
THE MARTIAN WORKSHEET

Question 1 (2 marks)

Let's say NASA provided the team of 8 crew with enough food for about 90 sols. Watney can ration out the food to last about 1.25 times longer than it would normally. He estimates it will be 1600 sols until he will be rescued. Mark also calculates he needs a minimum of 1500 calories per sol and that a single potato has about 130 calories. How many potatoes does he need to grow in order to survive? Note the potatoes will supplement the rations.

Question 2 (2 marks)

Watney sets up the circular habitat to become a farm. The circular farm area has a radius of 6.27 metres, and the dirt covers the floor to a depth of 12 centimetres. Mark needs about 35 litres of water per cubic metre of dirt. Find the total water required to successfully farm.

Question 3 (2 marks)

Two hydrogen molecules combine with one oxygen molecule to create two water (H_2O) molecules. Watney needs water to drink, but also to grow his crops. We can calculate that 1 kilogram of oxygen combines with 0.125 kilograms of hydrogen to form 1.125 kilograms of water (assume that 1 litre of water is the same as 1 kilogram of water). Calculate how much oxygen and hydrogen Watney will need to source to generate the required amount of water calculated in the Question 2.

Question 4 (3 marks)

Mark has to take the rover and make the journey to Schiaparelli Crater to blast off and hopefully intercept the rescue mission as it passes overhead. Every day, Mark has to stop the rover and recharge the batteries using solar panels. He has 11 hours of good sunlight each day to charge solar panels. His 3 square metre solar panels are 14.5% efficient, which means that they absorb 14.5% of the approximately 800 watts of sunlight hitting each square metre. If a fully charged battery has 20000 watt hours of stored energy, calculate how many solar panels he needs to bring along to recharge it from empty to full each day.