PLOT SUMMARY:

A guide to caring for your new pet: a *Velociraptor* dinosaur!

DINOSAUR HABITAT CHALLENGE:

Problem What problem will you solve?	Challenge What will you do?	Criteria What should the solution do to be successful?	Constraints What are the limits?
You need to build a habitat for your *Velociraptor*.	Design and build a model of a habitat for a *Velociraptor*.	• The habitat should provide enough space for your *Velociraptor*. • The habitat should ensure that the *Velociraptor* can't escape. • The habitat should provide some way to keep the *Velociraptor* warm. • The habitat should provide a way to keep the *Velociraptor* safely out of the main enclosure while you are cleaning. • Label enclosure dimensions on the plan and the model.	• Use only the materials given. • Model may be no larger than two feet on any side.

OTHER POSSIBLE PROBLEMS AND CHALLENGES:

Students can use the *Universal Challenge Pages* (pages 104–107) to create solutions to any of the problems below or problems they identify themselves.

Problem	You need to catch food for your *Velociraptor*.
Possible Challenge	• Design a trap or other device to catch small insects and reptiles.

Problem	You must pick up after your new *Velociraptor*.
Possible Challenge	• Design a dino-dung scooper.

Problem	The *Velociraptor* needs exercise and mental stimulation.
Possible Challenges	• Design a dino-proof puzzle toy that the *Velociraptor* must figure out to get its food. • Design some sort of exercise device for the *Velociraptor*.

MATERIALS:

Required: graph paper, large sheets of cardboard or foam board (one per team)

Suggested: structural items such as craft sticks, index cards, cardboard tubes; malleable materials such as construction paper, felt, fabric, aluminum foil, cotton balls; containers such as plastic fruit baskets, cardboard boxes, paper and plastic cups; craft items such as clay, paint, buttons, beads, pom-poms; connectors such as glue, tape, rubber bands, string, pipe cleaners

PREPARATION:

Provide teams with graph paper for their plans and a choice of large pieces of cardboard or foam board on which to build their models. While students will not be testing their designs in this project, you will need a space for them to display their models so that everyone can examine them and give feedback.

LESSON PLAN:

1. Have students read the passage and discuss the problems they identified. Use these questions as prompts:
   - Do you have or have you had a pet? How did you take care of it?
   - What are some of the challenges in taking care of a *Velociraptor*?
   - Would you want this dinosaur as a pet? Why or why not?
2. Introduce the Dinosaur Habitat Challenge by reading through the challenge pages together. Show students the available materials and review the criteria and constraints.
3. Explain to students that they will first draw a plan of their model habitat on graph paper, and they need to include measurements in their designs. They should label the length and width of the total enclosure and the height of any fences or walls. They will also need to calculate the area of their enclosure in square feet. If necessary, review the formula for finding area.
4. Explain that in addition to the four required criteria, students should reread the story and choose at least two additional criteria for their habitat models. Possible additional criteria: trees and plants; access to fresh water; a cozy space and materials for the *Velociraptor* to nest; ways for the *Velociraptor* to get exercise; enrichment mechanisms to encourage natural behaviors, such as hanging food up high or hiding food; ways to keep the *Velociraptor* safe from poachers.
5. Give students time to prepare, brainstorm, plan, and build their dinosaur habitats. Circulate to observe and answer questions as students work on their solutions. Remind them to use the challenge pages to guide them as they work through the engineering design process.
6. Have students evaluate their models by checking them against the criteria and sharing their solutions with the class to get feedback from peers. Then they should revise and improve their designs.
7. When students have completed the challenge, have them show and explain their dinosaur habitat models to the class. Then have them fill out the reflection page.
8. If time, allow students to choose their own problem and testing setup and use the *Universal Challenge Pages* (pages 104–107) to complete their challenge.

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Directions: Read the passage and underline the problems the character faces. Write and/or sketch your ideas for solutions in the margins.

A NEW PET

Congratulations! You are now the proud owner of a *Velociraptor*. Having a new pet can be very exciting. You may be an experienced dino owner or a first-time adopter. Please read this guide either way. It is important to keep your new dinosaur healthy and happy.

First, you need a safe place to keep your dinosaur. The *Velociraptor* is one of the smaller theropods. It is about 3 feet tall, 6 feet long, and 35 pounds in weight. Still, you don't want a *Velociraptor* getting loose in the neighborhood! Keep in mind that these dinosaurs are quite intelligent. They are also known to be good jumpers. Their enclosures must be designed and built carefully to contain them. *Velociraptors* love to run, so be sure its new home is at least 1,000 square feet. Include trees and plants to mimic its natural forested habitat. Be sure your dinosaur has access to plenty of fresh water. It is important to keep your dinosaur safe, as well. Dinosaur poachers are always looking to steal a healthy specimen.

Your pet will need a comfortable place to sleep. Provide soft materials such as straw or old towels. The *Velociraptor* will build itself a nest. If the weather gets cold, you need to keep your pet warm. Dinosaurs are *ectothermic*. This means they cannot make themselves warm. *Velociraptors* need sunlight or another form of heat to stay warm.

Feeding a large, carnivorous animal isn't easy. You will need to feed your *Velociraptor* nutritious foods that meet its dietary needs. You can't feed it hay or vegetables! In the wild, a *Velociraptor* will catch and eat insects and small reptiles. You should be able to order these through a local pet supplier. Or, depending on where you live, you could gather them yourself. Maintaining a healthy weight for your pet is important. With this pet especially, you don't want it getting too hungry.

Velociraptors have razor-sharp teeth in a narrow jaw. They run swiftly on their two hind legs. Their three-fingered grasping hands have sharp claws.

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A NEW PET

They use lightning-fast reflexes to catch prey. This dinosaur is fascinating to watch. However, it is not safe to have unprotected interaction with your new pet. Never go into the same space as your dinosaur. Hand-feeding your *Velociraptor* is not recommended.

How much you feed will depend on the activity level of your *Velociraptor*. All animals need exercise to keep fit and to stimulate their minds. We don't recommend taking your *Velociraptor* for a walk on a leash. You will need to give your pet the means and incentive to exercise. Hanging food overhead will promote jumping. Hiding food for it to find will encourage your dinosaur to use its natural instincts. You can put food in puzzle toys. Just remember that *Velociraptor* jaws are very strong!

Cleaning up after your *Velociraptor* is important. Dinosaur dung might not be pleasant, but you must clean it up! Dino droppings can carry bacteria and parasites. Dispose of them in a trash can with a tight-fitting lid.

Training your *Velociraptor* is fun for both you and the dinosaur. It provides exercise and mental stimulation. Positive training by giving rewards is the best approach. When the dino does what you are asking, use a long stick or feeding tongs to give it small bits of food. Try training it to sit, stay, and beg. If you give rewards consistently, your *Velociraptor* will quickly catch on!

Caring for a *Velociraptor* is a big responsibility. With careful attention and respect, you can enjoy your *Velociraptor* for many years.

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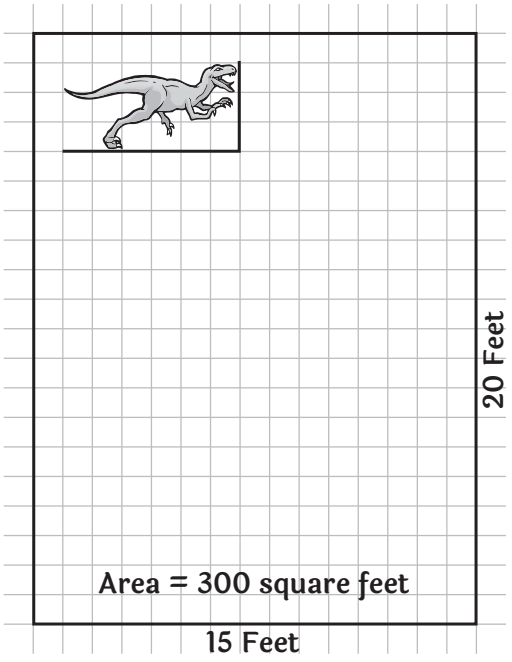
STEP 1: PREPARE FOR THE CHALLENGE

Problem What problem will you solve?	Challenge What will you do?	Criteria What should the solution do to be successful?	Constraints What are the limits?
You need to build a habitat for your *Velociraptor*.	Design and build a model of a habitat for a *Velociraptor*.	• The habitat should provide enough space for your *Velociraptor*. • The habitat should ensure that the *Velociraptor* can't escape. • The habitat should provide some way to keep the *Velociraptor* warm. • The habitat should provide a way to keep the *Velociraptor* safely out of the main enclosure while you are cleaning. • Label enclosure dimensions on the plan and the model.	• Use only the materials given. • Model may be no larger than two feet on any side.

Once you have a good idea of what you want your habitat to look like and include, you will draw a plan on graph paper. Each square of graph paper will represent one foot. So, if you want your enclosure to be a rectangle that is 20 feet long and 15 feet wide, it would be 20 squares long and 15 squares wide on your plan. It might look like the image on the right. Be sure to label the dimensions.



Because a *Velociraptor* needs at least 1,000 square feet of space, you will need to figure out how many square feet are in your habitat. To find the area of the rectangle, multiply the length times the width.

Here are the dimensions for the habitat on the right:

20 feet x 15 feet = 300 square feet

Your habitat will have to be much bigger than that! Think carefully about your measurements.

A Dinosaur for Scale

A *Velociraptor* is about 3 feet tall and 6 feet long. If you cut out a paper *Velociraptor* at the right size for your model, you can use it to help you decide how big to make all the parts of your habitat.

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STEP 2: BRAINSTORM, PLAN, AND BUILD

1. Brainstorm design ideas to meet each criteria for your model *Velociraptor* habitat.

Have enough space for your *Velociraptor* (at least 1,000 square feet).	Ensure that your *Velociraptor* can't escape.	Keep your *Velociraptor* warm.	Keep your *Velociraptor* safely out of the main enclosure while you are cleaning.

2. Draw some design ideas here for two (or more) additional criteria from the story you will meet in your habitat model.

3. Think about which design idea might best meet each of the criteria. Draw a star by the ideas (in #1 and #2) you will include.

4. On a piece of graph paper, draw a plan of your model, including all of the ideas to meet the criteria. Label all of the materials and measurements.

5. Build your *Velociraptor* habitat according to your plan! Include a label or labels that show the dimensions of your habitat. Remember the criteria that your model cannot be longer than two feet on any side.

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STEP 3: TEST, IMPROVE, AND SHARE

1. Check to see that your model meets each criteria:
   - ☐ Enough space for your *Velociraptor.* Square feet: _____
   - ☐ Keep it from escaping.
   - ☐ Keep it warm.
   - ☐ Keep it safely out of the main enclosure while you are cleaning.
   - ☐ Other: _____
   - ☐ Other: _____
   - ☐ The dimensions of the enclosure are labeled.
2. Does your dinosaur habitat meet all the criteria? If not, how could you improve it?

3. Share your dinosaur habitat with classmates. How can you use their ideas to make it better?

4. Keep redesigning until your dinosaur habitat meets the criteria!

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STEP 4: REFLECT

1. How does your design meet each criteria?
   - Enough space for your *Velociraptor*: _____
   - Keep it from escaping: _____
   - Keep it warm: _____
   - Keep it safely out of the main enclosure while you are cleaning: _____
   - Other: _____
   - Other: _____
   - The dimensions of the enclosure are labeled: _____
2. What other features did you include in your habitat?

   _____

   _____
3. How did you improve your design?

   _____

   _____
4. What was the hardest part about this challenge?

   _____

   _____
5. What have you learned from this challenge?

   _____

   _____