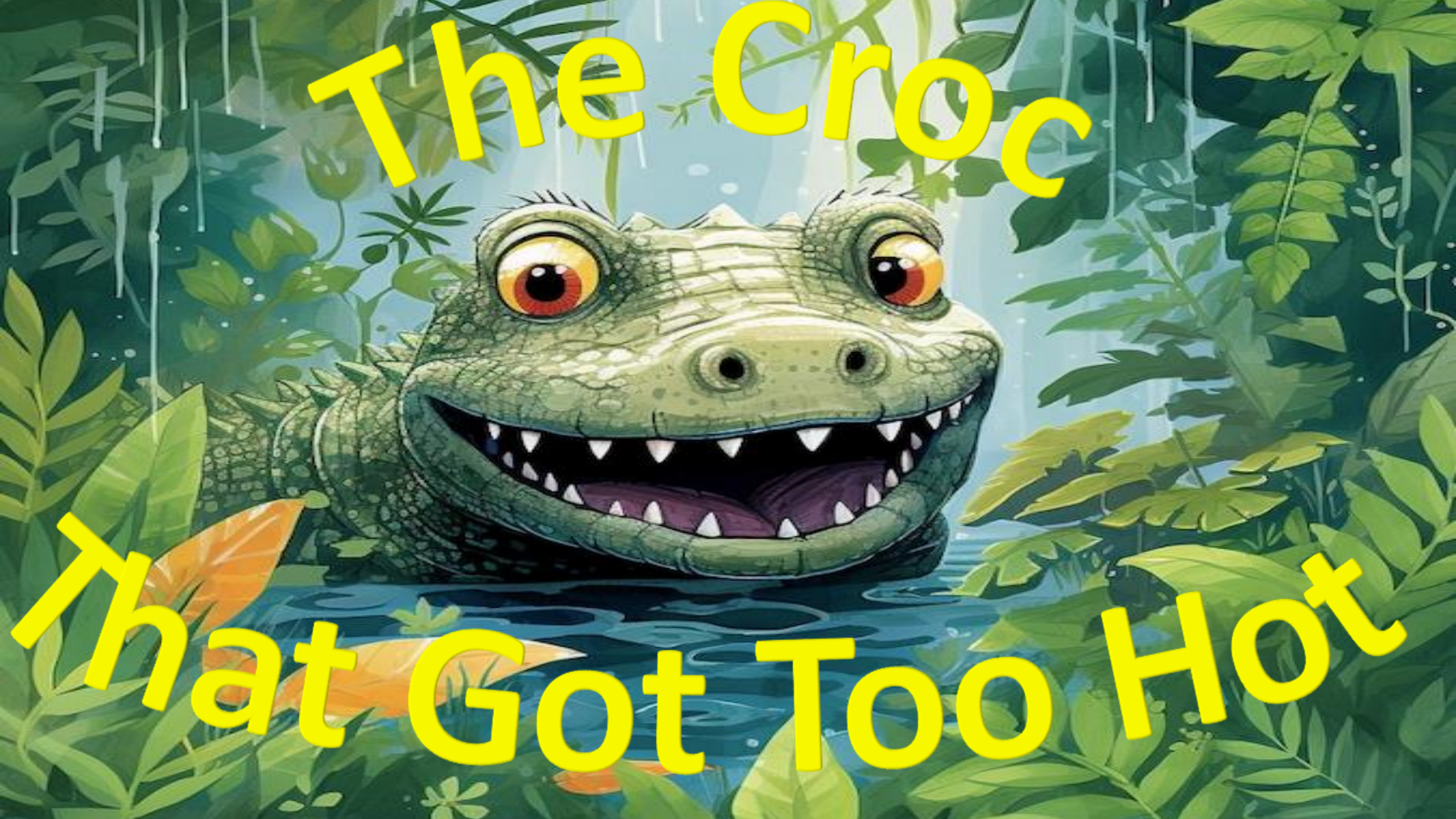

The Croc
That Got Too Hot

Activity 1

Meet The Crocodiles

Link to Zoo Website to see Bob and Bindi

Key Vocabulary

Do you know what any of these words mean? Look out for them throughout the lesson!

Manipulate

Reasoning

Scute

Key Vocabulary

Do you know what any of these words mean? Look out for them throughout the lesson!

Manipulate
To control, change or influence (a person, thing or situation) cleverly or unscrupulously.

Reasoning
The action of thinking about something in a logical, sensible way.

Scute
Thickened horny or bony plate on a turtle's shell or on the back of a crocodile, stegosaurus.

Learning Intention

We are learning the importance of data in the everyday world.

Success Criteria

- I can say why data can be used by humans to benefit animals.
- I can analyse environmental data from a zoo.
- I can create a piece of art that shows my understanding of crocodiles.

Meet Bob and Bindi

Bob and Bindi are West African Dwarf Crocodiles they reside in the Five Sisters Zoo in Polbeth, West Lothian, Scotland.

They were both born in 2019 and arrived at the zoo in 2020. Bob is the larger of the two crocodiles, measuring about 4 feet long, while Bindi is slightly smaller, measuring about 3 feet long.

The pupils at Addiewell Primary School have partnered with the Five Sisters Zoo who have installed a sensor in the crocodile enclosure and in the reptile house, “The Lost Kingdom”.

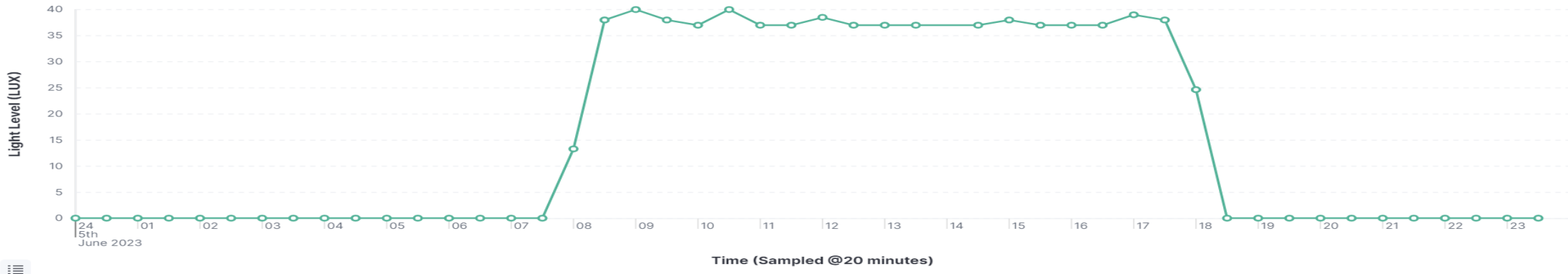
Data Comparisons: Compare and Contrast

Task 1

- The following slide shows data sets from 3 different sensor locations during the same date and time period.
- What is being measured?
- Can you identify the date/time period?
- Use your reasoning to identify which is a classroom, which is the crocodiles' enclosure and which is the reptile house "The Lost Kingdom".
- Identify one way the data sets are similar and one way they differ.

Light Level

addiewell-p-eh558pg-co2-06



Time (Sampled @20 minutes)

Light Level

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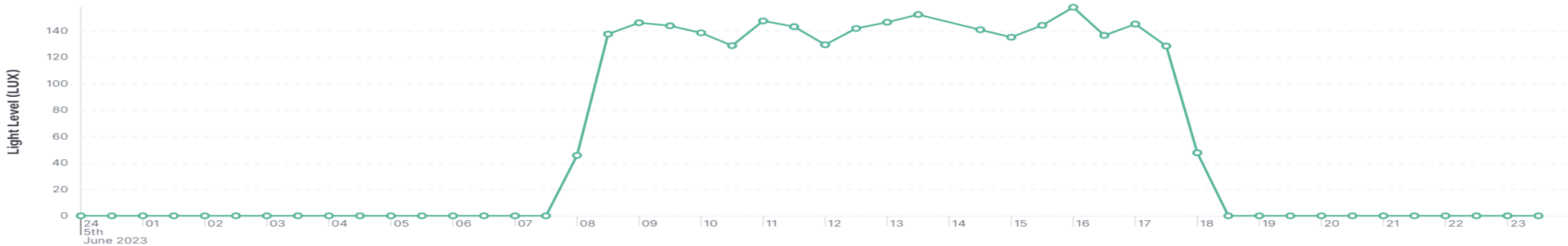

Time (Sampled @20 minutes)

Light Level

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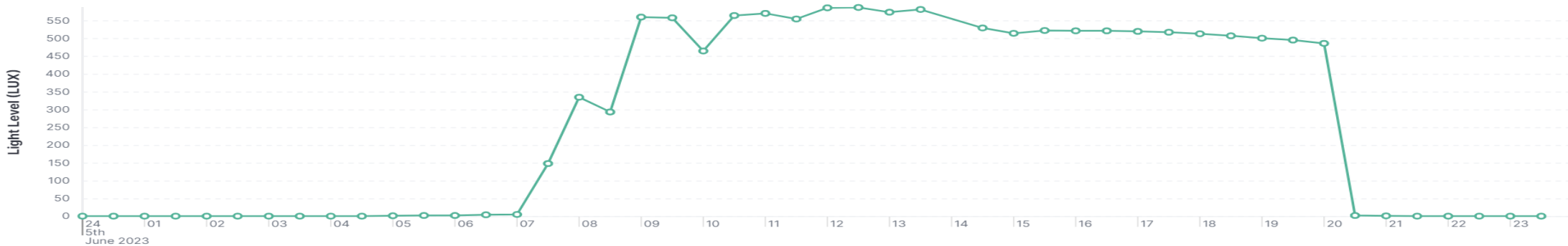
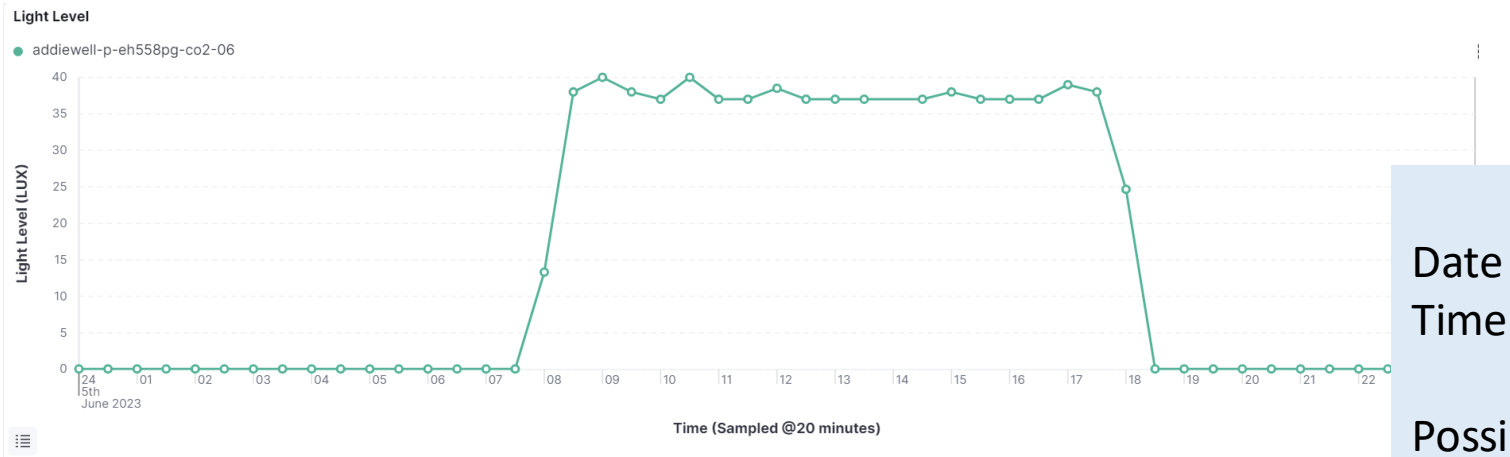
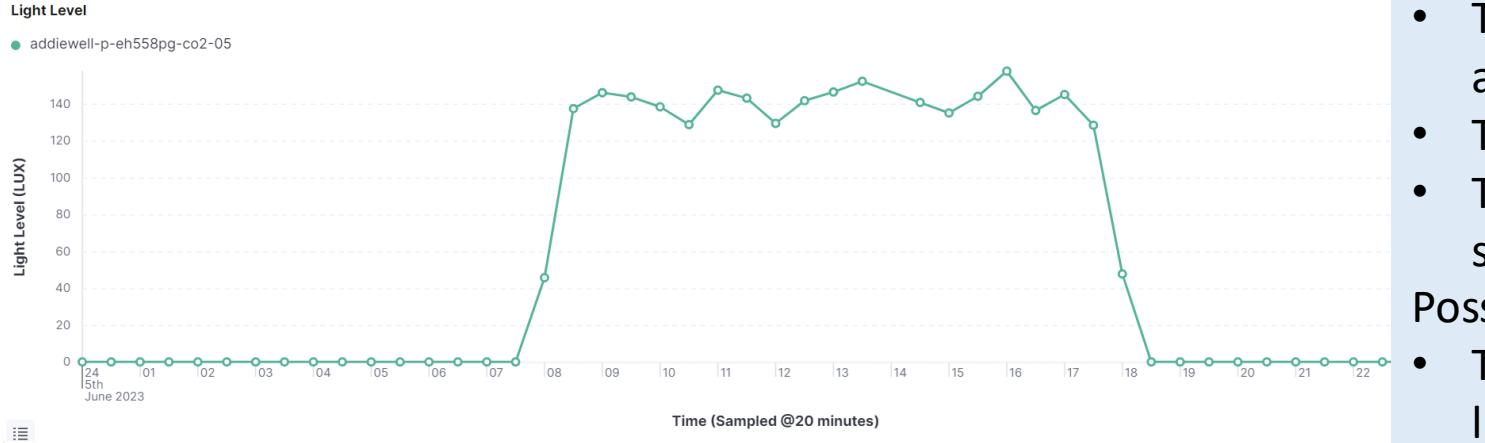


Time (Sampled @20 minutes)

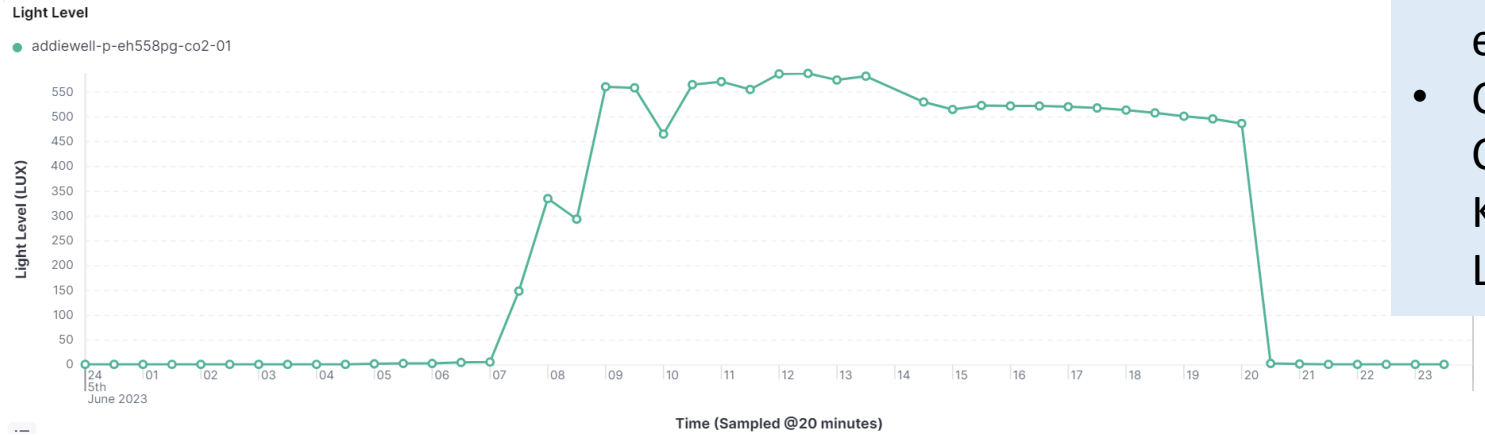
Crocodile Enclosure



Lost Kingdom



Classroom



Date - 5th June
Time – 24 hour period

Possible similarities

- They show the same date and time period.
- They all have zero readings
- They all have a similar shape

Possible differences

- The scale is different – light LUX differs greatly in each.
- Classroom is highest LUX, Crocs are lowest LUX, Lost Kingdom is in the middle LUX.

Links to Live Data

Task 2 – Explore the live data from the different locations. Try to identify three interesting pieces of information. Make notes on your thoughts, ready to share back to the class.

Crocodile Enclosure

Lost Kingdom

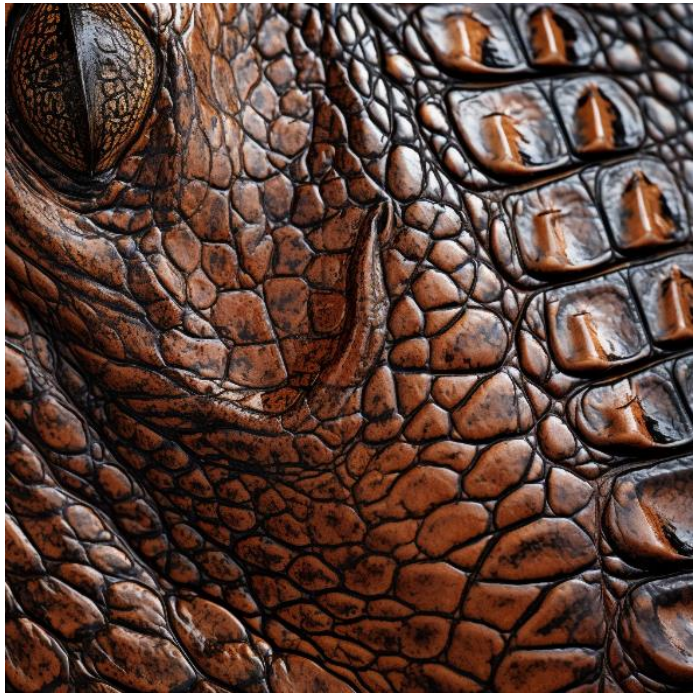
Your Classroom Data here

A Closer Look at Crocs

A scute or scutum is like a special shield for animals. It's a hard and strong plate on their body. You can find scutes on turtles' shells, crocodiles' skin, and birds' feet. These scutes help crocodiles swim silently underwater without making any ripples on the water's surface.

Why do you think scutes are beneficial to crocodiles in the wild?

How could they also benefit a herbivore that does not hunt?



A Closer Look At Crocs

Crocodiles have webbed feet which, though not used to propel them through the water, allow them to make fast turns and sudden moves in the water or initiate swimming. Webbed feet are an advantage in shallow water, where the animals sometimes move around by walking.

Crocodiles do not have sweat glands. Instead, they release heat through their mouths, which is why they are often seen basking with their jaws open.

Crocodile Art

Task 3

- Paying close detail to the different areas of the crocodiles body, create a piece of art, labelling key parts and describing what they do.

- You could use media like pencils focusing on shading, or print with newspaper and paint, collage, clay, textiles or use your own creative approach.

Plenary

- What have you learned so far?

- Draw a conclusion. Think about the statement below. What is your opinion? Have evidence to back up your opinion.

Data is not important for animals.

Activity 2

Exploring Crocodile Data Further

C02 and Temperature

Key Vocabulary

Do you know what these words mean? Look out for them throughout the lesson!

X-Axis

Y-Axis

Data set

Key Vocabulary

Do you know what these words mean? Look out for them throughout the lesson!

X-Axis

In line graphs, the x-axis runs horizontally. Typically, the x-axis has numbers representing different time periods or names of things being compared.

Y-Axis

In line graphs, the y-axis runs vertically (up and down). Typically, the y-axis has numbers for the quantity of variable being measured. The y-axis often starts counting at 0 and can be divided into as many equal parts as you want.

Data set

A collection of data

Learning Intention

- We are learning to critically analyse data gathered from the zoo.

Success Criteria

- I can suggest possible reasons for changes in data from the animals' habitats.
- I can give clear definitions for C02 and temperature.
- I can say why CO2 and temperature are important to crocodiles
- I can show my understanding of a crocodile's needs through a written piece.

Prior Learning

Can you remember what C02 and temperature are?

C02

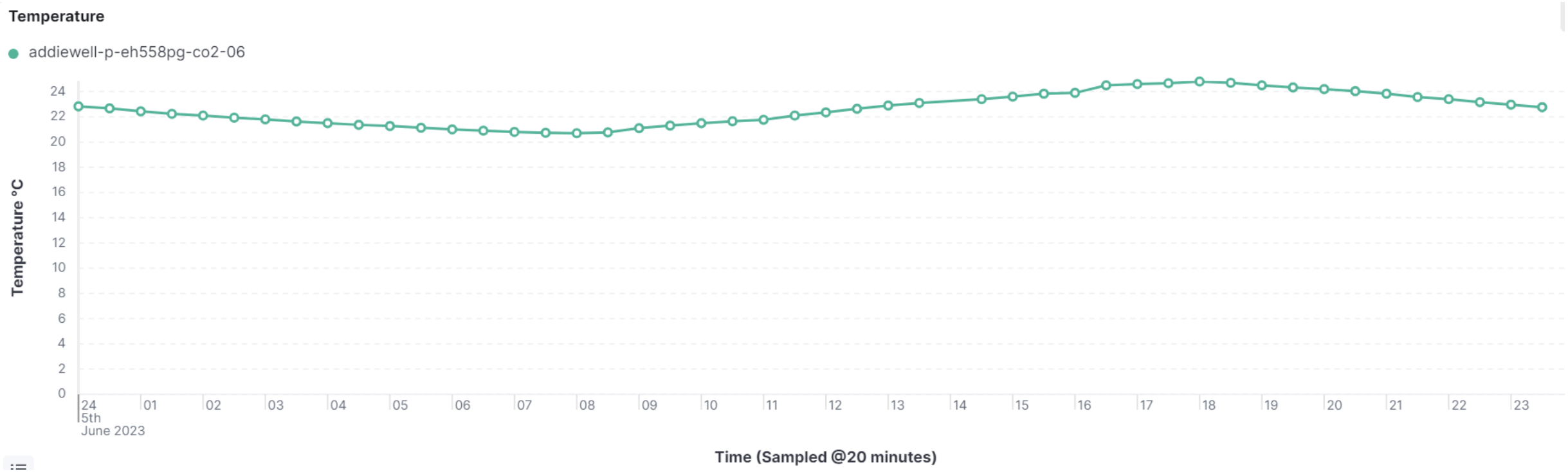
Carbon dioxide is a special kind of chemical that usually exists as a gas. We humans breathe it out, and most plants breathe it in. It's made up of one carbon atom and two oxygen atoms. So, when we exhale, we release carbon dioxide, and plants take it in to help them grow and stay healthy.

Temperature

Temperature is a way to measure how hot or cold something feels. We usually use a tool called a thermometer to measure temperature and the unit we use to measure temperature is called degrees Celsius (°C).

A Look At The Data

- What do you observe about the crocodile enclosure?



A Look At The Data

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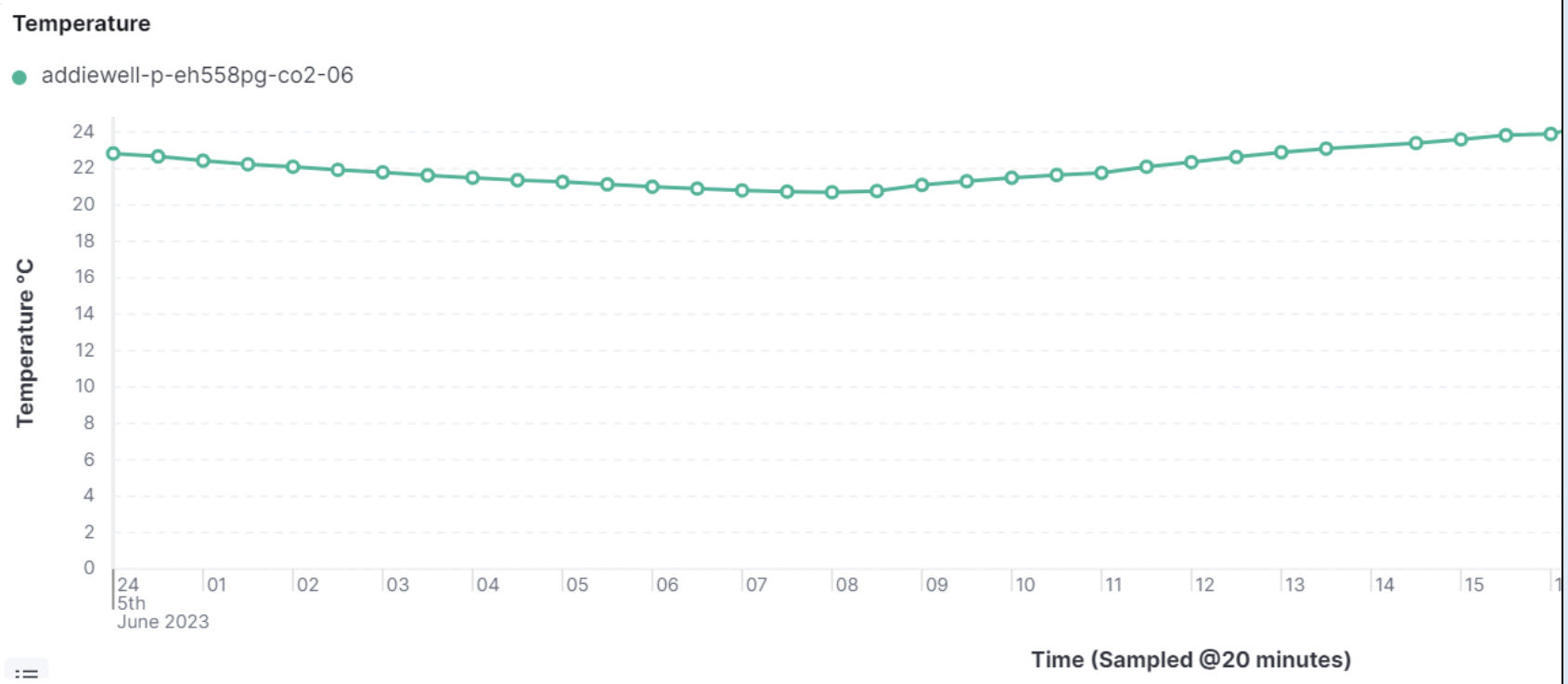


Where is the X-axis? What does it show?

What is the highest recorded temperature?

What is the lowest?

What is the difference between the highest and lowest?

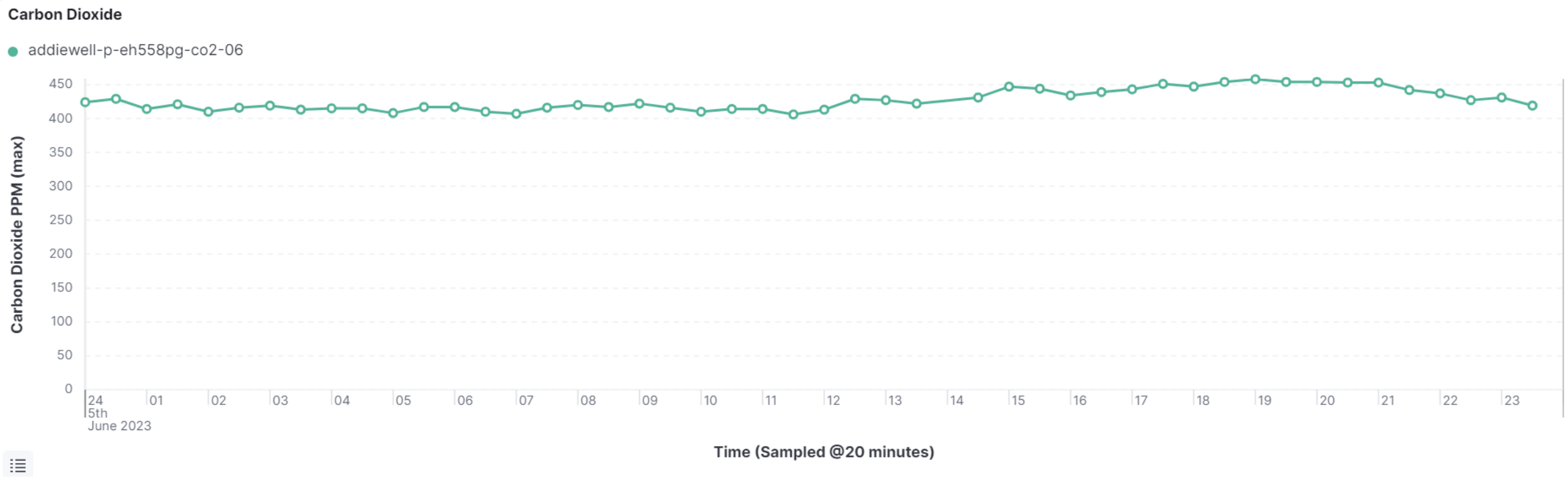
Are there any sudden changes in the data set?

What could make this graph more clear?

Compare this to your own classroom data. What are the similarities and differences.

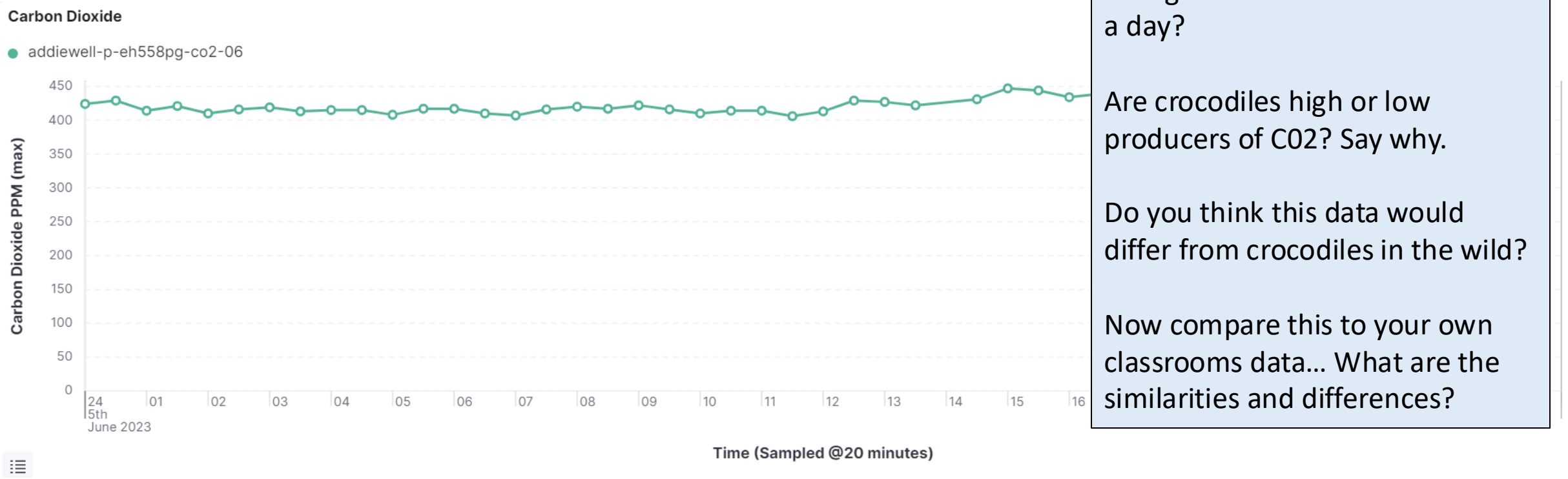
A Look At The Data

- What do you observe about the crocodile enclosure?



A Look At The Data

- What do you observe about the crocodile enclosure?



Where is the Y-axis? What does it show?

How would you describe the change in C02 over the course of a day?

Are crocodiles high or low producers of C02? Say why.

Do you think this data would differ from crocodiles in the wild?

Now compare this to your own classrooms data… What are the similarities and differences?

Clever Crocs

Crocodiles are incredible creatures! They can stay underwater for a really long time without needing to come up for air. They have a special part of their blood called haemoglobin that helps them breathe even when they are underwater.

Inside the haemoglobin, there are tiny messengers called bicarbonate ions. These messengers tell the haemoglobin to release more oxygen. The more bicarbonate ions there are, the more oxygen the crocodile gets.

This clever system helps crocodiles save their oxygen and survive underwater for a long time. And because of this, crocodiles produce less carbon dioxide, which is a waste product when they breathe.

Data Tasks

Task 1

Create a comparative bar graph showing the highest, lowest, average levels of C02 between your classroom, the crocodiles and the Lost Kingdom reptile house.

Task 2

Create a comparative bar graph showing the highest, lowest, average levels of temperature between your classroom, the crocodiles and The Lost Kingdom reptile house.

Literacy Activity

Task 3

Create an exciting and imaginative story that will captivate Primary 1 pupils. In the story, demonstrate your knowledge about crocodiles, temperature, and carbon dioxide (C02) in a fun and interesting way.

Choose one of the following approaches:

- An imaginative story titled "The Crocodile that Got too Hot"
- An article for the newspaper Crocodile Weekly titled “World Record Croc Celebrates Winning Breath Holding Championships”
- Or, you can create your own imaginative written piece.

Plenary

What have you learned so far?

Draw a conclusion. Think about the statement below. What is your opinion? Have evidence to back up your opinion.

Thanks to data, I have learned that crocodiles are intelligent.

Activity 3

Exploring Crocodile Data Further

Motion and Humidity

Key Vocabulary

Do you know what any of these words mean? Look out for them throughout the lesson!

Mode

Mean

Data set

Key Vocabulary

Do you know what any of these words mean? Look out for them throughout the lesson!

Mode
In mathematics and statistics, the mode is the value that appears most frequently in a data set.

Mean
In mathematics and statistics, the mean refers to the average of a set of values.

Data set
A collection of data.

Learning Intention

We are learning to critically analyse data gathered from the zoo.

Success Criteria

- I can suggest possible changes in data regarding animal's habits.
- I can show my understanding of a crocodile's motion by using my Maths knowledge of speed, distance and time to compare my own speed versus a crocodile's.
- I can give clear definitions for motion and humidity and say why they are relevant.

Prior Learning

Can you remember what motion and humidity are?

Motion

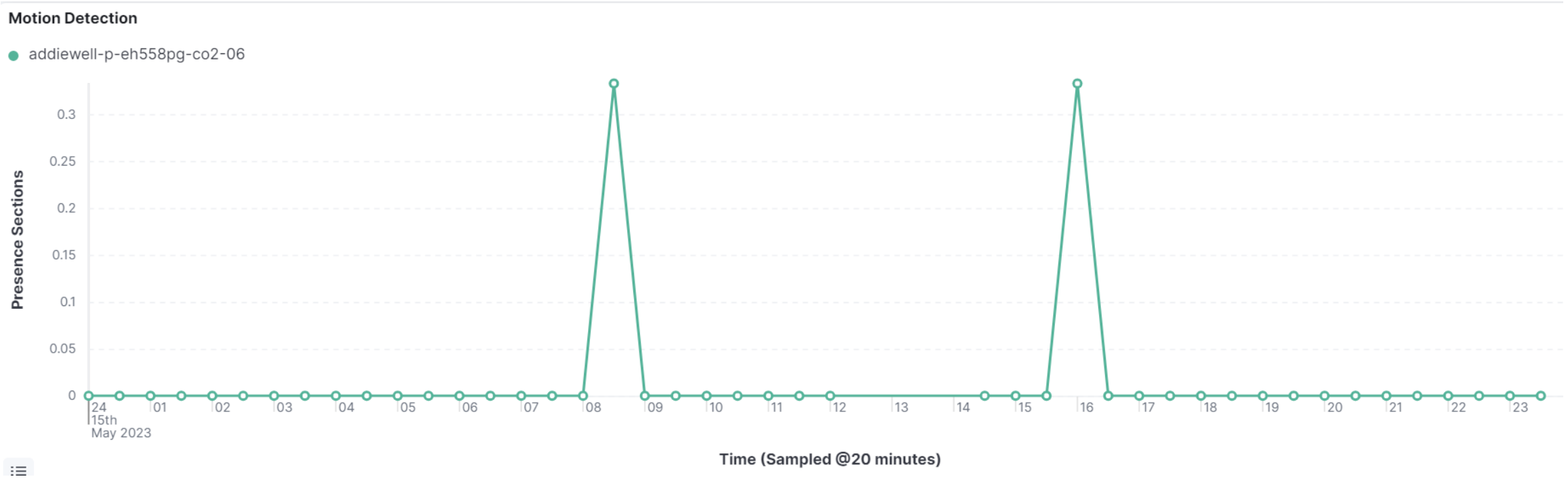
Motion is when a person or thing moves.

Humidity

Humidity is the amount of water vapour in the air. If there is a lot of water vapour in the air, the humidity will be high. The higher the humidity, the wetter it feels outside. Humidity is measured in percent (%). (ie 80% humidity would mean that the outdoor air contained 0.8oz/m3 of water.

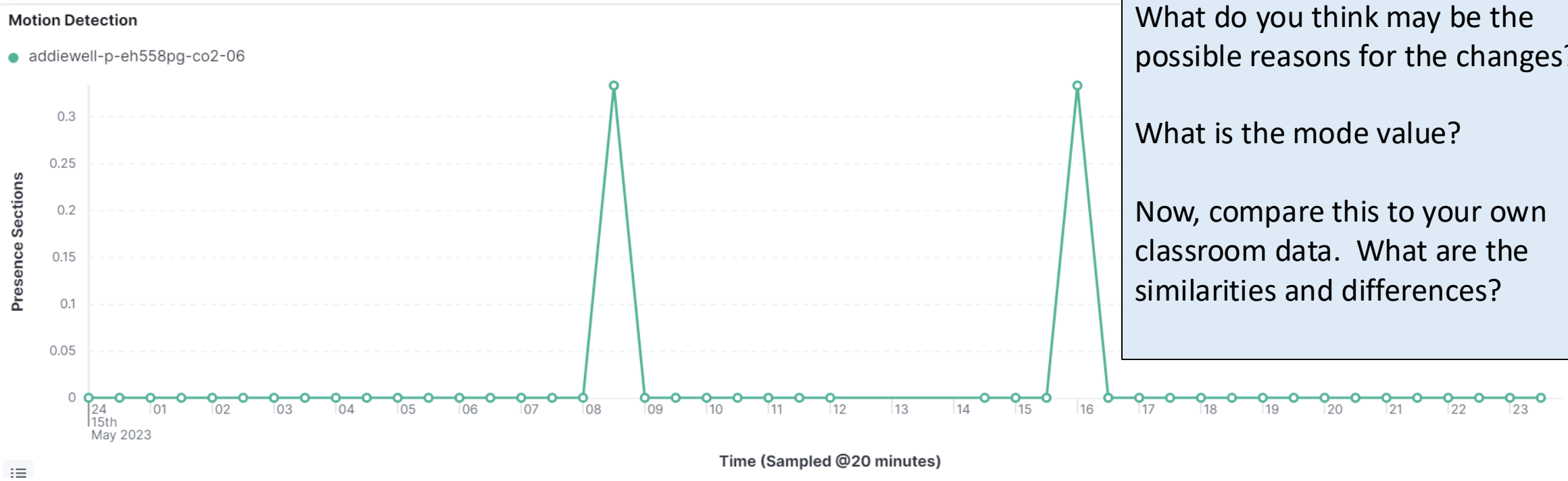
A Look At The Data

- What do you observe in the crocodile enclosure?



A Look At The Data

- What do you observe in the crocodile enclosure?



Identify any sudden changes in the data set. What might have caused these?

What do you observe that is unusual in this data set?

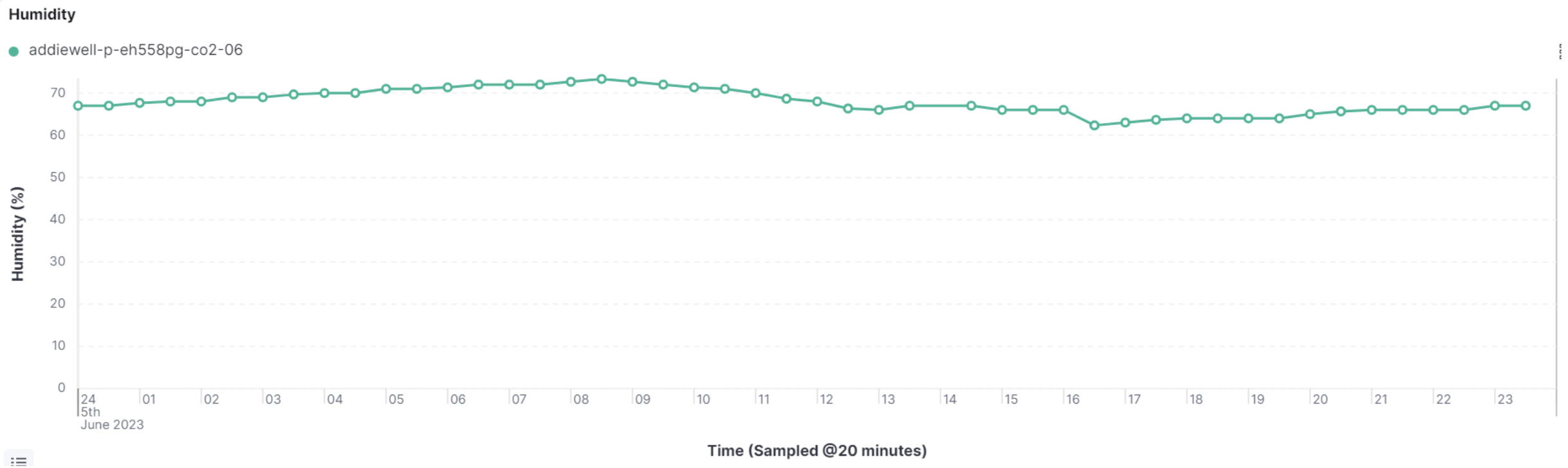
What do you think may be the possible reasons for the changes?

What is the mode value?

Now, compare this to your own classroom data. What are the similarities and differences?

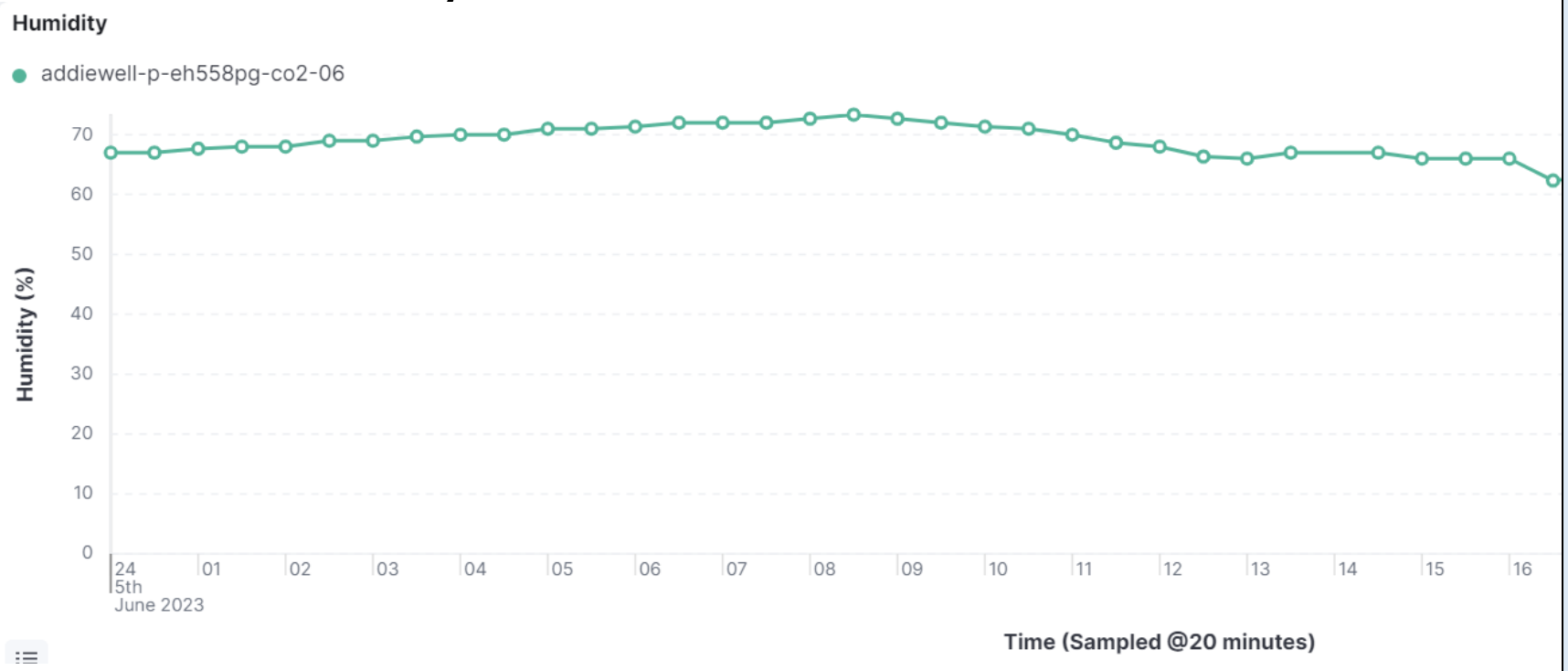
A Look At The Data

- What do you observe in the crocodile enclosure?



A Look At The Data

- What do you observe in the crocodile enclosure?



How would you describe these levels of humidity?

Why do you think the humidity rates are at that level?

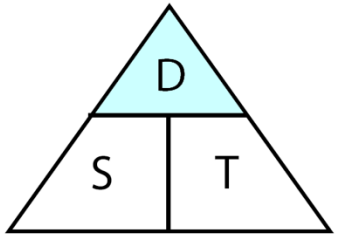
How do you think a human would feel in that level of humidity?

What do you think the long term effects would be on human skin?

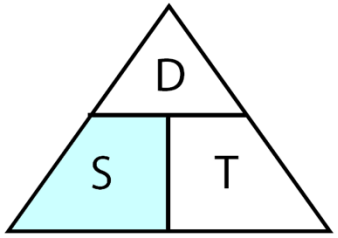
What is the mean value between midnight and 5am?

Now compare this to your own classrooms data… What are the similarities and differences?

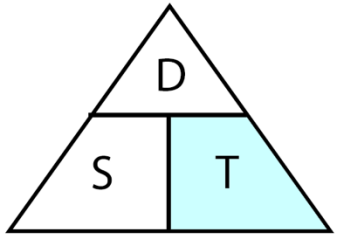
Data Task – Are You Faster Than A Croc?



Distance = speed x time



$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$



$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

In a race with a crocodile, do you think you would win? Let's see!

Data Task – Are You Faster Than A Croc?

Task 1

The average speed of a West African dwarf crocodile is 11 miles per hour.

Go outside with a partner. Measure, then run 20 metres. Your partner should time you.

Use the speed, distance, and time triangle to work out how fast you can run.

Is anybody in your class faster than a crocodile? Create a graph to display the results.

Geography Task

Task 2 – Geography

Create a poster researching information about crocodiles in the wild and in zoos. You could include some of the information you found out in the previous task. Here are some questions to help you:

- Where are crocs found in the wild?
- Do they tend to live in a particular country or continent?
- List countries and their capitals.
- What are the conditions like where crocs live?
- Where are crocs found in zoos?
- What types of crocodile are there?
- How do they differ?

Plenary

- What have you learned so far?

- Draw a conclusion… Think about the statement below, what is your opinion? Have evidence to back up your opinion.

Maths and data are linked.

Activity 4

Exploring Different Animals

Key Vocabulary

Do you know what any of these words mean? Look out for them throughout the lesson!

Observe

Predict

Scale

Key Vocabulary

Do you know what any of these words mean? Look out for them throughout the lesson!

Observe

To carefully see or notice something and understand that it is important or meaningful.

Predict

To make a guess or estimate about something that might happen in the future or what might be the result of a particular situation.

Scale

The size or number of things being shown on a chart. It helps us see how big or small the numbers are and how they relate to each other on the chart.

Learning Intention

We are investigating the habitats of other animals to predict the data they produce.

Success Criteria

- I can make predictions about living environments.
- I can create my own data set.
- I can work well as part of a team.

Worldwide Enclosure Watch

Task 1

Go online to a trusted official zoo website and watch live webcam footage from different animals. There are some below to help, but search all over and check out different enclosures around the world.

https://www.edinburghzoo.org.uk/webcams/

https://www.dublinzoo.ie/animals/animal-webcams/

https://www.folly-farm.co.uk/webcams/

https://zoo.sandiegozoo.org/live-cameras

Think and Discuss

Task 2 – Pick an animal and create a poster or presentation displaying everything you have observed/researched about your animal, how they live and what their enclosure looks like. Below are some questions to start you off.

- What do you observe in their enclosure?
- What are the animals' needs?
- What are the animals' likes and dislikes?
- What do they eat? Herbivore, carnivore, omnivore? When do they eat?
- How often and when do they sleep?
- How do they communicate?
- Do they like water? How would that affect their humidity?
- Do they play often? Energetically or slowly? How would this affect motion and CO2?
- Do they like hot or cold temperatures?
- Do they like a bright or dark environment? (Light LUX)
- Are they inside or outside? How might this affect all the data?

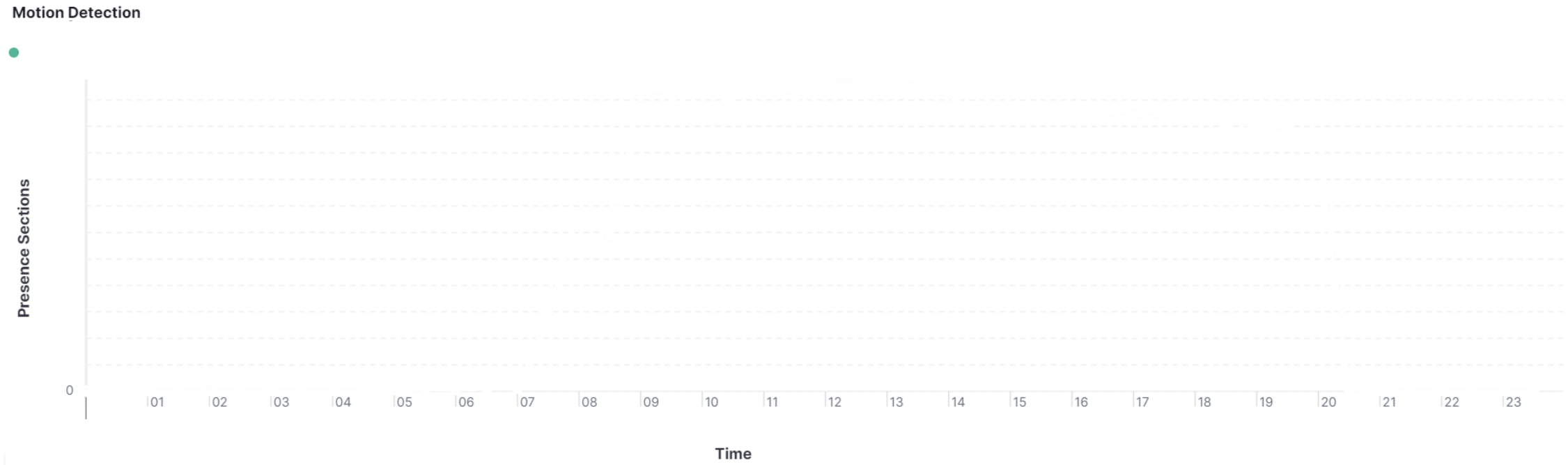
Data Set Predictions

Task 3
Using the detailed information from your posters, fill in the blank data sets. Try to make predictions about what the sensors, within your chosen animal's enclosure, would show for CO2, humidity, temperature, light, and motion. Use the knowledge you have about the animal's habitat and behaviour to make educated guesses about the data that the sensors might collect.

Mini success criteria:

- Add your date
- Time should be over 24 hours
- Add your scale (it must go as high as your biggest data point)
- Give your sensor a title (ie, Penguin Sensor at Edinburgh Zoo)
- Use a ruler!

Here is an example of a blank data set. What do you notice?



Plenary

What have you learned so far?

Draw a conclusion. Think about the statement below. What is your opinion? Have evidence to back up your opinion.

Data is boring.

Activity 5

The Perfect Enclosure

Key Vocabulary

Do you know what any of these words mean? Look out for them throughout the lesson!

Problem

Solution

Habitat

Key Vocabulary

Do you know what any of these words mean? Look out for them throughout the lesson!

Problem

Something that is not good and needs to be fixed or solved.

Solution

The answer or way to fix a problem, make things better or solve an issue.

Habitat

The natural home or environment where animals, plants, or organisms live.

Learning Intention

We are using our knowledge of data to improve the environment of an animal in a zoo.

Success Criteria

- I can investigate a problem and plan a solution.
- I can describe the role of data in our investigation and predict results.
- I can create visual representations of my ideas.

What's The Problem?

Now you have fully investigated your chosen animal, discuss with your group . . .

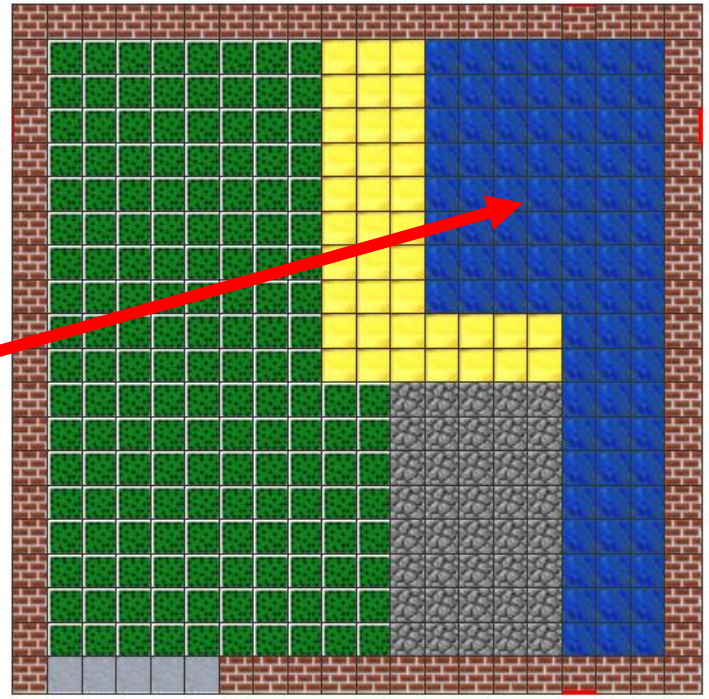
- What problems do you think these animals experience in their enclosures?
- How could their lives be improved?
- Would it be good to encourage more movement or play?
- How might it be possible to create a more natural habitat or environment?
- What materials would be needed to create a more natural environment? Foliage? Water? Sand? Rock? Ice?
- What else?

Design Activity

(Tasks should pop up one at a time)
Task 1
Create a presentation showing your animal's needs and wants and how you would help meet these with a new enclosure design.

Task 2
Create a 2D Minecraft or other model of your enclosure. Label each part and explain why that would be beneficial to your animal.

https://mcdesign.michd.me/



Water

A large pool of water allows the crocodile to swim around and gain more exercise. The water, combined with the heat will increase humidity in the enclosure, which crocodiles enjoy.

Art Activity

Task 3

Create a 3D model of your enclosure and your animal.

You can do this using materials such as a shoebox with tissue paper/card, paper mache, clay …

Mini success Criteria:

- It must be free standing
- It must be colourful
- It should be accurate to your animal's needs

Plenary

What have you learned so far?

Draw a conclusion. Think about the statement below. What is your opinion? Have evidence to back up your opinion.

Data has the power to bring about meaningful changes in the world.

Activity 6

Making Your Own Project

Where could you investigate?

Learning Intention

We are learning to be inventive and use data to solve problems that interest us.

Success Criteria

- I can say how it would be beneficial to gather data in different places.
- I can use data to back up my opinions.

Brainstorm!

Task 1 – Think about things that interest you.

- What are your favourite hobbies?
- What is your favourite subject in school?
- What do you like watching on TV?
- What technology do you like using?
- Who are important3 people that interest you?
- What are your top 3 skills?

From this information, create working groups of classmates that share similar interests and skills.

Put a plan into action!

Task 2

- What would be interesting to monitor?
- Who is local to you?
- What data could you gather/compare?
- How would it benefit the organisation? Increased safety? Increased business? An interesting comparison with existing data/competitors?

Write an e-mail

Task 3

- Using the information from task 2,compose a persuasive email to an organisation with the request to place a sensor with them. In the email, introduce yourself, explain what IoT (Internet of Things) is, and the purpose of the a sensor.

- Also describe the experience you have analysing data (classrooms, animals, etc)

- Show your e-mail to others in your group. How could it be improved? You want to give it the best chance of success! Make any changes and re-draft the e-mail.

- Show the email to your teacher to check that it is okay to send. You may need your teacher to send the e-mail.

Task 4 – Stand up for what you believe in!

Below are two debate topics.

Hunting of animals
Are you for or against?

Animals being kept in zoos
Are you for or against?

Split into groups with similar opinions. Then, spend some time researching and gathering notes to support your thoughts. Afterwards, come together as a class, dividing into those who are in favour and those who are against. Then, have a debate to discuss and share your views.

Plenary

What have you learned so far?

Draw a conclusion. Think about the statement below, what is your opinion? Have evidence to back up your opinion.

Children aren’t capable of understanding data.