THE STRIVING

MUSLIM ACADEMY

Islamic and Academic Education

YEARS 7 TO 9 · SCIENCE

The skeleton, muscles and breathing

What a skeleton is for, why muscles come in pairs, and why a lung is millions of sacs rather than a bag.

WHAT IS INSIDE

- What a skeleton is for
- What a muscle does when it contracts
- Surface area, and why lungs are not bags
- The skeleton, muscles and breathing
- How each one is answered

The Striving Muslim Academy

1 sets · a hint on every question

Written for a parent teaching at home. No training assumed, and nothing else to buy.

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What a muscle does when it contracts

Read this, then answer the questions on it.



WHAT A MUSCLE DOES WHEN IT CONTRACTS

A muscle contracts by shortening. OpenStax puts it at the level of the cell: for a muscle cell to contract, the sarcomere must shorten, and as those shorten the whole muscle cell contracts.

A muscle pulls on a bone. To pull on a bone, that is, to change the angle at its synovial joint, a skeletal muscle must also be attached to a fixed part of the skeleton. To produce the opposite movement, an opposing set of muscles is activated instead.

The anatomy has a name for that pairing. The principal muscle in an action is the prime mover, or agonist, and a muscle with the opposite action is called an antagonist. To extend the knee the quadriceps are the agonists; to flex it, an opposite or antagonistic set called the hamstrings is activated. Which muscle is which depends on the movement, not on the muscle: take the bending as the action and the names swap over.

Antagonists are not only there to undo a movement. They maintain body or limb position, such as holding the arm out or standing erect, and they control rapid movement, as in checking the motion of a limb.

The Str

The skeleton, muscles and breathing

Every answer is on the pages you have just read.



1. **State the three functions of a skeletal system.**
   One sentence in the source gives all three.

2. **Name the three kinds of skeletal system, and say which humans have.**
   One of them is internal and mineralised.

3. **A muscle contracts by shortening, and it pulls on a bone. Explain what follows from that about how muscles must be arranged across a joint, and give the names for the two.**
   A pull can close the angle at a joint. Ask what opens it again.

4. **Explain why a large animal cannot absorb enough oxygen through its outer surface.**
   Two things change as an animal gets bigger, and they change in opposite directions.

5. **A fish's gills and a human's alveoli solve the same problem the same way. Name the problem and the solution.**
   Look at the shape of both.

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How each one is answered

Mark it together. Where a question asks for a list, the order does not matter.



THE SKELETON, MUSCLES AND BREATHING

1. State the three functions of a skeletal system.

1. Support the body.
2. Protect internal organs.
3. Allow for the movement of the organism.

Answer: **to support the body, protect internal organs, and allow movement**

2. Name the three kinds of skeletal system, and say which humans have.

1. Hydrostatic skeleton, exoskeleton and endoskeleton.
2. An endoskeleton consists of hard, mineralised structures within the soft tissue.
3. Humans have an endoskeleton.

Answer: **hydrostatic, exoskeleton and endoskeleton, and humans have an endoskeleton**

3. A muscle contracts by shortening, and it pulls on a bone. Explain what follows from that about how muscles must be arranged across a joint, and give the names for the two.

1. A muscle pulls on a bone to change the angle at its synovial joint, and it must also be attached to a fixed part of the skeleton to do so.
2. To produce the opposite movement, an opposing set of muscles is activated instead.
3. The principal muscle in an action is the prime mover, or agonist, and a muscle with the opposite action is called an antagonist. At the knee the quadriceps are the agonists of extension and the hamstrings the antagonists.

Answer: **in opposing sets, an agonist and an antagonist, because the opposite movement comes from the opposing set being activated**

4. Explain why a large animal cannot absorb enough oxygen through its outer surface.

1. As size increases, diffusion distances increase.
2. At the same time the ratio of surface area to volume drops.
3. So there is more inside to supply and proportionally less outside to supply it through, and diffusion cannot cover the distance.

Answer: **because diffusion distances increase while the ratio of surface area to volume drops**

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SAMPLE PAGES

You have read a few pages. The pack is longer.

What you are holding is a short sample, taken from different parts of the pack so that you can see how a week is planned and what a child is actually asked to do, before you decide.

The complete pack, and the rest of the academic materials, are on our website: schemes of work for a parent teaching at home, and practice packs for the skills children get stuck on.

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Our Islamic Education classes are free. These packs are part of what pays the teachers who teach them.