Designing a Sustainable City
You and your group will work as young city planners! Your task is to design a sustainable city layout inspired by what you've learned about Karlsruhe, Germany. You will use the engineering design process and apply proportional reasoning to create a model city that is sustainable, efficient, and fair for everyone.

Step 1: Research Together

- What is the engineering design process?
- How is math used in real-world city planning?
- What are proportional relationships and why do they matter?

Step 2: Plan Your City

- Decide what zones your city will have (e.g., residential, green space, transport, commercial).
- Research or decide on realistic proportions based on real city data (e.g., 40% residential, 25% green space).
- Use your ratio and proportion skills to allocate space in your city accordingly.

Step 3: Create Your Model

- Draw a scale model or map of your city.
- Build your scale model. You may use concrete materials (e.g., recycled cardboard, paper, building blocks) to build your model.
- Make sure your model shows proportional relationships clearly.
- Include a table, graph, and equation to show the math behind your city's design.

Step 4: Justify Your Design

- Write a short explanation of why you chose your proportions.
- Explain how your city supports sustainability and fairness.
- Make connections between your design and what you learned about Karlsruhe.

Step 5: Present to the Class

- Present your model and explanation.
- Share how you used proportional reasoning.
- Be ready to answer questions and receive feedback from your classmates.

Rubric Reminder: Use the class rubric to make sure your project includes everything:

- Proportional Representation
- Data Modeling (table, graph, equation)
- Model Construction
- Design Quality
- Rationale and Reasoning
- Collaboration and Presentation

Let's build cities that are smart, green, and built with math!

Rubric for Prototypes and Presentations

Criteria	*Exemplary (4 pts)*	*Proficient (3 pts)*	*Developing (2 pts)*	*Beginning (1 pt)*
Proportional Representation	Uses ratios and proportions accurately and insightfully to represent multiple zones and sustainability elements	Uses ratios accurately with minor errors	Uses basic ratios, lacks depth or connection to sustainability	Incorrect or missing use of ratios
Data Modeling	Includes a clear, labeled table, graph, and equation; demonstrates deep understanding	Includes all elements with some clarity	Includes two elements, limited connection	One or no element shown or unclear
Model Construction	Physical model is detailed, creative, and clearly represents proportional design using concrete materials	Physical model shows effort and basic accuracy in proportional layout	Model is incomplete or lacks proportional clarity	Minimal or no attempt at building model
Design Quality	Neat, scaled, highly organized and visually effective	Organized and scaled with minor errors	Partially organized, lacks scale	Unclear or incomplete visual design
Rationale and Reasoning	Thorough explanation connecting math and design decisions	Explains math connection with some support	Basic explanation, lacks math connection	Minimal or missing rationale
Collaboration and Presentation	All members contribute; presentation is polished and engages audience	Most contribute; clear presentation	Uneven participation or limited clarity	Disjointed or incomplete presentation