

MARS LAG Teaching Guidelines

Subject: Mathematics

Topics: Algebra—Expressions and Equations

Grades: 6 – 12

Knowledge and Skills:

- Can evaluate expressions by substituting values for variables
- Can simplify expressions using correct order of operations
- Can do basic operations on both sides of an equation in such a way as to preserve the equality

Answers:

1. 112,000,000 miles

2.

<i>t</i>	<i>d</i>
1245	6×10^6
1422	7.65×10^6
1137	5×10^6
2212	1.5×10^7

Mars Lag

Here's a question the Mars rover mission planners might ask: suppose the rover sends back a signal which NASA scientists review, and then send some sort of instruction. If we want to limit the total "lag" time (from the time the rover sends a signal to the time it receives an instruction) to 30 minutes, and it takes the scientists 10 minutes (600 seconds) to review the data, what is the maximum distance between Earth and Mars that will allow that?

The formula relating the "lag" time would be

$$t = 600 + 2\frac{d}{c}$$

where

t = "lag" time in seconds

d = distance between Mars and Earth in miles

c = the speed of light = 186,000 miles/second

1. Find the answer to the question above by setting $t = 1800$ seconds, and solving for d .
2. Solve for the missing value (t or d) in each of the following cases:

t	d
1245	?
1422	?
?	5×10^6
?	1.5×10^7