

Radar Gun Lab

Purpose/Problem: How does a radar gun work?

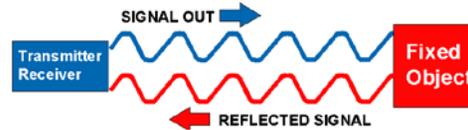
Who is the fastest student in our class?



Research/Observations:

Radar stands for **radio detection and ranging**. Radar is a system that uses reflected radio waves to detect objects and measure their distance and speed.

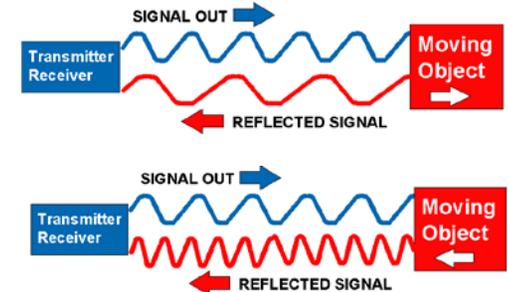
To measure distance, a radar device sends out **microwaves** that reflect off an object.



The **time** it takes for the reflected waves to return is used to calculate the object's distance.

To measure speed, a radar device uses the **Doppler effect**. The Doppler effect is the change in **frequency** of a wave as its source moves in relation to an observer. When the wave source moves toward the observer, the frequency of the waves is **higher** than it would be if the source was stationary.

When a wave source moves, the frequency of the wave changes because the motion of the source adds to the motion of the waves.



Glue this side down in
your Science
Notebook :)

For example, a police radar gun sends out microwaves that reflect off a car, but because the car is moving the frequency of the reflected waves is **different** from the frequency of the original waves. The difference in frequency is used to calculate the car's speed.

Hypothesis: _____

Procedure/Experiment:

1. Follow all of Officer _____ instructions.

Record/Analyze the Data:

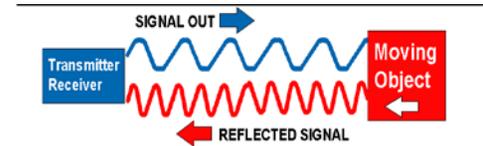
Student Name	Trial 1 Speed	Trial 2 Speed	Trial 3 Speed

1. Why are tuning forks important to use in the police force?

2. What explains why the pitch of a siren coming from far away sounds different than the pitch of a siren nearby?

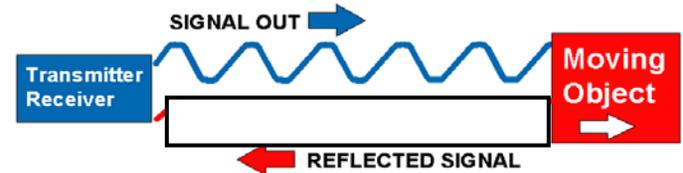
3. Describe the process that energy is being transferred when microwaves are sent from the transmitter through air.

4. In the figure below, describe the direction the object is moving (toward, away or stationary) in relation to the radar gun?



5. Why does the reflected microwave look different than the initial microwave sent from the radar gun?

6. Draw what the reflected wave would look like when the target is moving away or in the same direction as the radar gun.



Conclusion: _____

