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Edible Rovers Activity – High School – Edible Rover Worksheet – Algebra 1

Instructions

You have just been notified that NASA is planning to launch another Mars Rover Mission and you are going to design the rover. NASA has given you a budget of $1,450,000 and provided you with several required parts for the rover; however, you must design a new body and select the instruments that will be mounted on the body. The body must weigh less than 16 kilograms and be able to support the instruments you plan on using. You have been given a list of four material types (Table 1), each with unique strengths, weights, and costs, to choose from for the body. Use your knowledge of Mars Rovers and mathematics to construct a rover that can effectively study Mars while meeting all of these requirements.

Material	Price ($/sqr. m)	Strength (kg/sqr. m)	Weight(kg/sqr. m)
Funky Carbon	52500	8	4
Honeycomb Core	45000	8	4.75
Old School Steel	35000	6	5
Outer Space Aluminum	30000	5	4.5

Table 1: Available Materials for Body Construction

1. Describe a Mars rover's instrumentation. What scientific instrumentation can be found on a Mars rover and what does each instrument do?

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2. Think about the Mars rover you are building. What will be the purpose of your rover? What capabilities should your rover have?

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3. What instruments are you planning on using? Give a brief description of why for each one. How much will these instruments cost?

   1. _____
   2. _____
   3. _____
   4. _____
   5. _____
   6. _____
   7. _____

   Cost:

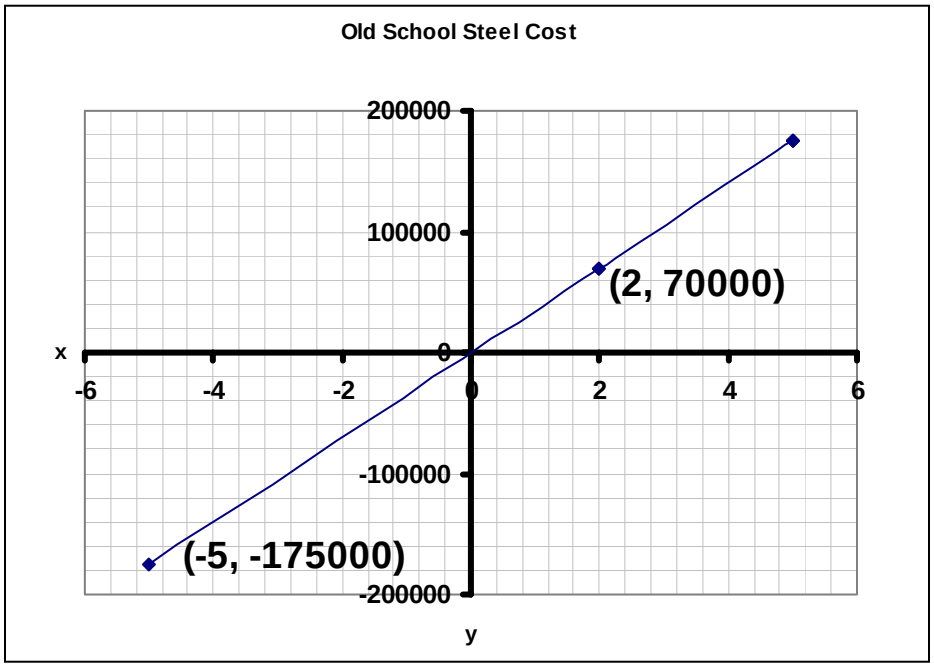
4. Draw the body of your rover in the space below. Be sure to include dimensions in your design. Also, keep in mind the mission constraints and the strength required to support the instruments you plan on using.

5. Based on the dimensions of your design, how much material will you need for the body of your rover?

_____

_____

6. Study Graph 1 and Graph 2 and develop an equation in terms of y and x to represent the graphs. What do y and x represent?



Graph 1: Old School Steel Cost representation

Graph 1x:

Graph 1 y:

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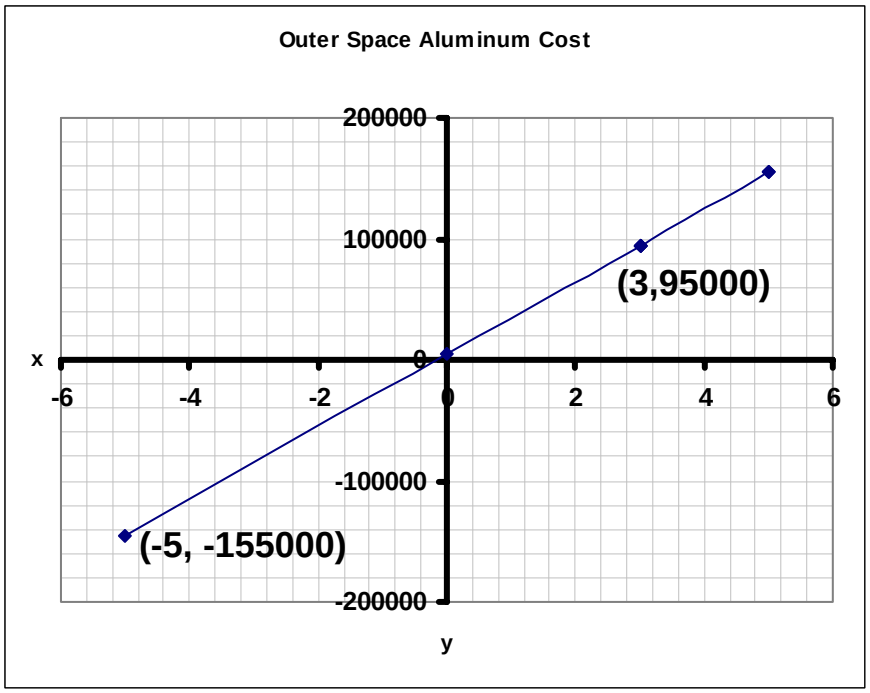

Graph 2: Outer Space Aluminum Cost representation
(note: the linear equation does not pass through the origin)

Graph 2 x:

Graph 2 y:

7. The company who provides Funky Carbon has requested that you pay a $2,500 surcharge for their services. Create a graph and corresponding equation of the price of Funky Carbon. Use the information from Table 1 and take into account the $2,500 fee.

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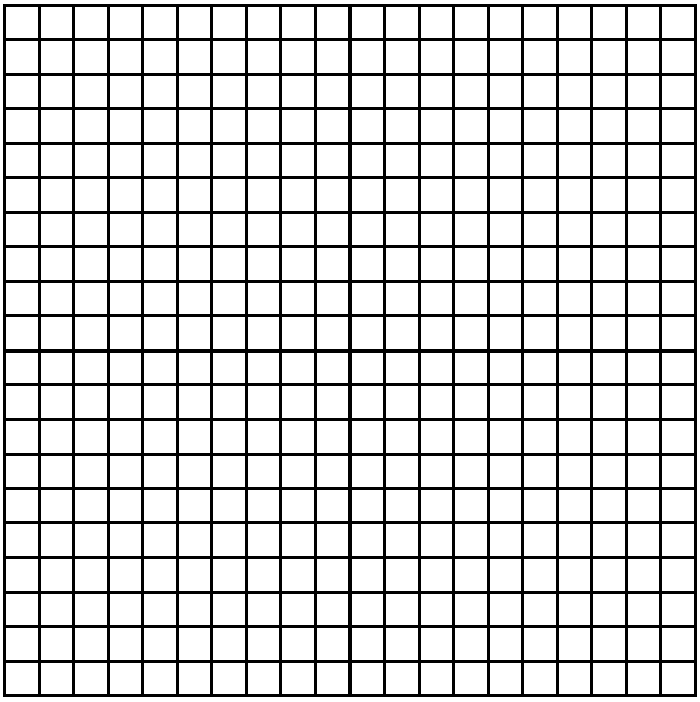

8. The company who provides Honeycomb Core has offered decreased cost rates with an increase in purchase quantity. Using the information from Table 2, create a graph and corresponding equation to represent the cost of Honeycomb Core.

Quantity of Purchased Honeycomb Core (m^2)	Price (dollar/m^2)
0 - 1.499	45000
1.5 – 3.2499	42500
3.25 - 4.5	40000

Table 2: Fixed Rates of Honeycomb Core based on quantity purchased

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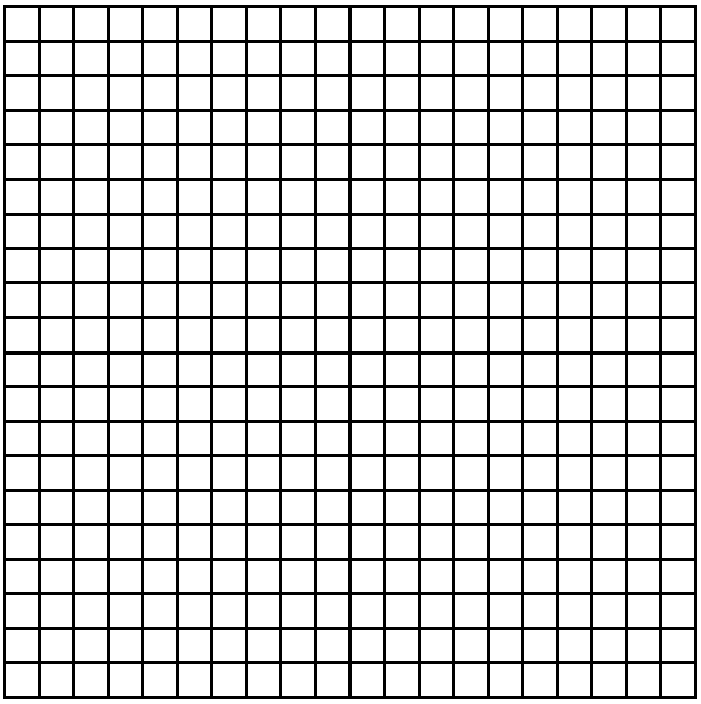

9. Which type of material will you use for the body of your rover (see Table 1)? Why? What is the total cost and weight of the body? How much weight can it hold?

   Material:

   Cost:

   Weight:

   Strength:

   Why: _____

   _____

   _____

10. What is the total cost of your rover?

    Cost Before Adjustments: _____

    Can the body of your rover support all of the instruments you planned on using? Can you still afford all of the instruments? If not, how will you alter your design plans to fit your constraints?

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Cost After Adjustments: _____

11. Draw a complete design of your Mars Rover in the space provided. Use the body you designed as the base and determine where the instruments will attach, how the body will sit on the wheels, where the required components will go, etc. Label the parts of your Rover and the dimensions of the major parts.

Construction Phase:

12. What materials (candy) are you planning on using for your wheels, body, and instruments?

Component	Material (Candy type)
Body	
Wheels	

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Component	Material (Candy type)

13. What steps will you follow to build your rover?

_____

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_____

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14. What was the most difficult part of the construction process and how would you do it differently next time?

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15. Describe any changes you would make to the design process if you were to build another rover.

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