STUDY GUIDE
for
Kinematics of Trauma

1. Guidelines to aid the prehospital provider in determining which patients require immediate transport to a trauma center are known as

   A. mechanism of injury standards
   B. injury severity indexes
   C. standing orders
   D. trauma triage protocols

2. Which of the following mechanisms of injury indicate rapid transport to a trauma center?

   A. Falls greater than 20 feet
   B. Deaths of another car occupant
   C. Ejection from vehicle
   D. All of the above

3. Which of the following physical findings indicate rapid transport to a trauma center?

   A. Pulse greater than 100
   B. Glasgow coma score greater than 13
   C. Femur fracture
   D. Airway burns

4. A car traveling at 55 mph will tend to remain traveling at 55 mph until something stops it or slows it down. This is know as the law of

   A. kinetics
   B. inertia
   C. energy
   D. motion

5. Which of the following will generate the greatest amount of kinetic energy?

   A. 20lb object traveling at 50 mph
   B. 30lb object traveling at 40 mph
   C. 40lb object traveling at 30 mph
   D. 50lb object traveling at 20 mph

6. Axial loading occurs when

   A. the shoulder strikes the side window
   B. the head strikes the front windshield
   C. the knee strikes the lower dashboard
   D. the chest strikes the steering wheel

7. Injuries from the "paper bag syndrome" include

   A. subdural hematoma
   B. pericardial tamponade
   C. lacerated trachea
   D. pneumothorax

8. Which of the following statements is true regarding lateral impact accidents?

   A. The greater amount of passenger protection lessens the injury pattern
   B. They account for the least percentage of vehicular deaths
   C. The amount of vehicular damage exaggerates the injury pattern
   D. None of the above

9. The most commonly seen injury associated with rear-impact accidents is

   A. kidney laceration
   B. lumbar spine fracture
   C. cervical spine injuries
   D. cardiac contusion

10. Which of the following injury patterns are most associated with frontal motorcycle accidents in which the driver is ejected?

   A. Lateral pelvis dislocations
   B. Bilateral femur fractures
   C. Spleen and liver lacerations
   D. Crushing injuries

11. Which of the following statements is true regarding pedestrian accidents?

   A. Adults tend to turn away prior to impact
   B. Children tend to face the oncoming car prior to impact
   C. Adults are often thrown up and over the bumper
   D. All of the above

12. When assessing falls, you should focus your attention to

A. the height of the fall
B. the surface the victim fell onto
C. the body part that hit first
D. all of the above

13. Primary injuries from a blast include

A. extremity fractures
B. liver lacerations
C. lung injuries
D. impaled objects

14. Secondary injuries from a blast include

A. extremity fractures
B. liver lacerations
C. lung injuries
D. impaled objects

15. Tertiary injuries from a blast include

A. extremity fractures
B. liver lacerations
C. lung injuries
D. impaled objects

16. Which of the following factors will determine a bullet's trajectory?

A. Gravity
B. Wind speed
C. Bullet speed
D. All of the above

17. A bullet's profile refers to its

A. speed
B. trajectory
C. size and shape
D. drag

18. The formation of a partial vacuum within the body from a high-velocity projectile is called
    A. profilation
    B. cavitation
    C. ballistication
    D. none of the above

19. Which of the following statements is true regarding knife injuries?
    A. men attackers usually stab downward
    B. women attackers usually stab upward and outward
    C. impaled knives should never be removed in the field
    D. none of the above

20. Which of the following penetrating injuries has the greatest energy transfer?

    A. shotgun blast
    B. .38 caliber handgun
    C. Bow and arrow
    D. High speed rifle

21. Which of the following procedures are required prior to transporting the seriously injured trauma victim?

    A. a primary examination
    B. a secondary examination and initiation of IV fluid replacement
    C. obtaining a medical history and immobilizing extremity fractures
    D. answers a and b only
    E. answers a, b, and c

22. Newton's first law of motions states that
    A. a body in motion will remain in motion unless acted upon by an outside force.
    B. force equals mass multiplied by acceleration or deceleration.
    C. a body at rest will remain at rest unless acted upon by an outside force.
    D. both answers a and b
    E. both answers a and c

23. Newton's second law of motion states that
    A. a body in motion will remain in motion unless acted upon by an outside force.
    B. force equals mass multiplied by acceleration or deceleration.
    C. a body at rest will remain at rest unless acted upon by an outside force.
    D. both answers a and b
    E. both answers a and c

24. An automobile traveling approximately 30 mph is driven head on into a cement bridge abutment, coming to a sudden stop. Which of the following statements regarding the energy of this accident is false?

A. A destructive energy was created the instant the auto struck the abutment.
B. The auto absorbed energy at impact, manifested by vehicle deformity and bending of the frame.
C. The restrained driver of this auto also absorbed energy on impact.
D. Three impacts occurred: the auto impacted the abutment, the driver impacted the seat belts, the driver's internal organs impacted various internal structures and/or restraining ligaments.
E. The transfer of energy may have resulted in tissue injuries despite the presence of restraints.

25. The branch of physics that deals with force and its effects in producing or modifying motion in bodies is called
A. kinematics
B. kinetosis
C. kinesthesia
D. kinetics
E. kinesiology

26. Energy manifested in the form of motion is called
A. potential energy
B. thermal energy
C. kinetic energy
D. radiant energy
E. latent energy

27. Deceleration forces may result in life-threatening hemorrhage of the _____ secondary to laceration by the ligamentum teres.
A. aorta
B. liver
C. kidneys
D. spleen
E. bladder

28. Deceleration forces may result in life-threatening hemorrhage of the _____ secondary to laceration by the ligamentum arteriosum.
A. aorta
B. liver
C. kidneys
D. spleen
E. bladder

29. A frontal impact accident, involving "down and under" travel of the driver, has caused the driver's knees to impact with the dashboard. From this impact alone, you would anticipate all of the following, except
    A. knee injuries
    B. femoral shaft injuries
    C. distal tibial injuries
    D. posterior hip fractures
    E. posterior hip dislocations
30. A frontal impact accident, involving "up and over" travel of the driver, has produced a star fracture of the windshield, high above the steering wheel. From this sign you would anticipate
    A. skull or facial fractures
    B. compression, hyperflexion, or hyperextension injuries of the cervical spine
    C. femoral fractures
    D. answers a and b only
    E. answers a, b, and c
31. Which of the following statements regarding ejection injuries is false?
    A. Ejection produces multiple impacts.
    B. Ejection occurs most frequently in frontal impacts.
    C. Ejection frequently saves the victim from more serious injuries.
    D. All of the above.
    E. None of the above.

32. In an accident involving lateral impact on the driver's side, with a restrained driver, you would anticipate injuries
    A. anywhere along the right side of the patient and the patient's spine.
    B. anywhere along the left side of the patient and the patient's spine.
    C. anywhere about either side of the patient and the patient's spine.
    D. involving the upper extremities, chest, and spine only.
    E. involving the lower extremities, pelvis, and spine only.

33. When a vehicle is impacted from the rear, the occupant's body is propelled forward to impact the restraint device (a restrained occupant) or the vehicle's interior (an unrestrained occupant). Meanwhile, the occupant's head
    A. has moved forward, preceding the body (hyperflexion) and then snapped backward (hyperextension), producing a "whiplash" injury.
    B. has first snapped backwards (hyperflexion) and then snapped forward (hyperextension), producing a "whiplash" injury.
    C. remains stationary, causing hyperflexion of the cervical spine with a more rapid rebound hyperextension, producing a "whiplash" injury.
    D. remains stationary, causing hyperextension of the cervical spine with a more rapid rebound hyperflexion, producing a "whiplash" injury.
    E. none of the above.

34. In an accident involving off-center impact, causing rotation of the auto around the point of impact, you would anticipate

A. lateral injury patterns
B. frontal injury patters
C. the occupant nearest to the point of impact to suffer significant injury
D. the occupant furthest from the auto's center mass to suffer significant injury.
E. all of the above

35. Which of the following statements regarding restraint systems is false?

A. Even properly positioned lap and shoulder belts may produce significant injuries during an accident.
B. Airbags are effective only in frontal collisions.
C. Survival rates are greatly improved by the use of the restraint systems.
D. All of the above are false.
E. None of the above is false.

36. Suspected alcohol intoxication or substance abuse is an important factor in consideration of the mechanism of injury because

A. the relaxation produced by drugs or alcohol lessens the severity of injury.
B. blood testing is required by law in many states.
C. altered ability to perceive signs and symptoms of injury will frequently result in missed injuries.
D. all of the above
E. none of the above

37. Motorcycle accidents with frontal impact frequently cause

A. abdominal injury from handlebar contact.
B. pelvic injury from handlebar contact.
C. bilateral femoral fractures from handlebar contact.
D. answers b and c only
E. answers a, b, and c

38. When involved in a motorcycle accident, if the victim was wearing a helmet
A. the likelihood of head injury is greatly diminished.
B. the likelihood of spinal injury is greatly diminished.
C. the likelihood of deceleration injury is greatly diminished.
D. answers a and b only
E. answers a, b, and c

39. The most commonly fractured bone in the body is the
    A. mandible
    B. clavicle
    C. humerus
    D. femur
    E. tibia

40. Your patient jumped from a second-story window to escape a person threatening assault. Her chief complaint is bilateral ankle and heel pain from first landing erect, on both feet. Given this mechanism of injury, you must also suspect

    A. spinal fracture
    B. internal injuries
    C. upper extremity injuries
    D. answers a and c only
    E. answers a, b, and c

41. Which of the following statements regarding bullet wounds is false?

    A. Bullets designed to expand on entry create an entrance wound that will be larger than the exit wound
    B. A higher-velocity bullet will produce less cavitation injury because the bullet will be less likely to tumble or fragment as it travels through the body.
    C. All bullets create greater entrance wounds than exit wounds because the velocity is slowed by the body tissue prior to exit.
    D. All of the above are false.
    E. None of the above is false.

42. Identifying the forces involved in a vehicle collision, and their direction and strength, helps determine the:

    A. mechanism of injury.
    B. velocity and mass.
    C. speed before impact.
    D. rescue requirements.

43. Energy can neither be created nor destroyed. It is only changed from one form to another.This is:

    A. the law of conservation of energy.
    B. the law of inertia.
    C. Newton's first law of motion.
    D. Newton's second law of motion.

44. Kinetic energy can be measured by the formula:

A. mass x acceleration (deceleration).
B. (mass x velocity^2) divided by 2.
C. mass x velocity.
D. mass / velocity.

45. Using the formula for kinetic energy, hitting an object while traveling at 60 mph is _____ as injurious as if the speed were 30 mph.

A. equally.
B. twice.
C. 4 times.
D. 8 times.

46. Vehicle collision begins when the auto strikes an object. As a result:

A. energy of motion is converted to vehicle damage.
B. energy of motion is dissipated into the environment.
C. stopping distance has no relation to the force of the collision.
D. vehicle deformity is a poor indicator of forces experienced by occupants.

47. Body collision occurs when a passenger strikes the vehicle interior. An unrestrained occupant:

A. slows at the same rate as the vehicle.
B. continues to move at the initial speed.
C. slows at a lesser rate than the vehicle.
D. increases in speed during the collision.

48. During a vehicle collision, the internal contents of the body press into each other or the wall of a body cavity. This is called:

A. body collision.
B. secondary collision.
C. organ collision.
D. internal collision.

49. Secondary blast injuries are caused by:

A. organs and tissues pressing into each other.
B. flying debris striking the occupants.
C. an additional vehicle striking the first, after it has stopped.
D. the occupant striking the vehicle interior.

50. The primary purpose of restraints in a vehicle is to:

A. prevent "whiplash" injury.
B. slow the occupant along with the vehicle.
C. prevent the occupant from striking the roof.
D. prevent any injury to the occupant.

51. The kind and extent of trauma from a fall are dependent on all of the following EXCEPT:

A. height of the fall.
B. stopping distance.
C. weight of the victim.
D. area of body contact.

52. There are three phases to a blast. During the SECONDARY phase, the victim is likely to:

A. be struck by flying debris.
B. be thrown to the ground.
C. suffer auditory injuries.
D. suffer lung injuries.

53. A gunshot wound delivered at close range is likely to show:

A. Tattooing at the entrance wound.
B. powder burns at the exit wound.
C. a larger entrance than exit wound.
D. equal-size entrance and exit wounds.

54. Trauma is best described as:
A. penetration of tissues by a moving object.
B. physical injury caused by an external force.
C. closed wound with or without bone fracture.
D. any injury or wound with external hemorrhage.

55. During a frontal impact collision, the occupant's head may contact the windshield. Pushing by the rest of the body results in compressional force to the cervical spine. This is called:
A. vertebral compression.
B. axial loading.
C. midline force.
D. axis compression.