Bellringer

What is the ability to shorten and reduce the distance between the parts?

a. Contractibility  
b. Excitability  
c. Extensibility  
d. Elasticity

Which exercise is not considered aerobic exercise?

a. swimming  
b. running  
c. weightlifting  
d. walking
1.05 Understand the functions and disorders of the muscular system
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• What are the characteristics of muscles?
• What are the functions of the muscular system?
• What are common disorders of the muscular system?
• How are muscular disorders treated?
• How does the muscular system relate to the body’s support and movement?
Characteristics of Muscles

Contractibility

Excitability

Extensibility

Elasticity

1.05 Understand the functions and disorders of the muscular system
Characteristics of Muscles

Contractibility -

The ability to shorten and reduce the distance between the parts.

1.05 Understand the functions and disorders of the muscular system
Characteristics of Muscles

Excitability — is the ability to respond to certain stimuli by producing electrical signals called impulses.

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Characteristics of Muscles

Extensibility — is the ability of a muscle to be stretched.
Characteristics of Muscles

Elasticity — is the ability of a muscle to return to original length when relaxing.
Muscle Tone

Discuss muscle tone.

• Atrophy: muscle shrinks from disuse
  
  \[ a- \underline{\text{________}} \text{-trophy \underline{\text{________}}} \]

• Hypertrophy: muscle enlarges from overuse
  
  \[ \text{hyper-} \underline{\text{________}} \text{-trophy \underline{\text{________}}} \]
Muscle Tone

John just got a cast off his leg. His calf muscle on the affected leg is 1” smaller in diameter than his other calf muscle.

• What happened?

• How do you explain this to him?
Muscle Fatigue

- Muscle fatigue is caused by an accumulation of lactic acid in the muscles.
- The body corrects muscle fatigue by passing lactic acid into the bloodstream.
- If vigorous exercise continues, the lactic acid level in the blood rises sharply. This impedes muscular contraction, causing muscle fatigue and cramps. After exercise, a person must stop, rest and take in enough oxygen to change lactic acid back to glucose.

- **Aerobic** (cardiovascular exercise) – muscle movement that uses oxygen to burn carbs. and fats to produce energy (ex: walking, swimming, etc.)

  vs

- **Anaerobic exercise** (builds muscle and physical strength) – muscle movement that does not require oxygen and only burns carbs. to produce energy (ex: weightlifting).
Functions of the Muscular System

1. Movement
2. Posture
3. Body heat

1.05 Understand the functions and disorders of the muscular system
Movement: Skeletal Muscle

- Receptors in muscles provide the brain with information about body position and movement.

- The brain controls the contraction of skeletal muscle.
**Movement**

**Skeletal muscle movement includes:**

- **Point of origin** – is the part of a skeletal muscle that is attached to a fixed structure or bone (it moves least during muscle contraction)
- **Point of insertion** – is attached to a moveable part (is the part that moves most during a muscle contraction)

**Muscles are arranged in pairs:**

- **Prime mover** – produces movement in a single direction
- **Antagonist** – produces movement in the opposite direction
- **Synergists** – steady a movement or stabilize joint activity
Movement: Digestive System

The nervous system regulates the speed at which food moves through the digestive tract.
Movement: Circulatory System
Heartbeat

The nervous system and hormones regulate the speed at which the heart beats.

1.05 Understand the functions and disorders of the muscular system
Bellringer

• What disorder is caused by an infectious disease and causes continuous spasms of the voluntary muscles?
  a) Tetanus  
  b) Fibromyalgia  
  c) Muscular dystrophy  
  d) Strain  

• What disorder is characterized by chronic muscle pain lasting 3 months or more?
  a) Hernia  
  b) Fibromyalgia  
  c) Tendonitis  
  d) Muscle spasms
The muscular system effects posture by giving our bodies form and shape.
Body Heat

When a muscle is stimulated ATP (adenosine triphosphate – a major source of energy found in the muscle cell) is released, producing the heat our bodies need.
Myopathy

Myo-
-pathy

A disease of muscle or muscle tissue
Fibromyalgia

- **Cause** – unknown/ possible causes could be stress, illness, trauma, or it could be hereditary
- **Symptoms** – chronic muscle pain lasting 3 or more months, fatigue, headache, feelings of numbness and tingling
- **Diagnosis** – done by symptoms. There is no lab test that can be done to diagnose this condition.
- **Treatment** – pain relief (medication), getting enough sleep, exercise regularly, massage therapy, chiropractic procedures, relaxation techniques, stretching exercises
- **Prognosis** – is a lifelong condition but is not fatal

1.05 Understand the functions and disorders of the muscular system
Hernia

Occurs when an organ protrudes through a weak muscle.

There are 3 types of hernias:

- Abdominal – occurs when organs protrude through the abdominal wall
- Inguinal – occurs in the inguinal area
- Hiatal – occurs when the stomach pushes through the diaphragm
Muscle spasms
(Involuntary hypertonicity)

Muscle spasm – a sustained contraction of a muscle

- Cause – overuse of a muscle, low electrolyte levels or poor circulation
- Locations – usually occur in legs and feet
- Symptoms – sudden, painful, involuntary contraction of a muscle
- Treatment – use gentle pressure and stretching of muscle to relieve pain
Muscular Dystrophy

A group of diseases in which the muscle cells deteriorate.

- **Cause** – genetic defect
- **Symptoms** – chronic progressive muscle atrophy
- **Diagnosis** – enzyme test, genetic testing, muscle biopsy and electromyography
- **Treatment** – physical therapy, respiratory therapy, orthopedic appliances and drug therapy
- **Prognosis** – varies depending on the progression of the disease.

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Myasthenia Gravis

Occurs when the connection between the nerves and muscle is lost.

- **Cause** – is an autoimmune disease (antibodies attack the body’s own tissues)
- **Symptoms** – muscle weakness of the voluntary muscles
- **Diagnosis** – neurological testing, blood test, electromyography (EMG)
- **Treatment** – rest, medications, removal of thymus gland
- **Prognosis** – good (may have significant improvement of muscle weakness), remission is possible
Strain

Overstretching or injury to a muscle and/or tendons

- Frequent sites include: back, arms and legs
- Symptoms: myalgia (muscle pain), swelling, limited movement
- Treatment:
  - Rest and elevation of extremity
  - Muscle relaxants or pain medications
  - Alternating heat and cold applications
Tendonitis

Inflammation of a tendon.

- Can come from a sudden injury or repetitive motion
- Symptoms: pain when moving affected limb or joint, tenderness, mild swelling
- Diagnosed by physical exam or x-rays
- Treatment: corticosteroids, pain relievers, therapy, surgery for severe cases
Tetanus

Is an infectious disease which causes continuous spasms of the voluntary muscles.

- Is caused by tetanus bacteria that can enter the body through a puncture wound.
- Symptoms: tightening of muscles, ’lockjaw’
- Treatment: wound care, antibiotics, tetanus vaccine, TIG (tetanus immune globulin/antitoxin)