Inside a Muscle Lab: Low-write

Name _____

Date _____

Period _____

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Do Now This bull is a Belgian Blue. It was born with much more muscle than most cattle. Look at its shoulders and back legs. 2 minutes, before you open the lab

A. What do you think is different inside its muscles?

B. Does a bigger muscle have more cells, bigger cells, or both?

☐ More cells ☐ Bigger cells ☐ Both

☐ I can name four jobs of the muscular system.

☐ I can put the parts of a skeletal muscle in order, from the whole muscle to a myofibril.

☐ I can explain how connective tissue and a tendon let a muscle pull on a bone.

Part 1. What muscles do (Tab 1)

SEP 4 Analyzing and Interpreting Data · CCC Energy and Matter

Click all four activities. Read the energy for each one. Then do Step 2, Feel it.

1. Copy the energy for each activity.

Activity	Energy each second (W)
Lying down	
Standing still	
Walking	
Running	

2. Running uses about how many times the energy of lying down? Example, not yours: 300 ÷ 100 = 3 times.

☐ about 2 times ☐ about 5 times ☐ about 10 times

3. Feel it. Which muscle got hard when you bent your elbow against your hand?

☐ front of upper arm ☐ back of upper arm

READ FIRST. In the lab, find the green Learn It box and read it. Then answer 4 to 5.

4. Which job is the muscle doing? Tick one in each row.

You shiver at a cold bus stop.	☐ Movement	☐ Posture	☐ Heat	☐ Moves things inside
You type a text message.	☐ Movement	☐ Posture	☐ Heat	☐ Moves things inside
Food moves along your intestine.	☐ Movement	☐ Posture	☐ Heat	☐ Moves things inside
You keep your head up in class.	☐ Movement	☐ Posture	☐ Heat	☐ Moves things inside

5. Why do you get hot when you run? Your muscles use more _____, and most of it becomes

☐ heat ☐ bone ☐ blood

Part 2. Zoom into a muscle (Tab 2)

SEP 2 Developing and Using Models · CCC Scale, Proportion, and Quantity

Click every level, 1 to 5. Read how wide each one is.

6. Fill in the widths for levels 1 to 4. For "What I see", write one word: whole, bundles, stripes or threads.

Level	About how wide (µm)	What I see
1		
2		
3		
4		

7. About how many cells fit across one bundle? Example, not yours: 600 ÷ 30 = 20. Yours: 1,000 ÷ 50 = _____

8. Which level is one whole cell, with many nuclei? ☐ Level 1 ☐ Level 2 ☐ Level 3 ☐ Level 4

READ FIRST. In the lab, find the green Learn It box and read it. Then answer 9 to 11.

9. Write the four levels in order, from largest to smallest. Use the word bank.

Word bank: fascicle · muscle fiber · myofibril · whole muscle

10. What does each wrap go around? Clue: epi = on top, peri = around, endo = inside.

Epimysium wraps	☐ the whole muscle ☐ a fascicle ☐ one fiber
Perimysium wraps	☐ the whole muscle ☐ a fascicle ☐ one fiber
Endomysium wraps	☐ the whole muscle ☐ a fascicle ☐ one fiber

11. Model check (SEP 2). A muscle is an organ because it has
☐ only one kind of cell ☐ muscle, nerve, blood and connective tissue

Part 3. Pull the tendon (Tab 3)

SEP 3 Planning and Carrying Out Investigations · CCC Cause and Effect

Pick a muscle. Slide to shorten it. Press Record. Do at least four trials. Try a torn tendon or no nerve signal once.

12. Copy four of your trials.

#	Muscle	Healthy, torn tendon, or no signal?	Shortens (cm)	Elbow angle
1				
2				
3				
4				

13. What did each muscle do to the elbow? Tick one in each row.

Front muscle shortens	☐ bends ☐ straightens ☐ no change
Back muscle shortens	☐ bends ☐ straightens ☐ no change

14. With a torn tendon, the elbow ☐ bent ☐ did not move because the tendon
☐ could not pull the bone ☐ pushed the bone

READ FIRST. In the lab, find the green Learn It box and read it. Then answer 15 to 16.

15. Muscles work in pairs because a muscle can only ☐ pull ☐ push

16. Explain it (SEP 6). Finish each sentence. A runner tears the tendon at the back of her heel. Her calf muscle still _____. But the tendon cannot pull the _____, so her foot does not point down.