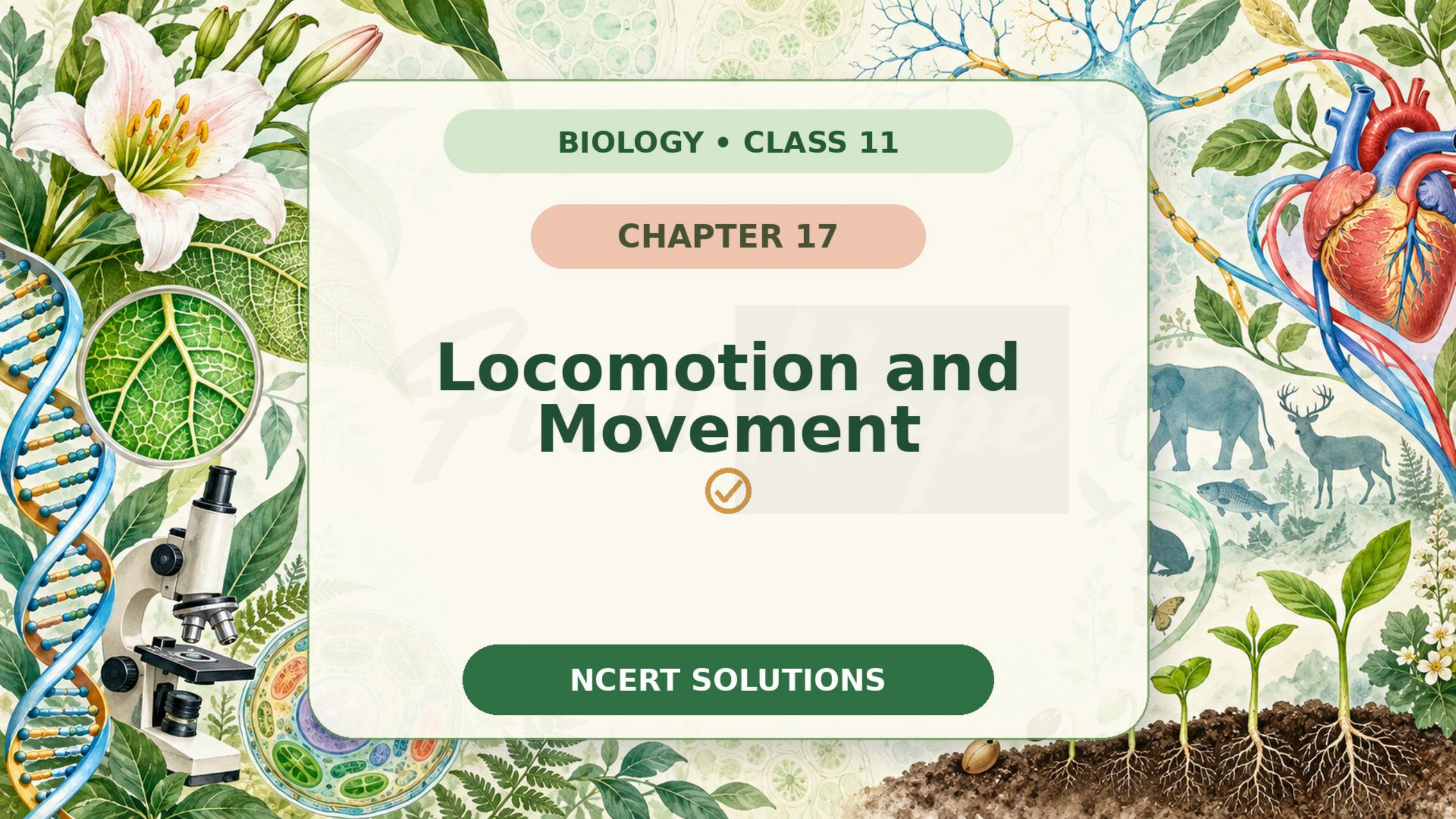


A detailed biology-themed collage serves as the background. It includes a large pink lily flower in the top left, a blue and orange DNA double helix on the left, a magnifying glass focusing on a green leaf's vein structure, a microscope in the bottom left, a cross-section of a plant cell, a human heart with red and blue blood vessels on the right, a blue elephant and a deer in a landscape, a fish, a frog, and various green plants and soil at the bottom.

BIOLOGY • CLASS 11

CHAPTER 17

Locomotion and Movement

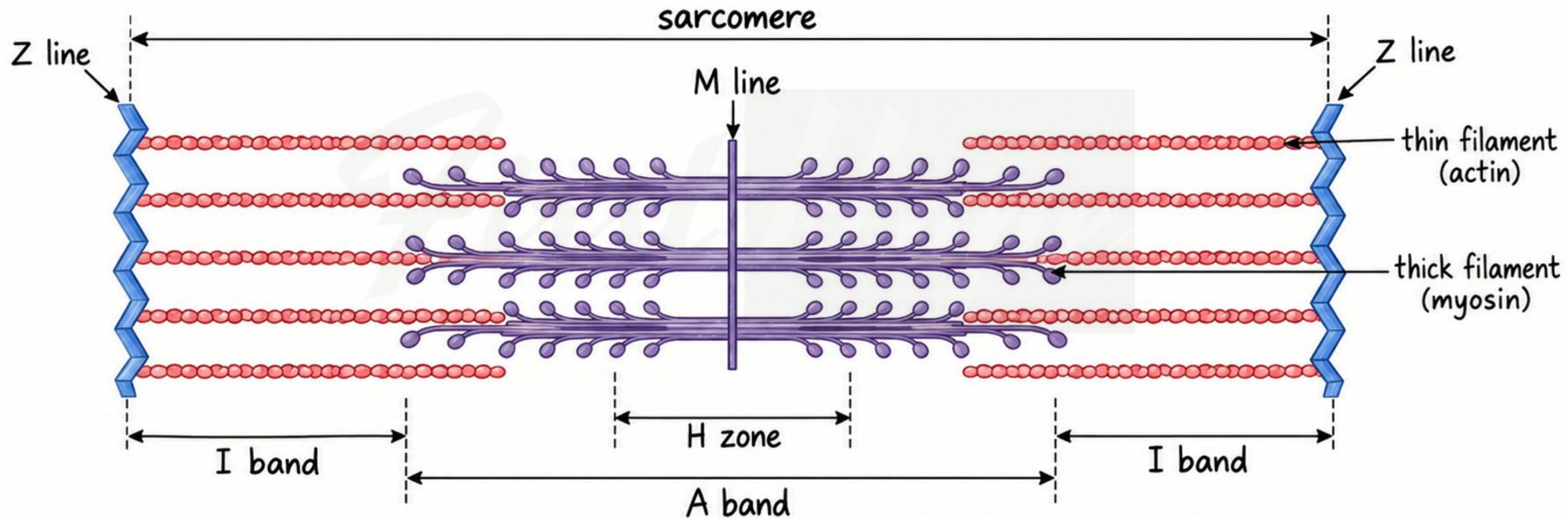


NCERT SOLUTIONS

EXERCISE SOLUTION: QUESTION 1

1. Draw the diagram of a sarcomere of skeletal muscle showing different regions.

Answer:

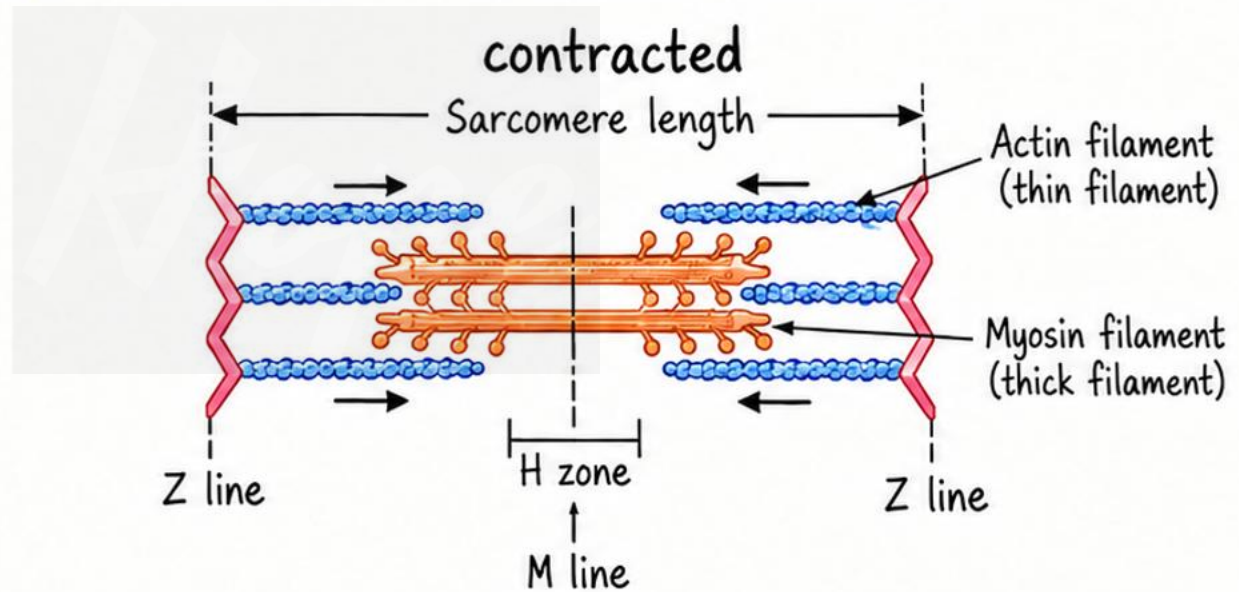
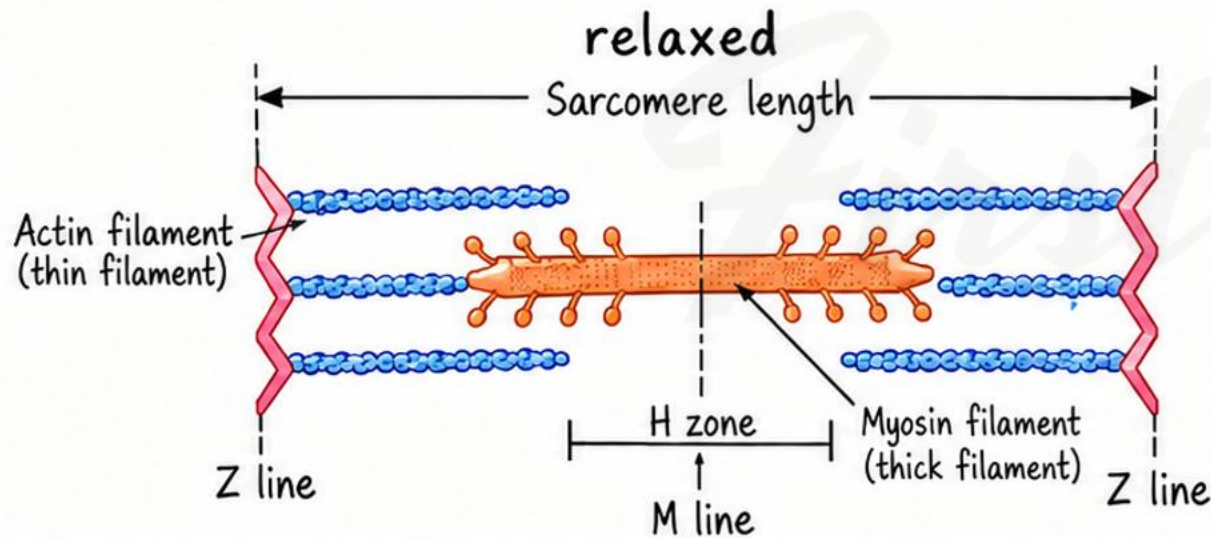


A sarcomere is the functional unit of a myofibril and lies between two successive Z lines.

EXERCISE SOLUTION: QUESTION 2

2. Define sliding filament theory of muscle contraction.

Answer: The sliding filament theory states that muscle contraction occurs when thin actin filaments slide inward over thick myosin filaments toward the M line. The filaments themselves do not shorten; their overlap increases and the sarcomere shortens.



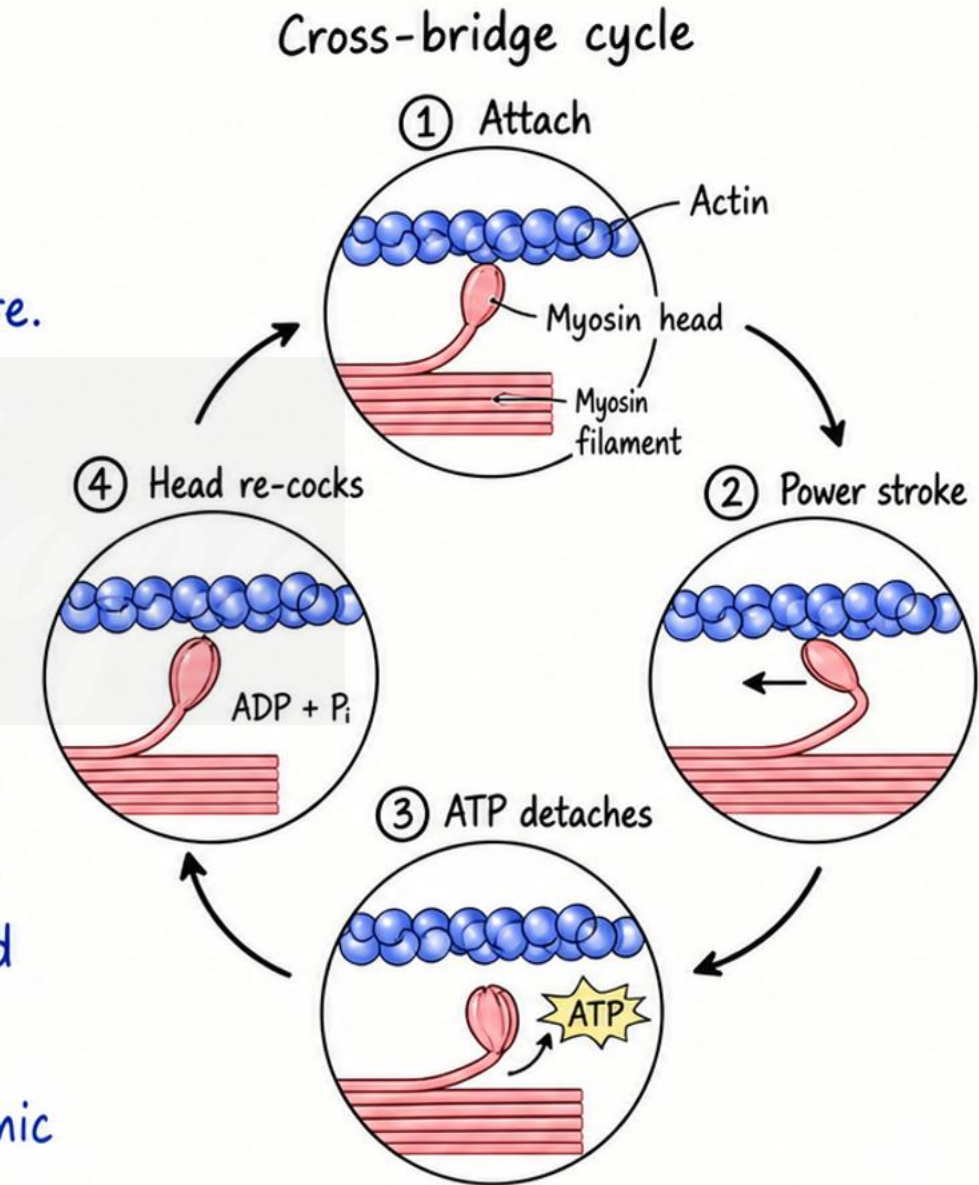
- A band — length remains constant.
- I band — becomes shorter.
- H zone — becomes narrower or may disappear.
- Z lines — move closer together.

EXERCISE SOLUTION: QUESTION 3

3. Describe the important steps in muscle contraction.

Answer:

1. A motor-neuron impulse reaches the neuromuscular junction and acetylcholine starts an action potential in the muscle fibre.
2. The action potential travels over the sarcolemma and through T-tubules, causing the sarcoplasmic reticulum to release Ca^{2+} .
3. Ca^{2+} binds troponin; tropomyosin shifts and exposes myosin-binding sites on actin.
4. Energised myosin heads attach to actin, forming cross-bridges.
5. The power stroke pulls actin toward the M line; ATP binds to detach myosin, and ATP hydrolysis re-cocks the head. Repeated cycles shorten the sarcomere.
6. When stimulation ends, Ca^{2+} is pumped back into the sarcoplasmic reticulum; binding sites are covered and the muscle relaxes.



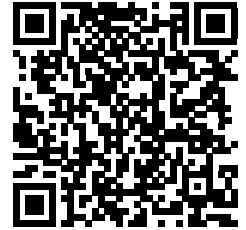


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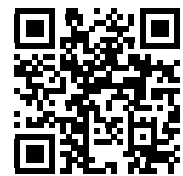


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