Totally Terrapin Trivia

(To be played as "I Have, Who Has")

This game should be played after the major concepts about the diamondback terrapin and its plight have been covered through the lessons or PowerPoint presentations.

Be sure to make an extra copy of each page of the game cards. It will serve as your answer key. Questions start in the left column and go down. The next answer is at the top of the right side of the same page and, once again, works down. Each page is set up this way.

Before beginning, you may wish to distribute the carapace and plastron diagrams (attached) to help students identify the number of scutes or scales. This will also help them grasp the vocabulary.

Directions:

1. Carefully cut out the cards. Laminate for durability.
2. Shuffle the cards.
3. Deal a card out to each student. If you have fewer students than cards, ask for volunteers who want an extra. Tell the students to read their cards silently.
4. Ask the student who has the card that says "I have the first card" to stand. Tell him/her to read the whole card.
5. Explain that the student who has the answer to the first question (that was just read) should stand, read the answer from their card and then continue to read the new question that is at the bottom of the card.
6. The student with that answer should stand and repeat the process.
7. Turns will continue until all cards have been read. The game is over when the final student reads "Congratulations, team! You rocked at Totally Terrapin Trivia!"

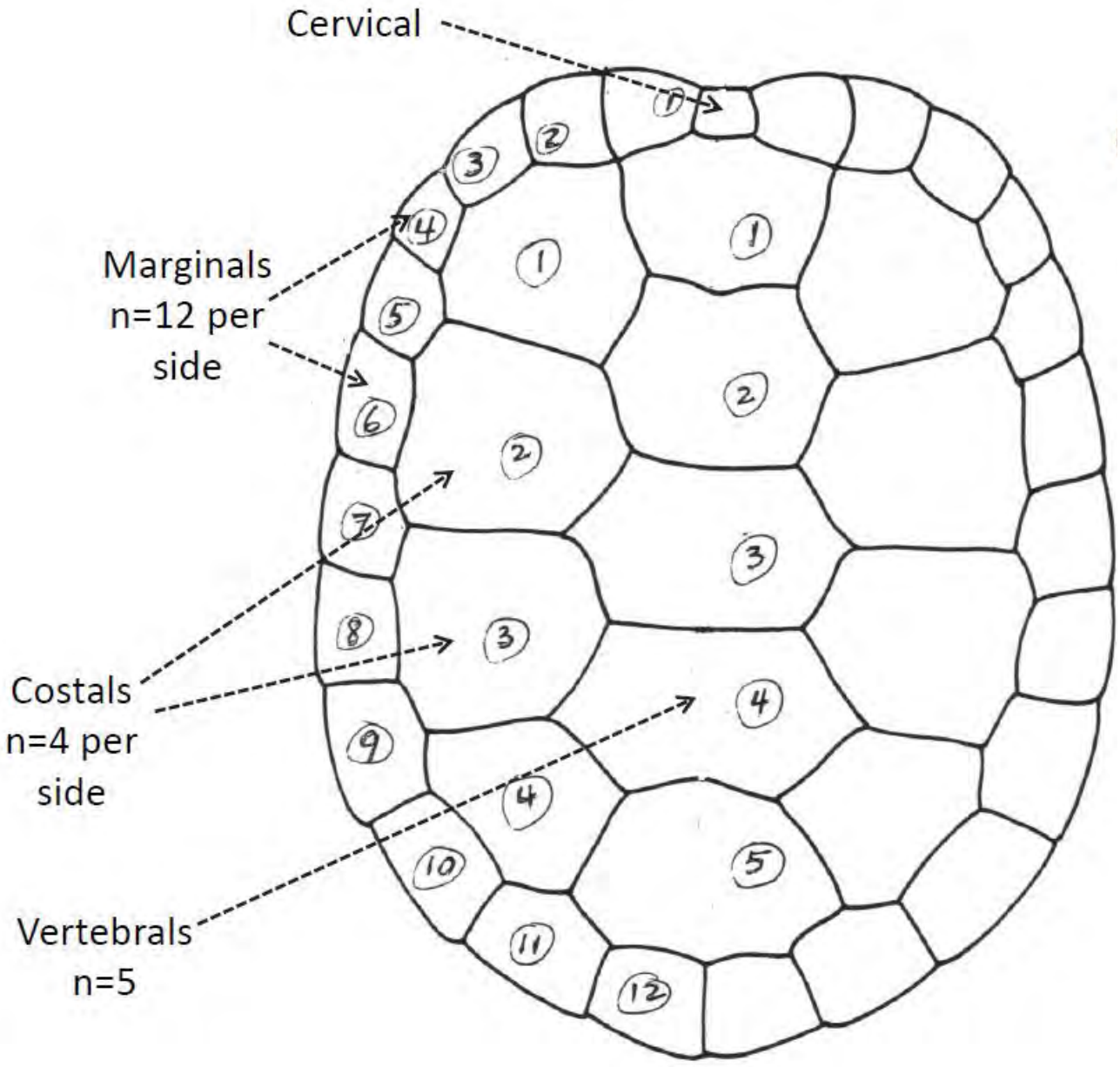
I have the **first card**. Who has what classifies a diamondback terrapin as a vertebrate?	I have a **carapace**. Who has the word for the bottom part of a turtle shell?
I have a **backbone**. Who has the location of a diamondback terrapin's backbone?	I have a **plastron**. Who has a synonym for the enlarged scales on a turtle's shell?
I have the **underside of the carapace**. Who has the category of vertebrates to which diamondback terrapins belong?	I have **scutes**. Who has the number of vertebral scutes on the carapace?
I have **reptiles**. Who has the word for the top part of a turtle shell?	I have **5**. Who has the number of cervical scutes on a diamondback terrapin's carapace?

I have **one**. Who has the normal amount of marginal **scutes** found on each **side** of a terrapin's carapace?	I have the **brackish** (fresh/saltwater mix) **water** of the tidal marsh. Who has types of food terrapins like to eat?
I have **twelve**. Who has the term used for a scute that is not normal?	I have **salt marsh snails, small crabs, and small bivalves(clams, mussels)**. Who has the reason why thousands of diamondback terrapins drown each year?
I have an **anomaly**. Who has the geographic range where diamondback terrapins can be found?	I have **commercial-style crab traps**. Who has the term for other unwanted species caught in traps or nets?
I have the U.S. coastline from **Cape Cod** down to Florida and around to the **Gulf Coast**. Who has the environment where diamondback terrapins can be found?	I have **bycatch**. Who has the device that prevents diamondback terrapins from entering crab traps?

I have **excluders** or **bycatch reduction devices**. Who has the average amount of eggs a female diamondback terrapin carries?	I have nest **temperature**. Who has the incubation temperature that will produce females?
I have **8 to 12**. Who has the reason why female diamondback terrapins are run over frequently by cars?	I have **85 degrees Fahrenheit or 32 degrees Celsius**. Who has the amount of time it takes for tiny hatchlings to emerge from incubated eggs?
I have the elimination of sand dunes on barrier beach islands which forces terrapins to search for sites near roads. Who has the average number of adult females killed in the turtle patrol area of Cape May and Atlantic Counties?	I have **7 to 8 weeks**. Who has the nickname for newborn hatchlings that are prone to be gulped down by birds?
I have over **1,000 adult females.** Who has the cause of an egg becoming a male or female diamondback terrapin?	I have **"seagull potato chips".** Who has the U.S. coin that is the size of a newborn hatchling's shell?

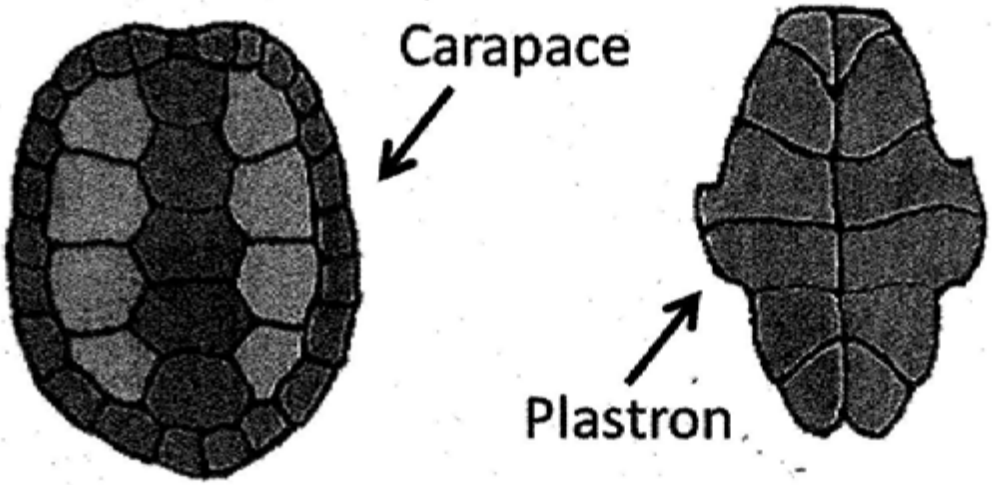
I have **a quarter**. Who has the item that has reduced adult female terrapin roadkills?	I have about **3 inches**. Who has the reason diamondback terrapins have lost most of their nesting area?
I have **terrapin barrier fences**. Who has the term for an inactive state resembling deep sleep in which terrapins pass the winter?	I have the **destruction of sand dunes** on barrier beach islands in order to build resort communities. Congratulations, team! You rocked at Totally Terrapin Trivia!
I have **hibernation**. Who has the name for a hatchling that does not hibernate while held in captivity for a year?	
I have **headstarter**. Who has the size a headstarter should be in order to help it become “predator-proof”?	

Dorsal View of Carapace



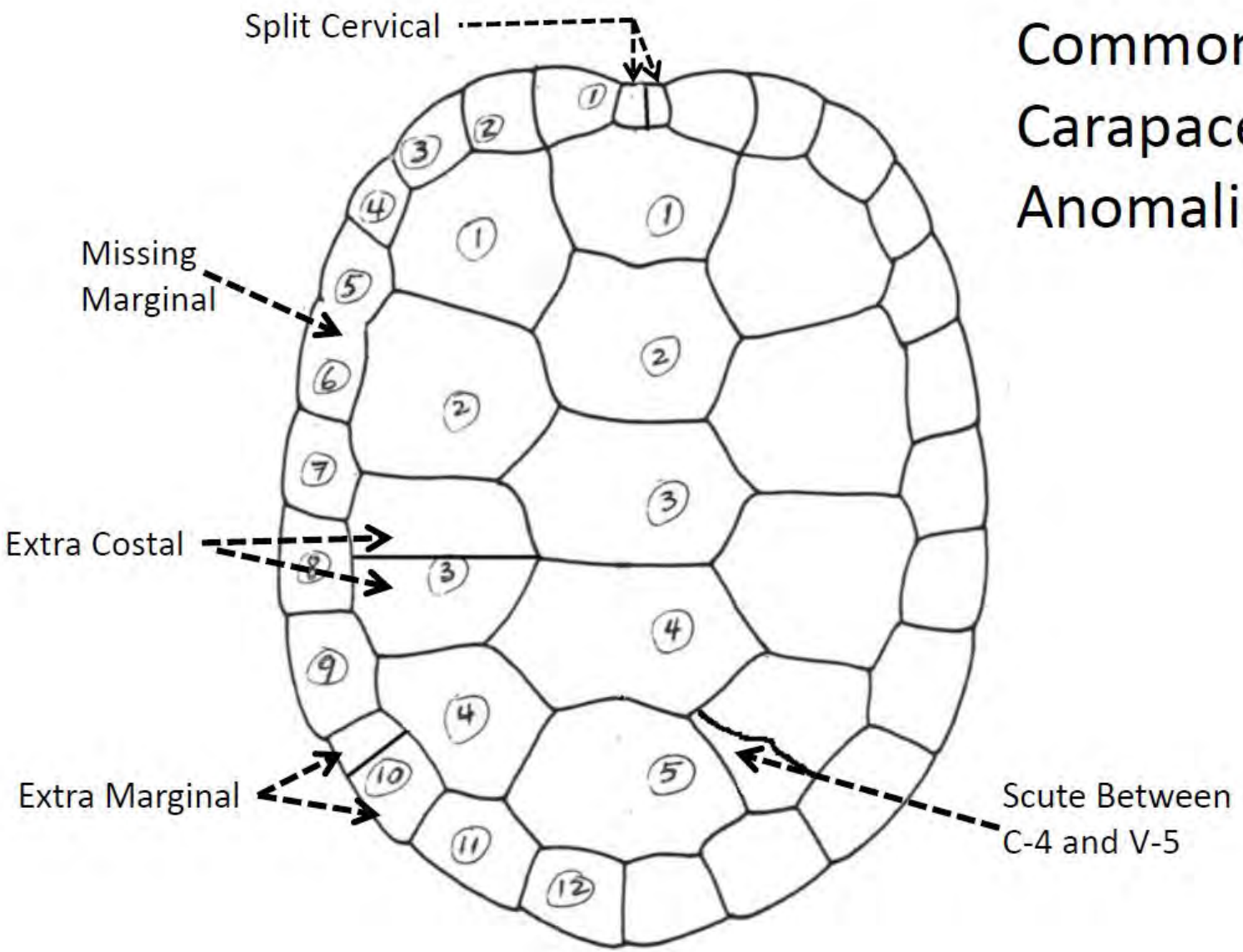
Terrapin scute morphology

- Cervical
- Vertebral
- Costal
- Marginal
- Plastral



The diagram above shows the "normal" arrangement of scutes on a terrapin shell.

Common Carapace Anomalies



Turtle Geometry

Objective: The pupils will be able to identify specific polygons as well as non-polygonal shapes while examining a diamondback terrapin. The students will also be able to write a descriptive paragraph including the related terms.

Essential Questions:

1. If you are a diamondback terrapin, explain the adaptations you have that help you survive.
2. Explain in an essay your life as a Wetlands Institute intern. Describe in detail what you do to help increase the diamondback terrapin population.

3. What can you do to help save diamondback terrapins?

Materials:
Diamondback terrapins (or pictures) for each cooperative group
Polygon and space figure samples
Turtle geometry recording sheet
Paper, pencils
Idiom, simile lists

Student Arrangement:
Cooperative groups of 4

Procedure: (To attend to all of the geometric terms, the math practice of this activity will span over a couple of days.)
1. Explain that a polygon is a closed 2-dimensional (flat) figure made of line segments. Clarify that objects that are not polygons can be open, crossing, or curved.
2. Define the following:
   Triangle (explaining equilateral, isosceles, scalene)—3 sides
   Quadrilateral (explaining rectangle, square, rhombus, parallelogram)—4 sides
   Pentagon—5 sides
   Hexagon—6 sides
   Octagon—8 sides
   Decagon-10 sides
3. (Optional) Another math lesson that can be included before this activity is the identification and description of space figures: sphere, cone, cylinder, pyramid, rectangular prism, cube.
4. Distribute one terrapin (or picture) to each cooperative group. The student with the longest pinky nail will be first to identify a geometric term that they see on the turtle. They will explain whether it is or is not a polygon. If it is a polygon they will name it, state why and how many sides it has. (Students may also state if it is a space figure and explain their reasoning.) The person to the right of him/her will record the shape and its location on the Turtle Geometry Recording Sheet. As you circulate, encourage students to explain the shapes they discovered.
5. Turns continue until everyone in the group has had a chance to contribute. You may have two rounds if you desire.
6. In language arts class, cooperative groups will review their Turtle Geometry Recording Sheet and apply it to paragraph writing class. The student who was last in the verbal identification (math) portion of the lesson will state an opening for the group's paragraph in the form of a question. Each student will then (moving to the right) craft a sentence about a geometric shape they identified. (The person to his/her right will record the stated sentence. If you prefer, you may also appoint one writer for the group instead.) Students will be asked to apply vivid describing words, similes or idioms learned in previous language arts lessons to their sentences. Remind the students to describe the turtle from head to tail; or tail to head. Also encourage the

use of transitions such as first, next, etc.. On the final student's turn, s/he will be asked to compose the closing.
7. Students should revise paragraphs to improve vocabulary and remove repeats. Editing should be performed for capitals and punctuation.
8. Each student will be asked to illustrate his/her turtle including the vivid geometry they just included in their paragraph. Geometric terms should be highlighted with a label and arrow.
9. To close, have each group share their paragraph with the class.

Assessment:
Observation: Circulate to each group to be sure students are performing their assigned jobs and using geometric terms correctly.
Checks for Understanding: White board reviews for exit knowledge of terms
Thumbs up and down
Final Product: Written Paragraph/Illustration

Core Curriculum Standards:
LA.3.W.3.4 *- [Grade Level Standard] - With guidance and support from adults, produce writing in which the development and organization are appropriate to task and purpose.*

LA.4.W.4.2.d *- Use precise language and domain-specific vocabulary to inform about or explain the topic.*

LA.5.W.5.2.d *- Use precise language and domain-specific vocabulary to inform about or explain the topic.*
LA.6-8.WHST.6-8.2.c *- Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.*
MA.3.3.4 *- [Critical Focus Area] - Students describe, analyze, and compare properties of two-dimensional shapes. They compare and classify shapes by their sides and angles, and connect these with definitions of shapes. Students also relate their fraction work to geometry by expressing the area of part of a shape as a unit fraction of the whole*
MA.4.4.G.2 *- [Standard] - Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.*
MA.5.5.G.3 *- [Standard] - Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories*
SCI.4.5.5.4 B.2 *- [Area of Focus] - Recognize that individuals vary within every species*
SCI.4.5.5.4 C.1 *- [Area of Focus] - Identify different stages in the lives of various organisms.*
SCI.8.5.5.8 B.a *- [Essential Question] - How are organisms of the same kind different from each other?*

Group Name_____

Turtle Geometry Recording Sheet

Geometric Shape	*Location*

What Is A Terrapin?

Objective: After studying the other vertebrate classes, the pupils will be able to name and define the remaining category: reptiles. They will be able to identify the parts of a turtle and explain conservation issues relating to the decrease in New Jersey's diamondback terrapin population.

Essential Question:

2. Pretend you are a diamondback terrapin. Explain how your adaptations help you to survive.

Materials: Adult Terrapin/Hatchling/ hatchling with lunchbox photos*, terrapin nest plaster molds or photo, turtle shell (or pictures) with backbone, Terrapin Topography Worksheet,
"Amazing Terrapins" article
*"Saving the Diamondback Terrapin" PowerPoint (for photos) or *photo files: plastron, carapace, bridge and diamondback terrapin (www.wetlandsinstitute.org)

Procedure:
1. We will discuss the latest progress of our terrapins. (The Disney teachers will be happy to share their headstarters' status☺.)
2. Define reptile as a cold- blooded animal that has a body covered with scales or plates. Most live on land; all breathe with lungs and lay eggs that often do not have brittle shells like those of birds. Most have 2 pairs of legs with 5 toes on each foot.
3. When giving examples such as crocodiles and snakes, include diamondback terrapins. Discuss how it is the only reptile that spends its entire life in the salt marsh (brackish water=salt/fresh water mix). Elaborate that turtles have a soft body encased in a hard shell into which, for most species, the head, legs and arms can be withdrawn. Show the turtle shell (or picture) that proves they have a backbone. Highlight that the diamondback terrapin cannot totally withdraw into its shell. (Few turtles can do this, as is the case, for example, for box turtles; most are like terrapins.)
4. Using the library of photos, identify the plastron (lower shell), the carapace (upper shell), and the bridge region (which connects the carapace and plastron on both sides of the body), scutes (enlarged scales made of keratin that cover the shell), eyes, nostrils, tail (males have larger tails), head, neck, legs and claws on one of the turtles. Have each group look carefully at their turtle (or photo) to locate these items. Instruct them to complete "Terrapin Topography".
5. Explain that claws are needed to help the female terrapin lay eggs (approximately 8-12) once these have been fertilized. They use their hind feet for nest digging. (Show a picture of the plaster models of the inside of terrapin nests.) When the female has finished dropping and positioning her eggs, she will cover her nest and make it appear just as it was when she arrived (camouflaging). The temperature of the eggs during incubation will determine whether females (higher temperatures: above 82 degrees F=28 degrees C; 85 degrees F=100% females) or males (lower temperatures: below 82 degrees F=28 degrees C) are produced. Young turtles will develop and hatch in about 2 months. Hatchlings break the eggshell with a special egg "tooth". (This is not a real tooth, but a growth of keratin that will fall off shortly after hatching.) It may take several hours to a whole day for a hatchling to emerge from its shell. A small yolk sac can often be seen on the bellies of hatchlings. This acts as a "lunchbox" for the baby until it is able to find its own food.
6. Distribute "Amazing Terrapins" article. Read and discuss this together.
7. Tell the students to name an interesting fact that they learned about our friends the terrapins.

Assessment:
Checks for Understanding: Exit slip or white board
Observation; Topography Worksheet

Standards: Science:
SCI.3-4.5.3.4.A.2 Compare and contrast structures that have similar functions in various organisms, and explain how those functions may be carried out by structures that have different physical appearances.
SCI.3-4.5.3.4.A.b} Essential functions required for the well-being of an organism are carried out by specialized structures in plants and animals.
{SCI.3-4.5.3.4.E.2} Evaluate similar populations in an ecosystem with regard to their ability to thrive and grow.
SCI.3-4.5.3.4.A.a} Living organisms: Interact with and cause changes in their environment. Exchange materials (such as gases, nutrients, water, and waste) with the environment. Reproduce. Grow and develop in a predictable manner.
{SCI.3-4.5.3.4.D.a} Plants and animals have life cycles (they begin life, develop into adults, reproduce, and eventually die). The characteristics of each stage of life vary by species.
{SCI.5-6.5.3.6.D.1} Predict the long-term effect of interference with normal patterns of reproduction.
{SCI.5-6.5.3.6.D.a} Reproduction is essential to the continuation of every species.
{SCI.3-4.5.1.4.C.a} Scientific understanding changes over time as new evidence and updated arguments emerge
{SCI.5-6.5.3.6.D.b} Variations exist among organisms of the same generation (e.g., siblings) and of different generations (e.g., parent to offspring).
{SCI.5-6.5.3.6.C.a} Various human activities have changed the capacity of the environment to support some life forms.

Acknowledgement: Wetlands Ecology: "A-maze-ing Terrapins", Wetlands Institute, www.wetlandsinstitute.org

Name_____

Terrapin Topography

Identify and label the parts of this diamondback terrapin.

Word Bank

Carapace Nostril Scute Tail Claw Mouth
Eye Mouth Leg Neck

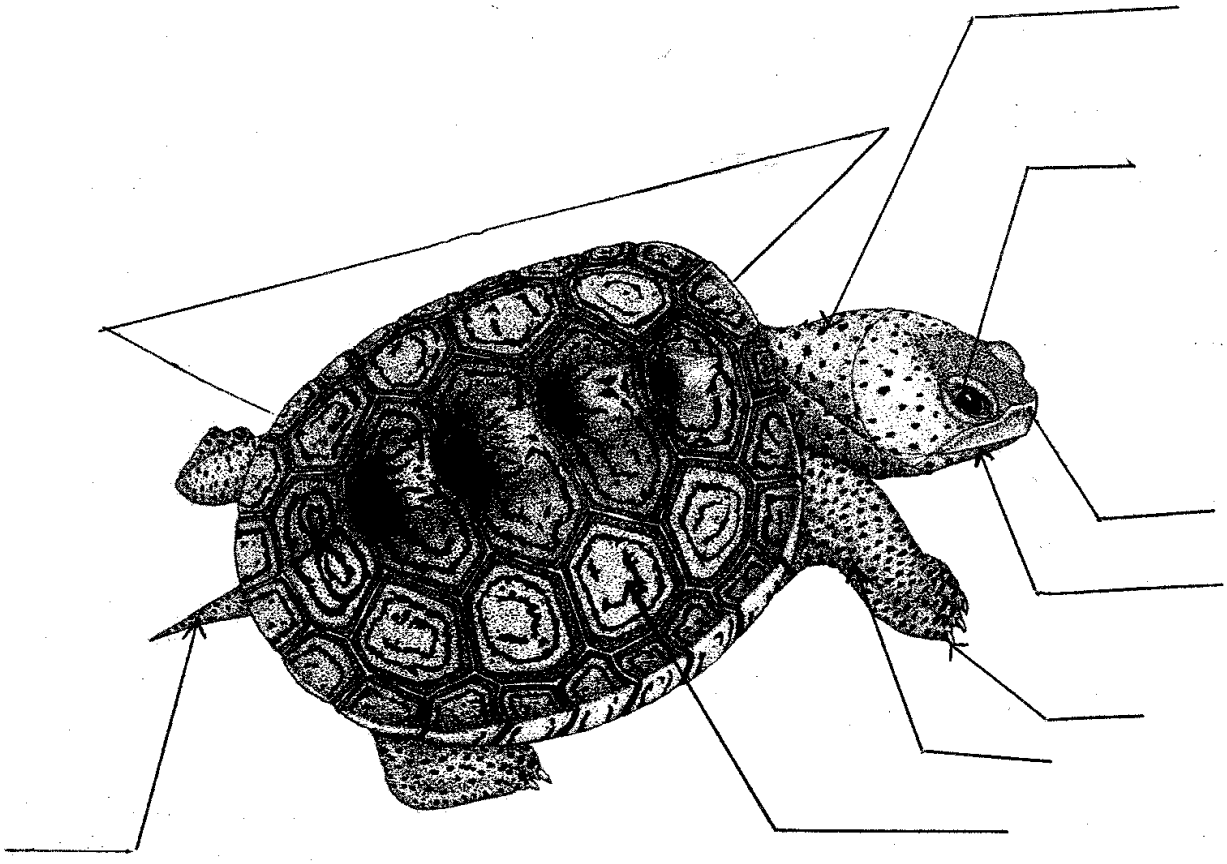
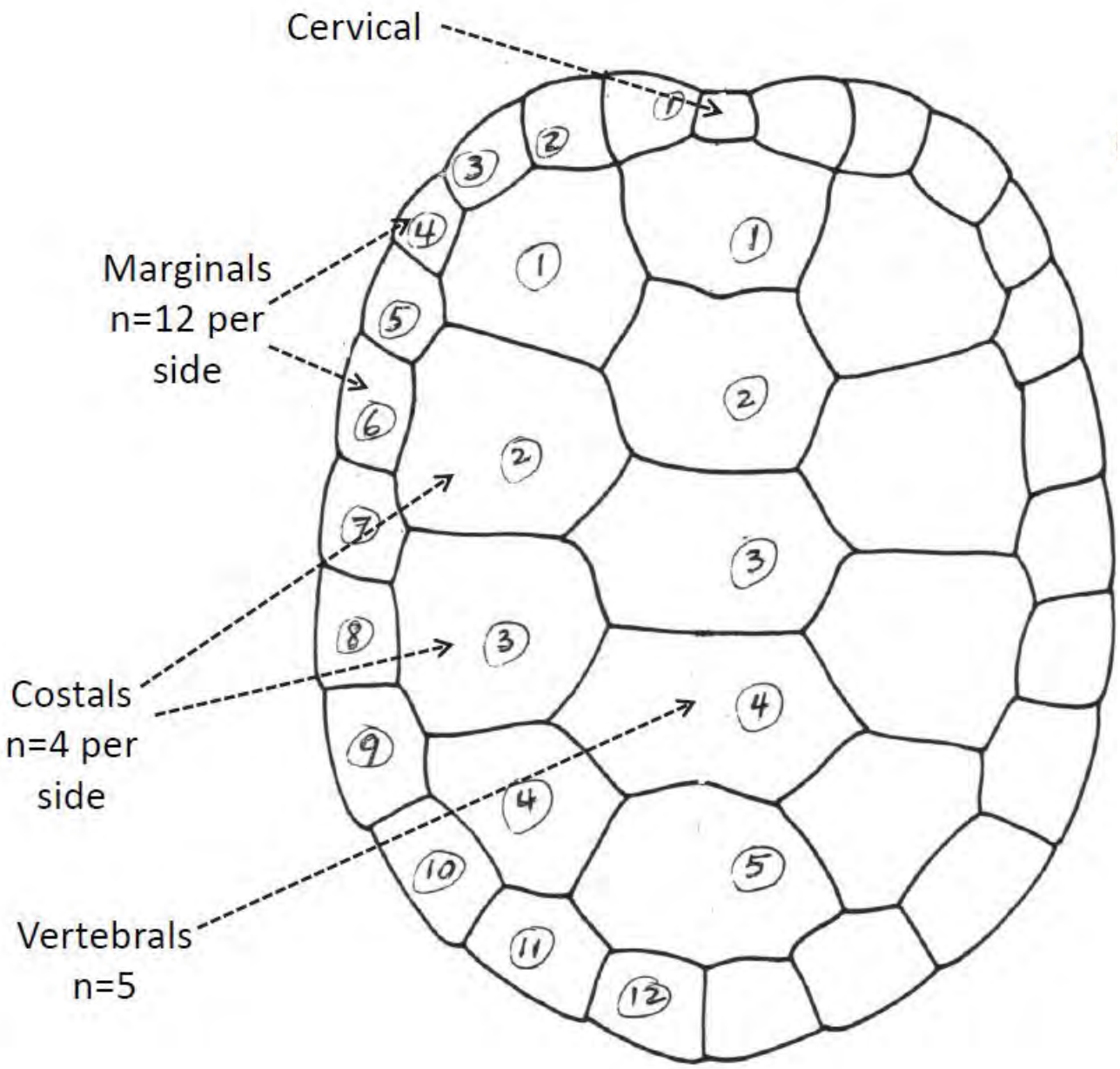


Illustration by Charles H. Miller

Dorsal View of Carapace



Terrapin scute morphology

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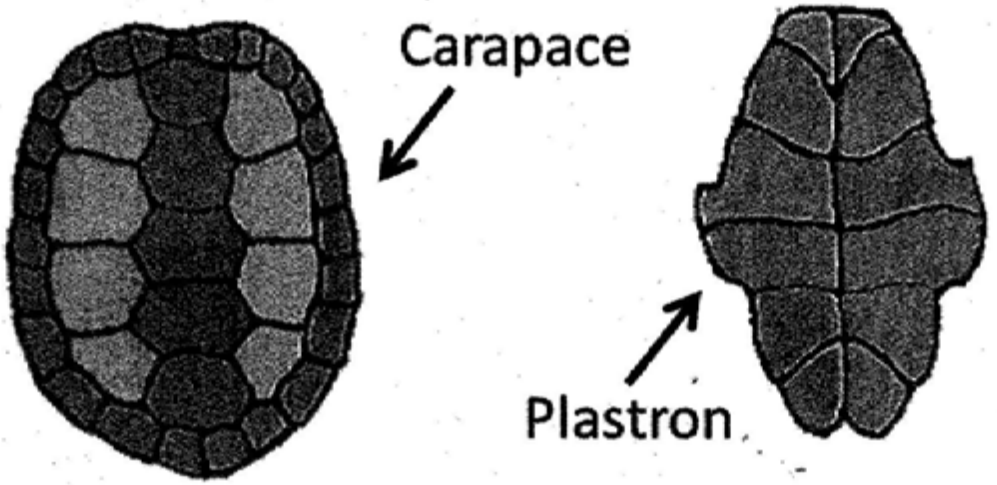


The diagram above shows the "normal" arrangement of scutes on a terrapin shell.

Amazing Terrapins

Diamondback Terrapins are the only reptiles that spend their entire lives in salt marshes. They occur along the Atlantic and Gulf coasts from Cape Cod to Texas. The shells of terrapins range in color from light brown to almost black. Light brown shells are usually marked with dark concentric lines. Skin color is also variable, ranging from black to light gray, marked with black specks or lines. Adult females and males differ from each other. Females are larger. The shells of females average about eight inches long. Average shell length in males is five inches. Females also have larger, broader heads, deeper shells, and shorter tails.

The diet of terrapins is mostly crabs, salt marsh snails (periwinkles), and tiny bivalves (mussels and clams). They may occasionally scavenge dead fish as well. Terrapins occasionally bask in the sun on mud banks like pond turtles. Females leave the marsh each summer in search of sandy areas above the reach of the tide in which to lay their eggs. A shallow hole is dug with the hind legs. Eight to twelve eggs are laid. The female returns to the marsh after filling the nest hole and covering it with debris to hide it from predators. Many nests, however, are still found and dug up by animals like raccoons.

The eggs hatch in about sixty days. If they hatch in the summer when it is still warm, the hatchling turtles, each about the size of a quarter, emerge from the nest. If the eggs were laid in July and hatch in the fall, the hatchlings may remain in the nest through winter and emerge in the spring. Hatchlings must face many dangers in the marsh. Small mammals (raccoons, foxes, skunks), large fish, crabs, small sharks and some birds (bald eagles, seagulls)eat baby terrapins. Other dangers include drowning in crab traps or being hit by boat propellers. Tragically, many females are run over and killed by automobiles as they search for suitable nesting sites.

Traffic Tragedy to Incredible Incubation

Objective: The students will be able to describe why roadkills are causing the female diamondback population to decrease and explain how the Wetlands Institute is helping to save the species. They will be able to read thermometers to determine if male or female turtles will be produced and, through physical change, create a model terrapin egg.

Essential Questions:

3. If you are a diamondback terrapin, explain the adaptations you have that help you survive.
2. Explain (essay) your life as a Wetlands Institute intern. Detail what you do to help increase the diamondback terrapin population.
3. Write a story about your life as a diamondback terrapin mother who is trying to cross the road to lay her eggs.
4. What can you and your family do to help save the diamondback terrapin?

Materials:
Cubes of clay for each student
Rulers, thermometer model, temperature worksheet
PowerPoint: "Saving the Diamondback Terrapin" (optional)

Procedure:
1. Students will review the tragedy of roadkilled female diamondback terrapins.
   Females are hit because they are looking for a suitable nesting site above the high tide line. Because of development of barrier beach resorts, the dunes (the original terrapin nesting habitat) have been destroyed leaving the turtles a dangerous alternative of nesting alongside heavily trafficked roads.
2. Turtle Patrol volunteers help cross females safely in the direction in which they were heading. If a terrapin has been hit and the eggs are potentially viable, they will take her back to the lab and perform an “eggectomy”. This is a made-up word for a surgical procedure where undamaged eggs are removed from the mother. Once eggs are removed, they are gently washed by squirts of distilled water and then carefully placed in a bed of 1.5 inch deep vermiculite. The date is recorded on a chart that is attached to the lid of the egg box (small Rubbermaid container). They are placed in the incubator at an 85 degrees F temperature to ensure females are produced. You can mathematically estimate the amount of turtles lost in the Cape May county patrol area by taking the 1 female plus 10 (average) potential eggs=population decrease of 12 turtles. Multiply 12*500 (average roadkills in Cape May County) = about 6,000 diamondback terrapins lost if we do not try to save the mothers and their eggs.
3. Extracted eggs are pink in color. When eggs turn white, they are viable. If they are grey or buff in color, they will not produce a hatchling. It takes 7 or 8 weeks for the babies to hatch.
4. Discuss that a physical change is a change to the form of a substance without really changing what it is. Show them an example of ripping paper. Even though it is in smaller pieces, you still have paper. Tell the class they are now going to create a physical change by taking their cube of clay and forming a 3-dimensional oval terrapin egg. The length of the egg should be 4 cm and the width should be about 2cm.
5. Review how to read a thermometer scale using a large model. Explain that above 82 degrees F mostly females are produced. 85 degrees F ensures females will be created. Anything below 82 degrees F will produce males. Distribute the thermometer worksheet. Have students record each temperature in both Fahrenheit and Celsius. Students will also label whether it will be a boy or girl at that temperature.
6. Ask students to discuss why the female diamondback terrapin population is decreasing to close the lesson.

Assessment: Checks for understanding, observation, products

Extension: Using the attached speculative prompt, students will be able to write a story centering around the challenge nesting female diamondbacks face while trying to cross the road.

Standards:

Science:

SCI.3-4.5.4.4 B.1} Demonstrate how measuring instruments are used to gather information in order to design things that work properly.

{SCI.3-4.5.10.4 B.1} Explain how meeting human requirements affects the environment.

SCI.3-4.5.2.4.B - [Strand] - Substances can undergo PHYSICAL or chemical changes to form new substances. Each change involves energy.Language Arts:

SCI.5-6.5.2.6.B - [Strand] - Substances can undergo PHYSICAL or chemical Changes to form new substances. Each CHANGE involves energy.

.Language Arts:

LA.3.W.CCR.4 - [Anchor Standard] - Produce clear and coherent WRITING in which the development, organization, and style are appropriate to task, purpose, and audience.

LA.4.W.CCR.3 - [Anchor Standard] - Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences.

LA.5.W.5.3 - [Grade Level Standard] - Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences.

LA.6-8.W.CCR.3 - [Anchor Standard] - Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences.

SCI.3-4.5.4.4 B.1} Demonstrate how measuring instruments are used to gather information in order to design things that work properly.

Polly the diamondback terrapin needs to find a nesting site, but she was afraid to cross the road. Write a story about what happens and if she solves her problem.

Remember, your characters must talk in a story, but you also must have other sentences that set the scene or help me visualize what is happening.

Prewriting Space

Name_____

Incredible Incubation

You just learned that incubation temperature determines whether female or male diamondback terrapins are produced.

Remember:

Above 82 degrees F(28 degrees Celsius)=mostly females are produced
85 degrees F(32 degrees Celsius) or higher=100% females are produced
Below 82 degrees F(28 degrees Celsius)= males are produced

A. *Record the temperatures below to the nearest degree in both Fahrenheit and Celsius.*
B. *Circle whether a female or male is more likely to be produced.*

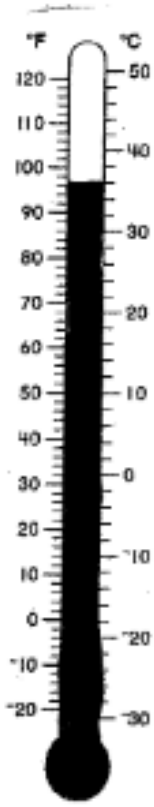
1._____degrees F
_____degrees C
Male or Female

2. _____degrees F
_____degrees C
Male or Female

3. _____degrees F
_____degrees C
Male or Female?

4. _____degrees F
_____degrees C
Male or Female?

5. _____degrees F
_____degrees C
Male or Female?



6._____degrees F
_____degrees C
Male or Female?

Terrapin Problem of the Day

Don't have enough time for a full lesson? Try one of these as a warm-up or brain break from what you are doing. It is suggested that the students have an understanding of the plight of the diamondback terrapin through one of the PowerPoint presentations before assigning these activities.

1. Using the Wetlands Institute data chart on the next page as a handout or display:
   a. Compute the range, median, mode, or average of roadkills, saves, or eggs incubated.
   b. Calculate total roadkills, saves, or incubated eggs.
   c. Figure differences among years for roadkills, saves and incubated eggs.
   d. Create a bar or line graph for each category.
2. Work in small groups (about 10 minutes) to create a short jingle or rap highlighting one of the major threats shown in the PowerPoint. You could assign topics such as crab traps, roadkilled females, stone lawns, development of resort towns.
3. Using the United States map, trace the range of the diamondback terrapin with a crayon.
4. Using the word diamondback terrapin, create an acronym poster relating each letter to conservation of the species.
5. Using an excluder (by-catch reduction device), find its area and perimeter.
6. If you have a commercial-style crab trap, measure the perimeter and compute the area of its rectangular opening. Note differences in the answers(#5 and 6).
7. Compare the heights of the openings in a commercial-style crab trap and excluder.
8. Using maximum height measurements from the MRR(Mark, Release and Recapture) sheets, decide whether the turtle would be able to enter the trap with and without the excluder (BRD).
9. Compute the volume of a commercial-style crab trap.
10. Display your United States map. Announce a state. Ask the students to vote if it is one where diamondback terrapins are found.
11. Using the diagram of a terrapin nest (see attached page), measure the

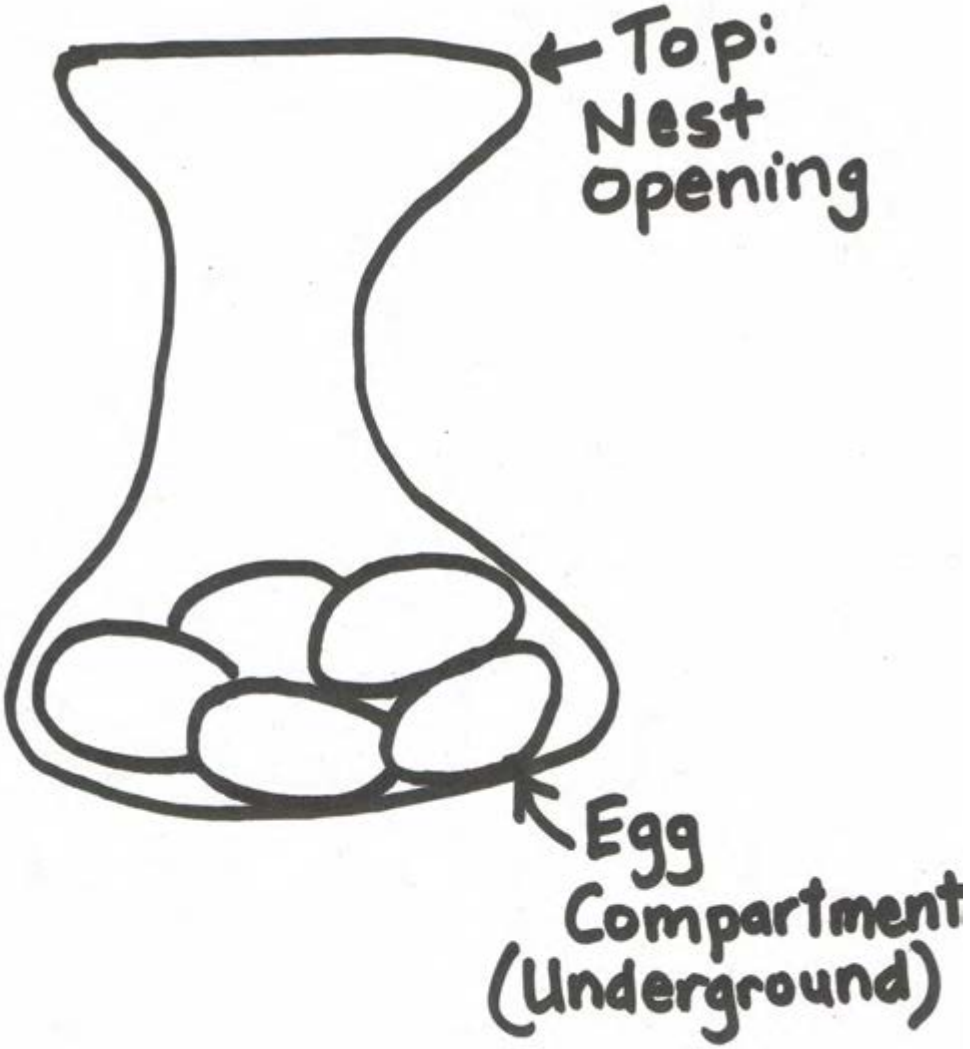
maximum height and width to the nearest cm or tenth of a cm.
12. Find the diameter and radius of the opening (top) of a terrapin nest. (See attached diagram.) Tell the students that they will be finding this measurement for fun. Scientists usually do not record this measurement in the field.
13. Using Venn diagrams, compare and contrast:
    a. hatchlings to adult terrapins
    b. females to males
14. Using the attached illustrations of a carapace and plastron, make puzzle pieces for students and have them assemble the puzzle. Be sure to laminate them if you are using regular paper. You may wish to use a more sturdy foam sheet found at your local craft store when creating this activity.
15. Distribute the daily nesting activity line graph. Have students determine the dates and lengths of nesting peaks.

2006-2012 Terrapin Conservation Project Statistics

Year	Roadkill Total	Eggectomies	Eggs	Hatches	Saves	Adult Recaptures on WI Trail	Exclosures	Hatchlings from Exclosures
2012	484		723	245	351		53	
2011	482		1065	516	273	119	119	22 Fall
2010	608	110	799	309	366	59	59	32 Fall
2009	557	96	516					
2008	575	84	486					
2007	382	71	406					
2006	367	58	363					

Name _____

Diamondback Terrapin Nest Diagram

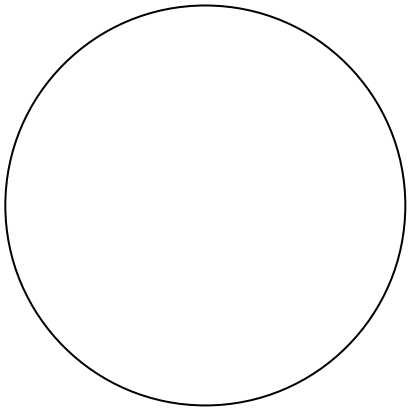


Name_____

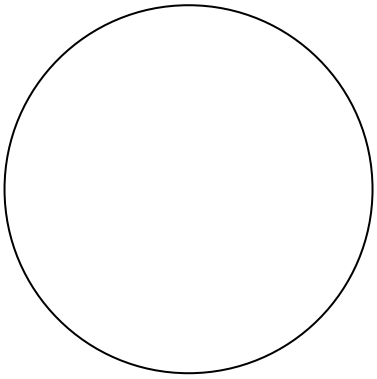
Measuring the Diameters of Diamondback Terrapin Nest Openings

Terrapin nest openings can be identified by their circular nature.
Measure the diameter of these terrapin nest openings to the **nearest tenth** of a centimeter. Use your compass to help you find the center point.

1. Diameter_____

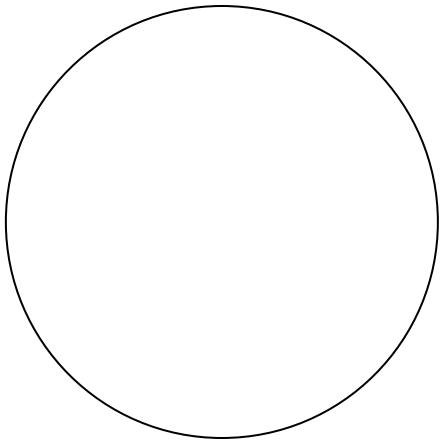


2. Diameter_____

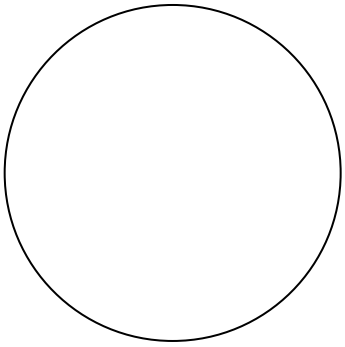


Turn the paper over.

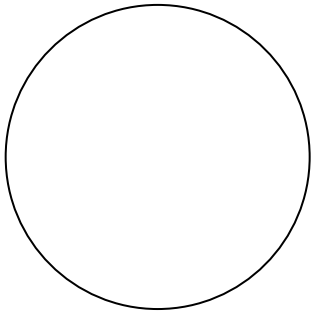
3. Diameter_____



4. Diameter_____



5. Diameter_____



Did you remember to label all of your answers with cm??????

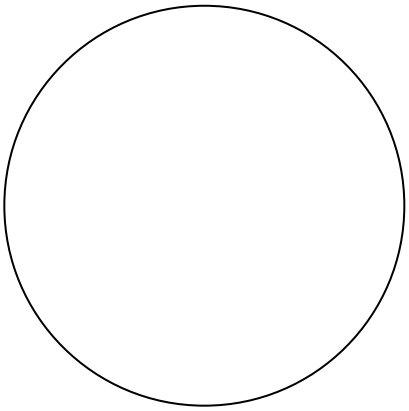
Name_____

Measuring the Diameters of Diamondback Terrapin Nest Openings

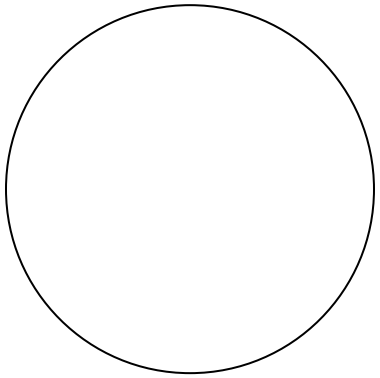
Terrapin nest openings can be identified by their circular nature.

A. Measure the diameter of these terrapin nest openings to the nearest tenth of a centimeter.
B. Compute the radius based on this measurement. (Remember: radius=1/2 diameter)

1. Diameter_____ Radius_____

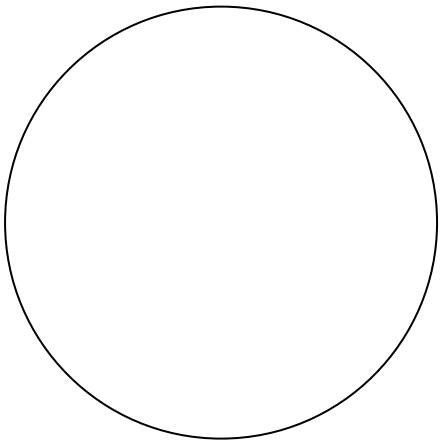


6. Diameter_____ Radius_____

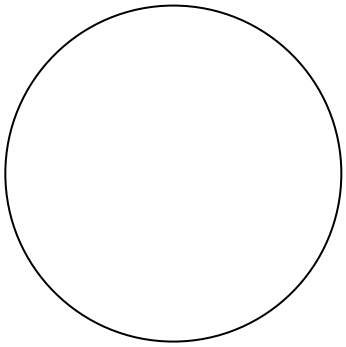


Turn the paper over.

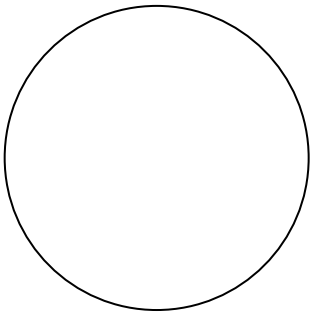
7. Diameter_____ Radius_____



8. Diameter_____ Radius_____



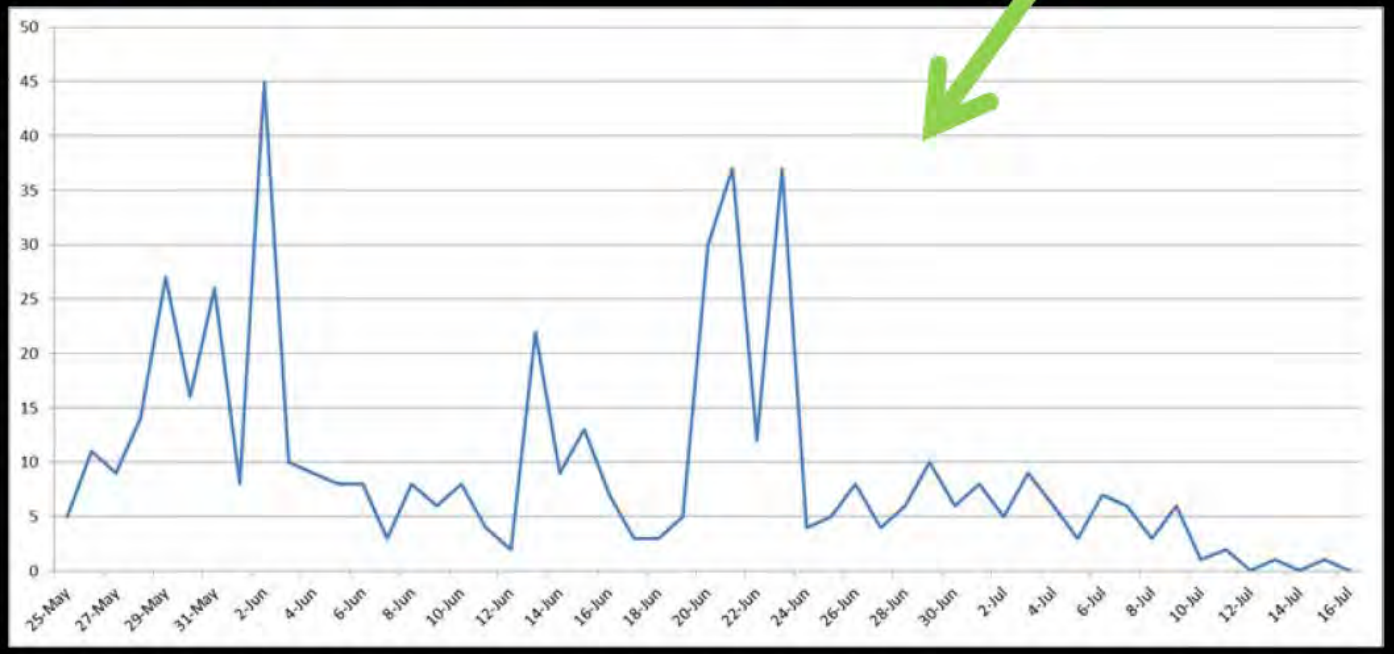
9. Diameter_____ Radius_____



2012 Terrapin Conservation Project Statistics

- Roadkills: 484
- Eggs saved: 723
- Eggs hatched: 245
- Road-crossing females saved: 351
- Head-starters released: 179
- Predator exclosures installed: 53

Roadkills per day during the 2012 terrapin nesting season



☒ Data Entered Date 6-20-12

Terrapin Conservation Project M.R.R. _____ (year)

Personnel Maggie Dugan, Jane, Lynn

Microchip Number 1254146685A

Date Captured 6-20-12 Original Capture (circle one) YES NO

LOCALITY DATA

Name of Location Wetlands Trail - Last third near dock Trap Number ____

GPS Coordinates N 39 03 27.9 W 074 46 20.4 Accuracy 4m

Date Released 6-20-12 Location Released Wetlands Institute Dock

TERRAPIN DATA

Condition (circle): (Alive) Dead Sex (circle): Male (Female) Unknown

Shell Dimensions (cm):

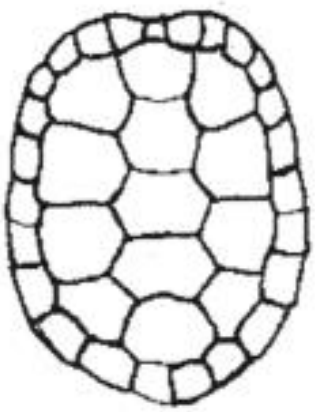
Midline Carapace 18.4 Max Width 13.7 Inter-abdominal _____

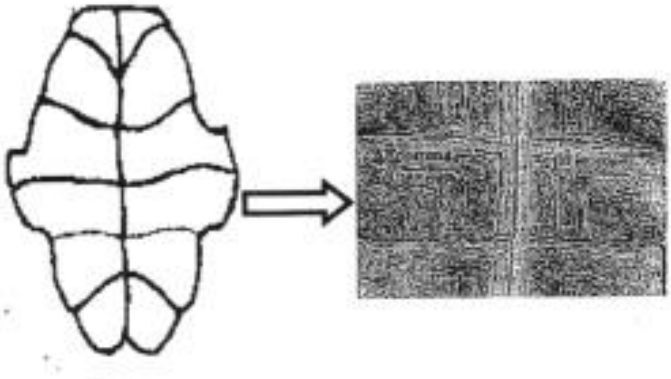
Midline Plastron 16.6 Max Height 7.4 -1 _____ -2 _____ -3 _____ -4 _____ -5 _____ -6 _____ -7 _____ -8 _____

Weight (g) 985.4

Circle if present: (Both Axials) (Rear Inguinals)

Mark any shell anomalies (including, but not limited to, notches and injuries) on diagram. Also, write a verbal description of the anomalies.





Other Comments: _____

☐ Data Entered Date _____

Terrapin Conservation Project M.R.R. 2012 (year)

Personnel Chelsea, Jess, Lynn

Microchip Number 076770827

Date Captured 6/20/12 Original Capture (circle one) (YES) NO

LOCALITY DATA

Name of Location Under WT dock, low tide Trap Number _____

GPS Coordinates N 39 23 07.8 W 074 46 30.8 Accuracy 4.

Date Released 6/20/12 Location Released _____

TERRAPIN DATA

Condition (circle): (Alive) Dead Sex (circle): Male (Female) Unknown

Shell Dimensions (cm):

Midline Carapace 16.1 Max Width 12.9 Inter-abdominal 28.8

Midline Plastron 14.9 Max Height 6.5 -1 _____

-2 _____

-3 _____

-4 _____

-5 _____

-6 _____

-7 _____

-8 _____

Weight (g) 682

Circle if present: (Both Axials) None Inguinals

Mark any shell anomalies (including, but not limited to, notches and injuries) on diagram. Also, write a verbal description of the anomalies.

Other Comments: Already laid eggs

Lesson: Using The Scientific Method

Students use the scientific method to review, collect, and interpret data from a terrapin fencing map

Grade Level 4 to 7

Lesson Plan: "Using The Scientific Method To Look at The Effectiveness of Terrapin Barrier Fencing"

Objective:

1. Students will examine a map and identify terrapin road kill hotspots using geographical information.
2. Students will propose a question in regards to the effectiveness of terrapin fencing.
3. Based on observation, students will formulate a hypothesis.
4. Students will collect and graph turtle road kill, from areas that are fenced, and those that are not.
5. Students will interpret data and form a conclusion.
6. Students will write an expository essay detailing their scientific process.

Essential Questions:

1. Can the students read and interpret geographical maps?
2. Can the students generate a scientific question for research from surveying the map?
3. Can the students compose a hypothesis from examination of the map?
4. Can the students extract and graph information from the map?
5. Can the students interpret data and develop a conclusion?
6. Can the students submit a detailed essay explaining their scientific process?

Material:

1. A copy of Terrapin Road Kill Geographical Map for all students
2. A copy of "Using The Scientific Method To Look At The Effectiveness of Terrapin Barriers" for each student
3. Graph and Composition paper for each student

Procedure:

1. Hand out material listed above.
2. Working with partners, groups, alone, or as a class examine the geographical map.
3. Have the students generate a scientific question.
4. Have students compose a hypothesis from examination of map.
5. Have students collect, and graph data from map.
6. Have students develop a conclusion.
7. Have the students write an expository essay detailing their scientific process.

Assessment:

This lesson may be used to assess knowledge of scientific process or graphing information, as well as, reading a map, and demonstrating expository writing.

Using the Scientific Method To Study The Effectiveness of Terrapin Barrier Fencing.

Ian has been collecting and mapping data to see if Terrapin fencing is effective in protecting nesting diamondbacks. Use Ian's data on the following page to create a graph and reach your own conclusion using the scientific method.

What is Ian hoping to find out with his data?

Question: _____

_____

_____

_____

_____

_____

What do you think Ian will find out?

Hypothesis: _____

_____

_____

_____

_____

_____

_____

Use the map to collect data on graph paper.

Organize data, Graph data, Analyze the Result

What did he discover with the data he collected?

Draw Conclusion: _____

_____

_____

_____

_____

_____

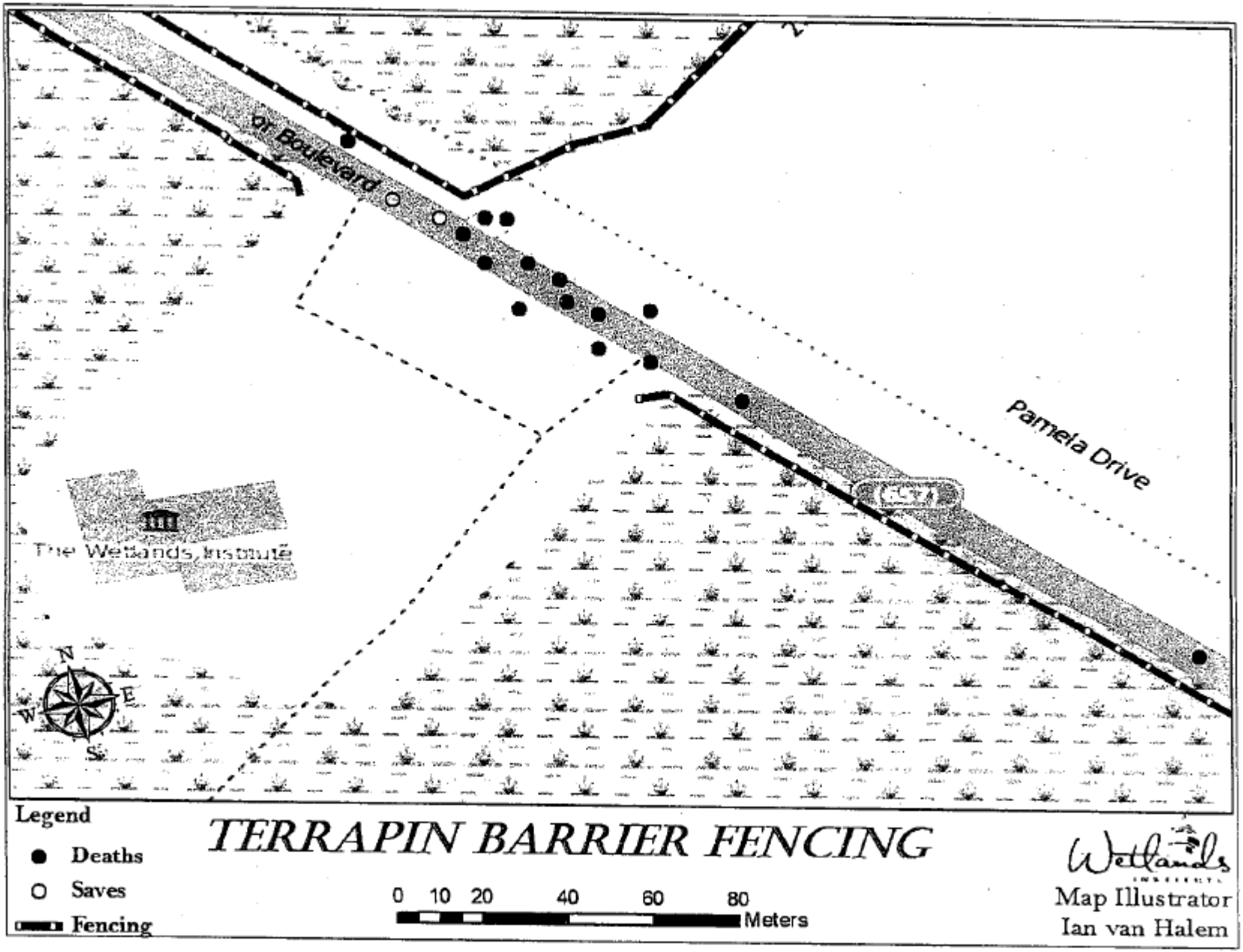
_____

_____

_____

_____

Communicate Results: Write a brief report in paragraph form regarding your data collection, your observations and your conclusion.



TERRAPIN BARRIER FENCING

Wetlands Institute

Map Illustrator
Ian van Halem

Answer Guide:

"Using The Scientific Process For Determining The Effectiveness of Terrapin Barrier Fencing"

l. The scientific question should center around, how effective is terrapin barrier fencing in preventing road kill.

- Remaining answers may vary
- Graphing should indicate: 12 deaths non fencing
  3 deaths fencing
- Conclusion
- Writing details each step of scientific process.

Science Standards

5.1 A, B, C, D

A DAY IN THE LIFE OF AN INTERN RESEARCH

TERRAPIN SCIENTIST

A comprehension activity dealing with the daily activities of an intern names Ashley.

(Based on a true day of a summer terrapin intern at The Wetlands Institute)

Grade Level 5 to 7

A Day in the Life of an Intern Research Scientist

My name is Ashley. I am a student at Michigan State University. This summer I was selected from a great many applicants in the United States to be one of twelve terrapin research interns at the renowned Wetlands Institute in Stone Harbor, NJ. It is a great honor because The Wetlands Institute is number one in continued research for the preservation and conservation of the diamondback terrapin. I am very excited to have been selected to work at this prestigious institute.

Since my arrival at the end of May, I have been starting my morning with the 5 o'clock road patrol. Another intern and I will travel a forty-mile route in search of nesting terrapin mothers who need help getting across the road. This is necessary because females come out to nest on higher ground that may, at times, be across a highway. (We know these turtles are females because males never leave the water.)

Besides this, we will also collect dead terrapins that have been hit, but still have eggs inside of them. We will need to take these terrapins back to the lab to perform an "egg-ectomy". This is an operation where we cut the eggs out of the dead mother and place them in an incubator to hatch for our head start program. Stockton College in New Jersey helps us incubate the eggs at a temperature that will produce females. You see, the temperature of the nest determines whether a terrapin is a boy or a girl. Warmer nests produce females and cooler nests produce males. When the babies hatch, they will raise them for a year so they can be microchipped and released back into the wild. The tiny microchip, that is the size of a grain of rice, is placed in the rear leg of the terrapin with a needle. When you run a scanner over the area, an identification number will show up on the screen. With this we can check any turtle captured in the future to see if they have been here before.

Sometimes the terrapin is flattened so badly that we just take the coordinates of our location with the GPS and respectfully toss her remains back into the marsh. If the terrapin doesn't have eggs and has not been

smashed too badly, we will measure the carapace and plastron before we return her there.

We arrive back at the Wetlands Institute at 8:30 a.m., just in time for the morning meeting. All interns are present and we discuss our research projects with senior scientists. Other ongoing terrapin projects requiring our assistance are also discussed. At 9 a.m., I am off to collect data for my research project.

I am trying to determine the effectiveness of terrapin fencing or barriers that keep females away from busy roads. To do this, I will walk along a mile stretch of road and search both sides for places where a terrapin began to nest, but changed her mind. I also look for places where she did nest, but a predator came and ate the eggs or young turtles leaving the shells behind. First, after locating the holes, I will measure from where the road begins to the center of the nest. Next, I will take the nest's GPS coordinates. After that, I will count the eggshells, if found, to estimate how many eggs were in the nest. Last, I will fill the nest hole and throw the shells back into the marsh.

This can be long hard work. Today the temperature is in the high nineties. There also are biting flies, ticks and poison ivy everywhere! I have found sixty nests on one side alone. I look at my watch and it is 12:30. It is time to return to the institute for lunch. It is nice and cool here, so I eat and relax for sixty minutes.

Now I must walk the institute's trail to search for nesting terrapins. I see one up ahead laying her eggs. I patiently wait for her to finish and cover the nest. She does this so well you could never identify the spot unless you had watched the process. After nesting is complete, I place a red flag beside the spot so we can return to put a protective cage over it to prevent predators from eating the eggs. Next, I quickly retrieve the terrapin so I can take her back to the lab to measure, weigh, and check for shell anomalies that differ from their normal pattern. Following, I will scan and microchip her if

necessary. This female does not have a chip, so I ask another intern to help me while I insert one. We return her to the bay, cover her nest with a protective enclosure, and return to the lab. It is now 2:45.

Jess needs help checking the storm drains across from the institute for her research project. We all help one another when we can, so I have offered to give her a hand. Hatchlings or baby terrapins will often fall through the holes in storm drains trying to find their way back to the marsh and have no way of getting out. Using a fishnet attached to a bamboo pole, we will scoop any terrapins out of the drain. Many die because the drains often contain chemicals from things like fertilizers or oil and gas residue. There is no way to escape unless it rains hard and they are swept out of the drain's overflow pipe or back out of the top of it, if it overflows. There are no turtles there today, so we return to the lab.

It is 3:45. Ben is in the lab when I return. He is a senior researcher who is working to become a doctor of science. His research project determines the amount of terrapins that die in crab traps because they can swim in, but they can't get out. Terrapins should surface for air about every twenty-five minutes. At the most, they can remain underwater for 3 or 4 hours when trapped. Without a way out, these turtles will certainly die.

Ben has found a ghost or abandoned trap with bones in it. By gluing the bones back together, he can determine how many terrapins have died in the trap. He is hoping his research may bring about a law that requires all traps to have excluders (a device that prevents adult terrapins from entering the traps). I help Ben glue the bones. Then, I hit the trail once more.

It is the height of nesting season and we find two more females laying nests. Females carry three clutches or groups of eggs. We estimate she lays each clutch about eighteen days apart. After we finish collecting data and enclosing the nest, it is now 6:00 and time for dinner.

At 7:00 I sit in my dorm room on the second floor of the institute and enter the data from the day into my computer for my research project. The

road patrol enters around 8:00 p.m. with a terrapin that is alive, but badly injured. She cannot be saved, so one of the senior scientists will give her a shot to put her to sleep. After, we will perform an "egg-ectomy" so her babies can have a chance to live.

I return to my data at 9 p.m. and finish at 10. I head to the shower and land in bed by 10:30. It has been a long day, but tomorrow we will begin all over again. I will be here until the end of July. I close my eyes knowing that I have been part of the incredible process of conserving and preserving the most precious diamondback terrapin so it might live on for generations to come.

Sequence for:
Day In The Life Of An Intern Research Terrapin Scientist

Fill in the activity that took place in Ashley's day.

5:00 am. to 8:30 am. _____

8:30 am. to 9:00am. _____

9:00am. to 12:30pm. _____

12:30pm. to 1:30pm. _____

1:30pm. to 2:45pm. _____

2:45pm. to 3:45pm. _____

3:45pm. to 4:45 pm. _____

4:45pm. to 6:00pm. _____

6:00pm. to 7:00pm. _____

7:00 pm. to 8:00pm. _____

9:00pm. to 10:00pm. _____

10:00pm. to 10:30pm. _____

Comprehension for:

A Day In The Life Of An Intern Research Terrapin Scientist

Using context clues to determine meaning.

1. What does the word ***prestigious*** mean in the first paragraph on page 1?

2. What does the word ***effectiveness*** mean in the third paragraph on page 2?

Understanding content.

3. How long will Ashley be working at the Wetlands Institute?

4. What is an egg-ectomy? Why is it done?

5. What does Ben hope his research project will change?

6. List three problems that the terrapins face.

1.

2.

3.

7. Because terrapins cross busy roads in order to nest, what is often the effect?

8. If the effect is " A male terrapin is hatched", what was the cause?

9. Name one problem that the terrapin faces and how could you help with a solution to that problem.

Elapsed Time

10. What time is it when Ashley hits the trail after lunch?

11. How long was she doing trail work before she returned to the lab to help Jess?

12. Ashley's day started at 5:00am. and lasted until 10:30pm. How long was her day?

13. How long did Ashley collect data for her research project?

Short Answer Questions

14. What personality traits would it take to be an intern research scientist? Use details from the story to support your answer.

15. Would you want to be an intern research scientist? Give reasons to back your decision.

Lesson Plan: A Day In The Life Of An Intern Research Scientist

Objectives:

1. The students will develop comprehension and understanding of written text.
2. The students will use context clues to extract meaning of words.
3. The students will demonstrate basic understanding of story.
4. The students will explain problems facing the diamond-back Terrapin
5. The students will determine cause and effect; problems and solutions
6. The students will infer and respond to story questions.
7. The students will explain reasoning for choosing to become, or not wishing to become a research intern.
8. The students will calculate elapsed time.
9. The students will sequence activity of an intern for a day.

Essential Questions:

1. Can the student read and demonstrate understanding of text?
2. Can the student use context clues to extract the meaning of words?
3. Can students produce causes and effects and problems and solutions from a nonfiction selection?
4. Can the students calculate elapsed time?
5. Can the students list problems facing diamond back terrapins?
6. Can the students make and reinforce inferences about life as a research intern?

7. Can the student construct valid reasoning for choosing to become, or not choosing to become a research intern?
8. Can the students sequence time and events in an intern's day?

Materials:

A copy of :

1. (For teacher) ~ Diamond Back Terrapin fact sheet.
2. (For all students) ~ "A Day In The Life of An Intern Research Scientist").
3. (For all students) ~ Comprehension questions.
4. (For all students) ~ Sequence, A day in the life of an intern.

Procedure:

1. Read "Diamond Back Terrapin Fact Sheet" to students
2. Handout materials
3. Students read and answer questions.
4. Review or Grade and then review.

Assessment:

1. Comprehension page or any individual task can be used as an assessment.

Answer Guide: Sequence

Day In The Life Of An Intern Research Terrapin Scientist

Fill in the activity that took place in Ashley's day.

5:00 am. to 8:30 am. ***Road Patrol***

8:30 am. to 9:00am. ***Meeting***

9:00am. to 12:30pm. ***Research***

12:30pm. to 1:30pm. ***Lunch***

1:30pm. to 2:45pm. ***Trail***

2:45pm. to 3:45pm. ***Help Jess***

3:45pm. to 4:45 pm. ***Help Ben***

4:45pm. to 6:00pm. ***Trail***

6:00pm. to 7:00pm. ***Dinner***

7:00 pm. to 8:00pm. ***Help Returning Road Patrol***

9:00pm. to 10:00pm. ***Record Data***

10:00pm. to 10:30pm. ***Shower Then To Bed***

Answer Guide:

A Day In The Life Of An Intern Research Terrapin Scientist

Comprehension:

1. Important, Well known, High Reputation etc.

2. How well it works, Producing a desired result.

Understanding Content:

3. From mid May to the end of July. About 2 and $\frac{1}{2}$ months.

4. Removing eggs from a dead terrapin to incubate as headstarters.

5. A law that requires all crab traps to have excluders on them.

6. 1.) Run over attempting to cross busy highways to nest.
   2.) Caught in crab traps unable to escape, so they drown.
   3.) When young, falling through the holes of storm drains.

7. The effect is often death or serious injury.
8. The temperature of the nest was cooler.

9. Problem	Solution
Cross busy highways and are killed or injured	Help build terrapin fencing or barriers, have an adult help any terrapin you see cross road.
Caught in traps	Write to NJ. Division of Fish and Wildlife persuading them to see that there are Excluders on traps. If you own a trap, place an excluder on it.
Falling down storm drains	Volunteer to patrol and rescue terrapins from drains in your area, invent something to prevent them from falling into traps

*** Accept reasonable solutions ***

Elapsed Time:

10. 1:30 pm
11. 1hr. 15min., or 1 and $\frac{1}{4}$ hours
12. 17 and $\frac{1}{2}$ hrs
13. 3 and $\frac{1}{2}$ hrs.

Short Answer:

14. Answers will vary. Be sure students use details from the story to support their answer.

15. Answers will vary. Be sure students support decision with valid reasoning.