PSBB Learning Leadership Academy

Lesson Sound -Numerical

1) A boy stands at a distance of 165m from a cliff. He claps his hand and hears an echo. If the speed of sound in air is 330m/s, after how long does he hear the echo?

Distance= 165mx2=330m

Speed=330m/s

Time =distance /speed

Time =330m/330ms^{-1}=1second

2) A mountaineer shouts for help. Half a second later she hears the echo. How far away is the rock reflecting her voice?(speed of sound in air=330m/s)

Time =0.5s

Speed=330m/s

Distance=?

Distance= speed x time

Distance= 0.5sx330ms^{-1}

Distance=165m (distance travelled by sound to and fro)

Distance between mountaineer and rock=165m/2= 82.5m

3) **A ship sends out ultrasound that returns from the seabed and is detected after 3.42s. If the speed of ultrasound through seawater is 1531m/s .what is the distance of the seabed from the ship?**

Given:

Time between transmission and detection=3.42s

Speed of ultrasound in sea water=1531m/s

Distance travelled by the ultrasound=twice the depth of sea= 2d

2d=speed x time

2d=1531m/s x 3.42s

2d= 5236m

d=5236m/2

d=2618m=2.62km

4) A submarine emits a sonar pulse which returns from an underwater cliff in 1.02s. If the speed of sound in saltwater is 1531m/s, how far away is the cliff?

Give:

Time between transmission and detection=1.02s

Speed of ultrasound in sea water=1531m/s

Distance travelled by the ultrasound=twice the depth of sea= 2d

2d=speed x time

2d=1531m/s x 1.02s

2d=1561.62 m

d=1561.62m/2

d=780.81m

5) A sonar device on a submarine sends out a signal and receives an echo 5s later. Calculate the speed of sound in water if the distance of the object from the submarine is 3625m.

Given:

Time between transmission and detection=5s

Therefore time taken for the sound to reach seabed =5s/2=2.5s

Distance between submarine and sea bed=3625m

Speed of sound in water =distance/time

=3625m/2.5s

=1450ms^{-1}