Inside a Muscle Lab

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? Show your math. _____

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. Use the data. Why do you get hot when you run?

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 table for levels 1 to 4.

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

7. A bundle is 1,000 µm wide and one cell is 50 µm wide. About how many cells fit across one bundle? Show your math (SEP 5). _____

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.

10. What does each wrap of connective tissue go around? Tick one in each row.

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). Why is a muscle called an organ and not just a 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 muscle still got shorter. What happened to the elbow, and why?

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

15. You pressed **Make the muscle push** . Why do muscles work in pairs?

16. Explain it (SEP 6). A runner tears the tendon at the back of her heel. Her calf muscle still works. Why can she not point her foot?

Claim	
Evidence from the lab	
Reasoning	