

You are a NASA engineer and have been asked to construct a space vehicle that will be used to send *C. elegans* to Mars, orbit it, and then return to Earth. Mission duration is 12 months. NASA has given you specifications (constraints) for this mission.

As you go you may find other constraints that need to be considered. As you find them please write them down along with how you solve for them.

C. elegans Needs (constraints):

- _____ A. Size cannot exceed 12"x 12"x12" (the propulsion system can accommodate no larger than this size)
- _____ B. Food (where will the food be, how much)
- _____ C. Dead Organisms (how will they be disposed of)
- _____ D. Reproduction (how will you ensure there are enough worms to survive the trip to Mars, orbit it and return)
- _____ E. Oxygen (how will they get the oxygen they need)
- _____ F. Waste (what will happen to it, make sure there isn't too much of it)
- _____ G. Size of Initial Population (number of organisms) (how many do you need to ensure there are enough that there will be some still alive when they return)
- _____ H. Microgravity (what do you need to do to ensure they are not affected by it)
- _____ I. Radiation (how will you protect them from the radiation)
- _____ J. Environmental Conditions (how will you make sure they do not get too cold, too hot, too wet, too dry, ect)

* Prioritize the above constraints according to their contribution to the success of the mission. Use numbers 1-10, with the highest priority as 1.

Now that you have prioritized the constraints needed for a successful mission, list below how you are going to meet these needs when designing your space vehicle. Make sure it is very clear what constraints each solution is meeting.

Solutions (What are you doing to solve for the constraint and why)	Constraints that the Solution Solves (needs that have been met)

C. elegans Space Vehicle

Name _____

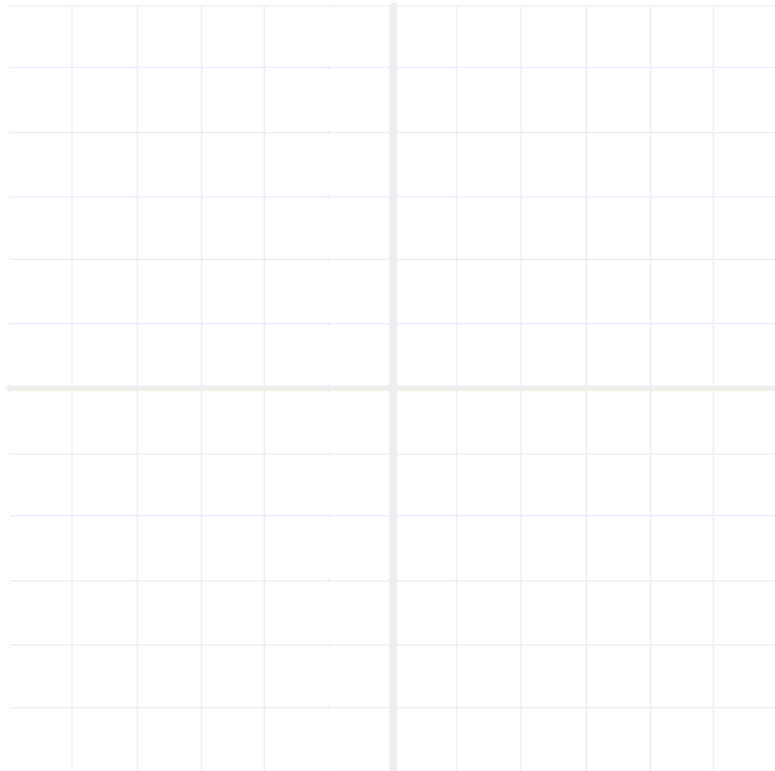
Sketch the interior (inside) of your Space Vehicle below (if needed draw your space vehicle from multiple angles). Your sketch should include all of the proposed solutions to the constraints. Label the areas where the solutions to the constraints are, write the name of the constraint(s).

Keep in mind that the design process is a loop: You may have to go back and change your science goals, look at your constraints again, and change your design. This is all part of the process. In the end, you should have a mission design that is a good balance between meeting your science goals and satisfying your engineering constraints.

Side View



Front View



C. elegans Space Vehicle Rubric

CATEGORY	4	3	2	1
Proposed Solutions	Solutions are Proposed for all 10 Constraints	Solutions are Proposed for 7-9 Constraints	Solutions are Proposed for 4-6 Constraints	Solutions are Proposed for 1-3 Constraints
Research for Solutions	Research based support for all 10 solutions	Research based support for all 7-9 solutions	Research based support for all 4-6 solutions	Research based support for all 1-3 solutions
Sketch	Complete, neat and all 10 constraints are clearly labeled	Not Complete or not neat or not all 10 constraints clearly labeled	Sketch is done but lacking in completeness, neatness and labeling	Sketch done but significantly lacking in completeness, neatness and labeling
Final Drawing	Final drawings appears to be professionally drawn (all 10 constraints are labeled, proper scale is used and effort in neatness and clarity of the drawing is obvious)	Final drawings are lacking in one of the following areas: all 10 constraints are labeled, proper scale is used and effort in neatness and clarity of the drawing is obvious	Final drawings contain all of the necessary components, but there are multiple errors and the drawing is not clear	Final drawings appear to be hastily drawn, care for clarity and neatness is not apparent and missing multiple components

TotalPoints: /16