DOLPHIN SOUND PRODUCTION

Sound travels in WAVES. The frequency of a sound wave is the number of wavelengths that travel past the ear in one second (measured in Hertz) . The intensity, or amplitude, of a sound wave is the loudness of a sound (measured in decibels). In other words, a change in pitch is a change in FREQUENCY while a change in volume is a change in AMPLITUDE.

In humans, very loud sounds above 90 decibels are damaging the inner ear and can even do irreversible damage above 120 decibels. Humans can hear frequencies of about 20 hertz to 20,000 hertz (number of vibrations per second). Sound waves of more than 20,000 hertz are known as ULTRASONIC and cannot usually be heard by humans. However, we can use ultra-sound in medicine, in ship navigation, and in industry.

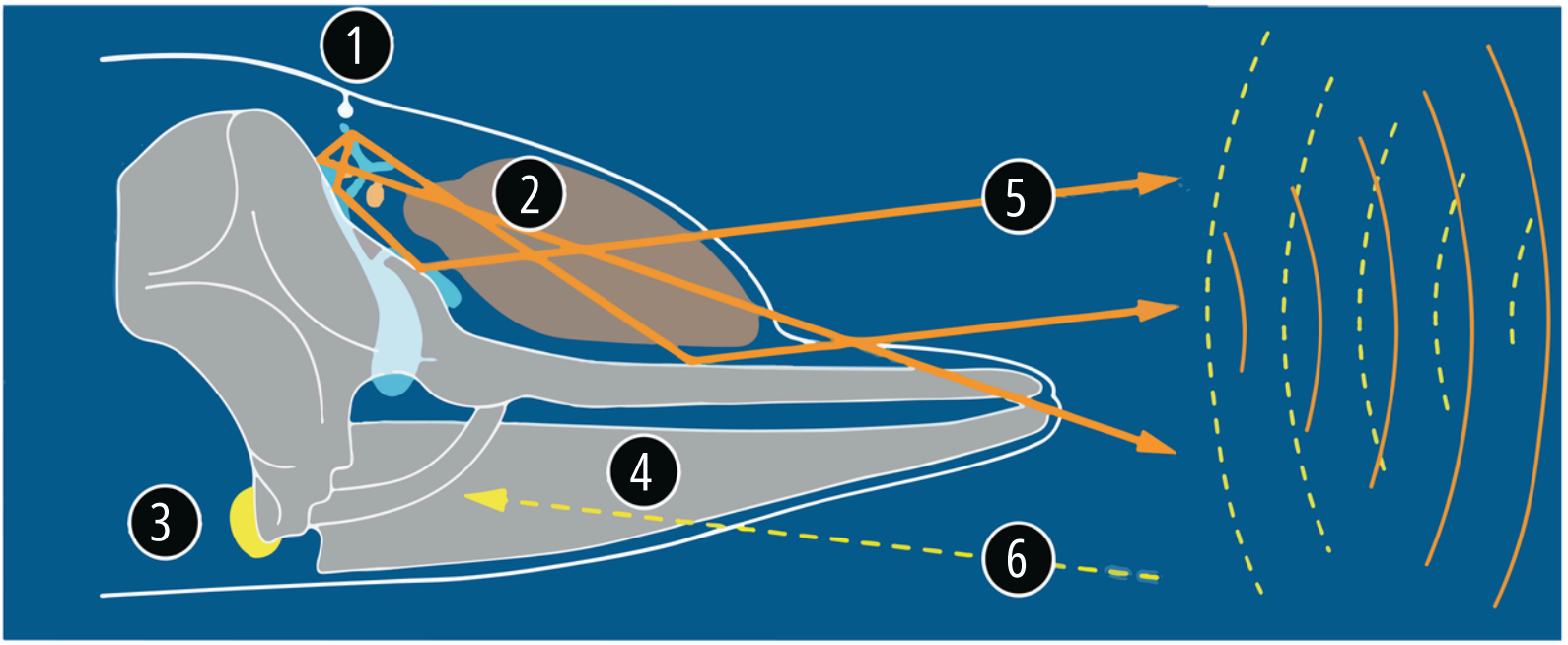
Sound is also used by various animals, including dolphins, bats, and some birds to perceive objects in their environment, which we call ECHOLOCATION. Sound moves 4X faster in water than in air, and most marine mammals rely on sound for communication, foraging, navigation and predator avoidance. Dolphins have a very sophisticated echolocation system that allows them to sense objects underwater even in very low visibility conditions. They can even use it to locate fish that are buried under the sediment on the ocean floor. The dolphin produces a sound (called a CLICK) and it travels through the bump that they all have on their foreheads - we call that the MELON. The melon acts like a cone, so it not only makes the sound LOUDER, it also focuses the sound in one direction. The click then travels through the water until it bounces off an object. That sound will ECHO back to the dolphin, through their lower jaw, or MANDIBLE, to the EARS.

But wait... I thought dolphins whistle? They do that too! Dolphins use their BLOWHOLES, not their mouths, to create whistles by forcing air through specialized muscles called PHONIC LIPS.

Scientists at the National Marine Mammal Foundation (NMMF) explore the sounds marine mammals make, the sounds they hear, and the effect of human-made sound has on them. They use special underwater microphones called HYDROPHONES to measure sounds underwater. NMMF scientists have also developed instrumentation that allows us to test the hearing of stranded wild marine mammals and determine the threshold criteria for exposure to sound that could affect marine mammal behavior and physiology, including hearing.

WORKSHEET: DOLPHIN SOUND PRODUCTION

Use the dolphin head schematic (A) to match each number to correspodning key word (C). Write the key word next to the correct number (B) and its function below.



1

2

3

4

5

6

KEY WORDS

Melon

Clicks

Echo

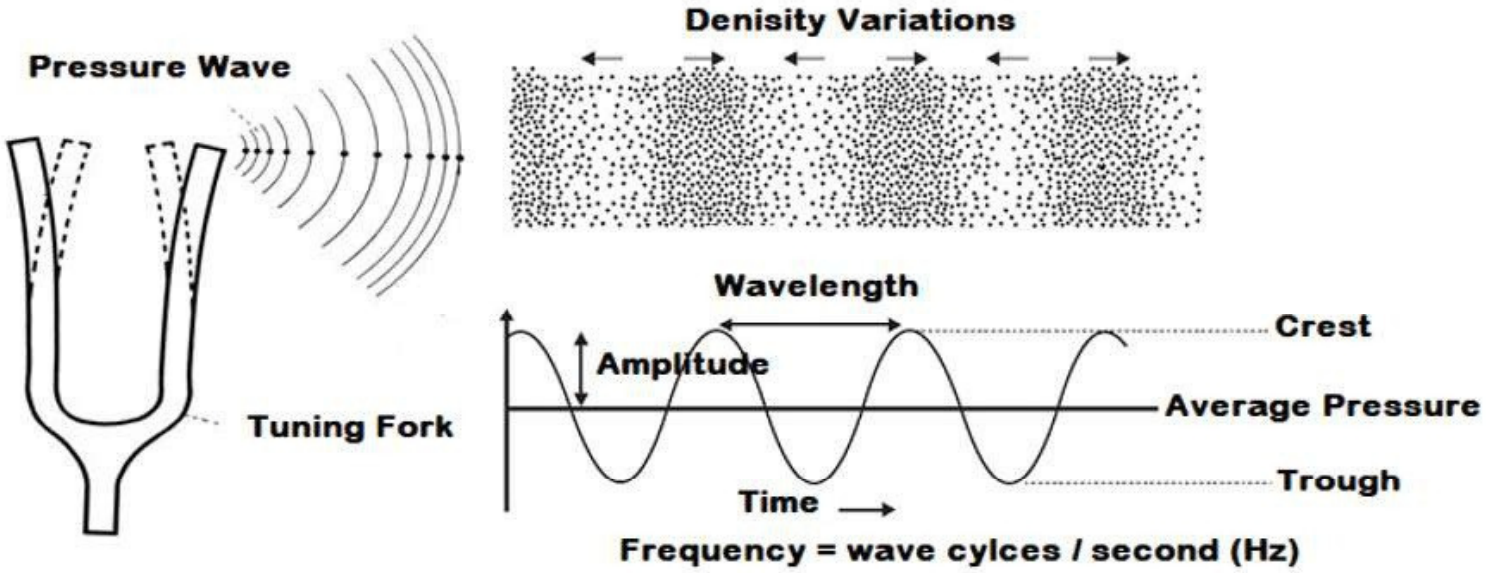
Mandible

Blowhole & Phonic Lips

Ear

DOLPHIN DOCTOR

LEARNING TO ANALYZE GRAPHS



SOUND WAVE ANALYSIS

(Circle the correct answer)

1.Sound is:
- A. vibrations of acompressiblemedium
- B. photons of sound
- C. noise measured in bels

2. There is no sound in a:
- A. solid
- B. vacuum
- C. liquid

3. Sound travels:
- A. slower in warm air than cold air
- B. faster in solids and liquids than in air
- C. faster in air than in water

4. The height of a wave is the:
- A. trough
- B. amplitude
- C. wavelength

5. The distance from one crest of a wave to the next crest of a wave is:
- A. wavelength
- B. frequency
- C. amplitude

6. The height of a sound wave indicates:
- A. frequency of the sound
- B. pitch of the sound
- C. the loudness of the sound

7. The number of cycles or waves passing a particular point every second is the:
- A. frequency
- B. wavelength
- C. volume

8. Frequency is measured in:
- A. hertz
- B. cycles per second
- C. both of the above

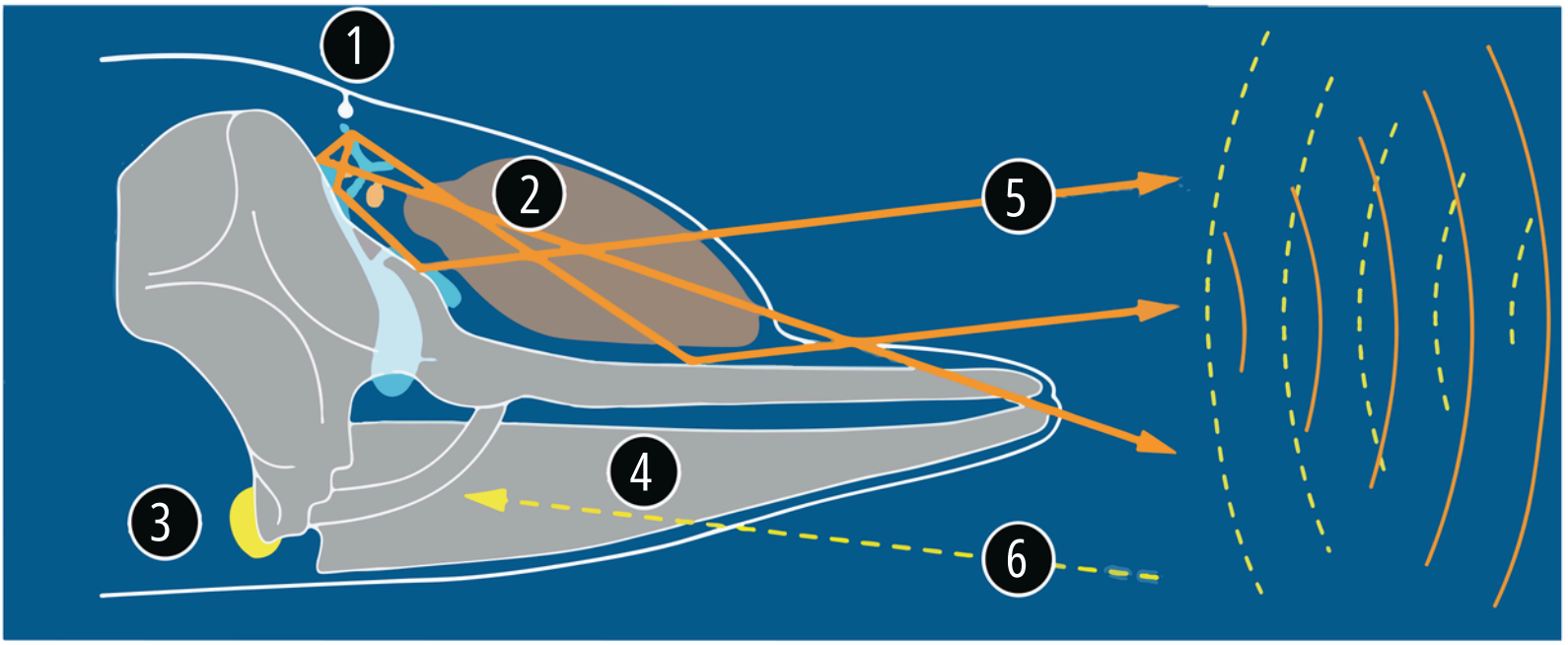
9. The pitch of a sound (high or low notes) is determined by the:
- A. talent of the singer
- B. amplitude
- C. frequency

10. Human hearing is between about:
- A. zero and 10,000 hertz
- B. 20 and 20,000 Hz
- C. 20,000 and 25,000 decibels

ANSWER KEY

WORKSHEET: DOLPHIN SOUND PRODUCTION

Use the dolphin head schematic (A) to match each number to correspodning key word (C). Write the key word next to the correct number (B) and its function below.



1 **BLOWHOLE & PHONIC LIPS**

2 **MELON**

3 **EAR**

4 **MANDIBLE**

5 **CLICKS**

6 **ECHO**

KEY WORDS

Melon

Clicks

Echo

Mandible

Blowhole & Phonic Lips

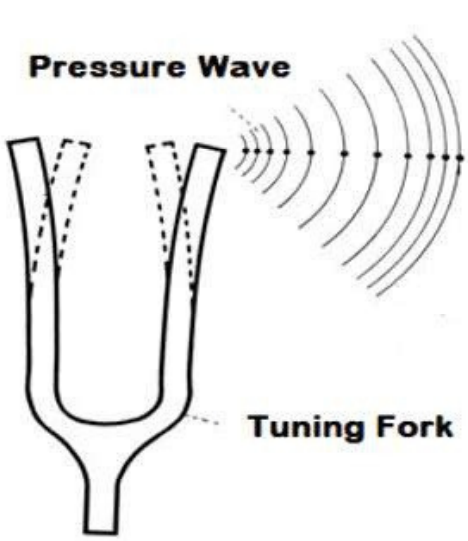
Ear

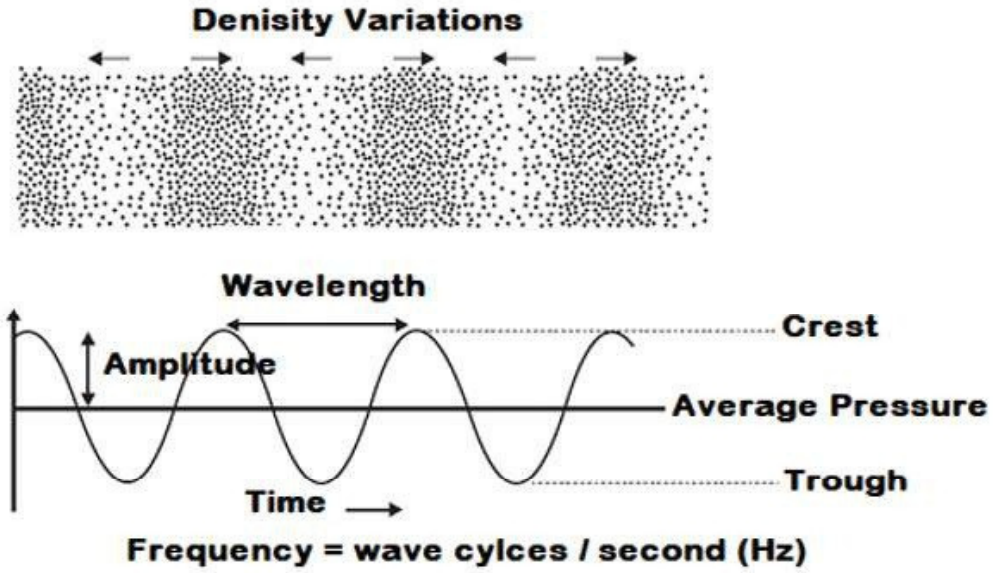
NATIONAL MARINE MAMMAL FOUNDATION

DOLPHIN DOCTOR

LEARNING TO ANALYZE GRAPHS

ANSWER KEY





SOUND WAVE ANALYSIS (Circle the correct answer)

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