

STAGE 4

ZOO MATHEMATICS

Learning resource



Zoo Keepers work mathematically every day to ensure that the animals are healthy and safe.

Students will learn how to calculate daily dietary requirements, track animal weight, design enclosures and locate and guide themselves around the Zoo.

These resources allow students to explore the Zoo via [Taronga TV](#) from home or at school.

Taronga Conservation Society Australia would like to thank NSW Department of Education Mathematics Advisors for their contributions to this resource.

STAGE 3 - MATHEMATICS OUTCOMES		
Problem	Outcome	Content Descriptor
1	MA4-15MG - Time	performs calculations of time that involve mixed units, and interprets time zones
	MA4-1WM - Communicating	communicates and connects mathematical ideas using appropriate terminology, diagrams and symbols
	MA4-2WM - Problem Solving	applies appropriate mathematical techniques to solve problems
2	MA4-2WM - Problem Solving	applies appropriate mathematical techniques to solve problems
	MA4-3WM - Reasoning	recognises and explains mathematical relationships using reasoning
3	MA4-5NA - Fractions, Decimals and Percentages	operates with fractions, decimals and percentages
	MA4-19SP - Data Collection and Representation	collects, represents and interprets single sets of data, using appropriate statistical displays
	MA4-3WM - Reasoning	recognises and explains mathematical relationships using reasoning
4	MA4-5NA - Fractions, Decimals and Percentages	operates with fractions, decimals and percentages
	MA4-19SP - Data Collection and Representation	collects, represents and interprets single sets of data, using appropriate statistical displays
	MA4-3WM - Reasoning	recognises and explains mathematical relationships using reasoning
5	Volume - MA4-14MG	uses formulas to calculate the volumes of prisms and cylinders, and converts between units of volume
	Length - MA4-12MG	calculates the perimeters of plane shapes and the circumferences of circles
	Area - MA4-13MG	uses formulas to calculate the areas of quadrilaterals and circles, and converts between units of area
	MA4-1WM - Communicating	communicates and connects mathematical ideas using appropriate terminology, diagrams and symbols
6	MA4.5NA – Addition and Subtraction	Selects and applies appropriate strategies for addition and subtraction with counting numbers of any size
	MA4-1WM - Communicating	communicates and connects mathematical ideas using appropriate terminology, diagrams and symbols
7	MA4-19SP - Data Collection and Representation	collects, represents and interprets single sets of data, using appropriate statistical displays
	MA4-3WM - Reasoning	recognises and explains mathematical relationships using reasoning
8	MA4-19SP - Data Collection and Representation	collects, represents and interprets single sets of data, using appropriate statistical displays
	MA4.1WM - Communicating	Describes and represents mathematical situations in a variety of ways using mathematical terminology and some conventions

Before your visit

Problem 1

Ticket prices:

Go to the [Taronga Sydney](#) website and investigate the cost of going to the Zoo with your family or a group of friends. Record the various packages available and compare the price of family packages with purchasing individual tickets for each family member. Compare the cost of buying tickets online with buying them at the Zoo.

Transport costs and times:

Organise your day by investigating your public transport options to and from the Zoo from your local bus, train and/or ferry station. To make the most of your day, plan to arrive at the Zoo when the doors open and leave when the doors close.

Planning your food for the day:

Plan out your menu for the excursion for you and three friends. You have a \$100 budget between all of you. Shop online to source your snacks, drinks and lunch for the day (see scaffold on next page).

Shopping ethically:

Visit the Taronga Conversation Society website, "[Raise your palm](#)" and read about palm oil and its impact on the environment. Use the WWF Palm Oil Buyers Scorecard on the site to check your purchases in the previous activity. How do the products score?

Visit the [Tiger Trek](#) and watch the clip, "Meet our tiger family". This website states that:

"With only 350 Sumatran Tigers left in the wild, these cubs are incredibly important, representing nearly 1 % of the total wild population of tigers."

How many Sumatran tigers are left in the world (wild & captivity)? Can you determine an appropriate range of tigers that might be left in the world?

Planning your food for the day Activity

Plan out your menu for the excursion for you and three friends. Keep in mind that you will need something for recess, lunch and a small fruit snack.

You have a \$100 budget between all of you. Shop online to source your food and drinks.

Fill in the table below:

Student 1	Item(s) Chosen	Quantity	Total Cost
Fruit Snack			
Recess			
Lunch			
Drink			
Student 2	Item(s) Chosen	Quantity	Total Cost
Fruit Snack			\$
Recess			\$
Lunch			\$
Drink			\$
Student 3	Item(s) Chosen	Quantity	Total Cost
Fruit Snack			\$
Recess			\$
Lunch			\$
Drink			\$
Student 4	Item(s) Chosen	Quantity	Total Cost
Fruit Snack			\$
Recess			\$
Lunch			\$
Drink			\$
OVERALL COST			\$
Change from \$100			\$

Before your visit

Problem 2

Using a [map of the Zoo](#) and the Zoo timetable (on the right-hand side of the map), write a proposed itinerary for the day if your school is arriving when the Zoo opens and departing* at _____ pm.

* The Zoo is open at 9.30 am. When planning a departing time, take into account how long the bus will take to get back to your school from Taronga Zoo. You need to be back at your school by 3:00 pm

ACTIVITIES:

- 1) Draw a Cartesian Plane over the Taronga Zoo map.
 - a. Write down the coordinates for all the places you plan to visit on your itinerary.

- 2) Using the scale on the map:
 - a. Estimate the distance you will have walked throughout the Zoo in a day.

Weighing animals

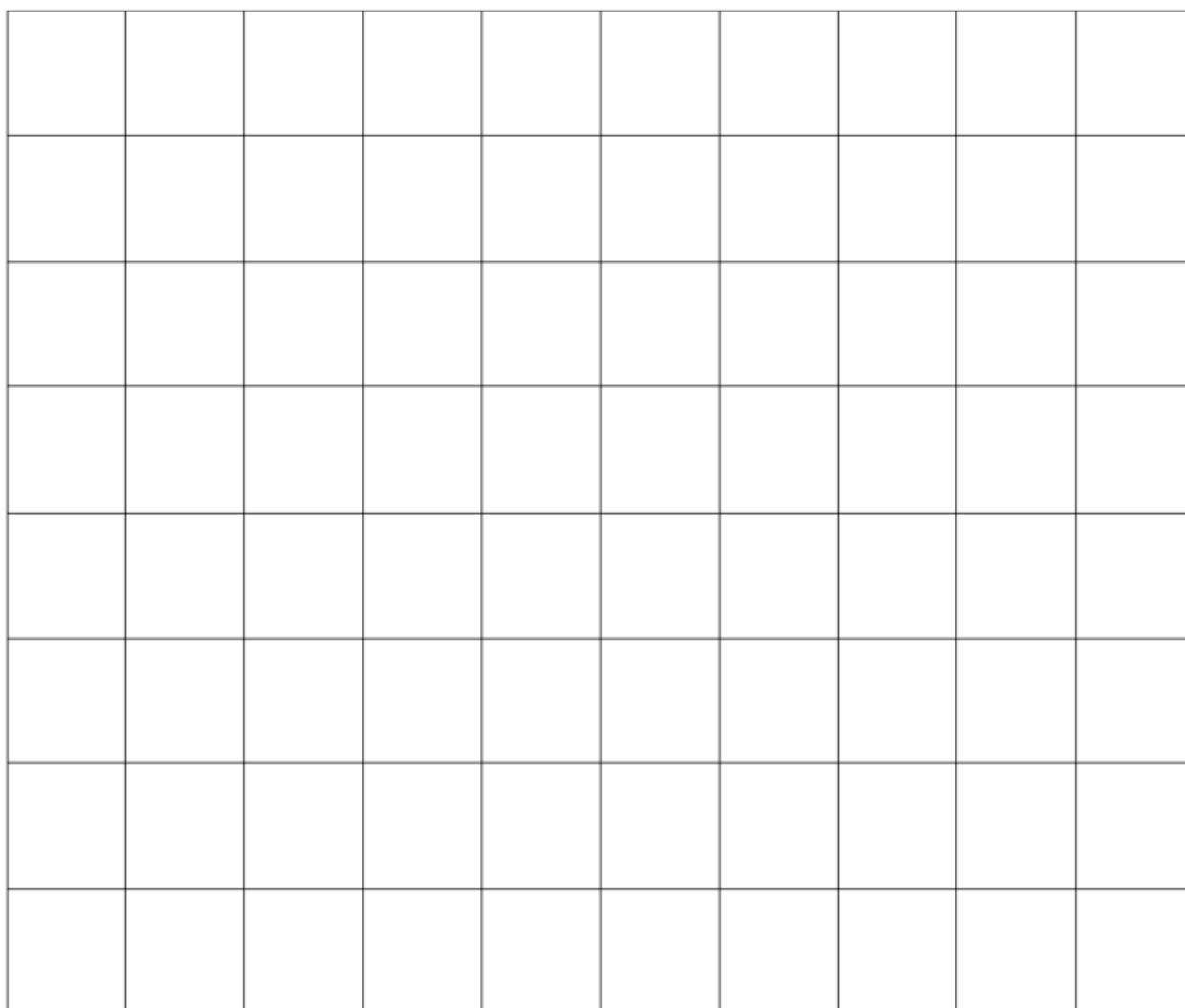
Problem 3

An essential part of a zoo keeper's job is to monitor the health of the animals in their care. One way they do this is to regularly weigh the animals and compare these weights over time. Below is a table that shows the weights of three Shingleback Lizards over 5 weeks.

	2/9/19	9/9/19	16/9/19	23/9/19	30/9/19
Wanilla	772g	761g	770g	766g	784g
Caltowie	744g	750g	730g	735g	740g
Guibar	820g	815g	802g	800g	798g



- a) Use the data above to create a graph below that best demonstrates the changes in the shingle back lizards' weights over time. (Don't forget to label your graph and use an appropriate scale.)



b) **Explain** why the graph you choose is the most appropriate way to display this data?

c) **Describe** the trends you observed over time for each Lizard in the space below

i. Wanilla

ii. Caltowie

iii. Guibar

d) What are the similarities and differences in the weights of the lizards over time?

Similarities	Differences

Animal diets

Problem 4

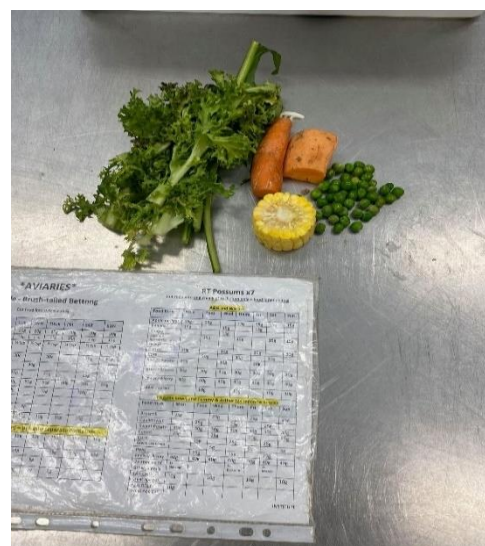
Zoo Keepers' prepare food for animals in their care. Food preparation for the animals at the zoo is often organised one week in advance. This means collecting the required items in advance.

Your job is to:

a) **Calculate** the food items required for two (2) ringtail possums every Monday (record in the column provided below)

b) **Calculate** the food items required for two (2) ringtail possums for the week (record in the column provided below)

c) **Research** and **fill** in the classification of the food items that the possums eat (each item will either be non-vegetable, green vegetable or non-green vegetable) We have started the process for you.



Diet	Amount per day per possum	Classification	Days possum receives food item	Amount of food for two possums on a Monday	Amount of food for two possums in a week
Hose pellets	30g	Non-vegetable	Everyday		
Spinach	15g		Everyday		
Endive	15g	Green vegetable	Everyday		
Lettuce	15g		Everyday		
Broccoli	1g		Everyday		
Corn	5g		Everyday		
Carrot	30g		Tu, Th, Sat		
Sweet potato	30g	Non-green vegetable	M, W, F, Sun		
Peas	5g		Th, Sat		
Eggplant	5g	Non-green vegetable	M		
Capsicum	5g		Tu		
Fennel	5g	Non-green vegetable	W		
TOTAL					

- d) What fraction of the ringtail possum's **weekly diet** is made up of non-vegetables, green and non-green vegetables?

Classification	Total (grams)	Fraction	Find Percentages
Non-vegetables			
Green vegetables			
Non-green vegetables			

- a) **Construct** an appropriate graph that compares the total of each classification of food

- b) Does the fraction of greens that the ringtail possums consume each day change across the week?
How do you know?

- c) Create a pie chart to display the percentages of each classification of food.

Noticing 3D objects at the zoo

Problem 5

Look carefully in and around the chimpanzees' exhibit enclosure.

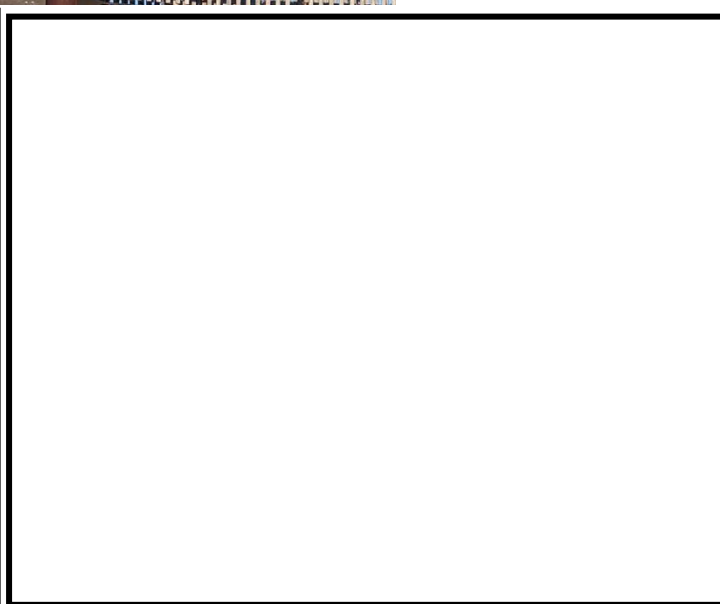
Identify and record the number of 3D objects you can see.

Draw and label the 3D objects below.

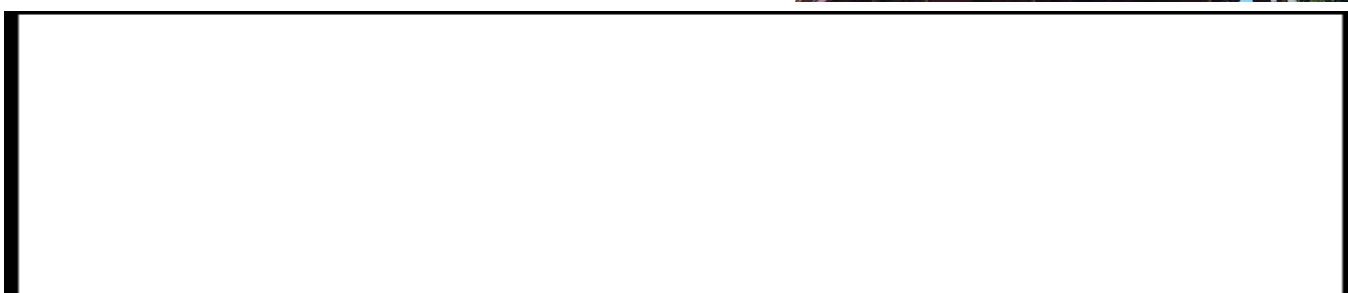
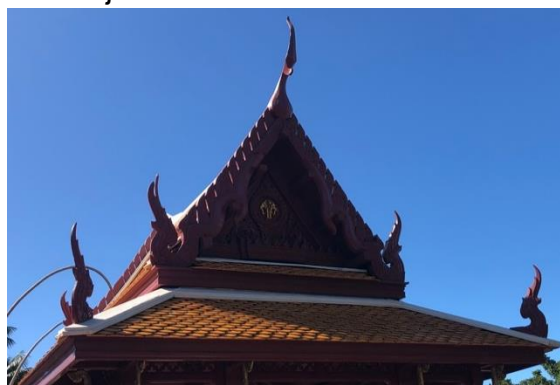


Photo: Rick Stevens

Examine the roof of the Elephant enclosure (*image below*). Sketch a side view and top view in the boxes below



Sketch a top and side view of this roof. Identify what 3D objects are used to create this roof.



I. Go onto and watch [Taronga TV](https://www.tarongazoo.com.au/taronga-tv) to see the latest in what is happening at the Zoo.



View a live tiger feeding taking place, this might help you with Problem 6



Tiger Cam

Spend some time with Sumatran Tigers. The three cubs are especially playful - you might catch them crouching in the crate or jumping on the Jeep! They are most active around their 9.30am and 2.15pm feeding times.

Using the map of Taronga Zoo Sydney, locate the enclosures of where these animals are being filmed, provide grid-references.



Seal Cam

Relax and take in the serenity of crystal blue waters in our Greater Southern Oceans precinct and watch the seals playfully glide and swim past the glass.



Elephant Cam

Wondering what mischief cheeky Asian Elephant calf Jai Dee is causing in the elephant herd today? Watch him with mum and aunt as they graze, swim and play.



Draw a design for a new enclosure for a reptile or chimpanzee. It must meet the requirements in the table, but can be any shape you choose:

	Reptile (<i>Dimensions</i>)		Chimpanzee (<i>Dimensions</i>)	
Total Area	2500 cm ²	L= _____ cm	_____ cm ²	L= 48m
		W= _____ cm		W= 36m
Total Volume	312,500 cm ³	L= _____ m W= _____ m H= 1.25m	N/A	N/A
Must include:	Water (<i>how much will depend on the reptile- research needed</i>) Rocks Logs (<i>climbing/perching</i>)		The climbing frame (<i>12m high</i>) Logs (<i>4-5m in length</i>) Netting (<i>6m x 8m</i>)	

- Fill in the blanks
- Create a scale and sketch your design below. Justify the shape and placement of features in your design.

Keeping up with the cubs

Problem 6



1st October 2019

1st February 2020

Read and examine the information on the boards above about the Sumatran Tiger Cubs at Taronga. Answer the questions below

- How many days between these two photos? _____
- How many months old are the cubs in the Oct 2019 photo? _____
- How many months old are the cubs in the Feb 2020 photo? _____
- What is the difference in weight between Oct & Feb (*both grams & kilograms*)?
 - Mawar: _____ kg _____ g
 - Pemanah: _____ kg _____ g
 - Tengah Malam: _____ kg _____ g

5. What do you notice about how much food is consumed by the cubs between the two photos?

6. Write a mathematical problem using the information to give to another classmate.

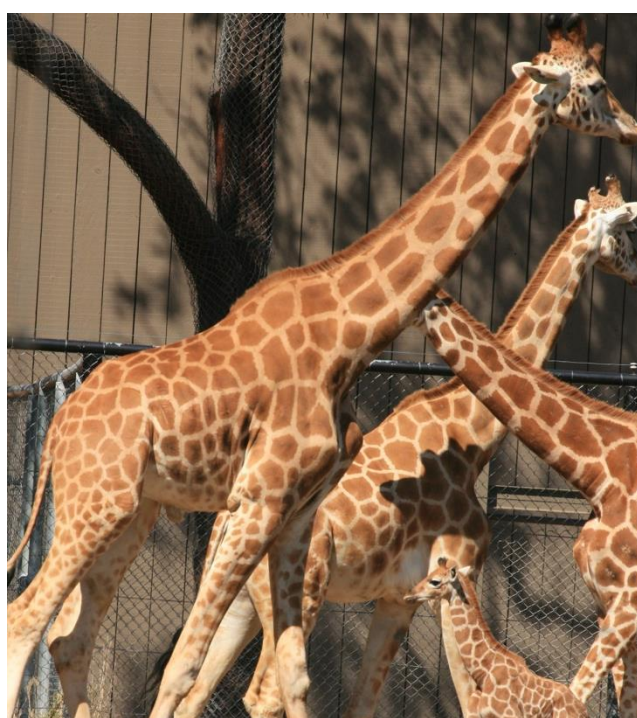
Animal patterns

Problem 7

What shapes make up the Giraffe's skin pattern?

- Fill in the table with the names of the different shapes you can see.
- Draw examples
- Are they regular (all sides and angles equal) or irregular? **Justify** your answer.

Name of Shape:	Triangle				
Image of shapes:					
Regular/ Irregular & Why					



A zookeeper's schedule

Problem 8

Below is an outline of the daily routine for a zookeeper working with lions, goats and bongos at Taronga Zoo Sydney. Use the information below to:

1. **Complete** the time chart
2. **Create** an easy to read timetable for a new zookeeper working on this division (on a separate piece of paper). Times must be written in 24-hour time.

Daily tasks	Time/duration	duration	Start time (24 hr)	Finish time 24 hr)
Location check of lions	8:20 – 8:30			
Exhibit clean and enrichment	20 minutes	20 minutes		
Lions put on exhibit and locations tagged on board	10 minutes	10 minutes		
Goats shift, clean and feed	9:00 – 9:40			
Bongo shift, feed and clean	20 minutes	20 minutes		
Lion talk	25 minutes	25 minutes		
Night yard clean	10:25 – 10:50			
Morning tea	½ an hour	½ an hour		
Morning team meeting	11:20 – 11:50			
Night yard and raceway clean	70 minutes	70 minutes		
Lunch	1:15 – 2:00			
Collect food buckets	¼ of an hour	¼ of an hour		
Finish back of house jobs	½ an hour	½ an hour		
Lion talk	2:45 – 3:10			
Male and female lions put in night dens, fed and locations tagged on board	½ an hour	½ an hour		
Bongo put in night dens	20 minutes	20 minutes		
Wash buckets	¼ of an hour	¼ of an hour		
Write daily report	4:15 – 4:30	duration		

- END -