surface area of the pool (remember the units)

Find the volume of the pool (remember the units)

On an average September day, 3.4 litres of water per sq m are lost through evaporation due to heat. Based on your measurements, how many litres of water need to be added to the pool per day in September?

Count how many dugongs are present in the pool:

Calculate the volume of water (in litres) per dugong:



Stage 5: Volume

Locate the dugong tank. Each day 15% of the water in the seawater tanks is replaced with freshwater.

If this is done continuously, what is the rate of water replacement (as a percentage):

Per hour? _____

Per minute? _____

Per second? _____

At the same time as the water replacement is going on, so is filtration of the water in the tanks. Water is taken out, treated and returned to the tank. The total volume of this tank is filtered every $1\frac{1}{2}$ hours at an astonishing rate of 509 litres per second. Using this information we are going to calculate the volume of the tank.

Filtering 509 litres per second means:

_____ litres per hour
_____ litres per $1\frac{1}{2}$ hours

The total volume of the tank is then: _____ litres

To filter the water 70% is drawn from the bottom of the tanks through 88 bottom outlets and the remainder is drawn off through surface skimmers. Remembering that the filtration rate is 509 litres per second;

What percentage is drawn off through the surface skimmers? _____

What volume of water is drawn off the surface per second? _____

What volume is drawn off the bottom per second? _____

What percentage of the total volume is handled by one of the bottom outlets, assuming all outlets handle the same volume?

Find the exact volume per second to 5 significant figures that the percentage in the question above represents?

Water is aerated to ensure there is a saturation level of oxygen greater than 95%. If X% is the actual level of oxygen saturation in the water and S% is the maximum level of saturation possible, then fill in the following statement with 95%, S% and X%.

_____ < _____ < _____

Stage 4: Estimating Fish Numbers

One method of estimating a large number of fish is to scoop a section of the tank and tag all the fish that are caught. Next, the tagged fish are returned and the same section of the tank is scooped again. The ratio of tagged to untagged fish caught can be applied to the total number of fish in the tank.

If the first scoop of banded rainbow fish netted 45 fish, which were then tagged and returned, and a second scoop of the tank netted 60 fish, 18 of which were tagged:

How many fish are there in the tank? _____

Locate the following fish types in the Southern Rivers exhibit. Use the information to fill in the table below. Then construct a scatter diagram on a separate piece of graph paper using the information from the table.

| FISH | Maximum Length (m) | Maximum Mass (kg) |
|--------------------|--------------------|-------------------|
| Golden Perch | | |
| Silver Perch | | |
| Australian Bass | | |
| Freshwater Catfish | | |
| Murray Cod | | |
| Trout Cod | | |

Using your knowledge of patterns in scatter diagrams, write a sentence to describe what conclusions you could draw about the trend concerning mass and length of a fish?

Think about another two characteristics which when graphed would NOT show this trend?
