

Sea Turtle Anatomy with Augmented Reality



VIRGINIA
AQUARIUM
& MARINE SCIENCE CENTER

Augmented Reality (AR) is the addition of computer-generated images to real world environments. In this activity, you will explore sea turtle anatomy and use a dichotomous key to identify the species of an AR sea turtle.

Duration

Activity: 30-45 minutes

Supplies

- Cell phone with camera and an internet access application, like Google Chrome.
- ["Background on Sea Turtles"](#) document
- Pencil
- Colored Pencils (optional)



Background

There are seven different species of sea turtle: Loggerhead, Leatherback, Green Sea Turtle, Kemp's Ridley, Olive Ridley, Hawksbill, and Flatback. Review the "Background on Sea Turtles" document with profiles with information about each species. List the five most common sea turtle species that visit Virginia's coast, starting from the most common visitor to least common.

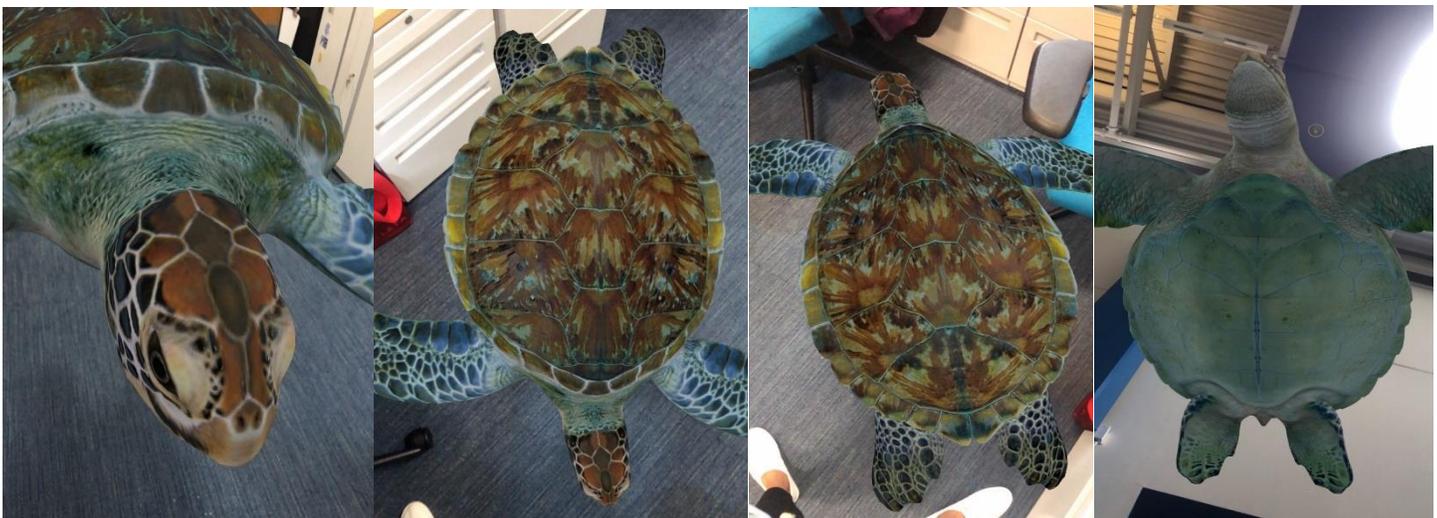
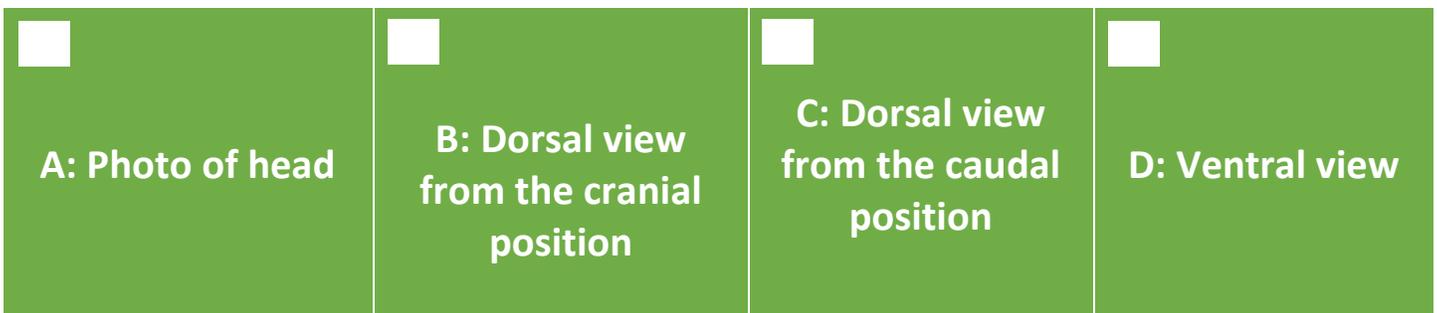
1. _____
2. _____
3. _____
4. _____
5. _____

Augmented Reality

1. Open your internet application and search “Sea Turtle” in the Google Search Engine.
2. Scroll down until you see “View in 3D” (see image on right)
3. Explore the AR turtle and move it around your surroundings. Enlarge the sea turtle to 125%, then return it to 100%.
4. Capture at least four screen-shots of the AR sea turtle. Listed below are four photograph suggestions. Check them off as you capture the photograph.
 - A. One close-up photograph of the head
 - B. One photograph of the dorsal side (top) from the front of the sea turtle.
 - C. One photograph of the dorsal side from behind the sea turtle.
 - D. One photo of the ventral side (bottom) of the sea turtle.



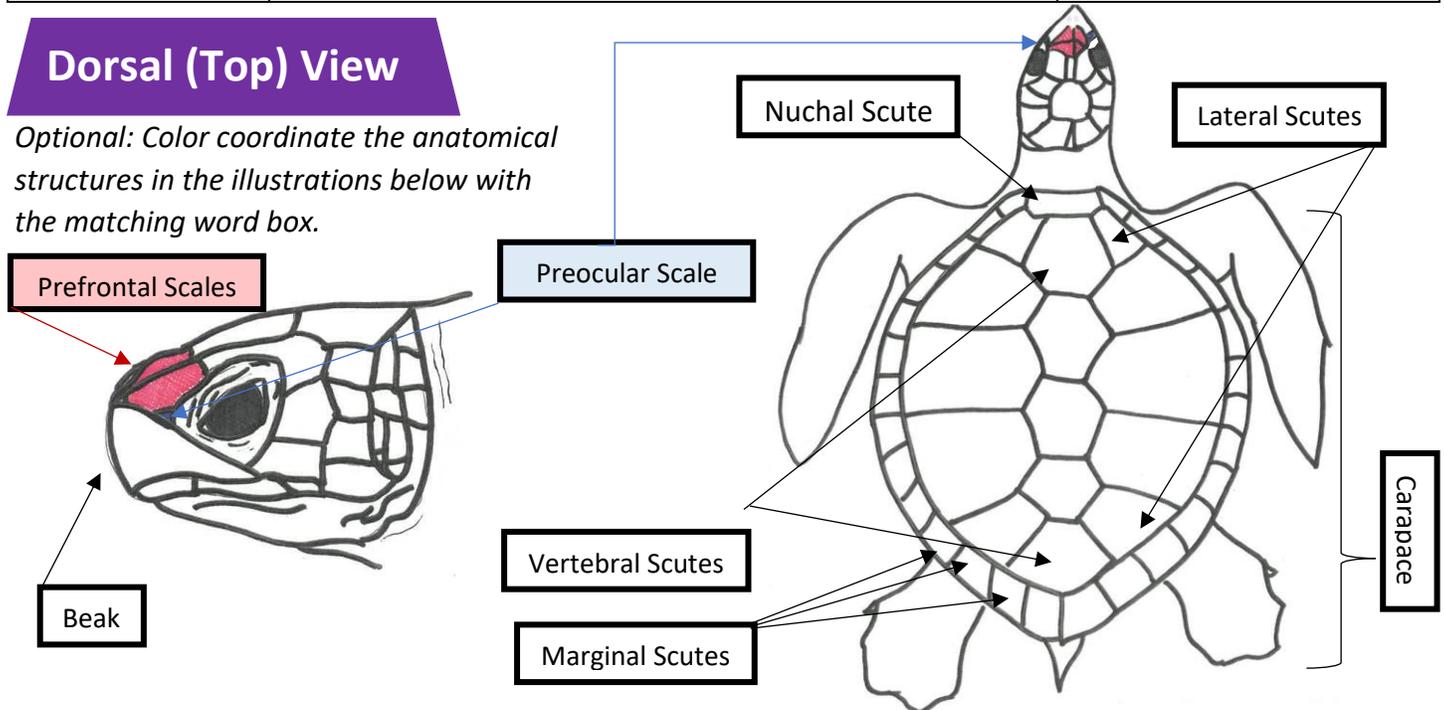
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II. External Sea Turtle Anatomy

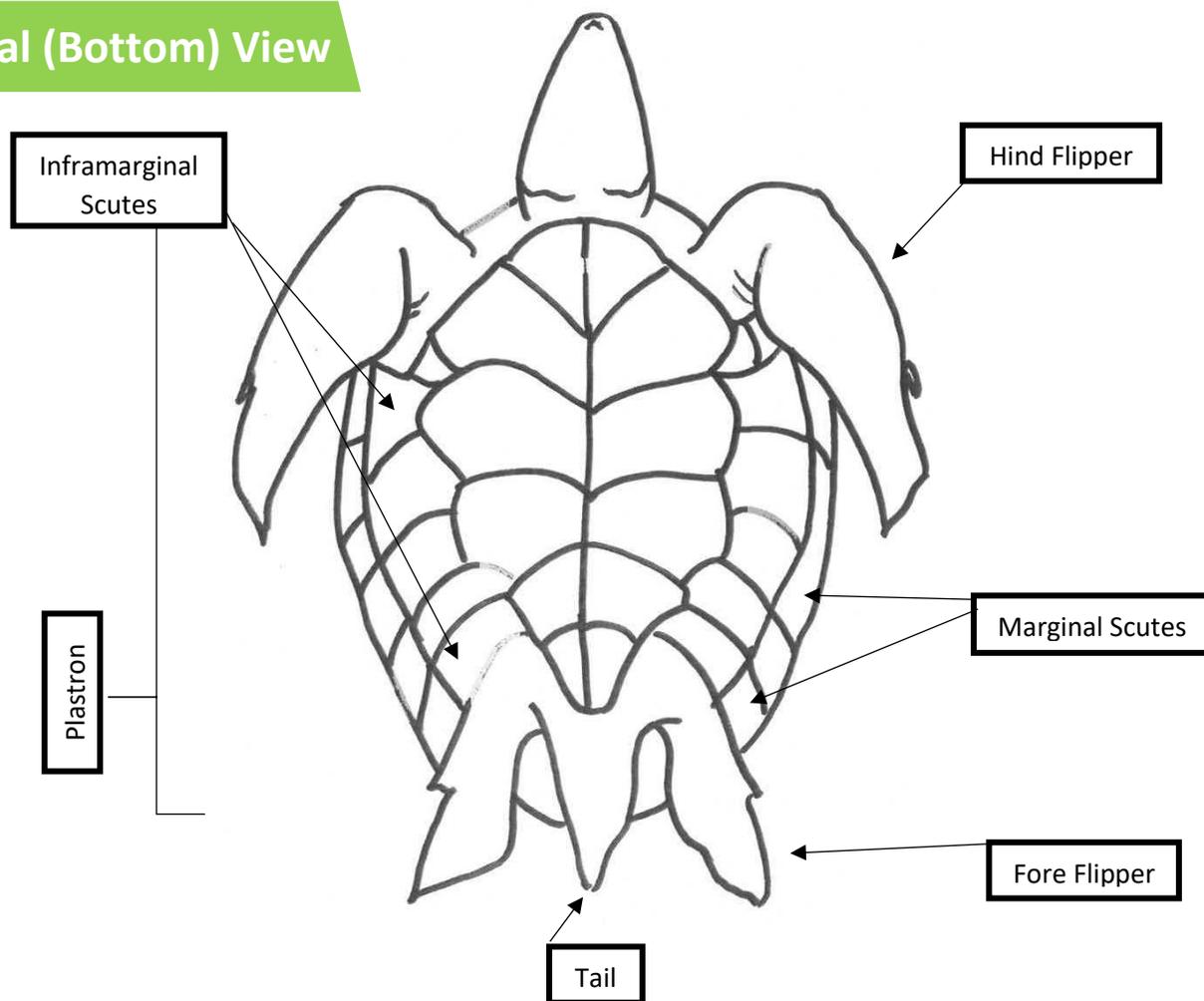
Now that you've taken pictures of your AR sea turtle, explore the anatomical features of sea turtles that will help identify the species of turtle used in Google AR. Identify and familiarize yourself with the structures listed below and count the number of each part on the augmented turtle.

Dorsal Side (<i>Upper-side/Top</i>)		Number on Augmented Sea Turtle
Carapace	The top shell of the turtle that is covered in a specialized scale, called a scute. Each species of sea turtle has a unique carapace which can be used to identify the species. The carapace protects the internal organs and provides some camouflage for the sea turtle. In all but the leatherback, the carapace is fused to the sea turtle's backbone.	
Lateral Scutes	Specialized scales located on the carapace of the sea turtle. The scutes must be shed as the sea turtle grows and develops. The number and position of these scutes are specific to each individual species.	
Vertebral Scutes	Scutes that are located on the carapace that run along the vertebral column (spine).	
Marginal Scutes	Scutes that run along the outer edge of the carapace.	
Beak	Specialized structure that is uniquely adapted for catching and consuming the specific diet for each species.	
Preocular Scales	Scale located before the eyes.	
Prefrontal Scales	Scales located at the front of the head, which can be used to identify the species.	
Nuchal Scales	The first scute located on carapace, located immediately posterior (behind) the head).	



Ventral Side (<i>Underside/Bottom</i>)		Number on Augmented Sea Turtle
Plastron	Portion of the shell located on the ventral side (underside) of the sea turtle.	
Inframarginal Scutes	Scutes located on plastron that touch the marginal scutes.	
Fore Flippers	Used to push the sea turtle through the water. When a female turtle is ready to nest, she will use her fore flippers and hind flippers to dig a pit and egg chamber	
Hind Flippers	Paddle-like appendages adapted to swimming in the ocean. Nesting females will use her hind flippers to cover her egg clutch with sand.	
Tail	The tail is considerably longer in male sea turtles.	

Ventral (Bottom) View



III. Sea Turtle Dichotomous Key

A dichotomous key is a tool used to determine the identity of something, such as the name of a butterfly or type of rock. By answering a series of questions that describe the physical characteristics of the object, the user is lead to the name of the object or organism. At each step, the user is given two choices; each choice leads to a different question. See an example of a simple dichotomous key that can be used to identify common writing tools.

Dichotomous Key for Writing Tools	
1.	A. Writes with ink.....Go to question 2 B. Writes with graphite (lead).....Pencil
2.	A. Writing tip is metal.....Pen B. Writing tip is felt.....Marker

The shape and number of scutes located on the carapace and plastron is distinct for each species of sea turtle. Therefore, we can use our observations and documentation of the AR sea turtle to identify what species it represents. Use the dichotomous key for Virginia’s sea turtles to identify the species.

Key for Virginia Sea Turtles

1.	A. Scutes arranged in a distinct pattern on carapace..... go to 2 B. No scutes on carapace, scutes replaced by longitudinal ridges.. Leatherback
2.	A. Has 4 lateral scutesgo to 3 B. Has 5 lateral scutesgo to 4
3.	A. Scutes overlap one another, beak noticeably hooked Hawksbill B. Scutes do not overlap, beak not hooked Green
4.	A. Small, terminal scute near tail on plastron..... Kemp’s Ridley B. No small, terminal scute near tail on plastron..... Loggerhead

According to the dichotomous key, what species of sea turtle is the augmented turtle? _____

Answer Key

I. Introduction: Virginia's 5 most common sea turtle visitors:

1. Loggerhead
2. Kemp's Ridley
3. Green
4. Leatherback
5. Hawksbill

II. External Sea Turtle Anatomy: Number of anatomical parts on virtual sea turtle

• Dorsal/Top Side

- Carapace-1
- Lateral Scutes-4
- Vertebral Scutes-5
- Marginal Scutes-24
- Beak-1
- Preocular Scales-0
- Prefrontal Scales-1 pair (2 individual scales)
- Nuchal Scales-1

• Ventral/Bottom Side

- Plastron-1
- Inframarginal Scutes-4
- Fore Flippers-2
- Hind Flippers-2
- Tail-1

III. Sea Turtle Dichotomous Key

- Augmented sea turtle is a green sea turtle