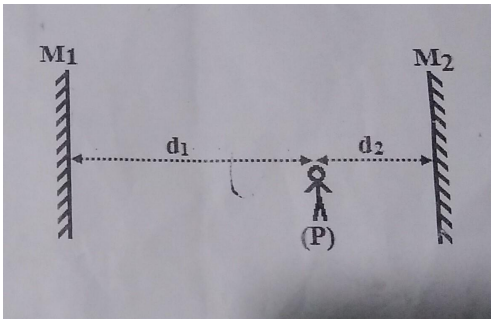
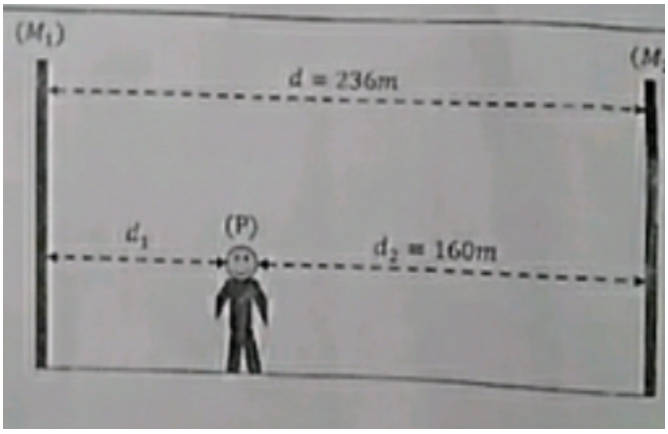
Physics Extra sheet

Exercise 1:

A person (P) is at rest between two walls M1; and M2, parallel, 400m apart.
(P), located at a distance d1 from M1 and at a distance d2 from M2 , emits a sound and he hears two sounds with a 0.6s time difference.
The speed of sound in air is given as 340 m/s.
Determine the values of two distances d1 and d2.



Exercise 2 : Sound reflection.



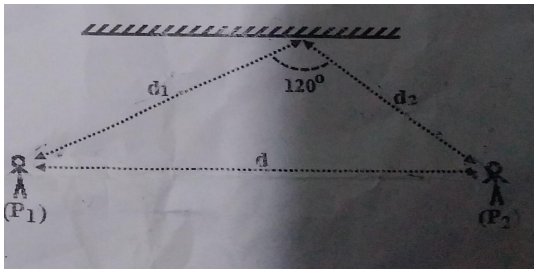
A person (P) is at rest between two walls M1 and M2. parallel, distant d = 236m.
(P), located at a distance d2 = 160m from M2 and at a distance d1 from M1, emits a sound and it hears two sounds with a time difference of 0.5s. The speed of sound in air is given as: V= 331($\sqrt{1 + (T/273)}$)
1- Show that the value of the speed of sound between the
two walls is 336m/s.
2- Calculate the temperature T of the air between the two walls.

Exercise 3: emission and reception of sound

A and B two people, (A) is at rest and (B) is moving away from (A) with a car at constant speed V in a rectilinear trajectory containing (A),
(B) emits a sound of big amplitude. When the distance between (A) and (B) becomes 200m, the sound emitted by (B) arrives at (A). The duration between the sound emission by (B) and its reception by (A) is 0.54s. The speed of sound in air is given as 340m/s.
Determine the speed V of the car.

Exercise 4 : Sound reflection

A person (P1) emits a high amplitude sound, another person (P2) at a distance d = 1000m from (P1), hears the sound and its echo with a time difference of 0.4s The figure opposite represents the two paths followed by the sound between (P1) AND (P2). The speed of sound in air is given as 340m/s. Determine the values of two distances d1 and d2.



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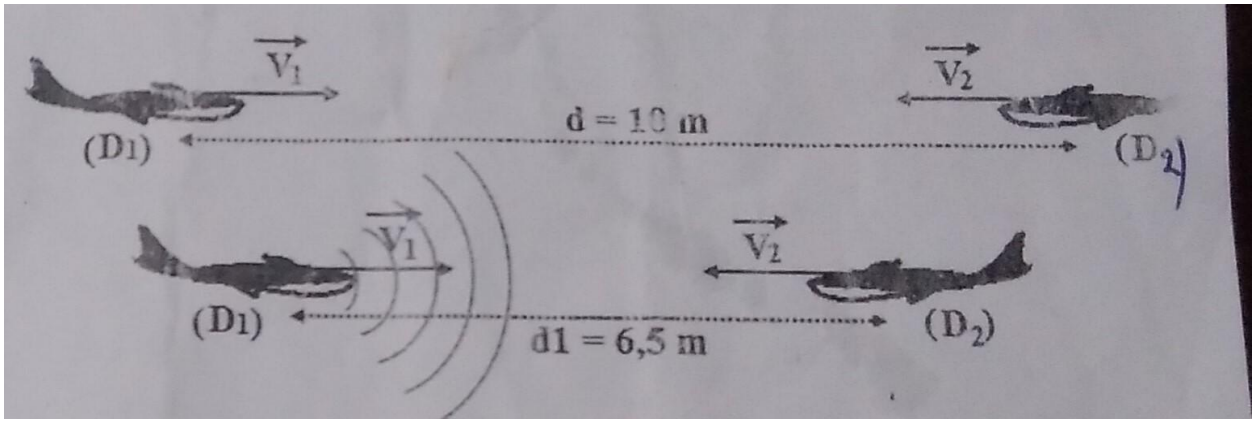
Exercise 5 : Ultrasound of a dolphin



Two dolphins (D1) and (D2) move in the water on the same straight line but in opposite directions, with constant speeds respectively V1= 15m/s and V2 = 20m/s as shown in the figure opposite.

At time t = 0s the distance between (D1) and (D2) is d = 10m, at time t the distance between them becomes d1 = 6.5m or (D1) starts emitting an ultrasonic signal and it detects this signal by reflection with (D2) after a duration Δt of the emission.
We give: the speed of sound in water is 1500m/s.
1- Calculate t1.
2- Determine the value of the duration Δt.
3- Knowing that D1 ‘ s response time (time that elapses between the dolphin's reception of a signal and his response to this signal) is 0.18s, can it avoid the dolphin (D2)?