

KINESIOLOGY

This exam tests knowledge of the scientific study of human movement. Topics include: the internal and external forces that act on the human body during movement, exercise, and athletics; the scientific principles of body mechanics, including general anatomy and physiology; the interaction of the neuromuscular system with movement. *It is recommended that the student has a background in Anatomy and Physiology before preparing for this exam.* 3 s.h. FIT-211-TE

This is a two-hour examination in which you must answer 100 multiple-choice questions (worth 1 point each). A passing score is **60** out of 100 points.

-

Here are the topics covered and their approximate importance on the test:

- I. INTRODUCTION TO HUMAN MOTION (5%)
 - A. Definitions of kinesiology
 - B. Definitions of biomechanics
 - C. Motor skills

- II. ANATOMY AND PHYSIOLOGY OF MOVEMENT (15%)
 - A. Anatomical and directional terminology
 - B. Skeletal anatomy
 - C. Muscular anatomy
 - D. Neuromuscular basis for motion

- III. BASICS OF BIOMECHANICS (10%)
 - A. General terminology
 - B. Methods of taking and recording measurement
 - C. Vectors

- IV. LINEAR MOTION (15%)
 - A. Newton's Laws
 - B. Forces affecting motion
 - C. Free-body diagrams
 - D. Velocity and acceleration

- V. ANGULAR MOTION (10%)
 - A. Terminology
 - B. Newton's Laws in rotational motion
 - C. Centripetal and centrifugal forces
 - D. Importance of angular motion in exercise

VI. STABILITY AND EQUILIBRIUM (10%)

- A. Definition of terms
- B. Center of gravity
- C. Bases of support
- D. Stable and unstable systems

VII. STANDING POSTURE (5%)

- A. Support
- B. Analysis of posture

VIII. LOCOMOTION (10%)

- A. Locomotion on solid surfaces
- B. Movement in a liquid medium
- C. Movement when suspended or without support

IX. OBJECTS AND IMPLEMENTS (10%)

- A. Throwing
- B. Kicking
- C. Striking
- D. Transition of force to an object

X. MOTION ANALYSIS (10%)

- A. Components of motion analysis
- B. Qualitative analysis
- C. Quantitative analysis

Textbooks:

The following texts were being used in similar college courses when this exam was developed, but many college-level texts in this subject will prepare you for this exam. Whatever texts you use, make sure to compare the topic outline shown above to your texts, to ensure that all topics are covered. We recommend you review more than one text.

Hamilton, Nancy and Kathryn Luttgens. *Kinesiology: Scientific Basis of Human Motion*. Current edition. Boston: McGraw-Hill.

Hall, Susan J. *Basic Biomechanics*. Current edition. Boston: McGraw-Hill.

SAMPLE QUESTIONS

1. Movements requiring maximum accuracy or involving loads are usually
 - a. sequential in nature
 - b. simultaneous in nature
 - c. segmental in nature
 - d. concurrent in nature

2. All of the following are factors in range of motion EXCEPT
 - a. joint structure
 - b. muscle bulk
 - c. ligamentous structures
 - d. segment length

3. A reduction in joint angle is called
 - a. abduction
 - b. adduction
 - c. flexion
 - d. extension

4. Which type of muscle contraction is involved when contraction velocity remains constant?
 - a. Isokinetic
 - b. Isotonic
 - c. Isometric
 - d. Eccentric

5. A football blocker tackles an opponent at an angle of 45° to the horizontal. How do the horizontal and vertical components of force compare?
 - a. The horizontal component is greater than the vertical.
 - b. The vertical component is greater than the horizontal.
 - c. They are equal.
 - d. They cannot be compared as they are completely different.

6. A 100 lb. woman acted upon by gravity exerts how much force?
 - a. 45 N
 - b. 445 N
 - c. 220 kg
 - d. 980 kg

7. The meter is the unit of measurement for
 - a. distance
 - b. speed
 - c. mass
 - d. velocity

8. If the velocity of a sailboat changes from 4 m/s to 2 m/s over a period of time, what is true of the sailboat's acceleration?
 - a. It is positive.
 - b. It is negative.
 - c. It is equal to velocity squared.
 - d. It cannot be determined from the information given.

9. The laws of constant acceleration can be applied to the
 - a. vertical and velocity components of projectile motion
 - b. vertical and trajectory components of projectile motion
 - c. horizontal and velocity components of projectile motion
 - d. horizontal and vertical components of projectile motion

10. Which of the following categories of motion is mutually exclusive with each of the others?
 - a. Translational motion
 - b. Rectilinear motion
 - c. Rotational motion
 - d. Curvilinear motion

11. A wheelbarrow is an example of which class of lever?
 - a. 1st class
 - b. 2nd class
 - c. 3rd class
 - d. 4th class

12. What does the center of gravity of an object represent?
 - a. The exact center anatomically
 - b. The geometric center
 - c. The center of the mass of body
 - d. The center of the base of support

13. The perpendicular distance between the line of force and the axis defines
 - a. moment arm
 - b. torque
 - c. fulcrum
 - d. vector

14. Which of the following is true of the existence of motion during a "stationary" stance?
- There is no motion.
 - There is slight motion forward and backward.
 - There is slight motion side to side.
 - There is slight motion in all directions.
15. Why is it easier for a runner to move the recovery leg forward more rapidly when it is flexed than when it is extended?
- The mass of the leg is greater when it is flexed.
 - The mass of the leg is less when it is flexed.
 - The moment of inertia of the leg is greater when it is flexed.
 - The moment of inertia of the leg is less when it is flexed.
16. Which of the following terms describes a force acting on a body in a fluid in a direction perpendicular to the fluid flow?
- Wave drag
 - Surface drag
 - Friction
 - Lift
17. When recording a videotape of a motion or sport skill for digital analysis, the coach should do all of the following EXCEPT
- have the athlete wear the least amount of clothing possible
 - have the athlete's clothing be as comfortable as possible
 - place markers on the joints or anatomical points of reference
 - ensure that the background color contrasts with the color of the athlete's skin and clothing
18. A karate kicker picks up the kicking foot and then snaps out at the target. A stronger kick is possible if he or she
- first pushes off with the kicking foot, increasing ground reaction forces
 - leans back during the kick to transfer center of mass
 - leans forward during the kick to transfer center of mass
 - jumps in the air prior to kicking to maximize use of body mass
19. A dynamometer measures
- velocity
 - acceleration
 - force
 - pressure
20. All of the following are examples of sagittal plane movements EXCEPT
- lateral flexion
 - flexion
 - hyperextension
 - plantar flexion

ANSWERS TO SAMPLE QUESTIONS

1. **b** 2. **d** 3. **c** 4. **a** 5. **c** 6. **b** 7. **a** 8. **b** 9. **d** 10. **c**
11. **b** 12. **c** 13. **a** 14. **d** 15. **d** 16. **d** 17. **b** 18. **a** 19. **c** 20. **a**