



Lesson 2: How Do Scientists Identify Turtles?

Description: Students will learn about the characteristics of the seven different species of sea turtles. Students will design their own dichotomous key to differentiate four different types of coins. Students will use a dichotomous key to identify a sea turtle that is assigned to them.

Objectives:

By the conclusion of the activities, students will

- Be able to identify the external anatomy of their turtle in order to follow the key.
- Be able to explain which characteristics helped them differentiate objects.
- Be able to convert weights from pounds (lbs) to kilograms (kg).
- Be able to convert linear length from feet (ft) to meters (m).
- Be able to convert temperature from degrees Celsius (°C) to degrees Fahrenheit (°F).
- Be able to convert linear measurements from centimeters (cm) to inches (in).
- Make these conversions in order to answer questions about sea turtles.

You will need:

- Copies of Chapter 2, *How Do Scientists Identify Turtles?* for each team of students.
- Word wall words (page 2-25 to 2-35)—printed, cut out and laminated (if desired)
- A set of coins consisting of a quarter, a dime, a nickel and a penny for each small group of students.
- Copies of *Make Your Own Dichotomous Key* worksheets (pages 2-5 to 2-6) for each student or small group of students.
- Copies of *Let's Identify a Sea Turtle* worksheets (pages 2-8 to 2-11).
- Printed sea turtle images. You will need one image for each student (pages 2-12 to 2-18). These can be laminated for future use if desired.
- Pens or pencils.

Standards:

Florida Sunshine State Standards-

English Language Arts

- **LAFS.5.RI.2.4** Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.

Mathematics

- **MAFS.5.NBY.2.7** Add, subtract, multiply and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Common Core Standards-

English Language Arts

- **RI.5.4** Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.



Mathematics

- **NBT.B.7** Add, subtract, multiply and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Vocabulary:

Algae: [AL-jee] A plant-like organism that does not have roots, flowers or stems. Algae live in water and damp places.

Carnivorous: Eating only meat.

Coral reef: Habitats made by living animals called corals. Coral reefs form in tropical oceans. Coral reefs have many, many different types of plants and animals living on them.

Dichotomous key: [die-KOT-uh-muss] A tool used by scientists. Pairs of questions are used to identify a plant or animal.

Endangered (species): A type of plant or animal that people think might become extinct.

Equator: An imaginary east-west line that circles the earth. It is half way between the North and South poles.

External anatomy: The structures on the outside of the body.

Fibropapillomatosis: [FIYE-bruh-PAH-pill-LOH-muh-TOE-siss] A disease that causes tumors to grow on sea turtles.

Government: A group of people who make the rules that the people in an area live by.

Herbivorous: A description of something that eats only plants.

Invertebrate: An animal that does not have a backbone or spinal cord.

Lateral scutes: The rows of scutes on each side of the vertebral scutes on a sea turtle's carapace.

Life history: The changes in a plant or animal over its life.

Niche: A habitat that contains the things necessary for a particular plant or animal to live.

Niche specialization: The process by which a plant or animal becomes better adapted to the specific characteristics of a particular habitat.

Omnivorous: Term for an animal that eats both plants and animals.

Organisms: Individual living things.

Polar: Referring to the North or South poles.

Prey: An animal that is hunted and eaten by other animals.

Rainforest: A place with lots of rain and large trees. Many different plants and animals live in rain forests.

Sargassum: A type of brown seaweed. Sargassum can float in the ocean.

Scutes: Individual sections of a sea turtle's shell.

Southern hemisphere: The part of the world that is south of the equator.

Threatened (species): A type of plant or animal that could become endangered.

Vegetation: Plants.

Vertebral scutes: The row of scutes down the middle of a sea turtle's carapace.

Vertebrate: An animal that has a backbone or spinal cord.

Procedure:

1. Add words for this lesson (pages 2-25 to 2-35) to your sea turtle word wall. Review these words with students (definitions are given in vocabulary, above).
2. Have students read “How Do Scientists Identify Turtles?” (Chapter 2 in *One in a Thousand: Those Amazing Sea Turtles*).
3. This lesson involves use of a dichotomous key. This is a tool biologists use to identify all kinds of different organisms. The word “dichotomous” means divided into two parts. The key involves careful observation of the thing you want to identify. Then a set of characteristics are identified that the object has or does not have. By constructing a series of questions the student will be to differentiate the items being examined.
4. There are three activities that complement the material presented in chapter 2. You may use one or all of them.
 - a. Activity 1 introduces the concept of a dichotomous key and guides students in the development of their own dichotomous key designed to let them distinguish common coins.
 - b. Activity 2 provides the students with a guide to using a dichotomous key to identify a sea turtle image. *Note that this key was specifically created for use with the images that are provided, and may not be accurate if other images are used.* Seven illustrations are provided for use by the students.
 - c. Activity 3 encourages students to use the metric system for scientific observations. They are provided sea turtle data in imperial units and asked to convert them to metric units. They also are provided temperature data in Celsius and asked to convert it to Fahrenheit.

Activities:**Activity 1: Make Your Own Dichotomous Key** (pages 2-5 to 2-6).

1. Divide students into small groups of 2-4 individuals.
2. Give each group 4 coins; a penny, nickel, dime and quarter.
3. Have them use the worksheet provided to develop their own dichotomous key which will let them identify the 4 coins.
4. Once they have created a key, have them swap keys with another group who is also finished. Have the two groups test out each other’s keys.
5. Have the groups revise their keys if needed.

Activity 2: Using a dichotomous key to identify your sea turtle (pages 2-8 to 2-18).

1. (Optional) Divide students into small groups of 2-4 students each.
2. Distribute an image of a sea turtle to each student or group.
3. Distribute a blank copy of the dichotomous key activity to each student or group.
4. Provide 10-15 minutes for students to examine their image, write down their field notes and draw their turtle.
5. Have each group use the dichotomous key to identify their turtle.
6. Ask them to can explain to their classmates the key characteristics they used to confirm their turtle’s identity.



Activity 3: Using the Metric System to Describe Your Turtle (page 2-20).

This activity is intended to help students practice transforming values between the standard American (Imperial) system of measurements and the metric system.

1. Hand out pencils and copies of the worksheet that is part of this lesson.
2. Ask students to work individually or in small groups to answer the questions on the worksheet.
3. Scratch paper may be useful so students can work out the calculations.





Name: _____

Make Your Own Dichotomous Key

Part I. Work in small groups. Each group should have a penny, a nickel, a dime and a quarter to work with.

1. Look at the four coins. How are the coins different from each other? How are they similar? List at least 4 descriptive things that you could use to tell the coins apart.

2. What is one description that you could use to tell one coin apart from all of the others? (How would you complete this sentence: "This coin is the only one that has/is...."?)

3. The first step in your dichotomous key would be (fill in the blanks):

1a. "The coin has/is _____; it is a _____".

Or

1b. "The coin does not have/is not _____; go to #2."

4. Put the coin you identified in step 1a aside. Look critically at the remaining three coins. What is one way you could identify one of the remaining three coins?

This coin has/is _____.

5. Set up the second step in your dichotomous key.

2a. "The coin has/is _____; it is a _____".

Or

2b. "The coin does not have/is not _____; go to #3."



6. Now two coins should have been identified using the steps above. Select one way that you can tell the remaining two coins apart.

7. Set up the third step in your dichotomous key.

3a. "The coin has/is _____; it is a _____".

Or

3b. "The coin does not have/is not _____; it is a _____."

Using the above steps, you should have been able to identify all four coins using the key that you designed.

8. Write your key on a separate sheet of paper (copy 1a, 1b, 2a, 2b, and 3a, 3b from above).
9. Ask your teacher if you can swap your key with another group. See if you can identify coins using the new key.



Make Your Own Dichotomous Key Answers

Characteristics that students may use to classify the coins:

- Size of the coin
- Color of the coin
- Rough or smooth edge
- Image from the face of the coin
- Other observations they come up with

Characteristics that could be used to classify one coin as different from another:

- Copper color is only found on a penny
- Smooth edges (on a silver coin) would be a nickel
- Smallest size (on a silver coin) would be a dime
- Largest size (on a silver coin) would be a quarter
- An image of a buffalo would be found on a nickel.



Name: _____

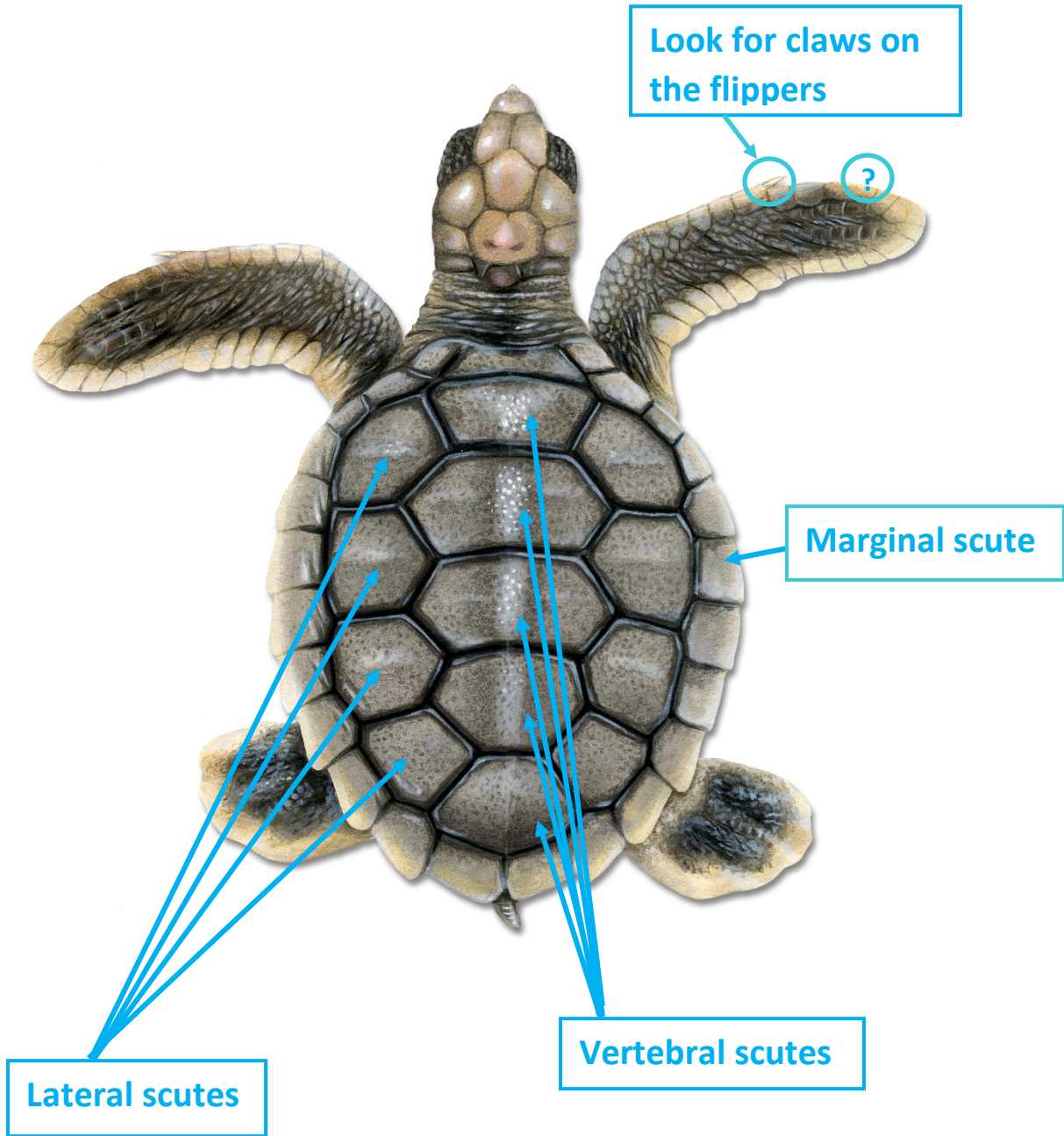
Let's Identify a Sea Turtle

We are going to learn to “key out” a sea turtle!

Before working with the dichotomous key, you will need to make some field notes to describe your turtle. You need to know the correct words to use.

- The **scutes** are the individual sections, or little squares, that you can count on many turtles' shells. There are three different types of scutes.
 - Vertebrae are the bones that make up your backbone. The scutes that are in the center of the turtle's carapace are called **vertebral scutes**. These go down the middle of the turtle's back.
 - Next to the vertebral scutes are the **lateral scutes**. These are fairly large and run along each side of the vertebral scutes.
 - The **marginal scutes** are the small scutes that go around the outside edge of the carapace.

The diagram on the next page will help you describe the key characteristics of your turtle. You will record your observations as field notes and draw your turtle. Then you will use the dichotomous key to try to identify it. This is an important job that biologists do every day.





Use your field notes and your drawing to identify your turtle.

My turtle was Turtle # _____

Sea turtle dichotomous key:

1. Does your turtle have scutes on its carapace?
 - a. If yes, go to step 2.
 - b. If no, then it is a **Leatherback**

2. How many lateral scutes does your turtle have (on each side)?
 - a. If 4, go to step 3
 - b. More than 4, please go to step 5

3. Does your turtle have scutes with rough/jagged edges?
 - a. If yes, it is a **Hawksbill**.
 - b. If no, go to step 4

4. Are the lateral scutes long and thin like a rectangle, or almost square?
 - a. If long and thin, then it is a **Green**
 - b. If almost square, it is a **Flatback**

5. How many lateral scutes are there (on each side)?
 - a. If 5, go to step 6
 - b. If 6 or more, then it is an **Olive Ridley**.

6. How many claws are on each of the front flippers?
 - a. If one, then it is a **Kemp's Ridley**
 - b. If two, then it is a **Loggerhead**

What species is your turtle? _____

What was the most useful description in helping you to identify your turtle? Explain why this one thing helped you so much.

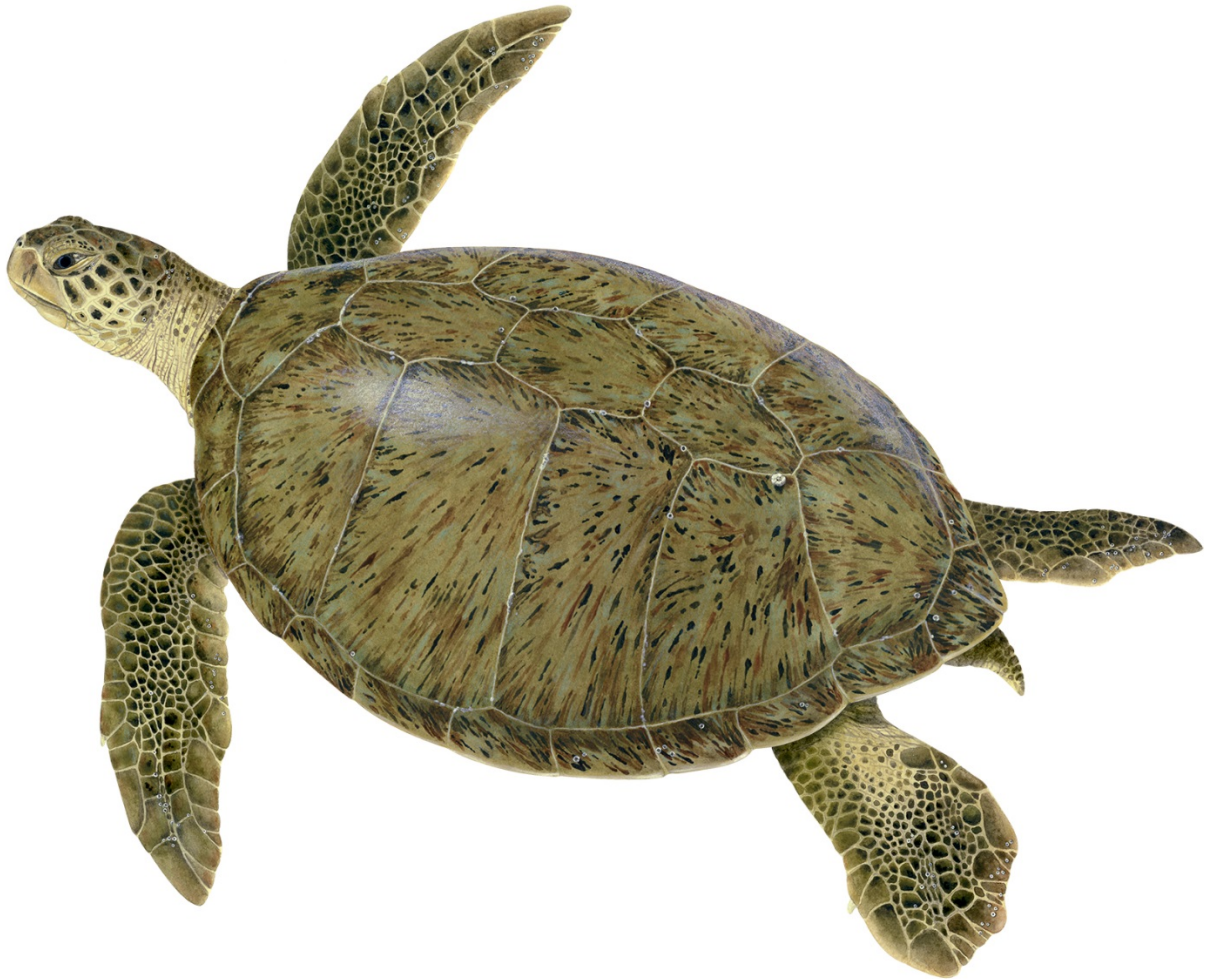


Turtle 1



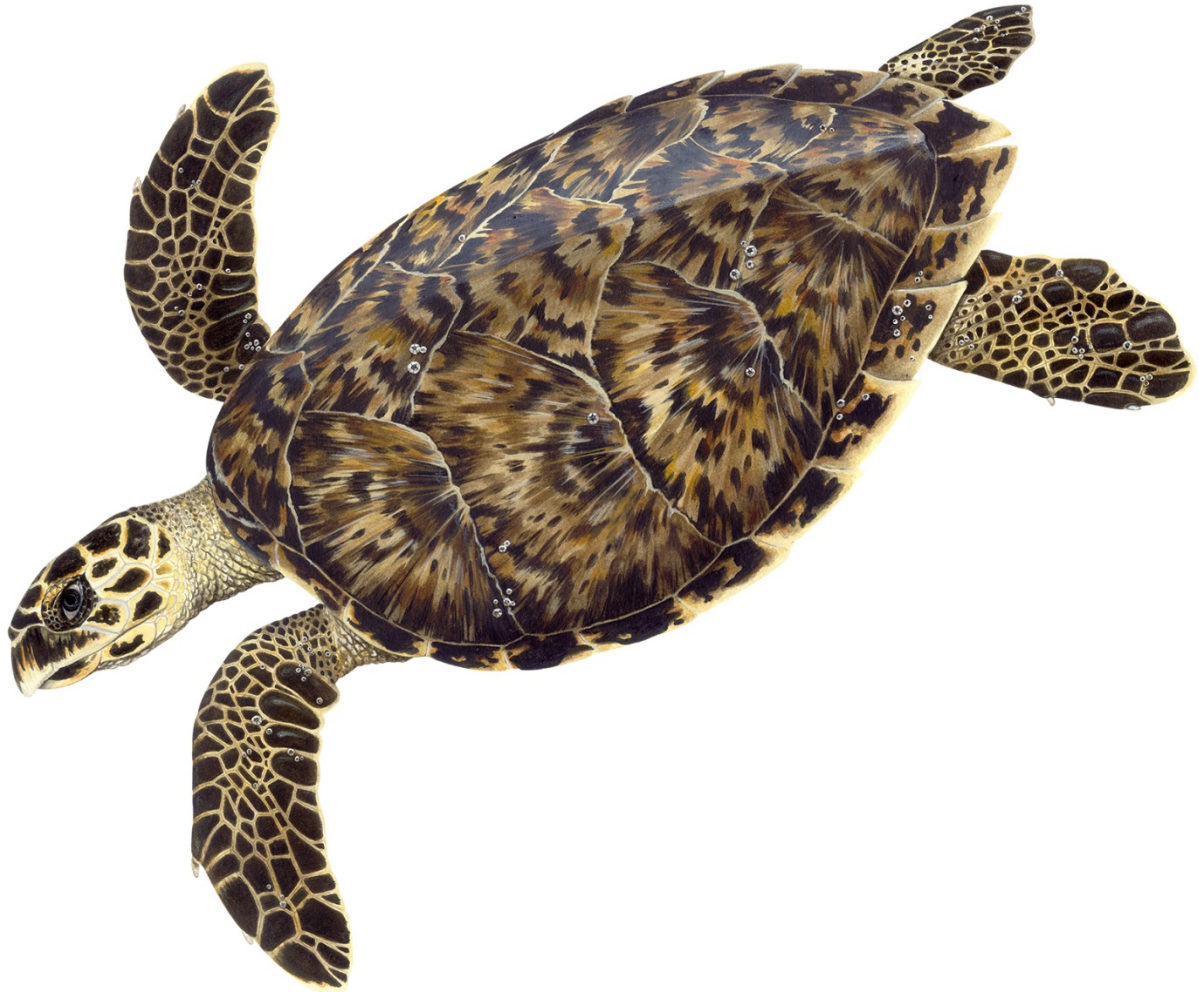


Turtle 2





Turtle 3





Turtle 4





Turtle 5





Turtle 6





Turtle 7





Let's Identify a Sea Turtle Answers

Identification of the turtle images by number:

- Turtle 1 is a Flatback Turtle
- Turtle 2 is a Green Turtle
- Turtle 3 is a Hawksbill Turtle
- Turtle 4 is a Kemp's Ridley Turtle
- Turtle 5 is a Leatherback Turtle
- Turtle 6 is a Loggerhead Turtle
- Turtle 7 is an Olive Ridley Turtle

Information on the carapace (lateral and vertebral scutes):

- The leatherback turtle has no scutes. It has a leathery covering, not a true shell.
- The hawksbill, green and flatback turtles should have 4 lateral scutes.
- The Kemp's ridley and loggerhead should have 5 lateral scutes.
- The olive ridley should have 6 lateral scutes.
- The flatback has lateral scutes that are almost the same in length and width (almost square).
- The hawksbill has scutes with rough or jagged edges.

Information on the number of claws on the front flipper:

- The Kemp's ridley, olive ridley, flatback, and green should have 1.
- The loggerhead and hawksbill should have 2.
- The leatherback has none.

Characteristics that students may find helpful to identify their turtle:

- Size
- Shape of lateral scutes
- Presence or absence of scales or scutes on carapace
- The number of lateral scutes
- The number of claws on the front flippers.



Name: _____

Using the Metric System to Describe Your Turtle

Scientists use special language to describe things. They need to be very careful about what they say. They want their information to be understood by other scientists. In this activity we are going to learn to describe sea turtles. We will use scientific language. When measuring things scientists always use the metric system. We are also going to use it to describe sea turtles and their environment.

The Leatherback Turtle:

The leatherback turtle is the largest turtle of all. It swims in the open ocean and eats jellyfish. Leatherback turtles are huge. They can weigh 1,000 pounds (lbs) and be 6 feet long.

A scientist would describe this turtle as follows: "The leatherback turtle is the largest turtle of all. They can weigh _____ kilograms (kg) and be _____ meters long."

- How many kg can these turtles weigh? (There are 2.2 lbs in one kilogram).

If a leatherback turtle is 1,000 lbs, how many kg is it?

- How many meters long can a leatherback turtle be?

(There are 3.3 feet (ft) in one meter (m). Therefore to convert a number from feet to meters you multiply by the number of feet by 0.3.)

If a leatherback turtle is 8 ft long, how many meters long is it?



The Loggerhead Turtle

Loggerhead turtles are medium-sized to large turtles. They are called “logger-head” because of the large size of their head. These turtles may weigh 300 lbs and be 3 feet long.

A scientist might describe this turtle as follows:

“The loggerhead turtle has a very large head. It can weigh _____ kg and be _____ m long”.

- How much would a 300 lb loggerhead turtle weigh in kg?

- How long is a 3 ft loggerhead turtle in meters?

The Green Turtle

Green turtles are the second largest turtles. The largest turtle is the leatherback, which lives in cold ocean water. The green turtles are very different. They enjoy tropical climates. Green sea turtles are common in Hawaiian waters. They are called “Honu” by the Hawaiian people.

Scientists often measure temperature in degrees Celsius (°C). Water temperatures are listed below in degrees Celsius (°C). Please change these numbers to degrees Fahrenheit (°F). Use this information to decide whether a leatherback turtle or a green turtle would be found in that water.

The formula to change temperature from °C to °F is:

$$(^{\circ}\text{C} \times 1.8) + 32 = ^{\circ}\text{F}$$

- If the water temperature is 5°C it is _____ °F.
- Is this water warm or cold? _____
- Would it be better for a green turtle or a leatherback?

Temperatures

- *A refrigerator should be between 32 and 40°F*
- *The average water temperature in the tropics is over 68°F*
- *An average summer day in Florida is about 82°F*
- *Average human body temperature is 98.6°F*



- If the water temperature is 28°C it is _____ °F.
- Is this water warm or cold? _____
- Would it be better for a green turtle or a leatherback? _____

- What is the temperature (°F) of water that is 42°C? _____ °F
- Do you think a turtle could live in this water? Why or why not?

Young turtles are called hatchlings. Hatchling green sea turtles are about 3 inches long. When they are little they may eat meat such as little crabs. Juveniles that are as small as 10 inches long may also eat some plant material. Adult green turtles can be more than 3 feet long. They prefer to eat plants and algae.

There are 2.54 centimeters in an inch. To convert from centimeters (cm) to inches (in) you multiply the number of cm by 0.39.

Scientists have recorded the length in centimeters (cm) of several turtles. Can you calculate how long they are in inches?

- “Annie” is a green turtle that has a carapace that is 25 cm long. How many inches long is she? _____ in.
- “Stubby” is a green turtle that was rescued after being hit by a boat. His carapace is 200 cm long. How many inches long is he? _____ in.
- A small turtle was rescued from the beach. It is 7 cm long. How many inches long is it?
_____ in.
- Which one of these turtles is an adult? _____
- Which one is a juvenile? _____
- Which one is a hatchling? _____



Using the Metric System to Describe Your Turtle Answers

The Leatherback Turtle:

- How many kg can these turtles weigh? (There are 2.2 lbs in one kilogram).
If a leatherback turtle is 1,000 lbs, how many kg is it? **2,200 kg**
- How many meters long can a leatherback turtle be?
If a leatherback turtle is 8 ft long, how many meters long is it? **1.8 m**

The Loggerhead Turtle

- How much would a 300 lb loggerhead turtle weigh in kg? **660 kg**
- How long is a 3 ft loggerhead turtle in meters? **0.9 m**

The Green Turtle

- If the water temperature is 5°C it is **41** °F.
- Is this water warm or cold? **cold**
- Would it be better for a green turtle or a leatherback? **leatherback**
- If the water temperature is 28°C it is **82.4** °F.
- Is this water warm or cold? **warm**
- Would it be better for a green turtle or a leatherback? **green**
- What is the temperature (°F) of water that is 42°C? **107.6** °F
- Do you think a turtle could live in this water? Why or why not?
No, it is too hot
- “Annie” is a green turtle that has a carapace that is 25 cm long. How many inches long is she? **9.75** in.
- “Stubby” is a green turtle that was rescued after being hit by a boat. His carapace is 200 cm long. How many inches long is he? **39** in.



- A small turtle was rescued from the beach. It is 7 cm long. How many inches long is it?
_____ **2.73** _____ in.
- Which one of these turtles is an adult? _____ **Stubby** _____
- Which one is a juvenile? _____ **Annie** _____
- Which one is a hatchling? _____ **the small turtle rescued from a beach** _____

Algae

Carnivorous

Coral reef

Dichotomous
key

Endangered

Equator

External

anatomy

Fibropapillomatosis

Government

Herbivorous

Invertebrate

Lateral scutes

Life history

Niche

Niche

specialization

Omnivorous

Organisms

Polar

Prey

Rainforest

Sargassum

Scutes

Southern

hemisphere

Threatened Vegetation

Vertebral

scutes

Vertebrate