1. Which structural feature primarily increases the force of vibration transmitted from the tympanic membrane to the oval window?

A. Lever action of ossicles
B. Increased surface area of the oval window
C. Reduced stiffness of cochlear fluids
D. Elasticity of the tympanic membrane

2. An increase of one decibel corresponds to:

A. Doubling sound intensity
B. Tenfold increase in sound intensity
C. 50% increase in frequency
D. Halving the amplitude

3. Which component does NOT vibrate in response to sound waves?

A. Basilar membrane
B. Stapes
C. Tectorial membrane
D. Tympanic membrane

4. Fluid pressure waves in the perilymph are initiated when:

A. Round window moves inward
B. Oval window moves inward
C. Tympanic membrane stiffens
D. Endolymph circulates

5. Which process directly bends the stereocilia of auditory hair cells?

A. Motion of the tectorial membrane
B. Displacement of endolymph
C. Vertical movement of basilar membrane
D. Movement of perilymph in the semicircular ducts

6. Depolarization of auditory hair cells occurs mainly due to:

A. Na■ influx
B. Ca²■ influx through mechanosensitive channels
C. K■ influx from endolymph
D. C■ efflux

7. Glutamate release from auditory hair cells is triggered directly by:

A. Opening of Na■ channels
B. Hyperpolarization
C. Entry of Ca²■
D. Movement of the tectorial membrane

8. The auditory pathway is considered bilateral because:

A. Each cochlea sends signals only to the opposite hemisphere
B. Sound reaches both ears, requiring integration from both sides
C. Inner hair cells are arranged symmetrically
D. The cochlear nerve has two roots

9. Which structure transmits vibrations to the oval window?

A. Malleus
B. Incus
C. Stapes
D. Round window

10. The round window bulges outward primarily to:

A. Increase sound amplification
B. Equalize endolymph pressure
C. Relieve pressure waves from scala tympani
D. Enhance frequency detection

11. The cochlear duct contains:

A. Perilymph
B. Air
C. Endolymph
D. Blood plasma

12. Static equilibrium is mainly detected by receptors in the:

A. Semicircular ducts
B. Saccule and utricle
C. Cochlear duct
D. Tympanic cavity

13. Dynamic equilibrium is triggered when:

A. Gravity bends hair bundles
B. Endolymph movement bends semicircular hair cells
C. Ossicles transmit vibration
D. The oval window oscillates

14. The macula is found specifically in the:

A. Semicircular ducts
B. Cochlea
C. Utricle and saccule
D. Vestibular nuclei

15. The receptor potential in macular hair cells changes when stereocilia:

A. Bend in either direction
B. Become detached from otolithic membrane
C. Bend toward kinocilium
D. Bend away from kinocilium

16. Which structure contains the primary integrating centers for equilibrium?

A. Cerebral cortex
B. Medulla and pons
C. Thalamus
D. Vestibular ganglion

17. The vestibular branch of CN VIII first synapses mainly in the:

A. Vestibular nuclei
B. Superior colliculus
C. Temporal lobe
D. Cerebellum

18. The stapes increases vibration amplitude at the oval window by a factor of approximately:

A. 2×
B. 10×
C. 20×
D. 100×

19. Which region is responsible for translating mechanical energy into neural impulses?

A. Tympanic membrane
B. Cochlear hair cells

C. Semicircular ducts
D. Vestibular nuclei

20. Scala vestibuli contains:

A. Endolymph
B. Perilymph
C. Lymphatic fluid
D. Hyaluronate-rich fluid

21. Which structure does NOT belong to the middle ear?

A. Incus
B. Eustachian tube
C. Scala tympani
D. Tympanic cavity

22. Which of the following best explains frequency discrimination?

A. Direction of hair bending
B. Region of basilar membrane activated
C. Intensity of endolymph flow
D. Stiffness of stapes footplate

23. Endolymph movement inside semicircular ducts is directly responsible for:

A. Static equilibrium
B. Tympanic vibration
C. Dynamic equilibrium
D. Sound frequency detection

24. Which is the first structure to vibrate when sound reaches the ear?

A. Oval window
B. Tympanic membrane
C. Stapes
D. Round window

25. The hair cells of the cochlea release neurotransmitters into:

A. Vestibular ganglion
B. Cochlear nerve fibers
C. Semicircular duct epithelium
D. Thalamic synapses

26. Pressure waves exit the cochlea by:

A. Bulging of the round window
B. Vibration of the helicotrema
C. Compression of the Eustachian tube
D. Relaxation of the tympanic membrane

27. Which type of potential is first generated in hair cells when stereocilia bend?

A. Action potential
B. EPSP
C. Receptor potential
D. Postsynaptic potential

28. Which structure helps equalize pressure between the middle ear and nasopharynx?

A. Oval window
B. Cochlear duct
C. Eustachian tube
D. Utricle

29. The utricle and saccule detect linear acceleration due to the presence of:

A. Cupula
B. Otolithic membrane
C. Tectorial membrane
D. Tympanic tension

30. Vestibular information reaches the cortex AFTER relaying through the:

A. Cerebellum
B. Thalamus
C. Medulla
D. Pons

Answer Key

1. A
2. B
3. C
4. B
5. C
6. C
7. C
8. B
9. C
10. C
11. C
12. B
13. B
14. C
15. C
16. B
17. A
18. C
19. B
20. B
21. C
22. B
23. C
24. B
25. B
26. A
27. C
28. C
29. B
30. B