



The table below gives the coordinates for the locations to be visited by the Curiosity Rover shown in the figure above. The X and Y coordinates are given in kilometers. Although Curiosity is free to travel between most points on the map, Point C is at a much higher elevation than the other points located in the crater floor, and a steep and impassible cliff wall exists between points B and C and runs diagonally to the lower left.

Label	Name	(X,Y)	Label	Name	(X,Y)
L	Landing Area	(45,40)	F	Crater Wall	(38,43)
B	Layered Wall	(50,35)	G	Mudslide	(17,30)
C	Alluvial Fan	(60,32)	H	Dark Sands	(17,19)
D	Summit Access	(65,50)	I	Mystery Valley	(5,10)
E	River Bed	(37,58)			

Problem 1 – Curiosity can travel at a top speed of 300 meters/hr. As soon as it lands, Curiosity will be instructed to travel to the highest priority location first, just in case the mission prematurely fails. To the nearest kilometer, what is the distance traveled, and to the nearest hour, how long will it take to travel between Point L and Point B?

Problem 2 – To the nearest kilometer, what is the distance from Point D to Point I, and to the nearest hour, how long will it take Curiosity to travel this far?

Problem 3 – One possible path Curiosity might take that connects all of the points is represented by the sequence L-B-D-C-D-E-F-B-G-H-I. To the nearest kilometer, what is the total distance traveled, and to the nearest tenth, how many days will this journey take?

Answer Key

Problem 1 – Curiosity can travel at a top speed of 300 meters/hr. As soon as it lands, Curiosity will be instructed to travel to the highest priority location first, just in case the mission prematurely fails. To the nearest kilometer, what is the distance traveled, and to the nearest hour, how long will it take to travel between Point L and Point B?

Answer: L (45,40) and B (50,35). Using the Pythagorean Theorem and distance formula for Cartesian points $D = ((50-45)^2 + (35-40)^2)^{1/2} = 7 \text{ km}$. Traveling at 300 m/hr, this will take $7000\text{m}/300\text{m} = 23 \text{ hours}$.

Problem 2 – To the nearest kilometer, what is the distance from Point D to Point I, and to the nearest hour, how long will it take Curiosity to travel this far?

Answer: Point D (65,50), Point I (5,10). $D = ((5-65)^2 + (10-50)^2)^{1/2} = 72 \text{ kilometers}$. Traveling at 300 m/hr, this takes $72000/300 = 240 \text{ hours}$ (or 10 days).

Problem 3 – One possible path Curiosity might take that connects all of the points is represented by the sequence L-B-D-C-D-E-F-B-G-H-I. To the nearest kilometer, what is the total distance traveled, and to the nearest tenth, how many days will this journey take?

$$\begin{aligned} D(LB) &= ((50-45)^2 + (35-40)^2)^{1/2} = 7 \\ D(BD) &= ((65-50)^2 + (50-35)^2)^{1/2} = 21 \\ D(DC) &= ((60-65)^2 + (32-50)^2)^{1/2} = 19 \\ D(CD) &= ((65-60)^2 + (50-32)^2)^{1/2} = 19 \\ D(DE) &= ((37-65)^2 + (58-50)^2)^{1/2} = 29 \\ D(EF) &= ((38-37)^2 + (43-58)^2)^{1/2} = 15 \\ D(FB) &= ((50-38)^2 + (35-43)^2)^{1/2} = 14 \\ D(BG) &= ((17-50)^2 + (30-35)^2)^{1/2} = 33 \\ D(GH) &= ((17-17)^2 + (19-30)^2)^{1/2} = 11 \\ D(HI) &= ((5-17)^2 + (10-19)^2)^{1/2} = 15 \end{aligned}$$

Total distance traveled = **183 km**. Time = $183,000/300 = 610 \text{ hours} = 25.4 \text{ days}$