

MISSION TO THE MOON

Teaching Guidelines

Subject: Mathematics

Topics: Geometry
Fractions, Decimals, Percents, Ratios

Grades: 6 - 9

Knowledge and Skills:

- Can use the unit "degree" to measure or describe a position on or sector of a circle
- Knows that a circle contains 360 degrees
- Can use proportional reasoning to solve problems
- Can solve a proportion for an unknown

Subject: Science

Topics: Earth and Environmental Sciences

Grades: 6 – 9

Knowledge and Skills:

- Can describe quantitatively the motion of the moon relative to the motion of the earth.

Materials: None

Procedure: This project should be done by students individually or in teams of two.

Distribute the handout and discuss it. Ensure that students understand the assignment.

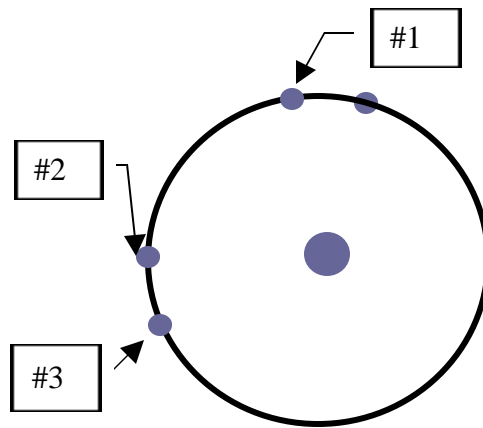
For younger or less advanced students, you may wish to guide the class in discovering how ratios can be used to solve the problem:

For the orbital motion of the moon, we use the fact that the moon completes one orbit (360°) every 655 hours to set up the proportion $h/655 = n/360$, where h = the number of hours that have passed and n = the number of degrees that the moon has moved in its orbit.

For the rotation of the earth, we use the fact that the earth completes one rotation (360°) every 24 hours to set up the proportion $h/24 = m/360$, where h = number of hours that have passed and n = number of degrees that the earth has rotated.

For more advanced students, it is preferable to let them try to work these proportions on their own, giving individual help if it is needed.

Give students a schedule for working on the assignment and a due date.



#1. After 55 hours, the moon will have moved approximately 30° in its orbit, to position #1. The Earth will have rotated 825° , or two complete rotations plus an additional 105° . Receiving stations "A" and "B" will be able to receive transmissions from the moon.

#2. After an additional 124 hours, the moon will have moved approximately an additional 68° in its orbit, to position #2. The Earth will have rotated an additional 1860° , or five more complete rotations plus an additional 60° . Receiving stations "A" and "B" will be able to receive transmissions from the moon.

#3. After an additional 37 hours, the moon will have moved approximately an additional 20° in its orbit, to position #3. The Earth will have rotated an additional 555° , or one more complete rotations plus an additional 195° . The moon will be almost directly overhead of the landing site.

For more advanced students it is preferable to let them try to work the problem on their own, giving individual help if really needed.

Give students a schedule for working on the assignment and a due date.

To: Navigation team

From: Chief Navigator, Earth-Moon missions

The diagram below shows the positions of the Earth and Moon at time of launch of our next moon mission.

The flight to the moon will take 54 hours. The astronauts will remain there for 124 hours, and then return to Earth in 37 hours.

Would you please work out these aspects of the mission flight plan?

- 1) Where will the moon be at the point that the astronauts land? Which of our receiving stations will be able to receive their transmissions at that time?
- 2) Where will the moon be when the astronauts launch from the moon's surface? Which receiving stations will be able to receive their signal?
- 3) The astronauts will be making a night landing at a point about halfway between receiving stations A and B. Will the moon be visible from the landing site at that time?

Keep in mind that the moon takes about 655 hours to make one complete revolution around the Earth.

I need this right away.

Sally

