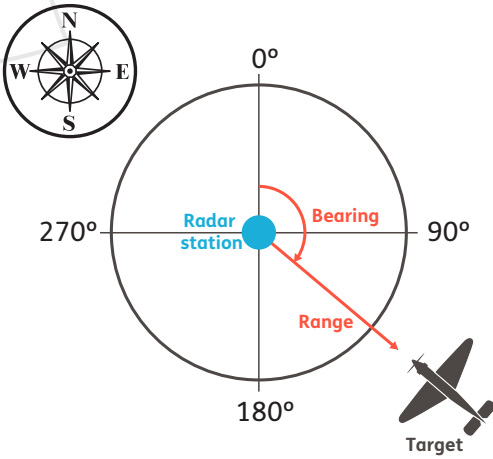


# TARGET DETECTION

During the Battle of Britain radar played a vital role as an early warning system for incoming bombing raids. In this activity you will build a ping pong ball model of a radar station and use it to find the range and bearing of targets you cannot see.

**Bearing**  
The bearing of a radar target is the angle between north and a line pointed directly at the target.

**Range**  
The range of a target is the distance to the target along the bearing

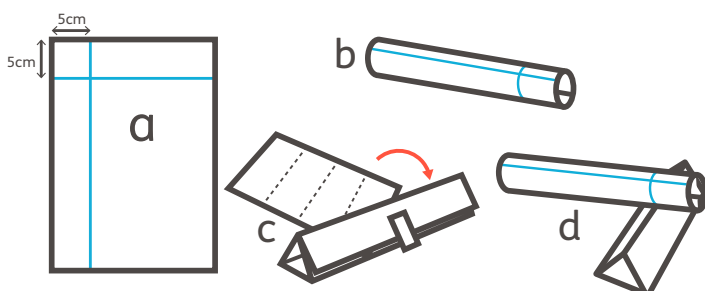


**WHAT YOU'LL NEED**

- A target board (this will have already been set up by your teacher)
- Ruler and pen/pencil
- Metre rule
- A4 paper x 2
- Adhesive tape
- 2 ping-pong balls
- Stopwatch or timer

## WHAT YOU NEED TO DO

1. Make a ping pong ball transmitter by following the steps shown in the diagram below.
  - (a) On a sheet of A4 paper, measure 5 cm in from the long edge and draw a line downwards. Then measure 5 cm in from the short edge and draw a line across the paper.
  - (b) Roll the paper into a tube that is big enough to allow a ping pong ball to roll down it freely. Fasten it with tape.
  - (c) Fold another A4 sheet of paper into four, and then into a prism and fasten with tape
  - (d) Place the tube on the prism, at right angles to it so that the line across the tube is lined up with



- the top of the prism. Fasten the tube in position with tape to complete your transmitter.
2. Roll a ping pong ball down the tube and time how long it takes it to travel 1 m. Work out the ball's speed in cm/s.
3. A target board has been set-up for you. Place your transmitter next to the board so that the tube is aligned with the 140° line on the bearings chart.
4. Roll a ping pong ball down the tube. It will either roll under the board and come out on the other side, or hit a target and bounce back. If the ball bounces back, make a note of the bearing.
5. Check all the bearings, in 5 degree increments. Record your findings.
6. Now you know the bearing(s) of the hidden targets, think about ways of finding the range(s) and calculate them.
7. Do you need to repeat your measurements?
8. Check with your teacher to find out if you are a good target detector.