

Design-a-Dino

Lesson Plan

Grade
7-8

NGSS Standards
MS-LS4-1, MS-LS4-2,
LS4.A

21st Century Skills
Critical thinking, problem
solving

Materials
Access to D&D Virtual Reality
Exhibit, worksheets

Estimated time
2 periods

Difficulty
Medium

Vocabulary
ischium, ilium,
pubis, fenestra,
mesotarsal, open acetabulum,
osteological,
sacral vertebrae

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Idaho Falls, ID

Program Coordinator
Chloe Doucette
Director of Education
Museum of Idaho

Objective

Learn the skeletal features that define dinosaurs and design a new species.

Activity

Period 1. Review with students the major types of dinosaurs and the characteristics that make a dinosaur a dinosaur.

Students visit the museum or access the Darwin and Dinosaurs virtual exhibit and see the dinosaurs. Specifically for this lesson, students pay close attention to the skeletons on display and indicate on the handout which are possibly dinosaurs (not all features can be seen).

Period 2. Students use their knowledge of dinosaur features to build and name a new dinosaur species.

Students hand in the last two pages of the handout.

Assessment

There is a ten question quiz that students hand in along with sketches of their new dinosaur (both skeleton and in the flesh). The quiz is worth 20 points.

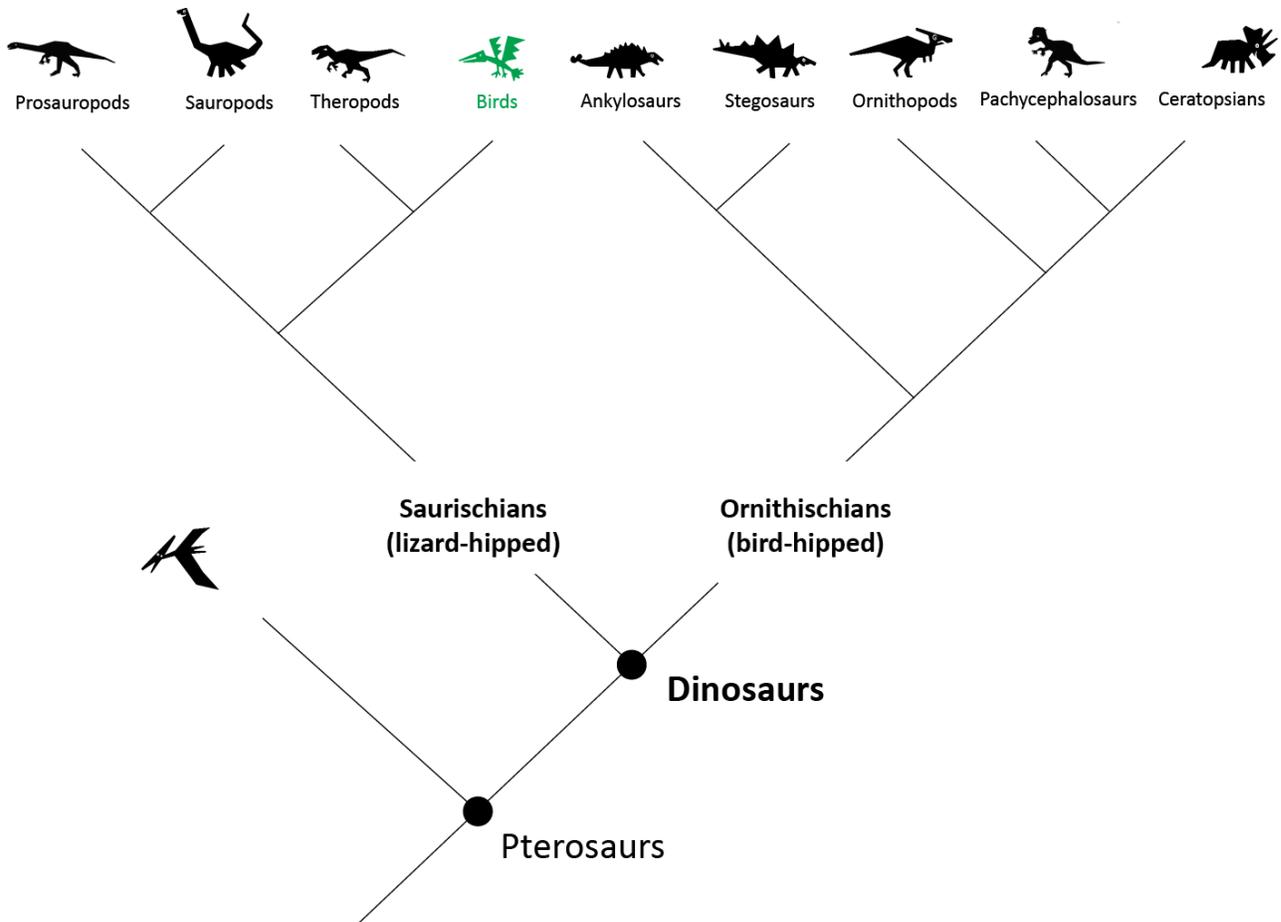
Class Discussion

The lesson starts with a review of pages 2-4, covering the types of dinosaurs and the skeletal features all dinosaurs share. Once the students have visited the exhibit and completed the quiz, they hand in the last two pages (use two-sided printing!), and the teacher can select one or more of the more interesting examples of new species to discuss in class highlighting the features covered in the activities.

Lesson plan based on Darwin & Dinosaurs Virtual Reality Exhibit
More lesson plans at darwindinosaurs.com

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Class Discussion

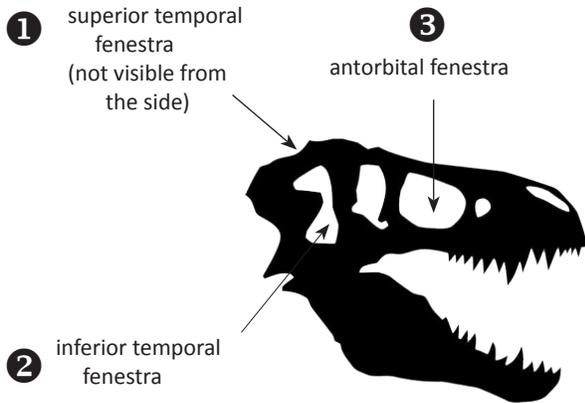


Types of Dinosaurs

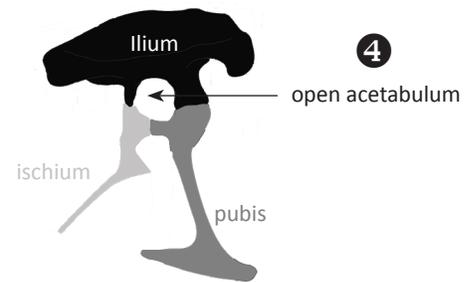
Dinosaurs are organized into two major groups: Saurischians (which have lizard-like hips) and Ornithischians (which have bird-like hips). Confusingly, birds evolved from theropods, a sub-group of the Saurischians. This is a case where the same structure (bird-like hips) evolved in two separate lines. Pterosaurs are not dinosaurs, but a sister class to the dinosaurs which lived at the same time.

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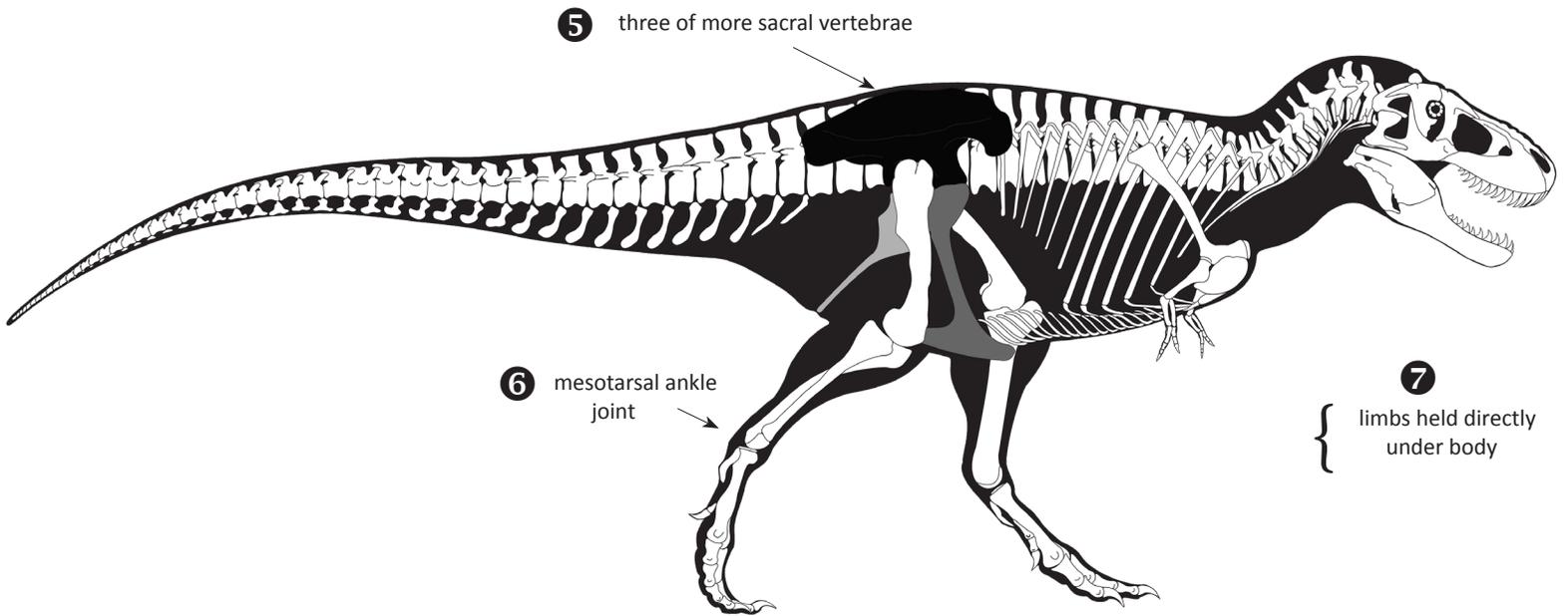
Class Discussion



Skull



Hips



T. rex

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Seven Skeletal Features that Make a Dinosaur a Dinosaur

Across all groups, all dinosaurs share certain skeletal features which make them “dinosaurs.” None of these features are unique to dinosaurs, but together the seven features make a dinosaur a dinosaur.

1. & 2. Temporal fenestra. Fenestra (plural fenestrae) is a term for an opening or hole in the bone. The superior temporal fenestrae are located on top of the skull and cannot be seen from the side. The inferior is the large hole behind the orbit or eye socket. Both the superior and inferior temporal fenestrae support larger, strong jaw muscles and make the skull lighter. All reptiles have temporal fenestrae (or modifications thereof).

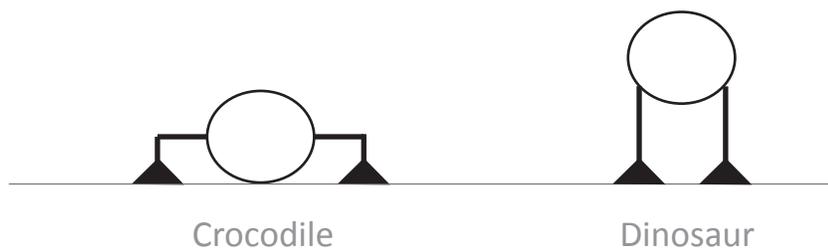
3. Antorbital fenestra. This is the large hole in front of the orbit or eye socket. Probably evolved to decrease the weight of the skull.

4. Open or perforated acetabulum. The hip structure of dinosaurs creates an opening where the ilium, ischium and pubis meet. The ball of the femur (leg bone) fits into this socket.

5. Three or more sacral vertebrae. Sacral vertebrae (vertebrae that meet the pelvis or hip structure) in dinosaurs are fused together to create greater strength where the hips meet the spine. Amphibians have only one sacral vertebra, reptiles typically have two.

6. Mesotarsal ankle joint. Dinosaurs had an ankle joint that included a mesotarsal bone that operated like a hinge. This limited movement in some ways, but provided added strength and stability for an upright posture, especially when running.

7. Limbs held directly beneath the body. In modern reptiles such as crocodiles and lizards, the legs are splayed out sideways, whereas the limbs in dinosaurs support an erect posture.



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Additional Resources

Dinosauria: Morphology

<https://ucmp.berkeley.edu/diapsids/dinommm.html>

Dinosaur Skeletal Anatomy

<https://ucmp.berkeley.edu/diapsids/images/dinoskeleton.gif>

The Saurischian Dinosaurs

<https://ucmp.berkeley.edu/diapsids/saurischia/saurischia.html>

The Ornithischian Dinosaurs

<https://ucmp.berkeley.edu/diapsids/ornithischia/ornithischia.html>

Dr. Scott Hartman's Skeletal Drawings

<https://www.skeletaldrawing.com/anatomy>

VR Exhibit

[Darwin & Dinosaurs Virtual Reality Exhibit](#)

my.matterport.com/show/?m=fv3NZ9XP6Zd

Instructions for using the touchscreens in the VR exhibit

When “walking around” in the 3D model click on a touchscreen. A popup will display “Click here for more information.” Click on this link. This will open a new tab and let you engage with the interactive. The 3D model will still be open in the first tab.

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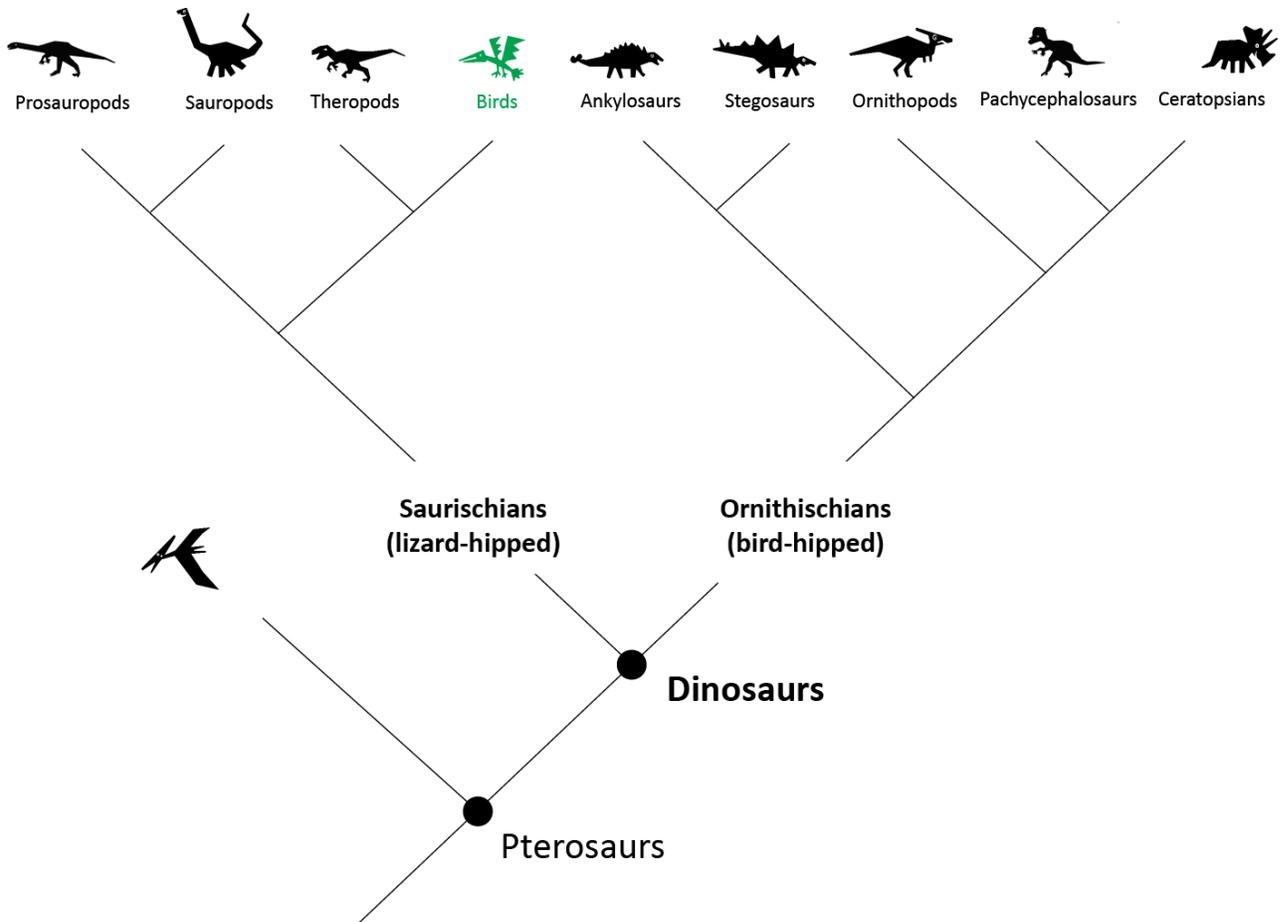
Teacher Answer Key

Students visit the museum (or the virtual exhibit) and indicate if the following ten specimens **could be** dinosaurs. (It is not possible to verify all seven features listed in the discussion because some cannot be seen - missing features can, however, rule out certain specimens.)

No.	Question	Possibly a dinosaur?	Pts.
1	T rex skull	<input checked="" type="radio"/> Yes <input type="radio"/> No	2
2	Albertosaurus	<input checked="" type="radio"/> Yes <input type="radio"/> No	2
3	Ceratopsian	<input checked="" type="radio"/> Yes <input type="radio"/> No	2
4	Quetzalcoatlus	<input type="radio"/> Yes <input checked="" type="radio"/> No	2
5	Plesiosaur	<input type="radio"/> Yes <input checked="" type="radio"/> No	2
6	Pachycephalosaur	<input checked="" type="radio"/> Yes <input type="radio"/> No	2
7	Dromaeosaur	<input checked="" type="radio"/> Yes <input type="radio"/> No	2
8	Nanotyrannus	<input checked="" type="radio"/> Yes <input type="radio"/> No	2
9	Dimorphodon	<input type="radio"/> Yes <input checked="" type="radio"/> No	2
10	Pteranodon	<input type="radio"/> Yes <input checked="" type="radio"/> No	2

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Class Discussion

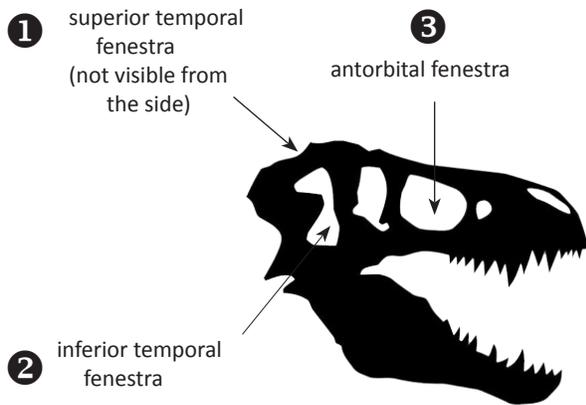


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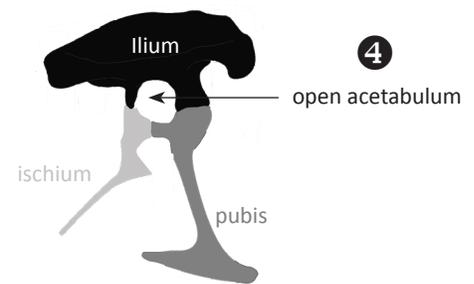
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Class Discussion



Skull

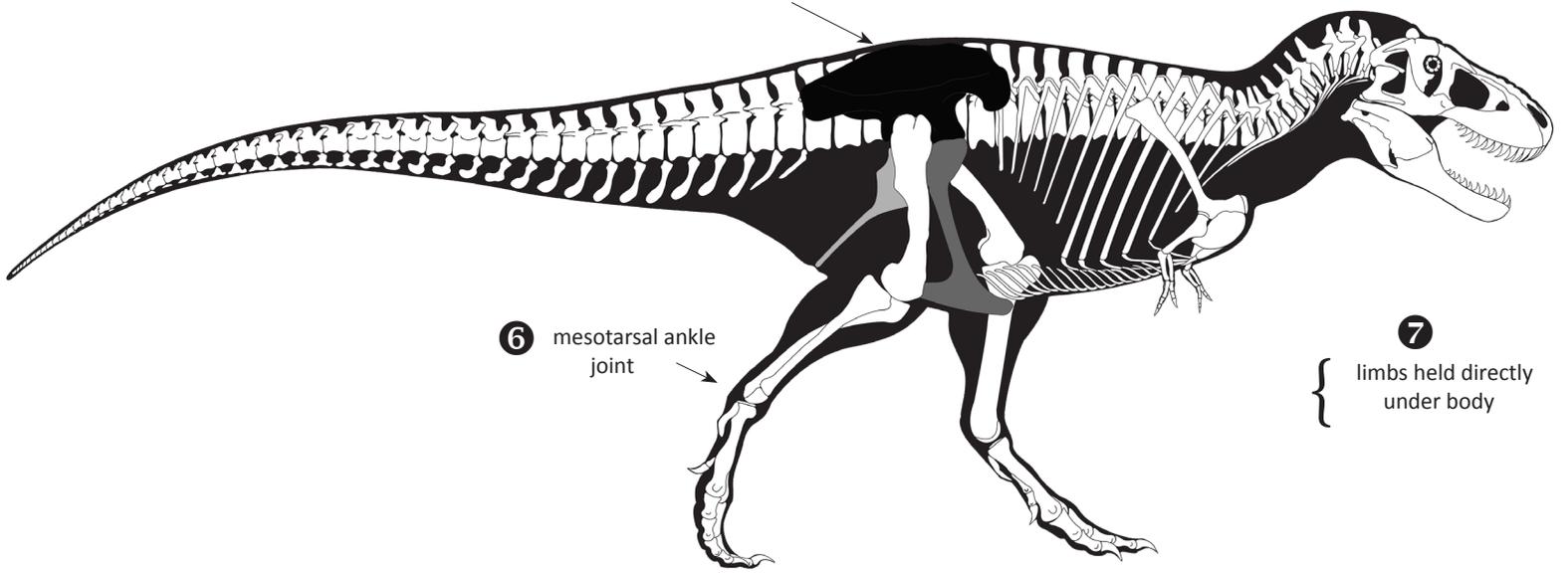


Hips

5 three or more sacral vertebrae

6 mesotarsal ankle joint

7 { limbs held directly under body



T. rex

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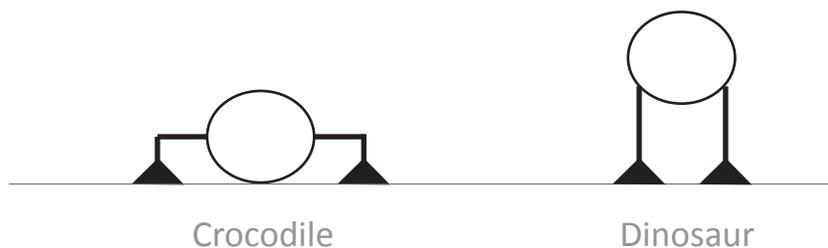
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NAME

CLASS

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Draw skeleton of your dinosaur here.

Dinosaur name: _____

Draw your dinosaur in the flesh here.
