



MATHEMATICS OF FLIGHT: STATUTE AND NAUTICAL MILES

Students will have a basic understanding of math applications used in flight. This includes calculating statute and nautical miles. Students will solve a series of problems. (One in a series.)

LESSON PLAN

Lesson Objectives

The students will:

- Be introduced to formulas used in flight related to navigation and aircraft performance.
- Learn the difference between statute and nautical miles.

Goal

In this lesson, students will gain an understanding of common calculations performed by flight personnel.

Statute Miles vs Nautical Miles

In the United States, we measure long distances in miles. On the ground, these are referred to as statute miles (sm). In navigation, distance is measured in nautical miles (nm), which allows for the curvature of the earth. A mile on the ground (sm) is 5,280 feet. A mile in the air (nm) is 6076.1 feet. To convert between the units, we use the formula:

$$\mathbf{nm = sm \times 1.15}$$

Therefore, 6076.1 feet = 5280 x 1.15

This would mean statute miles are smaller than nautical miles. This is logical because the farther we are from the earth's center, the farther it is between two locations.

Example:

Find the distance in nautical miles given a distance of 1000 statute miles, the approximate distance from Miami FL to Washington, D.C.

Solution:

$$\mathbf{nm = sm \times 1.15}$$

$$\mathbf{nm = 1,000 \text{ miles} \times 1.15}$$

$$\mathbf{nm = 1,150 \text{ miles}}$$

Grade Level: 6-8

National Mathematics Content Standards:

Algebra: Represent and analyze mathematical situations and structures using algebraic symbols; Use mathematical models to represent and understand quantitative relationships.

Technology Content Standards (from STL):

Technology and Society.

Materials Required:

- Paper
- Pencil or Pen
- Formula: $\mathbf{nm = sm \times 1.15}$

Exercise 1:

Find the distance in nautical miles given the distance 10,000 statute miles, the approximate distance traveled during the Round-the-Rim flight in 1919.

Solution:

$$\text{nm} = \text{sm} \times 1.15$$

$$\text{nm} = 10,000 \text{ miles} \times 1.15$$

$$\text{nm} = 11,500 \text{ miles}$$

Exercise 2:

Find the distance in nautical miles given the distance 2,163 statute miles, the distance of the first trans-continental flight across the United States by Lt. Jimmy Doolittle in 1922.

Solution:

$$\text{nm} = \text{sm} \times 1.15$$

$$\text{nm} = 2163 \text{ miles} \times 1.15$$

$$\text{nm} = 2,487.5 \text{ miles (rounded to the nearest tenth)}$$

Exercise 3:

Find the distance in nautical miles given the distance 4,153 statute miles, the approximate distance a flight of B-10 bombers flew from Washington, DC to Fairbanks, AK in 1934. Find the distance in nautical miles for the round trip.

Solution:

$$\text{nm} = \text{sm} \times 1.15$$

$$\text{nm} = 4,153 \text{ miles} \times 1.15$$

$$\text{nm} = 4,775.95 \text{ miles rounded up to 4,776 miles}$$

$$\text{Round trip: } 4,776 \text{ nm} \times 2 = 9,552 \text{ nm}$$

See student worksheet and presentation

Examples are from the collection of the National Museum of the U.S. Air Force

Resources:

National Museum of the United States Air Force

- <http://www.nationalmuseum.af.mil/factsheets/factsheet.asp?id=746>
- <http://www.nationalmuseum.af.mil/factsheets/factsheet.asp?id=731>
- <http://www.nationalmuseum.af.mil/factsheets/factsheet.asp?id=1328>

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STUDENT WORKSHEET

NAME: _____

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Exercise 1:

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