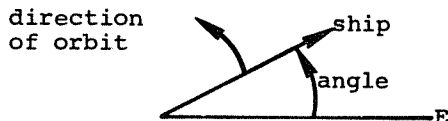


# Orbit

ORBIT challenges you to visualize spatial positions in polar coordinates. The object is to detonate a Photon explosive within a certain distance of a germ laden Romulan spaceship. This ship is orbiting a planet at a constant altitude and orbital rate (degrees/hour). The location of the ship is hidden by a device that renders the ship invisible, but after each bomb you are told how close to the enemy ship your bomb exploded. The challenge is to hit an invisible moving target with a limited number of shots.

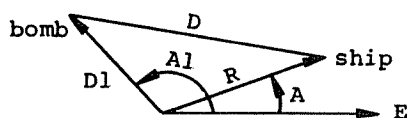
The planet can be replaced by a point at its center (called the origin); then the ship's position can be given as a distance from the origin and an angle between its position and the eastern edge of the planet.



The distance of the bomb from the ship is computed using the law of cosines (see line 430 of the program listing). The law of cosines states

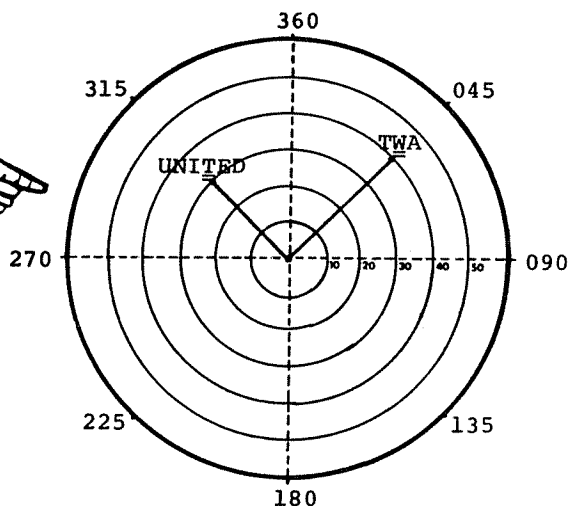
$$D = \sqrt{R^2 + D1^2 - R \cdot D1 \cdot \cos(A - A1)}$$

where D is the distance between the ship and the bomb, R is the altitude of the ship, D1 is the altitude of the bomb, and A-A1 is the angle between the ship and the bomb.



## Practice Off-Line Problem:

Aircraft appear on radar as blips of the form "=". What is the distance between the TWA and United aircraft shown on the radar screen on the right.



ORBIT was originally called SPACE WAR and was written by Jeff Lederer of Project SOLO Pittsburgh, Pennsylvania.

ORBIT  
CREATIVE COMPUTING MORRISTOWN, NEW JERSEY

SOMEWHERE ABOVE YOUR PLANET IS A ROMULAN SHIP.

THE SHIP IS IN A CONSTANT POLAR ORBIT. ITS DISTANCE FROM THE CENTER OF YOUR PLANET IS FROM 10,000 TO 30,000 MILES AND AT ITS PRESENT VELOCITY CAN CIRCLE YOUR PLANET ONCE EVERY 12 TO 36 HOURS.

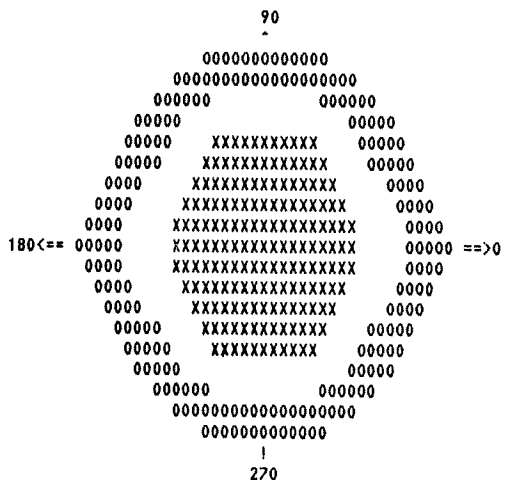
UNFORTUNATELY THEY ARE USING A CLOAKING DEVICE SO YOU ARE UNABLE TO SEE THEM, BUT WITH A SPECIAL INSTRUMENT YOU CAN TELL HOW NEAR THEIR SHIP YOUR PHOTON BOMB EXPLODED. YOU HAVE SEVEN HOURS UNTIL THEY HAVE BUILT UP SUFFICIENT POWER IN ORDER TO ESCAPE YOUR PLANET'S GRAVITY.

YOUR PLANET HAS ENOUGH POWER TO FIRE ONE BOMB AN HOUR.

AT THE BEGINNING OF EACH HOUR YOU WILL BE ASKED TO GIVE AN ANGLE (BETWEEN 0 AND 360) AND A DISTANCE IN UNITS OF 100 MILES (BETWEEN 100 AND 300), AFTER WHICH YOUR BOMB'S DISTANCE FROM THE ENEMY SHIP WILL BE GIVEN.

AN EXPLOSION WITHIN 5,000 MILES OF THE ROMULAN SHIP WILL DESTROY IT.

BELOW IS A DIAGRAM TO HELP YOU VISUALIZE YOUR FLIGHT.



X - YOUR PLANET  
O - THE ORBIT OF THE ROMULAN SHIP

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2 PRINT TAB(33);"ORBIT"
4 PRINT TAB(15);"CREATIVE COMPUTING MORRISTOWN, NEW JERSEY"
6 PRINT:PRINT
10 PRINT "SOMEWHERE ABOVE YOUR PLANET IS A ROMULAN SHIP."
15 PRINT
20 PRINT "THE SHIP IS IN A CONSTANT POLAR ORBIT. ITS"
25 PRINT "DISTANCE FROM THE CENTER OF YOUR PLANET IS FROM"

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125