MATH TRAIL SELF-GUIDE

Stage: 4

Meerkat Diet + Costing, Dubbo Stampede, TWPZ Animal Collection and Keeper Timetable

Taronga Western Plains Zoo is trialling a new inquiry-based mathematics program in which students will develop their working mathematical skills in a real-life context that is both meaningful and engaging.

NOTE: Students are to work in groups of 2-3 to complete these tasks.

You could print off ONE leaflet per group OR ONE leaflet per student.

TARONGA WESTERN PLAINS ZOO DUBBO

For the Wild

SUGGESTED ACTIVITIES

Learning Intention:

- I can understand the importance of working in a group.
- I am curious about my environment and the various habitats around me.
- I can collect and represent the data I have collected.

Success Criteria:

- I recognised the value of shared learning.
- I used my powers of observation to identify certain behaviours in my environment.
- I represented data I collected about my environment.

STUDENTS REQUIRE

- Photocopied Worksheets (**working groups of 2-3**)
- Clipboard
- Pencil
- Coloured Pencils
- Calculator

GROUP REQUIREMENTS

- 100m tape measure
- Stopwatches

PROPOSED ITINERARY

TIME	Activity	Location
9:15 – 9:30	Welcome	TWPZ Education Classroom
9:30 – 9:40	Map: Animal Collection Time: Keeper Activities	Grass area between the Safari Park Playground and the Savannah Plaza.
9:40 – 10:15	Keeper Talk Read explanation of Ethogram activity	Meerkats exhibit
10:15 – 10:45	Complete Ethogram + Data activity with partner Move to African Savannah Picnic Grounds	Meerkats exhibit
10:45 – 11:10	Morning Tea	African Savannah Picnic Grounds
11:10 – 11:50	Students complete section of "Dubbo Stampede" activity	Entrance of the Cheetah exhibit
11:50 – 12:40	Diameter and Circumference activities	Move to either section - **Waterhole,** - **Wild Herds** OR - **Lion Pride Lands**
12:40 – 1:10	Lunch	Wild Asian Wetlands Picnic Grounds
1:10 – 2:00	Area activity	Student's choice

NOTE: **After zoo activities** are to be completed back at school.

OUTCOMES - STAGE 4

COMPUTATION WITH INTEGERS

Compares, orders and calculates with integers, applying a range of strategies to aid computation MA4-4NA

- Apply the associative, commutative and distributive laws to aid mental and written computation ACMNA151
- Compare, order, add and subtract integers ACMNA260
- Carry out the four operations with rational numbers and integers, using efficient mental and written strategies and appropriate digital technologies ACMNA183

FRACTIONS, DECIMALS & PERCENTAGES

Operates with fractions, decimals and percentages MA4-5NA

- Solve problems involving addition and subtraction of fractions, including those with unrelated denominators ACMNA153
- Multiply and divide fractions and decimals using efficient written strategies and digital technologies ACMNA154
- Express one quantity as a fraction of another with and without the use of digital technologies ACMNA155
- Connect fractions, decimals and percentages and carry out simple conversions ACMNA157
- Find percentages of quantities and express on quantity as a percentage of another, with and without the use of digital technologies ACMNA158
- Solve problems involving the use of percentages, including percentage increases and decreases with and without the use of digital technologies ACMNA187

RATIOS & RATES

Operates with ratios and rates and explores their graphical representation MA4-7NA

- Recognise and solve problems involving simple ratios ACMNA173

TIME

Performs calculations of time that involve mixed units and interprets time zones MA4-15MG

- Solve problems involving duration, including using 12-hour and 24-hour time within a single time zone ACMMG199

MEASUREMENT & GEOMETRY

Calculates the perimeters of plain shapes and the circumferences of circles MA4-12MG

- Use formulas to solve problems involving circumference ACMMG197

Uses formulas to calculate the areas of quadrilaterals and circles, and converts between units of areas MA4-13MG

- Choose appropriate units of measurement for area and convert from one unit to another ACMMG195

STATISTICS AND PROBABILITY

Collects, represents and interprets single sets of data, using appropriate statistical displays MA4-19SP

- Construct and compare a range of data displays ACMSP170

WORKING MATHEMATICALLY

- Communicates and connects mathematical ideas using appropriate terminology, diagrams and symbols MA4-1WM
- Applies appropriate mathematical techniques to solve problems MA4-2WM
- Recognises and explains mathematical relationships using reasoning MA4-3WM

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MAP: ANIMAL COLLECTION

Map Activity

Collect your zoo map from the Amarti Education Center and say hello to the Education team ☺

Go to the **grass area** between the Safari Park Playground and the Savannah Plaza.

TASK:

Using your **zoo map** record every type of animal you see on the map under one of the headings below to complete the table:

	Number of Species	Fraction ?/?	Percentage %	Decimal 0.0
Native A native species is one that is found in a certain ecosystem due to natural processes. The koala, for example, is native to Australia. No human intervention brought a native species to the area or influenced its spread to that area. Native species are also called indigenous species.				
Non-Native Non-native species are organisms that do not occur naturally in an area, but are introduced as the result of deliberate or accidental human activities.				
Total number of species identified on the Zoo Map				

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TIME: KEEPER ACTIVITIES

TASK:
Using the timetable of Keeper Activities **convert the times** from 12-hour time to 24-hour time.

12-hour time	24-hour time	Activities
9:30am-10:00am		Ring-tailed Lemur/Spider Monkey Feed (@ Savannah Visitor Plaza, Keeper on Lemur Island)
9:25am		Black Rhino Keeper Talk
10:00am		Giraffe Activity - plenty to see at this time of day as the herd heads to the platform for a feed and the Giraffe Encounter.
11:20am		Hippo Activity – see the Hippos out of the pond as the Hippo Encounter takes place.
11:40am		Cheetah Keeper Talk
12:00pm		Asian Elephant Keeper Talk
12:30pm		Deer Feed
12:40pm		Barbary Sheep Feed (@ Waterhole)
12:45pm		Meerkat Feed (@ Waterhole)
12:30pm-1:00pm		Spider Monkey Feed (@Savannah Visitor Plaza)
12:30pm-1:00pm		Goat Feed
2:10pm		Otter Keeper Talk
2:35pm		Galapagos Tortoise Keeper Talk

TASK:
Are there any activities that occur at the same time? If so place a STAR next to them.

Circle the Keeper Activities on the table that you might like to attend while you are here ☺

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NEXT:
Let's move off to meet our wonderful Meerkats!

MEERKAT ETHOGRAM

An ethogram is a great way of observing animal behaviour and is often used by keepers and scientists in zoo to determine whether an animal is sick, injured, happy, pregnant or undergoing some other change.

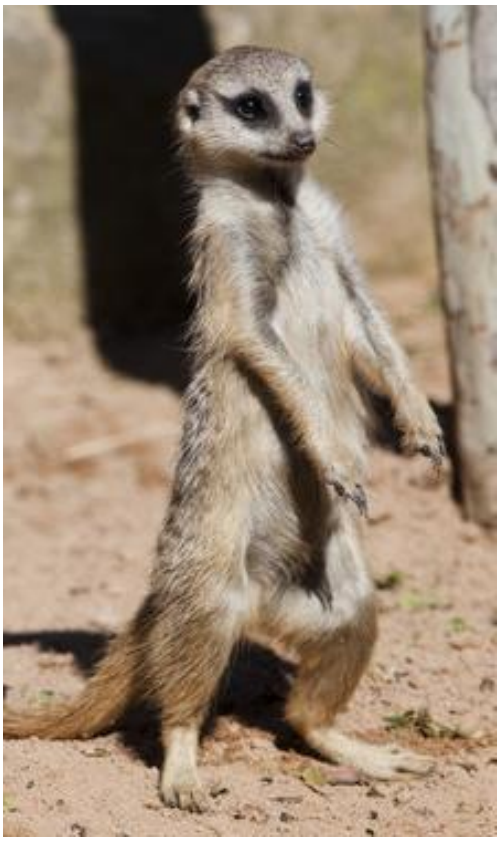
TASK: Meerkat Ethogram & Observation Data Sheet

With a partner choose a **single Meerkat to watch for 6 minutes.**

At the end of every 15 seconds, tick the behaviour or behaviours you have observed your animal doing and complete the questions that follow.

FOR EXAMPLE:

Seconds	Digging	Eating	Resting	Sentry	Toileting	Social Grooming	Not Visible
0:15	✓						
0:30				✓			
1:00				✓			
1:15							✓



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Seconds	Digging	Eating	Resting	Sentry	Toileting	Social Grooming	Not Visible
0:15							
0:30							
1:00							
1:15							
1:30							
1:45							
2:00							
2:15							
2:30							
2:45							
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4:15							
4:30							
4:45							
5:00							
5:15							
5:30							
5:45							
6:00							
TOTAL							

MEERKAT DATA

What fraction and percentage of the time was your Meerkat doing the following behaviours?

EXAMPLE: Digging (13 times) in 6:00 minutes (360 sec)

FRACTION: 13/36 PERCENTAGE: 13/360 x 100 = ____%

BEHAVIOUR	Total	FRACTION	PERCENTAGE
a) Digging			
b) Eating			
c) Resting			
d) Sentry			
e) Toileting			
f) Social grooming			
g) Not Visible			

1. What behaviour did your Meerkat perform the most?

- What may have been the cause for this?

2. What behaviour did your Meerkat perform the least?

- What may have been the cause for this?

3. Did any of the results surprise you?

- Explain why

DUBBO STAMPEDE CHALLENGE

Every year TWPZ hosts the Dubbo Stampede Challenge which is a running festival made up of four different events:

- Dingo Dash (5 km)
- Cheetah Chase (10 km)
- Zebra Zoom (21 km)
- Rhino Ramble (42 km)

Today you are going to work with a partner to predict what your **walking** times would be if you were completing these events at a constant speed.

Go to the start of the **Cheetah** exhibit, look for this sign. →

TASK:

- Using a stopwatch, take turns with a partner, then **WALK 50 meters** starting from the Cheetah sign (see above).
- Record your time to the nearest second in the box below.
- Use these results to calculate how long it would take you to **WALK** 1km (assuming you could maintain the same speed).

DUBBO STAMPEDE A RUNNING FESTIVAL FOR EVERYONE	**TIME TAKEN**	
	50 metres	**1 kilometer**
WALK		

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DUBBO STAMPEDE CHALLENGE

TASK:

Use your **WALKING** results from the previous table to calculate the time it would take you to complete each of the Dubbo Stampede events below:

	Dingo Dash (5km)	Cheetah Chase (10km)	Zebra Zoom (21km)	Rhino Ramble (42km)
Walk				

DUBBO STAMPEDE
A RUNNING FESTIVAL FOR EVERYONE

NEXT:

Let's move off to the
- Waterhole,
- Wild Herds OR
- Lion Pride Lands

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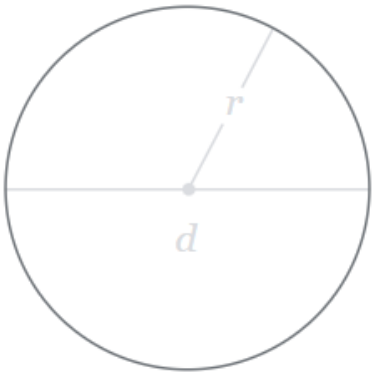
DIAMETER AND CIRCUMFERENCE



TASK:

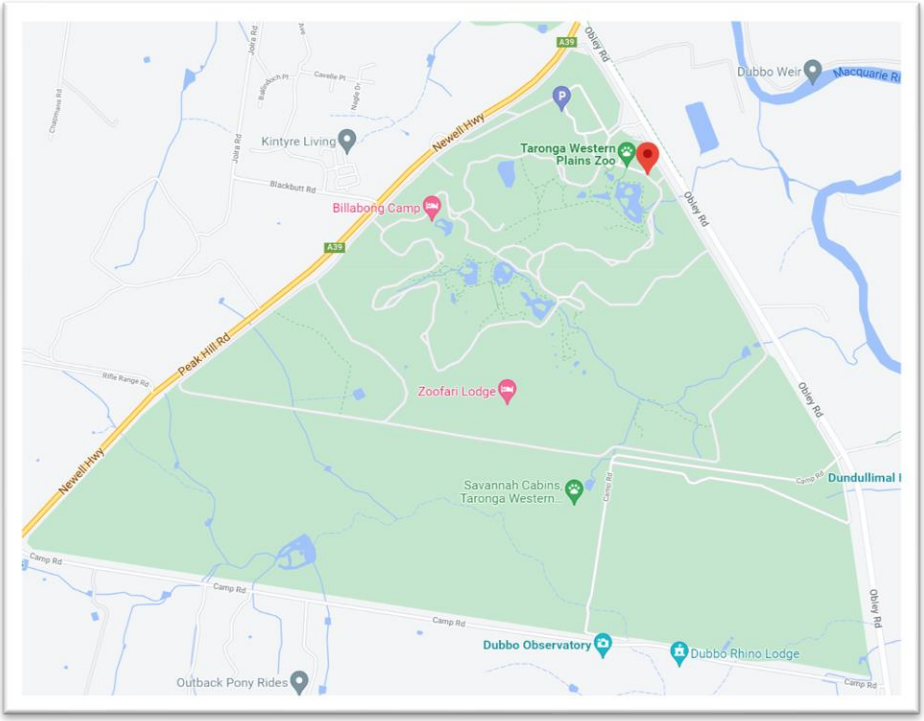
Use your trundle wheel or tape measure to find the diameter of one of the **circular** shelters / huts at either the;

- Waterhole
- Fallow Deer enclosure OR
- Lion Pride Lands.

NOTE: some of these are NOT perfect circles

	Diameter **2 x *r* = *d***	**Circumference (C)** **Pi x diameter** **3.14 x *d* = C**
Waterhole 		
Shelter/Hut at the Fallow Deer 		
Shelter/Hut at the Lion Pride Lands 		

AREA



The total area of Taronga Western Plains Zoo (TWPZ) is **758 hectares** (ha) with **350 ha** open to the public. A **110 ha** Australian native flora and fauna **sanctuary** is located within the grounds also.

The sanctuary area is fully fenced and is clear of predators and competing herbivores such as cats, foxes and rabbits. It is a breeding area for the Greater Bilby and the Plains Wander.

TASK:
Using the information above convert the areas (ha) in the table below into square meters.
Formula: **divide** the area (ha) by 100

NOTE: 1 ha = 0.01 squared km.

	Area in Hectares (ha)	**Area in Square Kilometres**
Total Area of TWPZ		
Area of TWPZ Open to Public		
Sanctuary		

AFTER THE ZOO: DAILY TASKS

Below is an outline of the daily routine for a zookeeper working with **Lions**, **Buffalos** and the **Bongos**.

TASK:
Use the information below to create an easy-to-read timetable for a new zookeeper working on this division. Times must be written in 24-hour time.

Hint: Think about some abbreviations you could use, an appropriate time scale to use and colour coding approach to make your timetable easier to read.

Daily Tasks
Location check of lions 8:20 – 8:30
Exhibit clean & enrichment 20mins
Lions put on exhibit & locations tagged on board 10mins
Buffalo shift, clean and feed 9:00 – 9:40
Bongo shift, feed and clean 20mins
Lion Talk 25mins
Night yard clean 10:254 – 10:50
Morning Tea ½ an hour
Morning team meeting 11:20 – 11:50
Night yard & raceway clean 70mins
Lunch 1:15 – 2:00
Collect food buckets ½ an hour
Finish back of house jobs ½ an hour
Lion Talk 2:45 – 3:10
Male & Female lions put in night dens, fed and locations tagged on board ½ an hour
Bongo put in night dens 1/3 of an hour
Wash buckets ¼ of an hour
Write daily report 4:15 – 4:30

AFTER THE ZOO: DAILY TASKS TIMETABLE

LION, BUFFALO AND BONGO TIMETABLE FOR A NEW KEEPER

AFTER THE ZOO: ANIMAL COLLECTION

TASK
Using your animal collection data.

Place each of the animals you observed into a category below and calculate the proportion of total animals each category make up.

	Names of Species	Number of Species	Fraction ?/?	Percentage %
Mammal A warm-blooded vertebrate animal of a class that is distinguished by the possession of hair or fur, females that secrete milk for the nourishment of the young, and (typically) the birth of live young.				
Reptile Are cold-blooded, they rely on heat from their surroundings to warm up. They are vertebrates and have dry skin, covered either with scales or horny plates. Reptiles breathe using lungs. Most species of reptiles eat other animals, and most lay eggs on land to breed.				
Amphibian Are cold blooded vertebrates, they don't have scales and can live on land and in water. This word comes from the Greek word amphibious, meaning "to live a double life".				
Birds A warm-blooded vertebrate animal of a class that is distinguished by the possession of hair or fur, females that secrete milk for the nourishment of the young, and (typically) the birth of live young				
Invertebrate Any animal that lacks a vertebral column, or backbone. More than 90 % of all living animal species are invertebrates.				

AFTER THE ZOO: ANIMAL COLLECTION

TASK
Graph your results below in a graph of your choice.

Why did you use this type of graph?

AFTER THE ZOO: MEERKAT DIET & COSTING

The Meerkat is primarily insectivorous in the wild but will also eat small vertebrates, eggs and some vegetable matter.

TASK: You are going to help calculate the approximate amount of food each animal eats

- per week,
- per year AND the cost per animal per week and per year to feed.

Daily Diet for the Meerkat Group (20 total)	**Total amount (g) / Wk / Group**	**Total amount (g) / Year / Group**
27g Mealworms		
180g Cat Kibble		
225g Fruit/Veg		
45g Corn Kernels		
13g Crickets		
Total = grams		

1. What fraction and percentage of the Meerkats diet is meat?

2. What fraction and percentage of the Meerkats diet is not meat?

AFTER THE ZOO:
DUBBO STAMPEDE CHALLENGE

TASK

How long would it take each of the animals to complete their own event and the other events in the Dubbo Stampede if they were travelling at their maximum speed?

EVENT →	Dingo Dash (5 km)	Cheetah Chase (10 km)	Zebra Zoom (21 km)	Rhino Ramble (42 km)
Zebra Max speed 64 km/h				
Rhino Max speed 55 km/h				
Cheetah Max speed 120 km/h				
Dingo Max speed 48 km/h				