Jump Rope Clues

Use activity data to explore how body systems work together.

L.4.1.2 "Obtain and communicate data to describe patterns that indicate the nature of relationships between human organ systems, which interact with one another to control digestion, respiration, circulation, excretion, movement, coordination..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline what blood carries between Mina's lungs and muscles. Circle the two kinds of counts in the table, then number the four times they were recorded in order.

Mina's Jump Rope Test

1. At recess, Mina jumps rope for three minutes. Her leg muscles pull on her bones to lift her feet. Muscles need oxygen to keep working. When Mina breathes in, air enters her lungs. Oxygen moves from the lungs into her blood. Her heart pumps that blood to her leg muscles.

2. Mina's muscles also make carbon dioxide as they work. Her blood carries this waste gas back to her lungs, where she breathes it out. A partner counts Mina's breaths for one minute at four points during her activity and rest. A small monitor records her heartbeats per minute at the same times.

MINA'S ACTIVITY COUNTS

Time	Breaths per minute	Heartbeats per minute
Before jumping	18	80
While jumping	34	136
First minute after stopping	26	108
After three minutes of rest	18	82

3. The lungs belong to the respiratory system. The heart and blood vessels belong to the circulatory system. Mina's measurements let you compare these systems during movement and rest. Look at what happens to both counts at each point. Then use the path of gases through her body to explain what the counts suggest.

2 ANSWER WITH EVIDENCE

Use the passage

1. Compare Mina's counts before jumping and while jumping. What pattern do you see in breathing and heartbeat?

2. Use the while-jumping counts and the passage to explain how Mina's lungs and heart help supply her working leg muscles.

3. How do both counts change from while jumping to the first minute after stopping? Why does this pattern fit what her muscles are doing?

4. When are both counts highest? Explain how Mina's blood and lungs work together to remove waste gas from her muscles at that time.

3 YOUR TURN

Your own words

Imagine you pedal a bike up a hill and then stop to rest. In three sentences, predict a pattern in your breathing and heartbeat, explain how your lungs, heart, and leg muscles are involved, and tell what you would measure to test your prediction.

ANSWER KEY

Jump Rope Clues

GRADE 4 · L.4.1.2

PART 1 · READ AND MARK

Underline what blood carries between Mina's lungs and muscles. Circle the two kinds of counts in the table, then number the four times they were recorded in order. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Compare Mina's counts before jumping and while jumping. What pattern do you see in breathing and heartbeat?	**Both increase. Breaths rise from 18 to 34 per minute, and heartbeats rise from 80 to 136 per minute.**
2	Use the while-jumping counts and the passage to explain how Mina's lungs and heart help supply her working leg muscles.	**At 34 breaths and 136 heartbeats per minute, Mina is breathing and pumping blood faster. Oxygen enters her lungs, moves into her blood, and is pumped by her heart to her leg muscles.**
3	How do both counts change from while jumping to the first minute after stopping? Why does this pattern fit what her muscles are doing?	**Breaths drop from 34 to 26 per minute, and heartbeats drop from 136 to 108 per minute. Her muscles are doing less work, so they need less oxygen.**
4	When are both counts highest? Explain how Mina's blood and lungs work together to remove waste gas from her muscles at that time.	**Both counts are highest while Mina is jumping. Her blood carries carbon dioxide from her working muscles to her lungs, where she breathes it out.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

After I stop pedaling up a hill, I predict my breaths and heartbeats per minute will both decrease. My leg muscles will need less oxygen, so my lungs can bring in less air and my heart can pump blood more slowly. I would count my breaths and use a heart monitor while pedaling and again after resting.

Accept explanations that link the pattern in both counts to changing muscle activity and describe oxygen or carbon dioxide moving between the lungs, blood, and muscles. The table shows breathing and heartbeat counts, not direct measurements of gas movement.