

Solutions

Each answer shows the steps, then the **result**.

2.1

- the conversion of physical energy into neural signals; e.g. light converted to a signal in the retina, or sound in the cochlea

2.2

- absolute threshold: the smallest stimulus detected 50% of the time; difference threshold: the smallest detectable change in a stimulus, which grows with starting intensity

2.3

(a)

- sensory adaptation

(b)

- it frees attention for changes in the environment, which are usually more informative

2.4

- Sound waves vibrate the eardrum, and the three ossicles amplify the vibration and pass it to the fluid in the cochlea; the moving fluid bends the hair cells, which transduce the movement into a neural signal that travels along the auditory nerve

2.5

- Absolute threshold is the minimum stimulation needed to detect a stimulus 50% of the time; difference threshold is the minimum difference needed to tell two stimuli apart 50% of the time

2.6

- The difference threshold is a constant proportion of the original stimulus, not a fixed amount; adding one candle to ten is noticeable, but adding one to a hundred is not

3.1 B

- rods support vision in dim light but do not code colour

3.2 B

- the just-noticeable difference is proportional to the original intensity

3.3

(a)

- the absolute threshold for that tone

(b)

- any one of: age-related hearing loss; prior noise exposure; attention or motivation during the test

3.4

(a)

- Transduction is the conversion of physical energy into a neural signal; in the eye it happens at the retina, where rods and cones convert light energy into an electrical signal; that signal passes through bipolar and ganglion cells to the optic nerve

(b)

- Any two: rods are more sensitive and work in dim light while cones need bright light; rods give no colour while cones detect colour and fine detail; rods are peripheral while cones concentrate at the fovea

(c)

- Absolute threshold; it is the minimum stimulation detected 50% of the time

(d)

- Weber's law; the difference threshold is a constant proportion of the original stimulus rather than a fixed amount; 5 g is 5% of 100 g and detectable, but only 0.5% of 1000 g, which falls below the proportion needed

(e)

- Sensory adaptation; sensitivity to a constant, unchanging stimulus decreases; this is useful because an unchanging stimulus carries no new information, so ignoring it frees attention for changes, which are more likely to matter