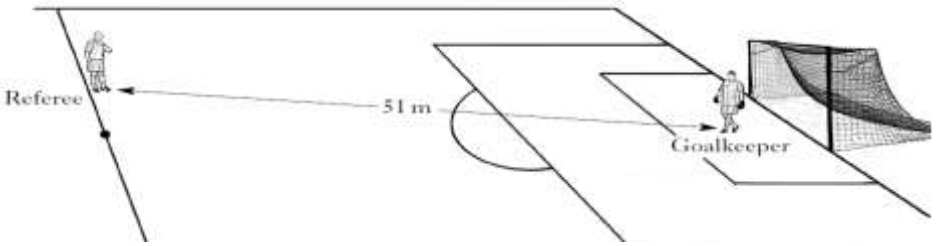
Speed of Sound - Homework

1. At the kick-off in a football match, during the World Cup Finals, the referee blows his whistle. The whistle produces sound waves.



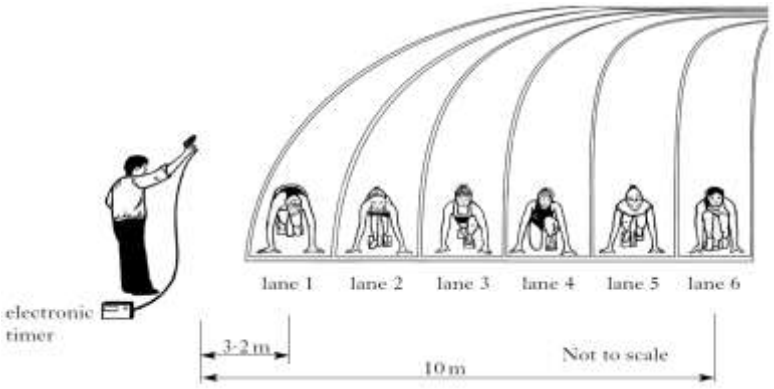
a) Calculate the time taken for the sound waves to reach the goalkeeper. (3)

b) (i) Are sound waves transverse or longitudinal waves? (1)

(ii) Describe **two** differences between transverse and longitudinal waves. (2)

(iii) What is transferred by waves? (1)

2. In a sprint race at a school sports day, the runners start when they hear the sound of the starting pistol. An electronic timer is also started when the pistol is fired into the air.



The runner in lane 1 is 3.2m from the starting pistol. The runner in lane 6 is 10m from the starting pistol

a) The runner in lane 1 hears the starting pistol first. Calculate how much later the runner in lane 6 hears this sound after the runner in lane 1. (3)

b) A sensor detects each runner crossing the finishing line to record their time.
The table gives information about the race.

Place	Lane	Time (s)
1st	1	13.11
2nd	6	13.12
3rd	3	13.21

Using your answer to part (a), explain why the runner in lane 6 should have been awarded first place. (1)