STAGE 3
ZOO MATHEMATICS
Learning resource

Zookeepers work mathematically every day to ensure that all animals in their care are healthy and safe.

Students will learn how to calculate daily dietary requirements, track animal weight, design enclosures and apply measurement skills needed to navigate the Zoo.

This resource could be used before or after a Zoo visit or could serve as a standalone learning task that can be completed at school.

Problem	Outcome	Content Descriptor
	STAGE 3 - MATHEMATICS OUTCOMES	
1	MA3.5NA – Addition and Subtraction:	Selects and applies appropriate strategies for addition and subtraction with counting numbers of any size
	MA3-13MG Time	Uses 24-hour time and am and pm notation in real-life situations and constructs timelines.
	MA3.17MG- Position	Locates and describes position on maps using a grid-reference system
	MA3.2WM-Problem Solving	Selects and applies appropriate problem-solving strategies including the use of digital technologies in undertaking investigations
	MA3.3WM- Reasoning	Gives a valid reason for supporting one possible solution over another
2	MA3-18SP-Data	Uses appropriate methods to collect data and constructs, interprets and evaluates data displays, including dot plots, line graphs and two-way tables.
	MA3.7NA- Fractions, Decimals and Percentages	Compares, orders and calculates with fractions, decimals and percentages
	MA3.1WM - Communicating	Describes and represents mathematical situations in a variety of ways using mathematical terminology and some conventions
	MA3.3WM- Reasoning	
3	MA3.7NA- Fractions, Decimals and Percentages	Compares, orders and calculates with fractions, decimals and percentages
	MA3-18SP-Data	Uses appropriate methods to collect data and constructs, interprets and evaluates data displays, including dot plots, line graphs and two-way tables.
	MA3.1WM-Communicating MA3.2WM- Problem Solving MA3.3WM-Reasoning	
4	MA3.11MG-Volume and Capacity	Selects and uses the appropriate unit to estimate, measure volume and calculate volumes and capacities and converts between units of capacity
	MA3.6NA – Multiplication and Division	Multiplication and Division: Selects and applies appropriate strategies for multiplication and division and applies the order of operations to calculations involving more than one operation
	MA3.1WM-Communicating MA3.2WM- Problem Solving	
5	MA3.15MG – Two-dimensional Space	Manipulates, classifies and draws two-dimensional shapes including equilateral, isosceles and scalene triangles and describe their properties
	MA3.14MG- Three-dimensional Space	Identifies three-dimensional objects including prisms and pyramids on the basis of their properties and visualises, sketches and constructs them given drawings of different views
	MA3.10MG- Area	Selects and uses the appropriate unit to calculate areas, including areas of squares, rectangles and triangles
	MA3.1WM-Communicating MA3.2WM- Problem Solving MA3.3WM-Reasoning	
6	MA3.5NA – Addition and Subtraction:	Selects and applies appropriate strategies for addition and subtraction with counting numbers of any size
	MA3-12MG- Measurement & Geometry:	Selects and uses the appropriate unit and device to measure the masses of objects and converts between units of mass
	MA3.1WM-Communicating MA3.2WM- Problem Solving	
7	MA3.15MG – Two-dimensional Space	Manipulates, classifies and draws two-dimensional shapes including equilateral, isosceles and scalene triangles and describe their properties
	MA3.3WM-Reasoning	Gives a valid reason for supporting one possible solution over another
8	MS3.13MG – Time	Uses 24-hour time and am and pm notation in real-life situations and constructs timelines.
	MA3.1WM-Communicating MA3.2WM-Problem Solving	

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Before your visit	Problem 1

a) Ticket prices

Go to the [Taronga Western Plains Zoo Dubbo](#) website and **i**nvestigate the cost of going to the Zoo with your family or a group of friends. **Record** the various packages available and **compare** the cost of a family package with the cost of purchasing individual tickets for each family member. **Compare** the cost of purchasing tickets online with buying them at the Zoo.

b) Transport costs and times

Organise your day by investigating your public transport options to and from the Zoo from your local bus and/or train station (assume that you have to arrive at the Zoo by 9am and leave by 4pm).

c) Planning your food for the day

View the lunch menu for the Midway Café on the next page. Make your selection for lunch from the menu and **record i**t in the table below. Now record the order and cost of **three other** friends or family members meals in the table below.

I.   Would $100 be enough to cover the bill?

II.   What change would you receive from $100?

	Menu item chosen	Cost
Person 1		
Person 2		
Person 3		
Person 4		

Total cost: $ _____

Change from $100: $ _____

III.   Adjust your choices given that you have $50 between the four of you.

	Menu item chosen	Cost
Person 1		
Person 2		
Person 3		
Person 4		

Total cost: $ _____

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LUNCH

Served daily from 11:30am – 2:30pm

TO SHARE

BOWL OF CHIPS — $7.00
Served with aioli (V)

BOWL OF SWEET POTATO CHIPS — $9.00
Sweet potato chips served with aioli (V)

BRUSCHETTA — $14.50
Toasted sourdough smothered with basil pesto, grilled haloumi and grilled capsicum salad (V) (GF)

CRISPY CHICKEN WINGS — $15.90
Tossed in smokey BBQ sauce served with truffle aioli

MEALS

SOUP — $12.00
Soup of the day with toasted sourdough (GF)

ORECCHIETTE PASTA — $17.50
Chorizo, salami, basil, extra virgin olive oil and fresh tomato tossed in orecchiette pasta

CRISPY WHITING — $14.50
Served with salad, chips and aioli

STICKY CHICKEN & SOBA NOODLE BOWL — $18.50
Wok tossed chicken in a sticky chilli, ginger and soy sauce with soba noodles and fresh cucumber

BBQ BRISKET BURGER — $18.50
Slow cooked smoky BBQ brisket, fried egg, fresh tomato and aioli on a potato bun served with chips

CHICKEN BURGER — $18.90
Grilled chicken breast on a potato bun with bacon, pineapple, mixed leaves, sliced tomato & aioli, served with a side of sweet potato fries (GF)

STEAK SANDWICH — $19.50
Grass fed scotch fillet with caramelized onion, Swiss cheese, lettuce, tomato, beetroot on toasted sourdough served with chips (GF)

QUINOA CHICKEN BURRITO — $17.90
With avocado, corn salsa, red quinoa, sour cream, chilli & leafy greens
Served with chips

FOR THE KIDS

CHEESEBURGER & CHIPS — $12.00
Beef, cheese & tomato sauce

GRILLED CHICKEN WRAP — $11.50
Burrito style with avocado, cheese, corn and tomato salsa
Served with chips

HAM & CHEESE PIZZA — $11.00
Crisp tortilla base, topped with ham & cheese on a tomato base

DINOSAUR CHICKEN NUGGETS (6) — $11.00
Served with chips and tomato sauce

BEVERAGE MENU

Please order and pay at the counter

FROM THE CAFE

COFFEE — FROM $4.20
Cappuccino, latte, flat white, mocha, macchiato, espresso, long black, piccolo latte, hot chocolate, chai latte

Extra coffee shot	+ $1.00
Hazelnut, caramel or vanilla syrup	+ $1.00
Mocha shot, soy & lactose free milk	+ $0.50

POT OF TEA — $4.50
English Breakfast, Earl Grey, Green, Peppermint, Chamomile

ICED DRINKS — $7.00
Iced coffee, iced chocolate or iced mocha

MILKSHAKE — Small $4.50 Large $6.50
Chocolate, banana, strawberry, vanilla or caramel

ICED TEA — $5.20
Peach or Lemon

WATER
Bottled water	$4.50
Sparkling water	$4.00
Vitamin water	$6.20
Deep Spring Flavoured Water	$4.20

SOFT DRINK — $4.20
Coke, Coke Zero, Diet Coke, Vanilla Coke, Sprite, Fanta, Lift, Creaming Soda or Pasito

FROZEN SOFT DRINK — Small $4.50 Large $6.50
Coke or Raspberry Fanta

FLAVOURED MILKS — Small $3.90 Large $5.50

POWERADE — $5.50
Mountain Blast, Berry Ice & Sugar-free Lemon Lime

JUICE — $4.50
Apple or Orange Keri fruit juice

d) Planning your day at the Zoo

Using a **map of the Zoo** and the Zoo timetable *(on the right-hand side of the map)*, **write** an itinerary for the day if your class is arriving when the Zoo opens at **9am** and departing at **4pm**.

EXTENSION ACTIVITY: Using the scale on the map estimate the distance you will walk when you visit the Zoo.

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Weighing animals

Problem 2

An essential part of a zookeeper'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 five 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 that best demonstrates the changes in the Shingleback Lizards' weights over time.

   Don't forget to label your graph and use an appropriate scale!
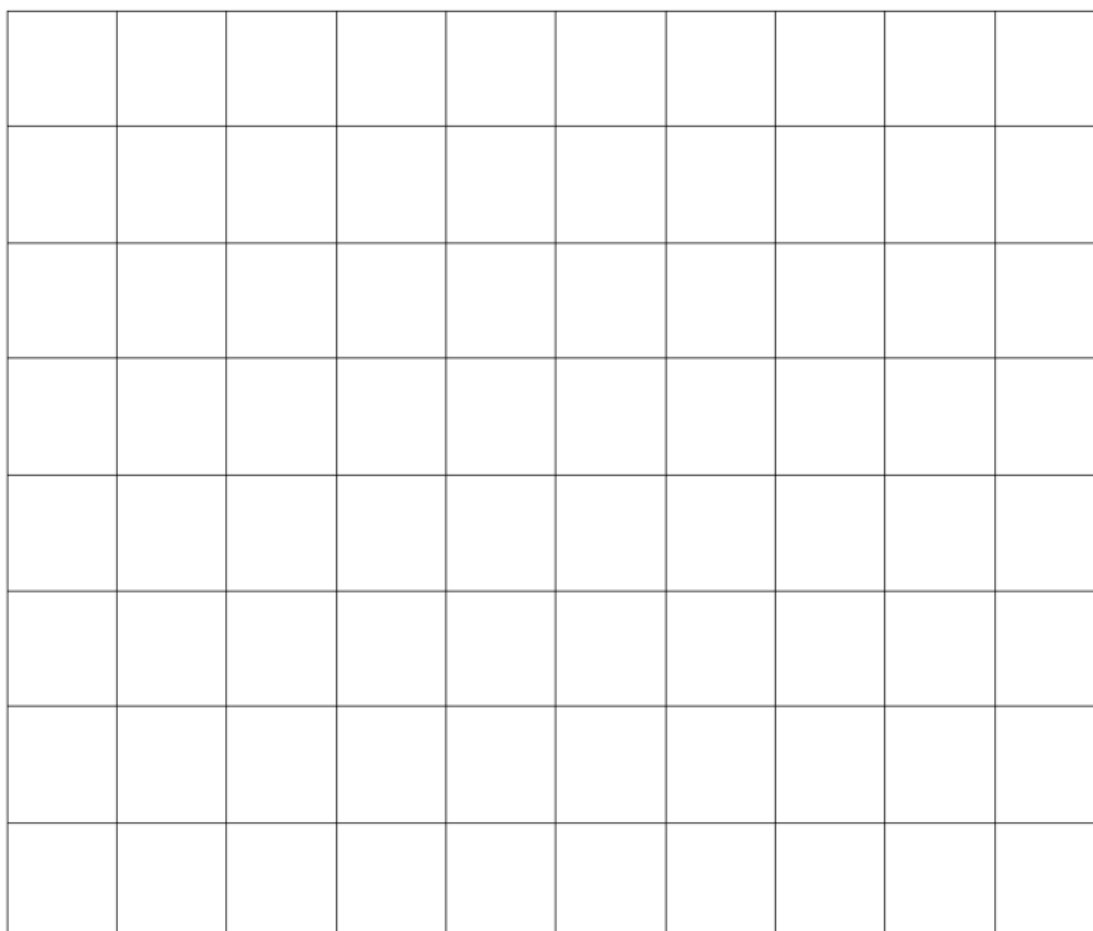
b) **Explain** why the graph you choose is the most appropriate way to display this data?

c) **Describe** the trends you observed over time for each lizard
   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 3

Zookeepers' 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 Ringtail Possums every Monday (record in the column provided below)

b) **Calculate** the food items required for two 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.
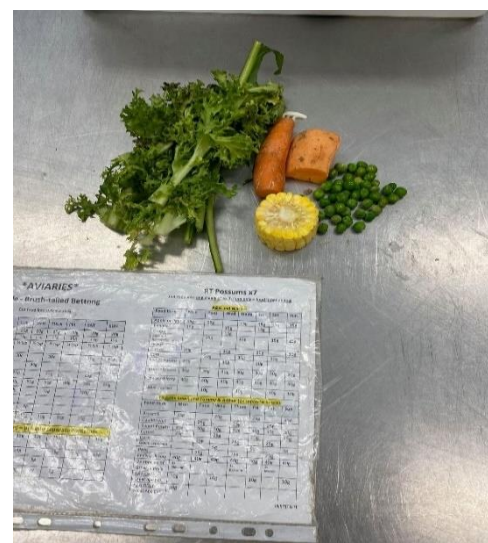
Diet	Amount per day <u>per possum</u>	Classification	Days possum receives food item	Two possums (on a Monday)	Two possums per week
Pellets	30g	Non-vegetable	Everyday		
Spinach	15g		Everyday		
Endive	15g	Green vegetable	Everyday		
Lettuce	15g		Everyday		
Broccoli	1g		Everyday		
Corn	5g		Everyday		
Carrot	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 vegetables and non-green vegetables?

Classification	Total (grams)	Fraction	*Extension:* Find Percentages
Non-vegetables			
Vegetables			

e) **Construct** a pie chart that compares the total amount of vegetables and non-vegetables.
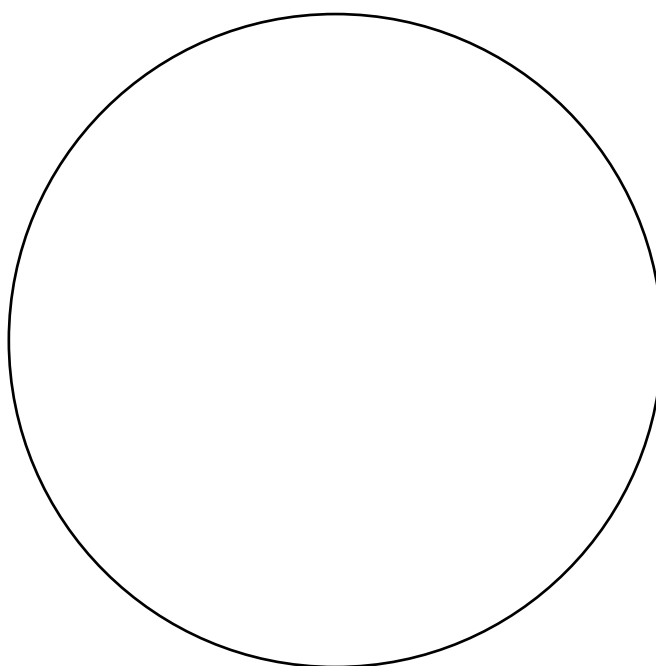
Transporting animals at the Zoo | Problem 4

Sometimes it is necessary to move animals to other locations in the Zoo or transport them to another Zoo around the world. Animals are transported in purpose-built transport crates or boxes.

a) Use the photograph and dimensions below to **calculate** the volume of the tanks we use to transport frogs.

Height = 40cm

Length = 25cm

Width = 30cm

b) Below are some examples of crates used to transport elephants and rhinoceros. **Label** the dimensions on the photographs and **calculate** the volume of each crate

	DIMENSIONS	VOLUME
Elephant Transport Box 	Height = 3m Length = 5m Width = 2m	

	Height = 2m Length = 3.5m Width = 1.5m	

c) In the space below, **design, draw** and **label** the dimensions of a crate that could be used to transport a different animal at the Zoo. Calculate its volume.

Chosen animal:_____

3D objects at the Zoo

a) **Go onto [Taronga TV](#) and visit the Tiger and Elephant Live Camera**
   i. Look carefully in and around both animal exhibits.
   ii. **Identify** and **record** the number of 3D objects you can see.
   iii. **Draw** and **label** the 3D objects.

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.

Elephant Cam

Tiger Cam 1

Spend some time with our Sumatran Tigers. The three cubs are especially playful, you might catch them chasing, playing, lounging by the water or jumping on the Jeep!

Tiger Cam 1

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

Side view

Top view

c) **EXTENSION: Draw a design** for a new reptile enclosure at Taronga Western Plains Zoo. It must meet the requirements in the table, but can be any shape:

i. **Fill** in the blanks

Reptile *(Dimensions)*		
Total Area	2500 cm²	L= _____cm
		W= _____cm
Must include:	Water (*how much will depend on the chosen reptile - research needed*)	
	Rocks	
	Logs (*climbing/perching*)	

ii. **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 Zoo Sydney. Answer the questions below.

a)   How many days between these two photos? _____

b)   How many months old are the cubs in October 2019? _____

c)   How many months old are the cubs in the February 2020? _____

d)   What is the difference in weight between October and February (*both grams & kilograms*)?
   a.   Mawar: _____kg   _____g
   b.   Pemanah: _____kg   _____g
   c.   Tengah Malam: _____kg   _____g

5. Describe the difference in food consumed by the cubs between the two dates?

6. Write your own mathematical problem using the information above.

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Animal patterns

What shapes make up a Giraffe's skin pattern?

a. **Fill** in the table with the names of the different shapes you can see.

b. **Draw** examples

c. Are they regular *(all sides and angles equal)* or irregular? **Justify** your answer.

Name of Shape:	Triangle				
Image of shapes:					
Regular/ Irregular & Why					
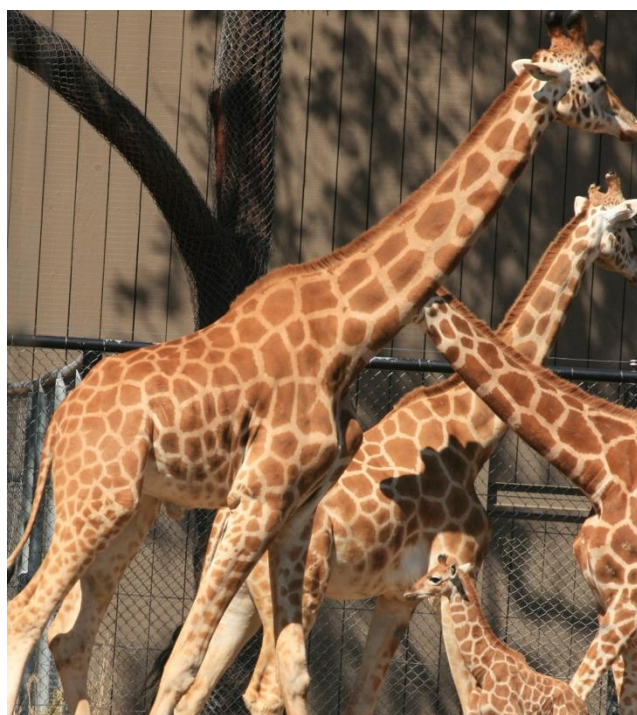
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A zookeeper's schedule   Problem 8

Below is an outline of the daily routine for a zookeeper working with lions, goats and bongos at Taronga Western Plains Zoo. 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 the next page). Times must be written in 24-hour time.

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

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- END -

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