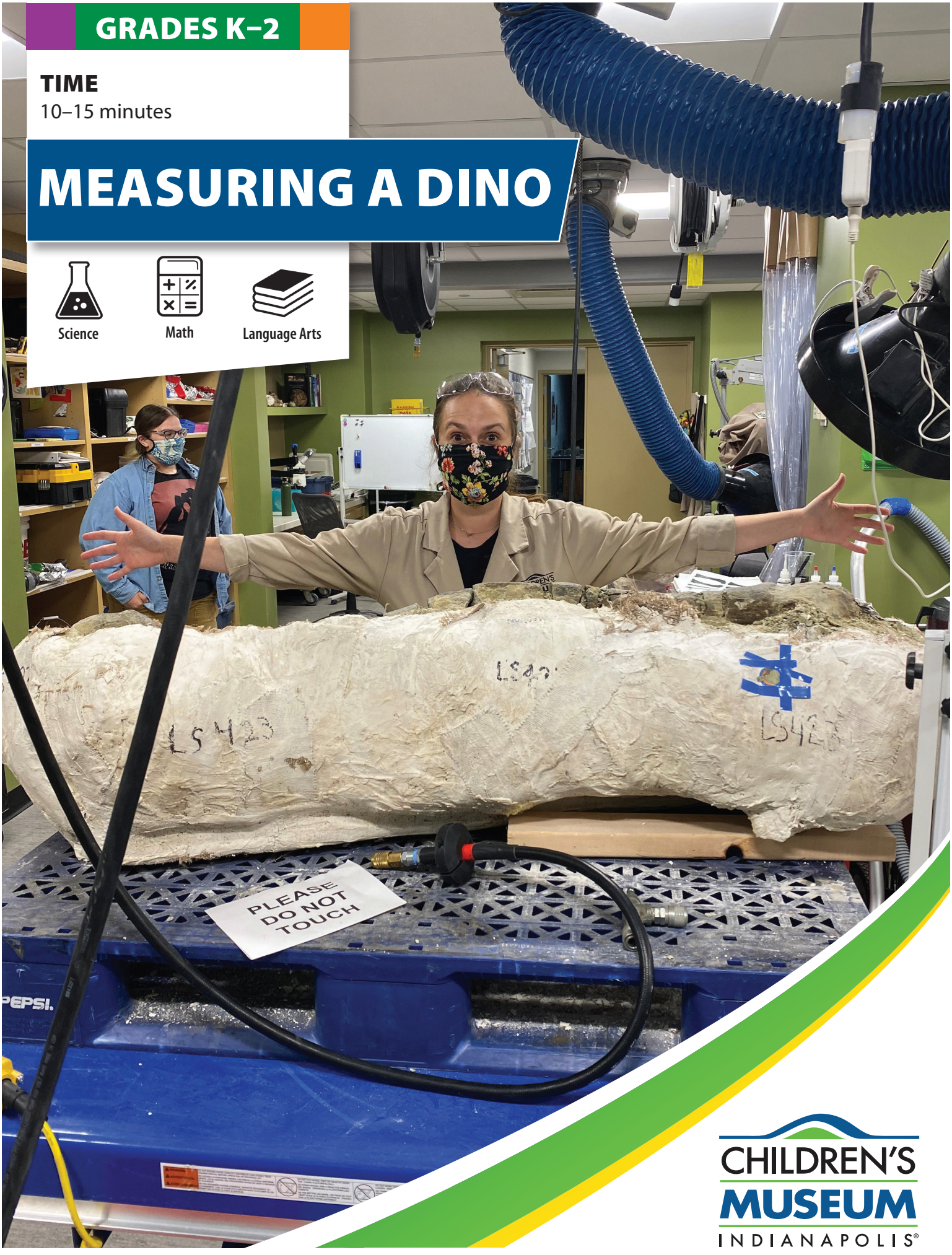
GRADES K–2

TIME
10–15 minutes

MEASURING A DINO

Science | Math | Language Arts



CHILDREN'S MUSEUM INDIANAPOLIS®

MEASURING A DINO

The Children's Museum's lessons are designed to weave classroom experiences and museum education together. All lessons are interdisciplinary and can be used as individual classroom experiences or in combination to create a cohesive unit. Lessons are optimized when used in connection with museum virtual programs and field trips.

In this activity, students will begin exploring dinosaurs' bodies by measuring them and comparing dinosaur size to their own size. Using simple measurement tools, they will take metric measurements of various parts of their own bodies and then see how they "measure up" to Stan the *Tyrannosaurus rex* and Kelsey the *Triceratops*. This lesson introduces them to both comparative and formal systems of measurement, and helps develop basic number sense.

FOCUS QUESTIONS

- How big were dinosaurs?
- Are dinosaurs big and small?
- What can fossilized bones tell us?

INDIANA ACADEMIC STANDARDS

Science: SEPS.1,SEPS.2 , SEPS.3 , SEPS.4 , SEPS.5, K.LS.2, 1.LS.3, 2.LS.2, 2.LS.3

Math: PS.2, PS.4, PS.5, K.NS.1 , K.NS.2, K.NS.3, K.NS.4, K.NS.8, K.NS.9, K.M.1, 1.NS.1, 1.M.1, 2.M.1, 2.M.2, 2.M.3

ELA: K.RN.1, K.RV.3.2 , K.SL.2.1, 1.RN.1, 1.RV.3.2, 1.SL.2.1, 2.RN.2.3, 2.SL.2.1

OBJECTIVES

Students will:

- Estimate the size of dinosaurs
- Measure, observe, and compare dinosaur body parts
- Use measurement tools

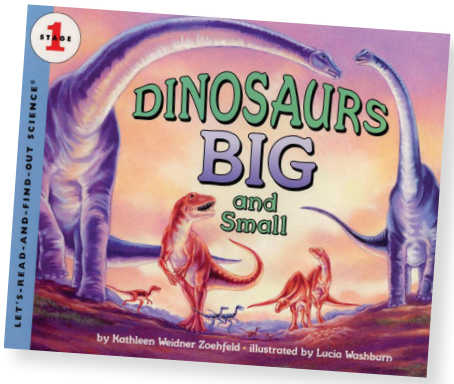
MATERIALS

- Book *Dinosaurs Big and Small* by Kathleen Weidner Zoehfeld
- Metric garment measuring tapes, 1 per pair of students
- Dino size chart worksheet, 1 per pair of students
- Scale **model** toys of T. rex and Triceratops, 1 of each
- Images of Kelsey and Stan (pages 5-8)

Photo Credits: Paleo Lab (Cover), The Children's Museum of Indianapolis; Paleontologists analyzing bone (above), The Children's Museum of Indianapolis; Book cover (page 3), www.harpercollins.com; Bucky Skeleton (page 4), The Children's Museum of Indianapolis, Kelsey and Stan drawings (page 4), The Children's Museum of Indianapolis; Stan and Kelsey skeletons and drawings (pages 5-8), The Children's Museum of Indianapolis

Measuring a Dino

PROCEDURES



1. Read *Dinosaurs Big and Small* by Kathleen Weidner Zoehfeld to the class to introduce students to the different sizes of dinosaurs.
2. Show the students the pictures of Kelsey and Stan. Ask students how big they think they would be compared to a *Tyrannosaurus rex* or a *Triceratops*. How many of them might have to stack up to be as **tall** as a *T. rex*? As long as a Triceratops?
3. Introduce the idea of formal units of measurement. People might be measured in feet or inches, long distances in miles. Share with the students that scientist use **units** called **meters** and **centimeters** to **measure** length.
4. Divide the class into teams of two. Have students use centimeter rulers to take measurements of each other and record the measurements on their chart.
5. Encourage students to problem-solve to find ways to make accurate measurements. For example, they will need to decide which way to measure the skull. You may ask some students to demonstrate for the others how to wrap or roll the measuring tape around their skull for a measurement.
6. Ask students how their measurements compare to Stan and Kelsey. When they used tools, was it easier for them to make the comparison between human and dinosaur?
7. Have the students think about smaller dinosaurs. How might they compare to a dino the size of a chicken or a squirrel? What measurements do they think those dinos might have?

METRIC VS. IMPERIAL VS. US

Colloquially, we often refer to the measurement system in use in the United States as the Imperial System, but while our measurements share many similarities (and some identical units) to the British Imperial System, they aren't exactly the same. The inch, foot, and yard are the same in both, for example, but volumetric measurements slightly differ. Both systems, however, trace their roots back to Ancient Greek and Roman systems of weights and measures, which may have been based on the human body (hence feet and even hands for measuring horses). Measuring and estimating using human parts is both natural and easy, as your students will discover in this activity, but it is too variable and imprecise for science. This is why by the late 1900s the majority of the world had adopted the metric system, which is based on fixed values and scales up and down by powers of ten. This makes unit conversions much simpler than in the US or British Imperial systems, where, for example, 12 inches make a foot, and 5280 feet make a mile.

Animal	Length (Head-Toe)	Back Foot	Hand	Skull (Around)	Largest Tooth
Stan	13 m (43 ft)	1 m (3 ft)	28 cm (11 in)	1.5 m (5 ft)	25 cm (10 in)
Kelsey	9 m (22 ft)	40 cm (16 in)	45 cm (18 in)	2 m (6ft 6 in)	2 cm (1 in)

Arms and Legs

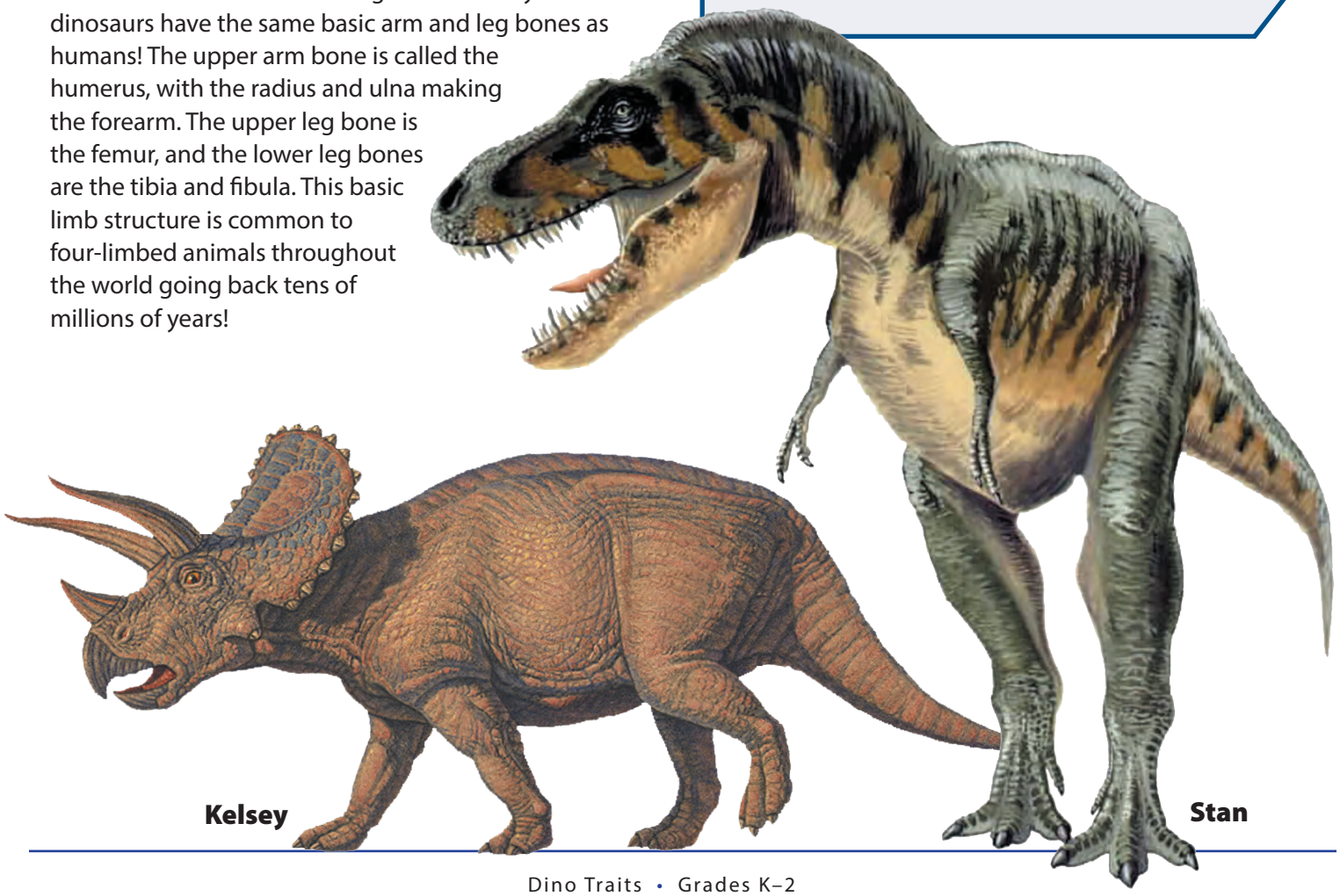
Dinosaurs and humans are extremely different, but like so many animals we share many traits: two eyes, four limbs, and teeth, for example. The similarities go further than skin deep, though. By comparing the images of the *T. rex* and *Triceratops* **skeletons** to images of human skeletons, your students might be able to spot skeletal similarities like the spine and ribs. Looking closely at the limbs can reveal something extraordinary: both dinosaurs have the same basic arm and leg bones as humans! The upper arm bone is called the humerus, with the radius and ulna making the forearm. The upper leg bone is the femur, and the lower leg bones are the tibia and fibula. This basic limb structure is common to four-limbed animals throughout the world going back tens of millions of years!

VOCABULARY

- **Model**
- **Measure**
- **Units**
- **Meter**
- **Centimeter**
- **Head**
- **Tail**
- **Backbone**
- **Skeleton**

T. REX AND BIRDS

Tyrannosaurus rex is classified as a theropod dinosaur, from the ancient Greek for "beast-foot." Theropods were an extremely diverse group of dinosaurs, but they shared certain traits like hollow bones, three-toed feet, and bipedalism (i.e. walking on two legs). By the late Jurassic, one group of theropods had evolved into the earliest birds, who are also bipedal with three toes and hollow bones. Even much larger theropods like *T. rex*, however, share one very interesting feature with birds: the furcula, or wishbone. This small v-shaped bone sits at the front of the chest and helps birds' bodies handle the rigors of flight, though its exact use in extinct dinos is still up for debate.

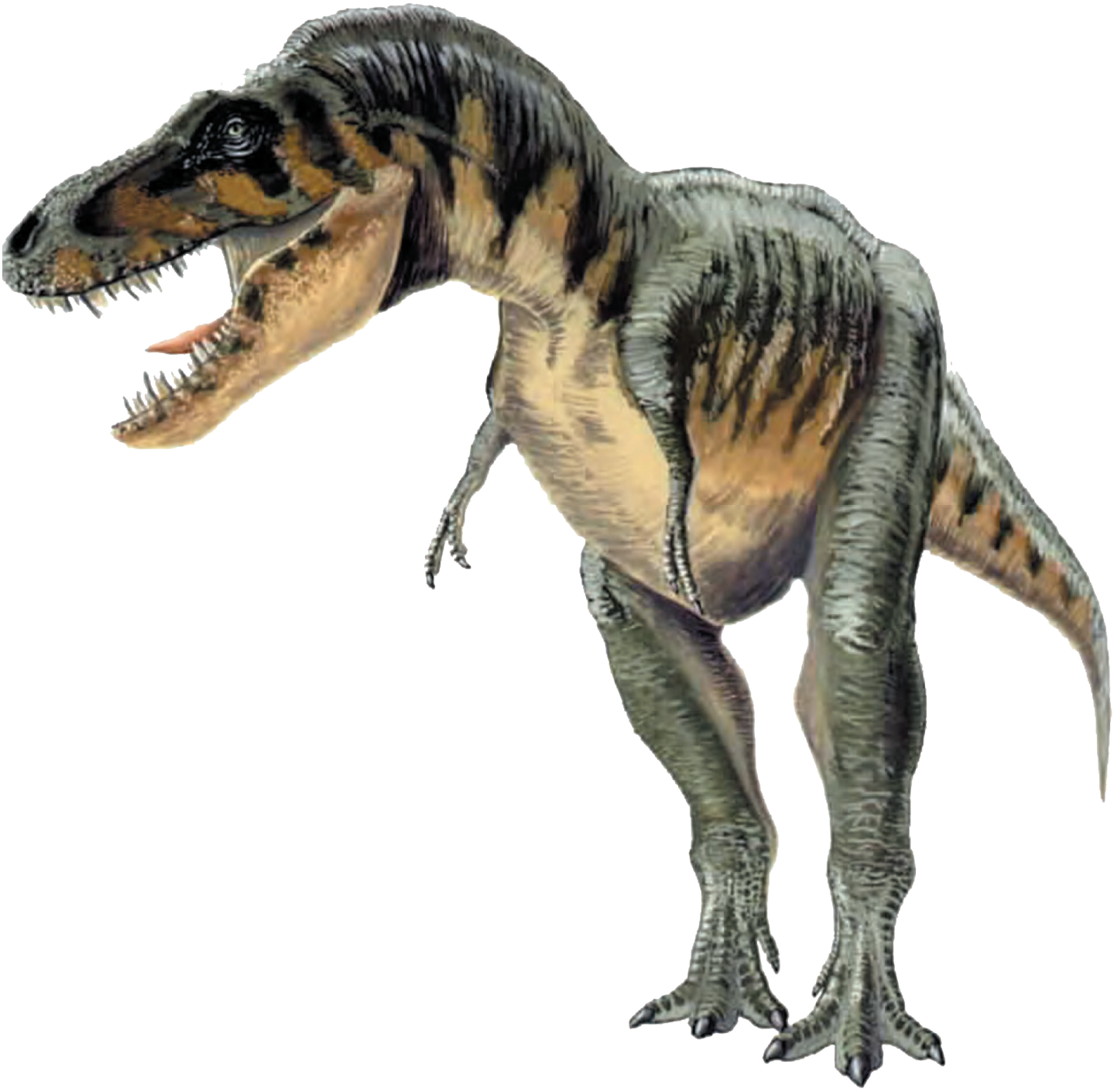


STAN - Skeleton

Tyrannosaurus rex

STAN - Drawing

Tyrannosaurus rex



KELSEY - Skeleton

Triceratops horridus

The shaded bones are real fossils.

Scale: 1 cm = 28 cm

KELSEY - Drawing

Triceratops horridus

Scale: 1 cm = 28 cm