Individual Momentum Activity 2

Can the astronaut be saved?

An astronaut whose jetpack is malfunctioning is drifting in space at a speed of _ m/s away from his spaceship. His total mass, including the jetpack is __kg. In order to move back *toward* his spaceship, he needs to throw something *away* from his spaceship. The only thing he has that he can risk throwing is his _-kg jetpack. He throws his jetpack away from the space ship with a velocity of _ m/sec.
He is currently __ m from his spaceship and he has 10 minutes of oxygen remaining. He is hoping to get back to his spaceship before his oxygen runs out.
a) What is the initial momentum of the astronaut/jetpack?

b) What is the momentum of his jetpack after he throws it?

c) What will the astronaut's momentum be after he throws the jetpack? What direction will his momentum be? What will his velocity be?

d) How many minutes will it take him to get back to the spaceship?

Energy considerations: Predict: By the astronaut pushing on the jetpack, did he add kinetic energy to the system or did he take it away?

Calculate: Find the initial and final kinetic energy of the system. Draw an appropriate bar chart for the system.

$$K_o + U_{gp} + U_{chem} + \text{Work} = K_f + U_{gf} + U_{chem} + \text{Heat}$$

_____ _____

How much chemical potential energy was converted to kinetic energy in this process?