

WonderHere<sup>?</sup>  
↓

a unit of study on  
**Government**



Math-Tropolis  
**MATH PROJECT**

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# MATH-TROPOLIS

where math & social studies collide!

Are you ready to build your very own city?! With a little bit of research, a little bit of math, and a LOT of imagination, you can create the most magnificent city around! The best part? You get the chance to grow in mathematical skills like problem solving, measurement, geometry, data, fractions, and lots more!

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Mathematics Topics Addressed	Primary (K-1st)	Post-Primary (2nd-3rd)	Comprehensive (4th-6th)
Focus on asking and answering questions	✓	✓	✓
Compare, classify, and organize information through observations and measurements	✓	✓	✓
Focus on drawing conclusions	✓	✓	✓
Focus on solving everyday problems	✓	✓	✓
Develop a concept of numeracy through play	✓		
Examine and explore 2 and 3 dimensional shapes	✓	✓	✓
Follow simple step-by-step directions	✓	✓	✓
Accurate use of mathematical tools	✓		
Round up figures and calculate with approximate values		✓	✓
Build, draw, examine, classify objects and figures.	✓	✓	✓
Study symmetry in proportion to a line.		✓	
Systematically collecting data on topics of interest	✓	✓	✓
Record and present data using tables and diagrams.	✓	✓	✓
Concept of a fraction			✓
Concept of percentages			✓
Connections between fractions, decimal numbers and percentages			✓

Primary: **TASK 1**

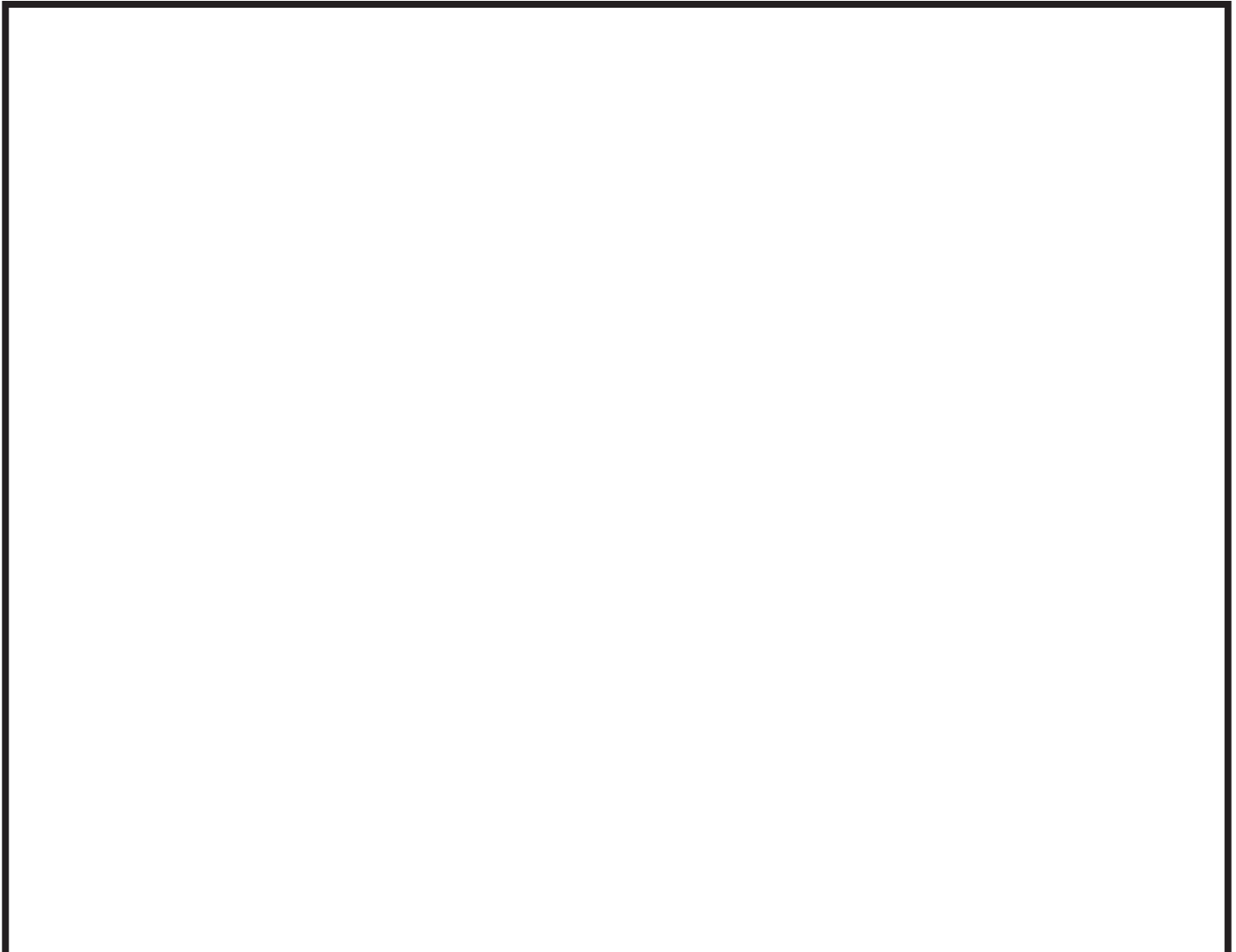
gather RESEARCH

What city, state do you live in? Complete each sentence below.

I live in the city of \_\_\_\_\_

I live in the state of \_\_\_\_\_

Draw a picture of your city.



Take a drive with your parents and look around your city. What do you see a lot of? What do you NOT see a lot of, but wish you did? Draw or write.



List ideas of how you could improve an area in your city. Would you like to see more parks, homes, apartments, better transportation, restaurants, ways to help your environment? Draw or write.



Primary: **TASK 2**

# poll your COMMUNITY

Pick your 3 favorite ideas to poll your friends and family members. Complete each sentence below to write your 3 favorite ideas below.

I think my city needs \_\_\_\_\_

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I think my city needs \_\_\_\_\_

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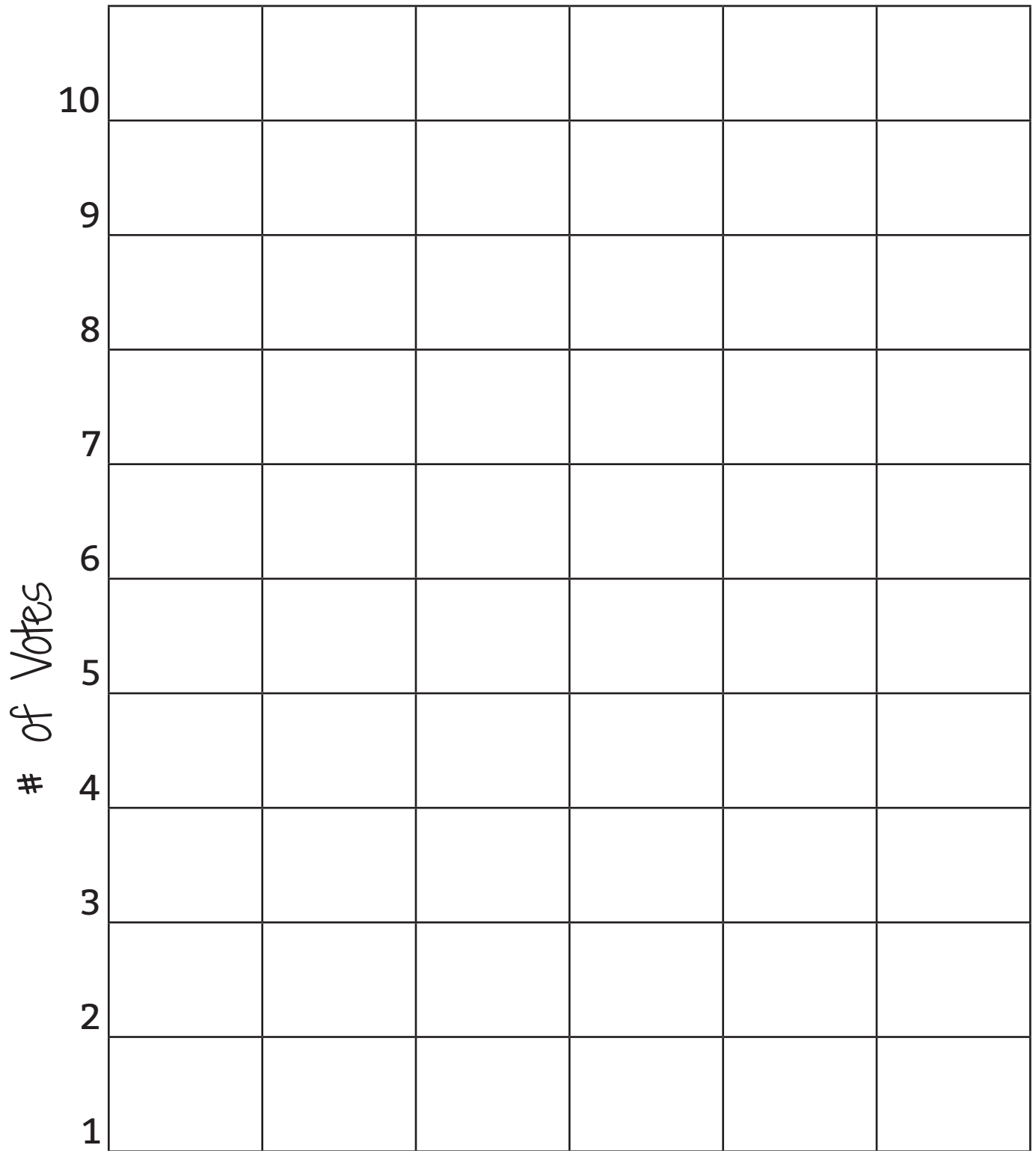
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I think my city needs \_\_\_\_\_

---

---

Ask 10 of your family or friends to pick their favorite of your 3 ideas. On the bar graph on the next page, color in one box for each selected idea to complete the bar graph below.



1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

### Ideas on Improving our City



Primary: **TASK 3**

analyze DATA

How many votes did Idea #1 get? \_\_\_\_\_ votes

How many votes did Idea #2 get? \_\_\_\_\_ votes

How many votes did Idea #3 get? \_\_\_\_\_ votes

What does your survey tell you?

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Which idea received the most votes? (Circle one)

Idea #1

Idea #2

Idea #3

How do you know?

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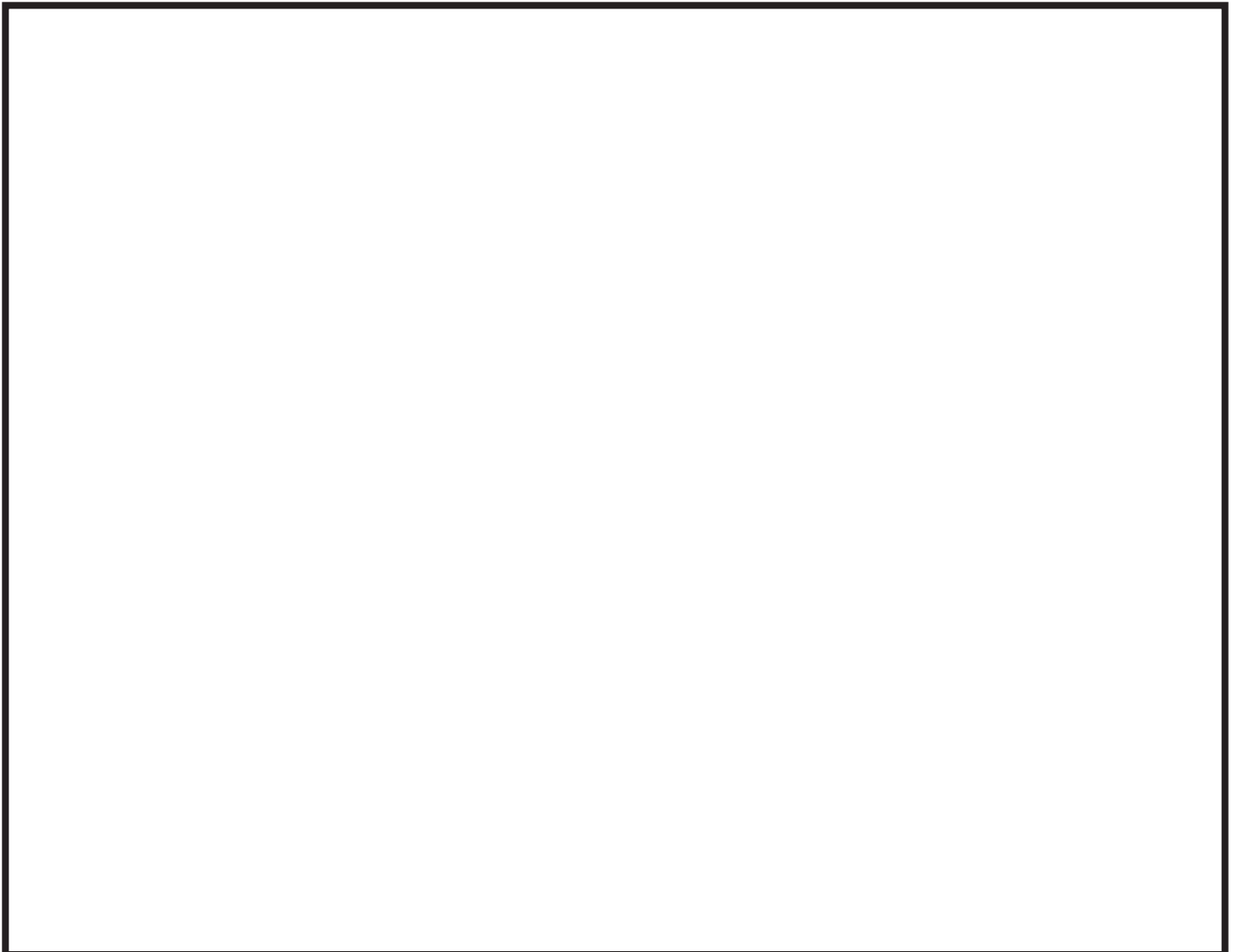
Primary: **TASK 4**

# city DEVELOPMENT

Based on your survey, what is your city development plan? What are you going to develop? Where? Draw a rough draft or write to tell about what you will build for your city.

Research lands to identify the location of your plan. Where do you want to develop?

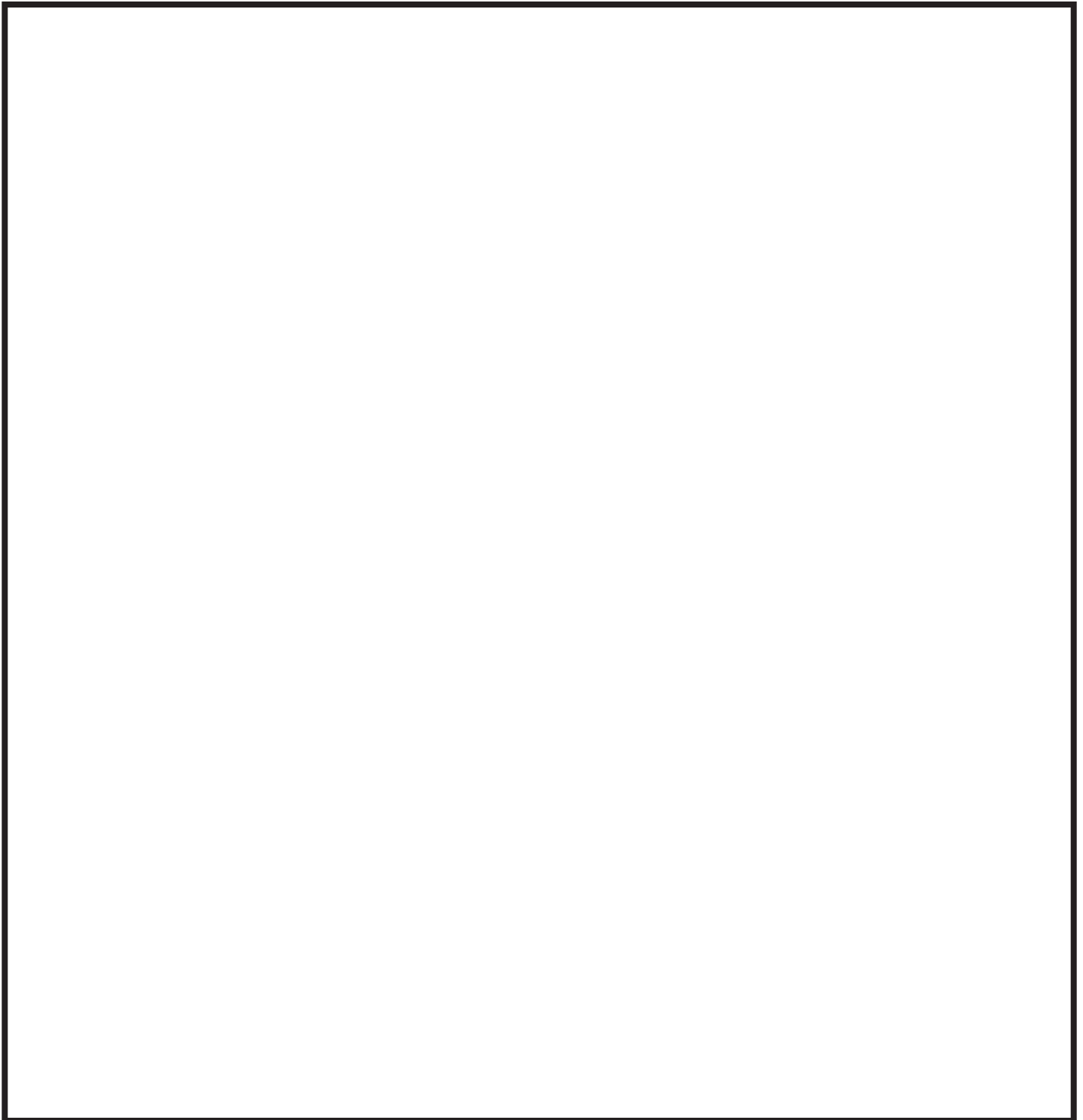
Address: \_\_\_\_\_ City, State, Zip \_\_\_\_\_



Primary: **TASK 5**

# the ARCHITECTURE

Draw a final, detailed draft of your proposed design for your city in the space provided below.










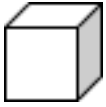

Using magnetic tiles, building blocks, tangram blocks, or LEGOs, build a replica of your proposed design for your city. Take pictures of it and place it here.



Answer the following questions based on what you built:

1. How many feet long is your design? \_\_\_\_\_
2. How many inches long is your design? \_\_\_\_\_
3. How many shoes long is your design? \_\_\_\_\_
4. How many paperclips long is your design? \_\_\_\_\_
5. How many paperclips does it take to trace the outside (perimeter) of your shape to make it all the way around your design once? \_\_\_\_\_
6. How many feet tall is the highest point of your design? \_\_\_\_\_
7. List 3 things that are taller than your design.  
\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_
8. List 3 things that are smaller than your design.  
\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

What shapes did you use in constructing your design?  
Write a number 0-10 on the line beside the name/picture of each geometric shape that you might have used.

 Circle _____	 Square _____	 Triangle _____
 Rectangle _____	 Diamond _____	 Pentagon _____
 Cone _____	 Cube _____	 Cylinder _____

Estimate how much money you think it would take to build your design in real life.

\$ \_\_\_\_\_ . \_\_\_\_\_

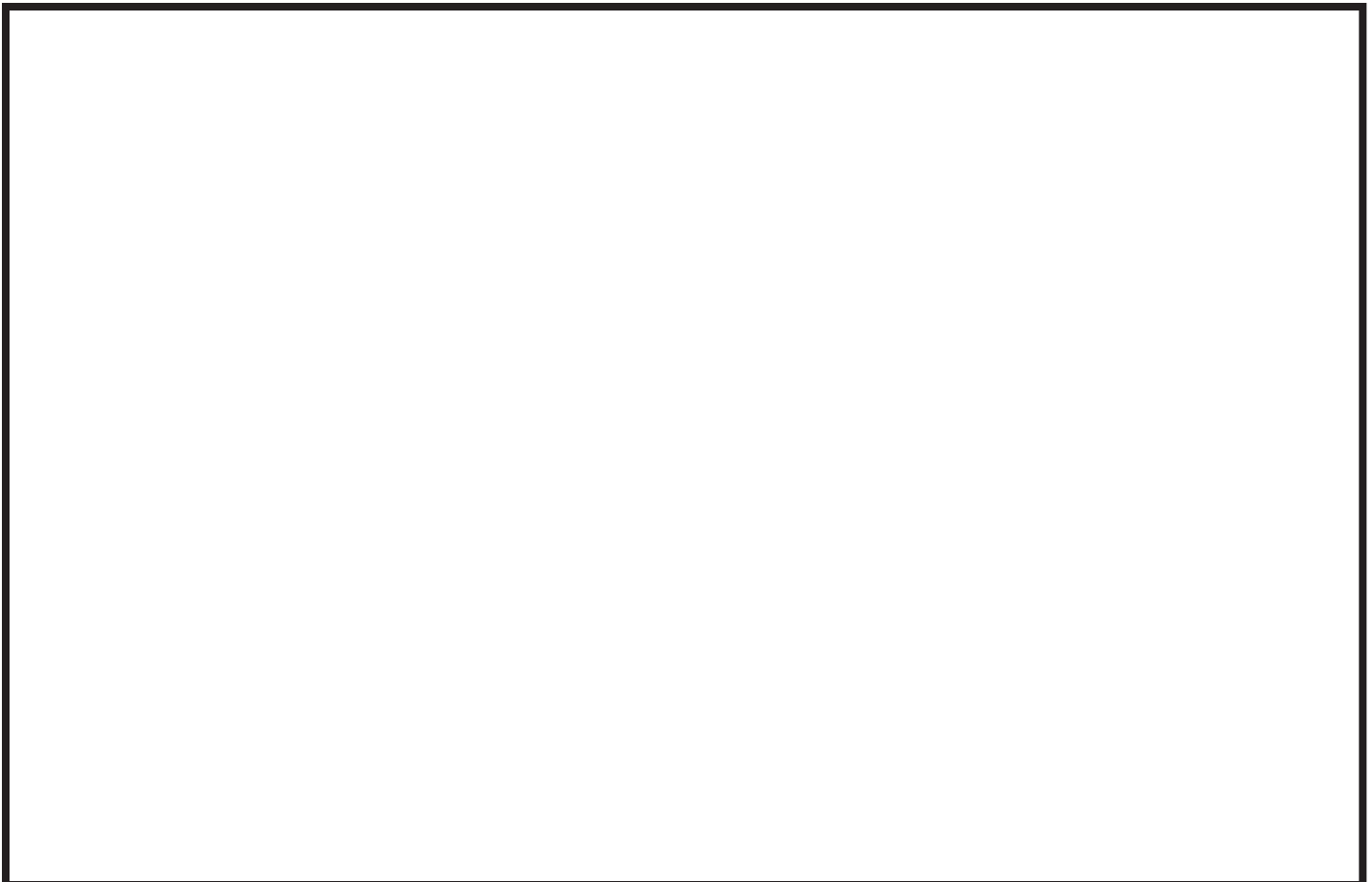
Primary: **TASK 7**

# Presentation & Reflection

Present your work and ideas before an audience of your friends and family. Receive feedback from your audience in the follow areas:

1. Was I easy to understand?
2. Did I share my ideas clearly?
3. How could I have done even better?

Write or draw to share about your experience with this project, here.



# Primary Project Rubric

	Neatness	Creativity	Effort	Mathematic Understanding
Mastery	The project was completed very neatly with great attention to detail.	The child utilized their imagination and displayed out-of-the-box thinking when designing their city.	The child put a lot of time and effort into this project, taking great pride in their work.	The child showed thorough understanding of the shapes used in their design and could identify nearly all 9 shapes in their design.
Progressing	The project was completed somewhat neatly. The child displayed some attention to detail.	The child showed some creativity when designing their city.	The child put some time and effort into this project, sometimes taking pride in their work.	The child showed some understanding of the shapes used in their design and could identify about 3-8 shapes in their design.
Developing	The project was incomplete or completed messily with little or no attention to detail.	The child showed little creativity and/or interest when designing their city, needing much prompting along the way.	The child showed disinterest and put little effort into the project.	The child showed little to no understanding of the shapes used in their design and had difficulty identifying the shapes in their design.



What city, state do you live in? Complete each sentence below.

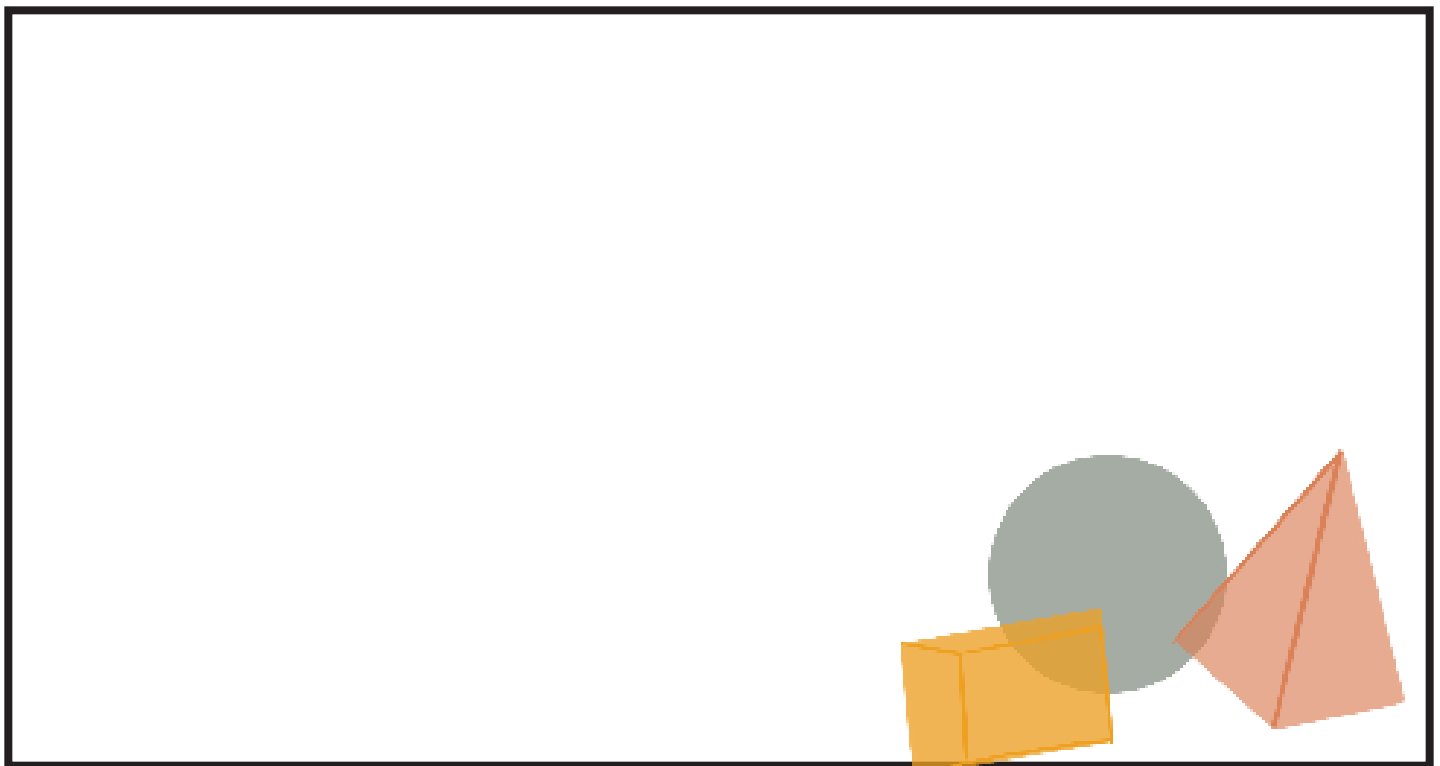
What city/state do you live in? \_\_\_\_\_

What is your current city's population? \_\_\_\_\_

What reliable source(s) did you use to determine this information? \_\_\_\_\_

What would you consider is the most important information for a city planner when determining how to develop your city to benefit your residents?

Write or doodle your response below.



Take a drive with your parents and look around your city. What do you see a lot of? What do you NOT see a lot of, but wish you did? Draw or write your observations below.



List ideas of how you could revitalize an area in your city. Would you like to see more parks, homes, apartments, better transportation, restaurants, ways to help your environment? Identify 1-3 of your favorite city development ideas and draft a survey to receive information from your friends and family.



# Post-Primary: TASK 2 poll your COMMUNITY

Interview your friends and family members. Here are some survey questions to consider using:

- Would you like to see \_\_\_\_\_ in our community?  
Yes or no? Why or why not?
- Which of the following 3 development ideas is your favorite?
- Where do you think our city needs development?
- What do you think our community is missing?
- What changes do you think our community is in need of?

List your survey questions here:

Question 1:

Question 2:

Question 3:

Question 4:

Question 5:

My Survey - For each question, summarize how your friends and family answered the survey.

Answers to Question 1:

Answers to Question 2:

Answers to Question 3:

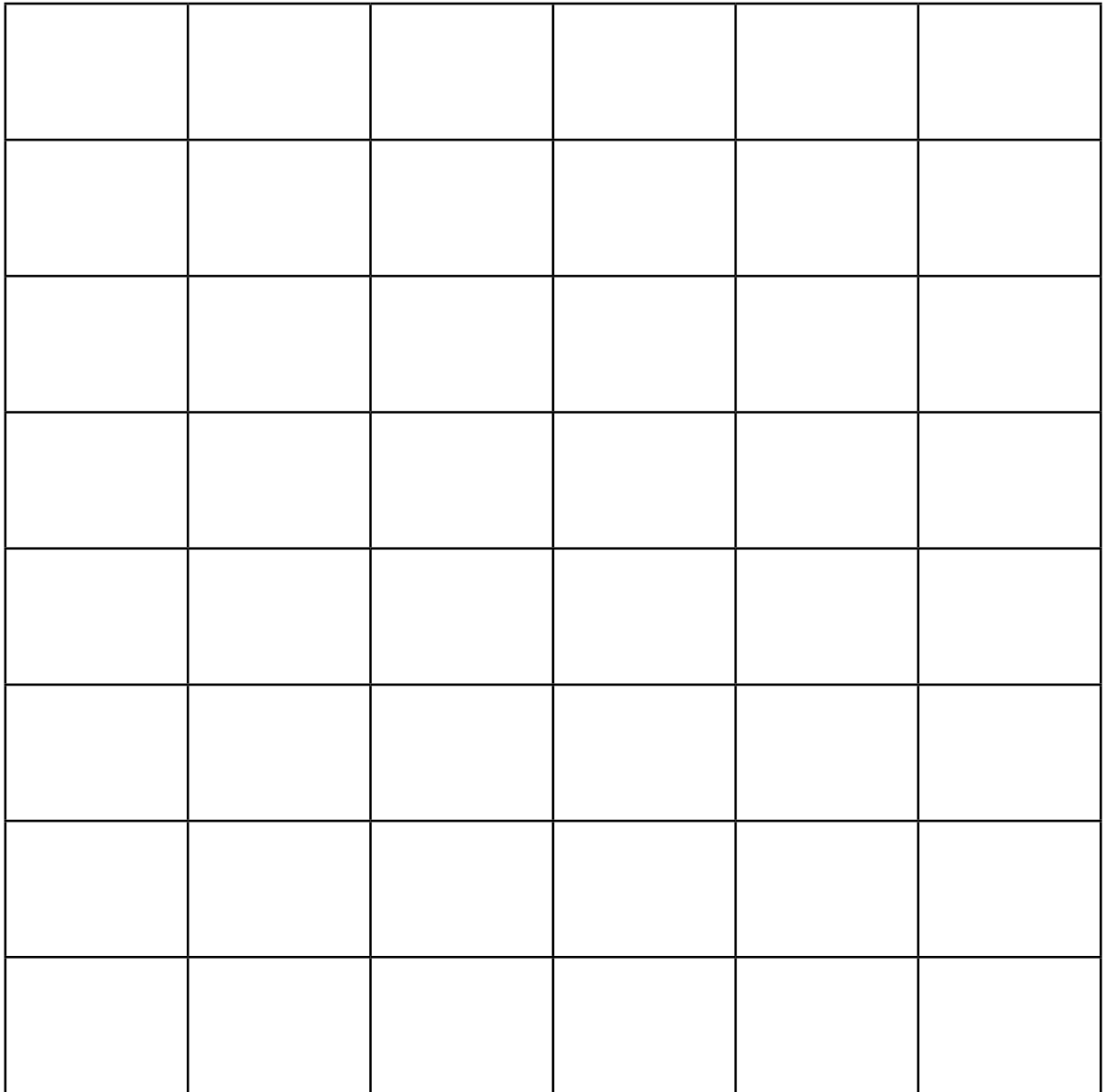
Answers to Question 4:

Answers to Question 5:

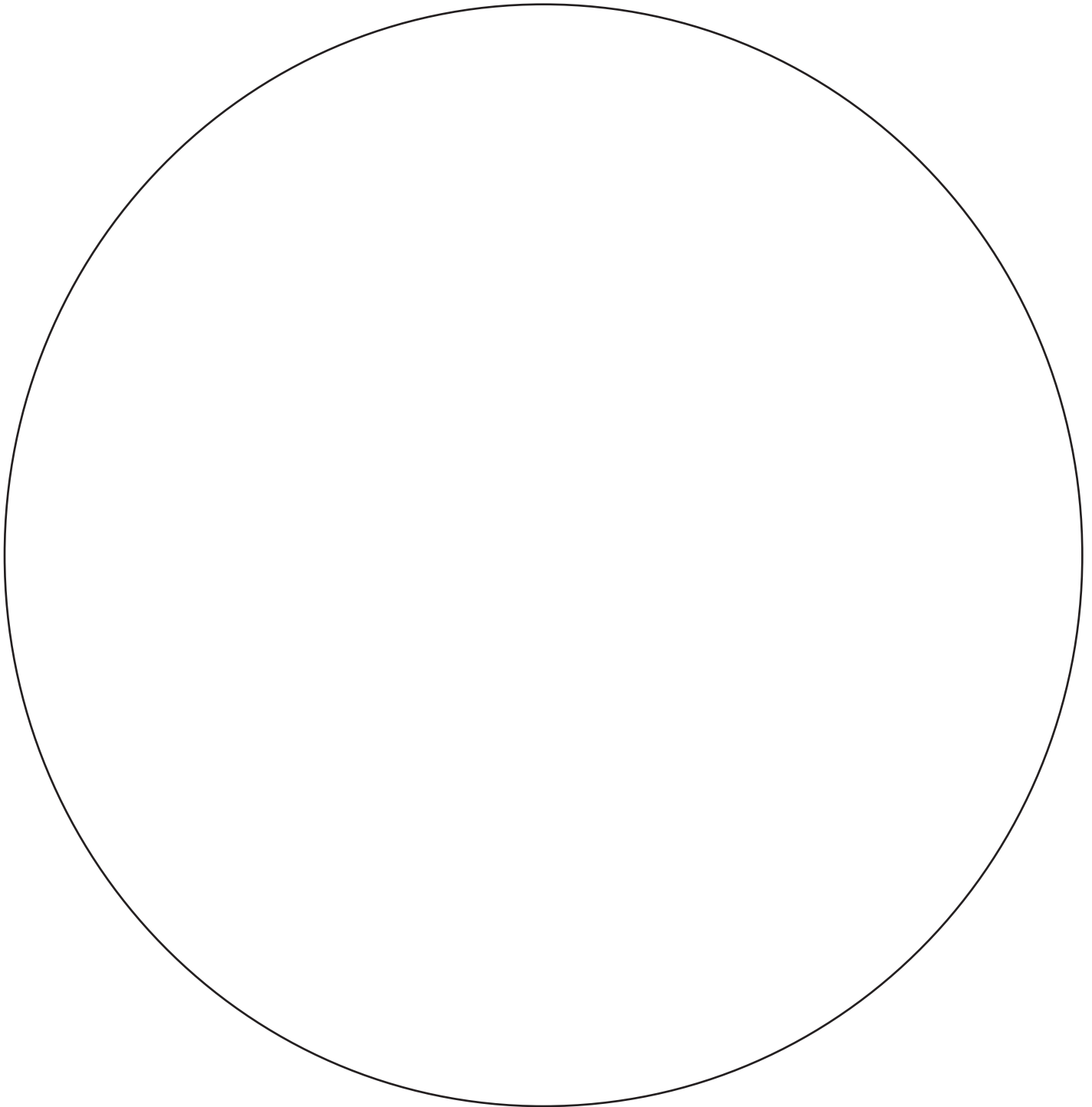
Post-Primary: **TASK 3**

# create a GRAPH

Using the data that you collected from your survey, create a bar graph that outlines what the people you polled thought about your 3 top ideas. Label your bar graph appropriately.

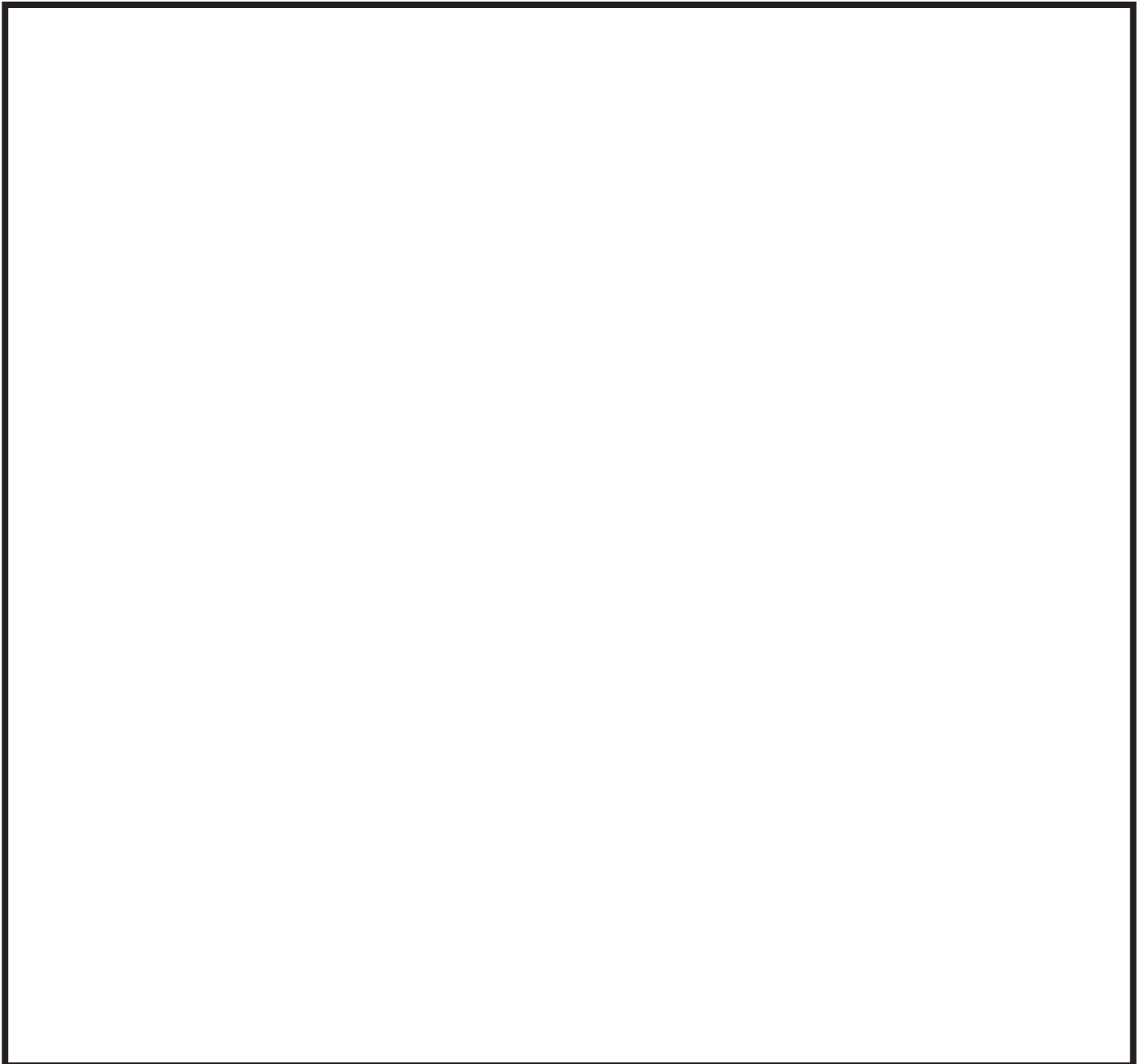


Using the data that you collected from your survey, create a pie chart that outlines what the people you polled thought about your 3 top ideas. Label your pie chart appropriately.



# Post-Primary: TASK 4 city DEVELOPMENT

Based on your survey, the research you gathered, finalize your idea. What is your city development plan? Outline in detail what kind of building or otherwise do you propose to develop, why, and WHERE.



Research lands to identify the location of your plan. Where do you want to develop?

Address: \_\_\_\_\_

City, State, Zip \_\_\_\_\_

Why did you decide on this location? Using words and a drawing or photograph of the actual area, explain your reasoning.

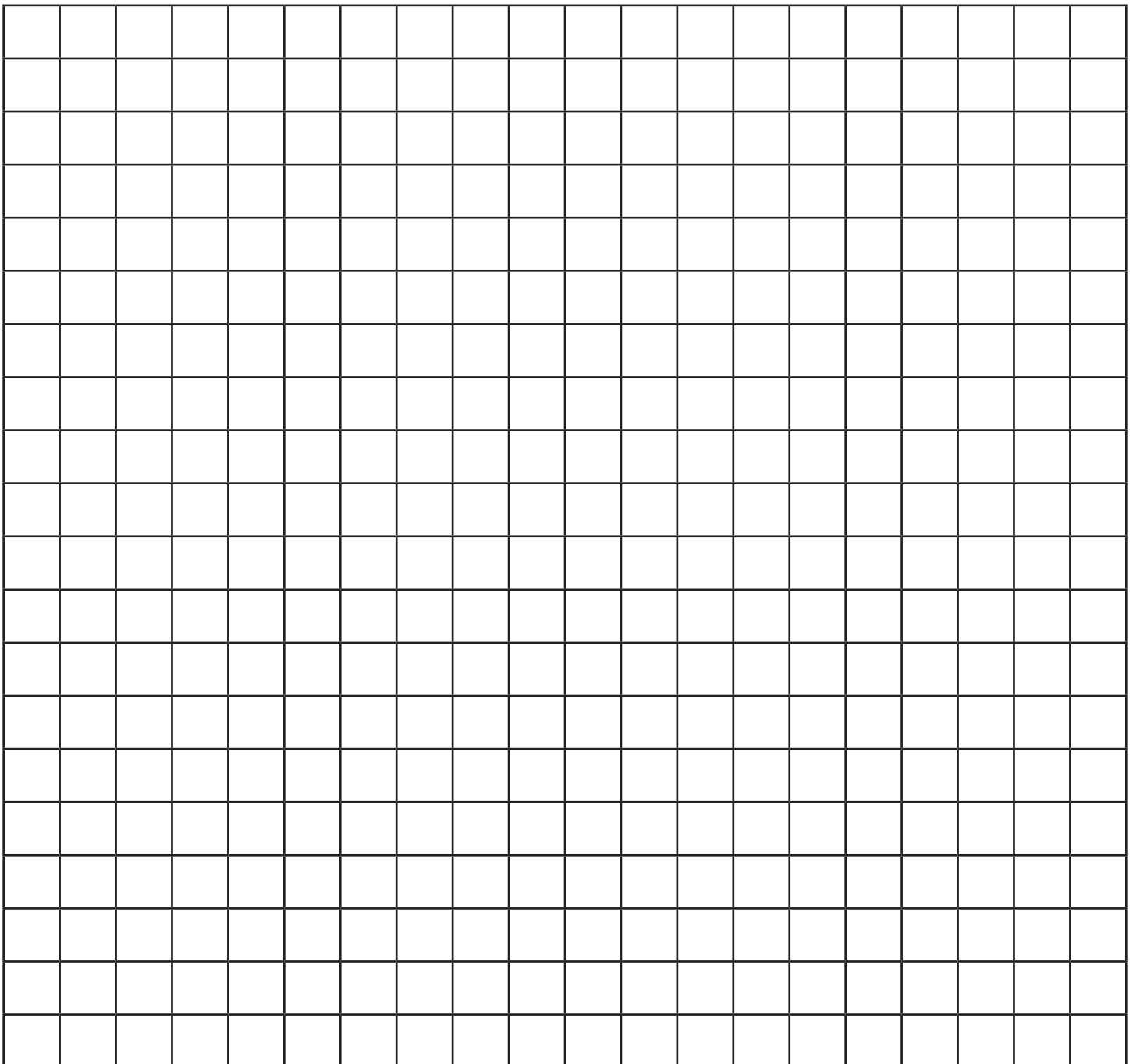


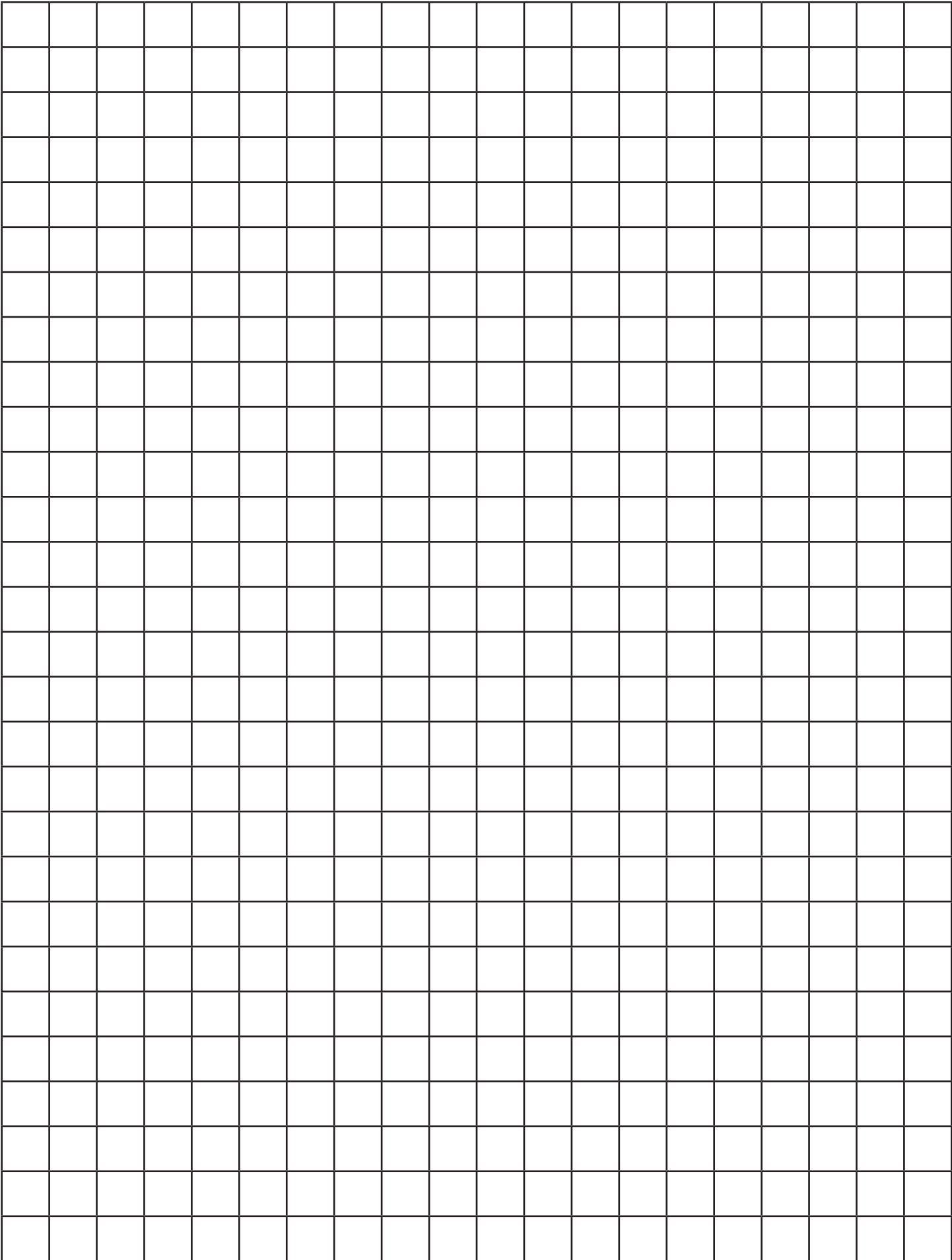


Post-Primary: **TASK 5**

# the ARCHITECTURE

Draw a replica of the land you are developing and the project you will be developing onto the land. Draw and label using identifiable geometric shapes (circle, cube, rectangle, square, cone, cylinder, hexagon, etc). Label each geometric shape and the area and perimeter of land.





Answer the following questions based on what you designed on the previous pages:

Choose 3 buildings in your town to measure. Write down their measurements here.

\_\_\_\_\_ in.

\_\_\_\_\_ cm.

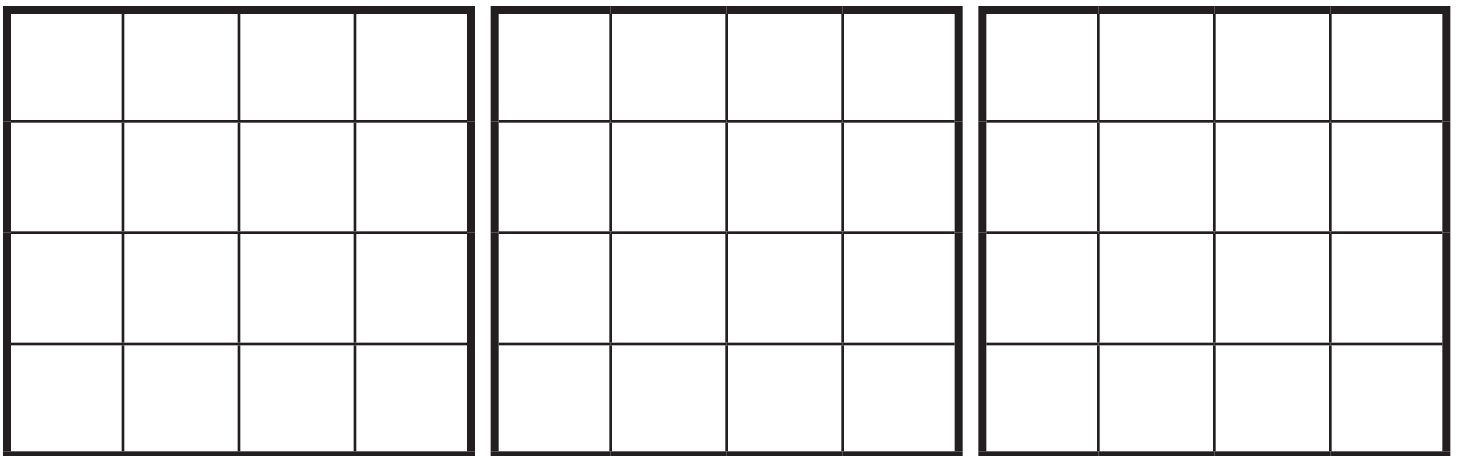
\_\_\_\_\_ in.

\_\_\_\_\_ cm.

\_\_\_\_\_ in.

\_\_\_\_\_ cm








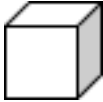

Do you have any symmetrical buildings or structures in your town? Recreate them below and draw a line of symmetry.



What is the perimeter of your entire town? \_\_\_\_\_

What is the area of your entire town? \_\_\_\_\_

What shapes did you use in your design? Write a number 0-10 on the line beside the name/picture of each geometric shape that you might have used.

 Circle _____	 Square _____	 Triangle _____
 Rectangle _____	 Diamond _____	 Pentagon _____
 Cone _____	 Cube _____	 Cylinder _____

Estimate how much money you think it would take to build your design in real life.

\$ \_\_\_\_\_ . \_\_\_\_\_

What is the reason for your estimate?

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# Post-Primary Project Rubric

	Neatness	Creativity	Effort	Mathematic Understanding
Mastery	The project was completed very neatly with great attention to detail.	The child utilized their imagination and displayed out-of-the-box thinking when designing their city.	The child put a lot of time and effort into this project, taking great pride in their work.	The child showed thorough understanding of shapes, measurement, symmetry, data collection, and graphing throughout the project.
Progressing	The project was completed somewhat neatly. The child displayed some attention to detail.	The child showed some creativity when designing their city.	The child put some time and effort into this project, sometimes taking pride in their work.	The child showed some understanding of shapes, measurement, symmetry, data collection, and graphing throughout the project.
Developing	The project was incomplete or completed messily with little or no attention to detail.	The child showed little creativity and/or interest when designing their city, needing much prompting along the way.	The child showed disinterest and put little effort into the project.	The child showed little to no understanding of shapes, measurement, symmetry, data collection, and graphing throughout the project.

Comprehensive: **TASK 1**

# gather RESEARCH

Complete each sentence below.

What city/ state do you live in? \_\_\_\_\_

What is your current city's population? \_\_\_\_\_

What reliable source(s) did you use to determine this information? \_\_\_\_\_

Outline the demographics within your city. Focus on ethnicity, gender, age, and household income. Create a series of graphs to organize and present this information.

Title of Chart:

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Key:

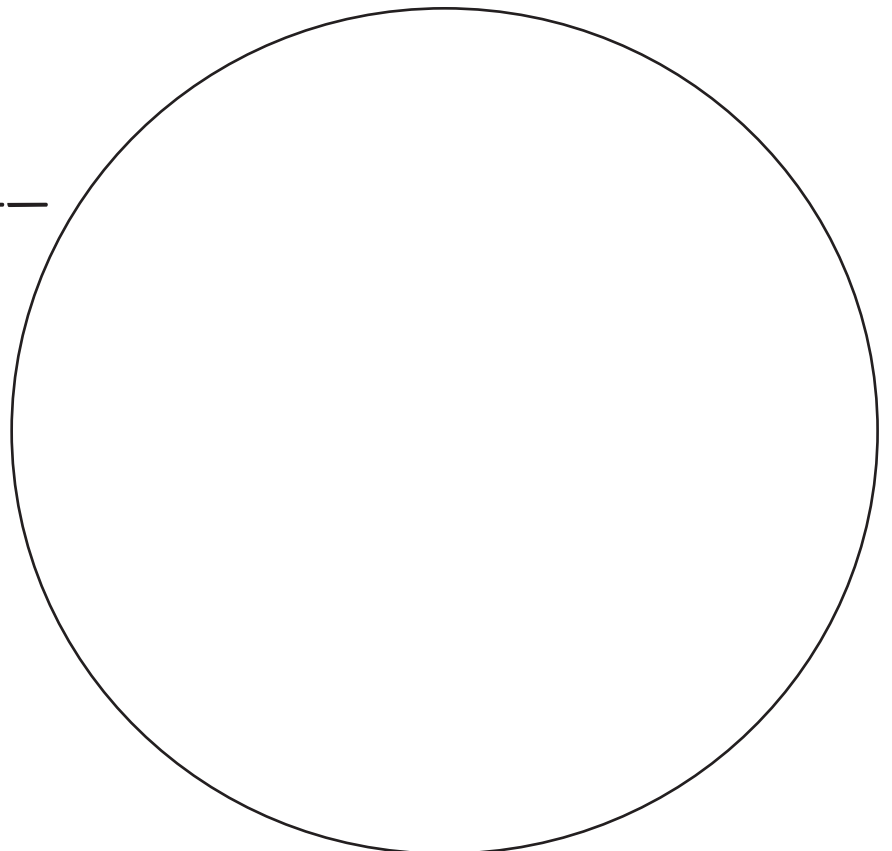
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Title of Chart:

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Key:

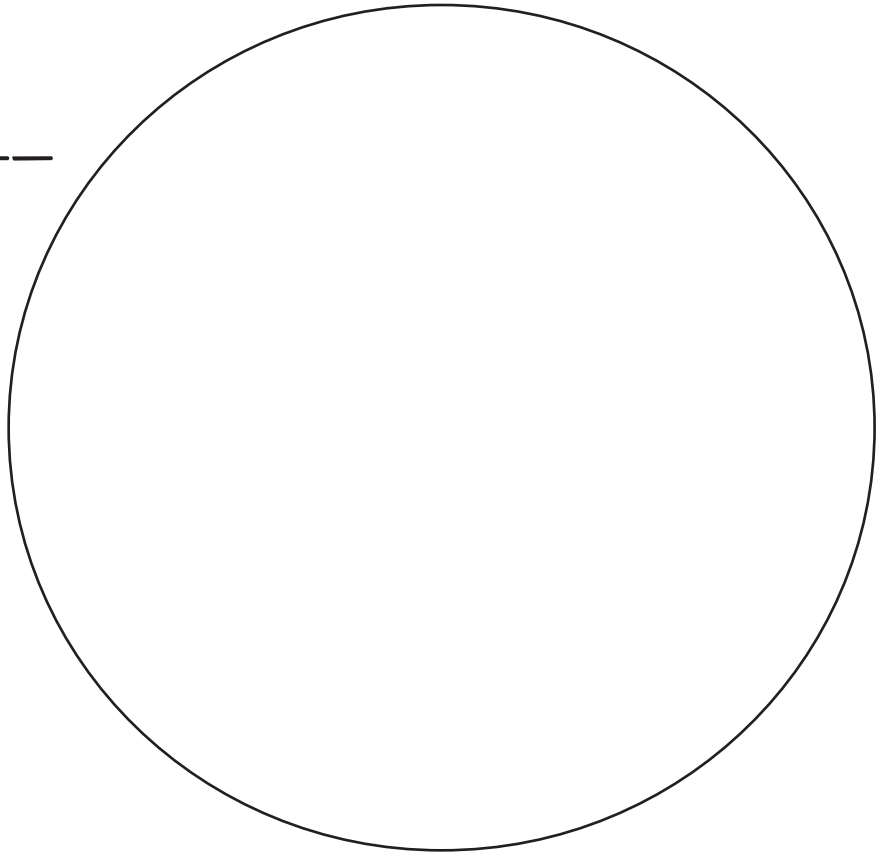
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Title of Chart:

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Key:

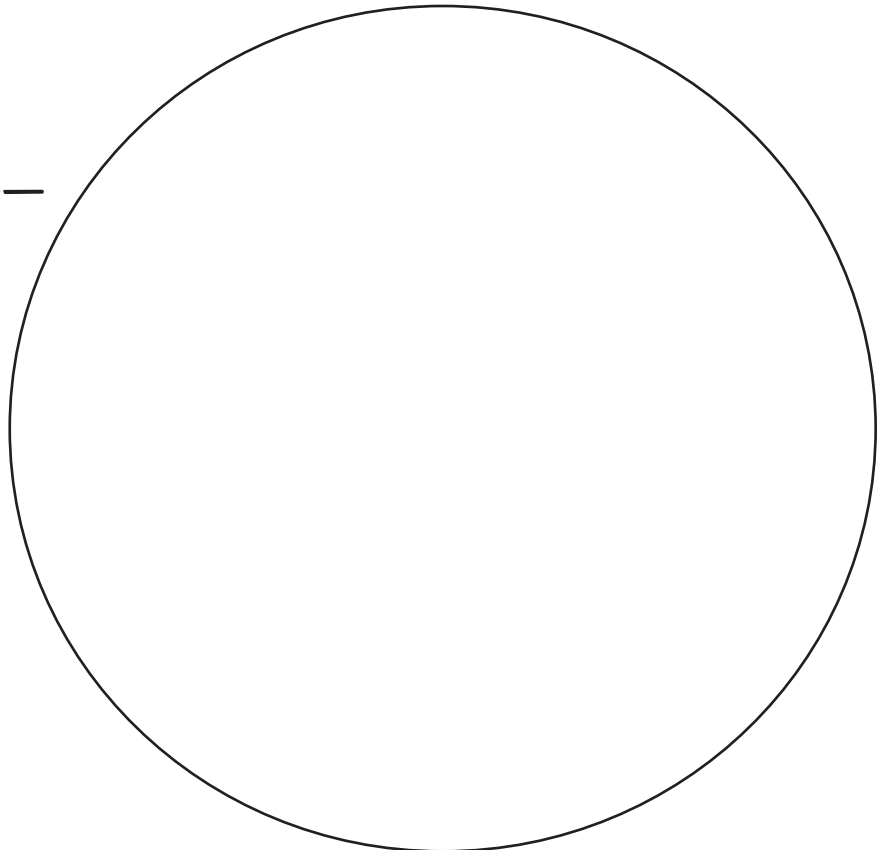
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What is the median age of males/females in your city?

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What is the average household size?

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What is your city's median household income?

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List the population by race/ethnicity. Then, draw a bar graph on the next page to demonstrate the break down.

Hispanic

African-American

White

Asian

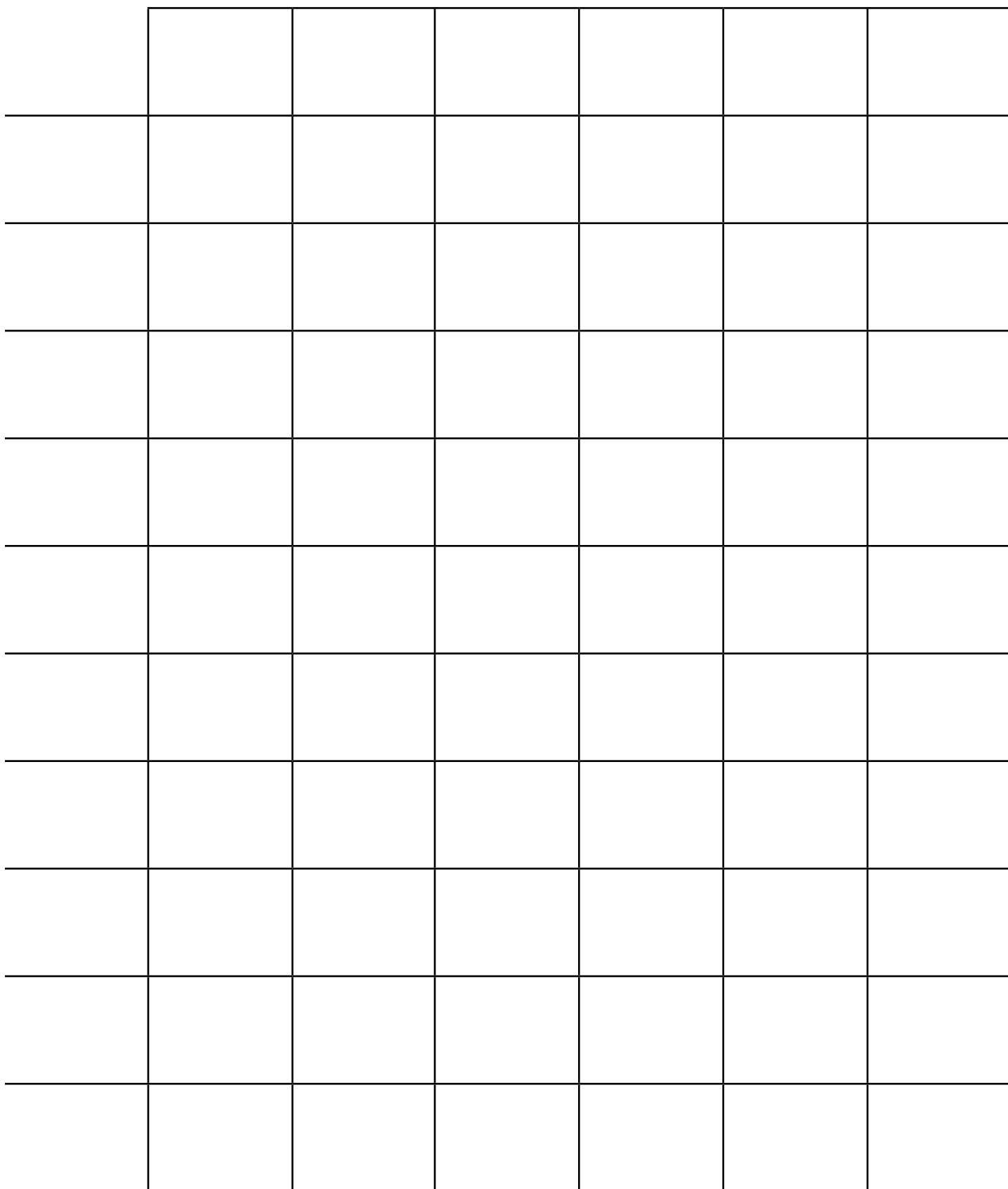
Two or More Races

American Indian/Alaskan

Native Hawaiian/ Pacific Islander

Other

Bar Graph Title: \_\_\_\_\_



What interesting information did you discover about your city? What surprises you?



What would you consider is the most important information for a city planner when determining how to develop your city to benefit your residents?



Take a drive with your parents and look around your city. What do you see a lot of? What do you NOT see a lot of, but wish you did? Draw or write your observations below.



List ideas of how you could revitalize an area in your city. Would you like to see more parks, homes, apartments, better transportation, restaurants, ways to help your environment? Identify 1-3 of your favorite city development ideas and draft a survey to receive information from your friends and family.



# Comprehensive: TASK 2 poll your COMMUNITY

Use the website [www.surveymonkey.com](http://www.surveymonkey.com) to post a survey to poll your community on your ideas. Ask questions like:

- Would you like to see \_\_\_\_\_ in our community?  
Yes or no? Why or why not?
- Which of the following 3 development ideas is your favorite?
- Where do you think our city needs development?
- What do you think our community is missing?
- What changes do you think our community is in need of?

List your survey questions here:

Question 1:

Question 2:

Question 3:

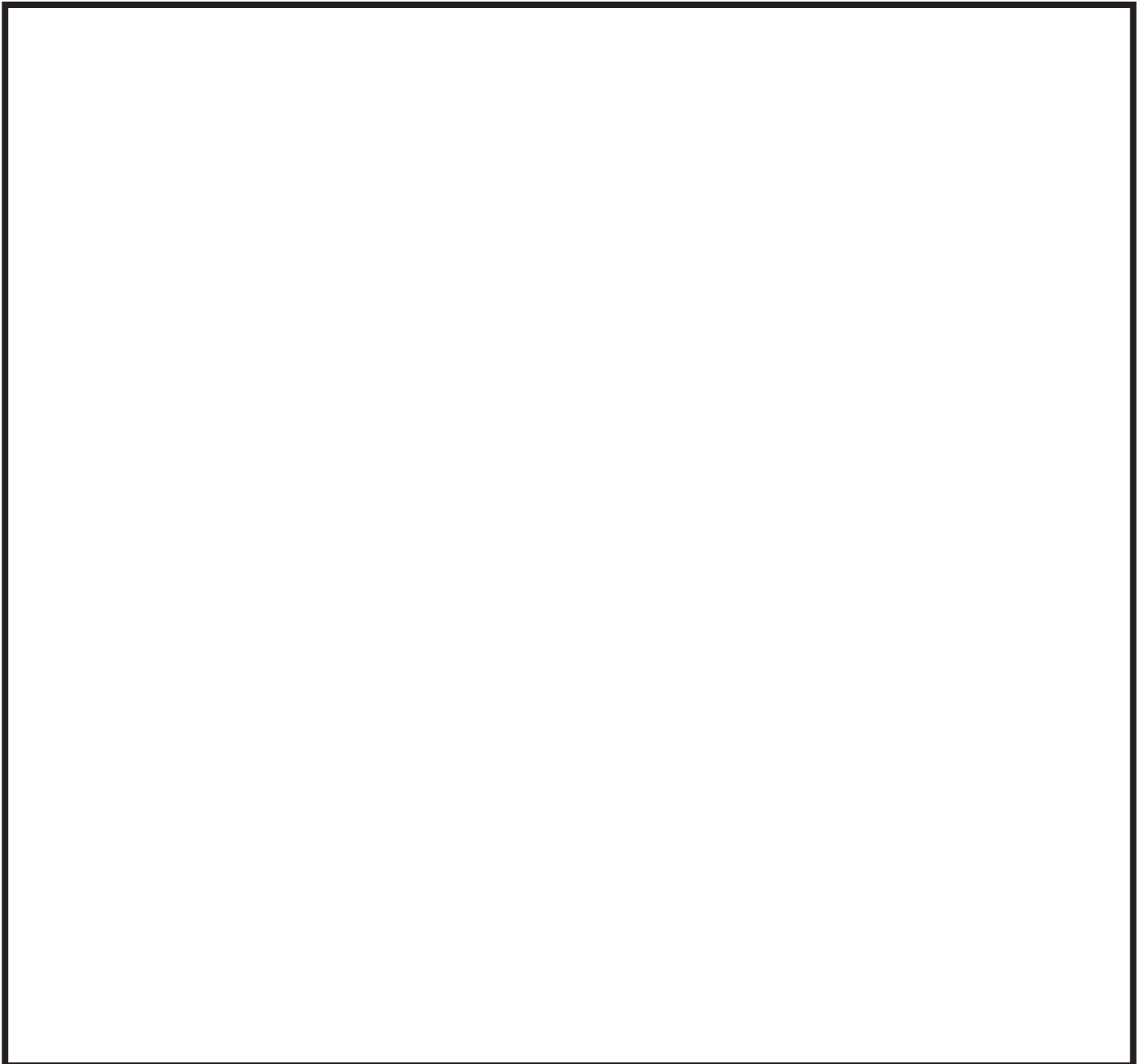
Question 4:

Question 5:



# Comprehensive: TASK 3 city DEVELOPMENT

Based on your survey, the research you gathered, finalize your idea. What is your city development plan? Outline in detail what kind of building or otherwise do you propose to develop, why, and WHERE.

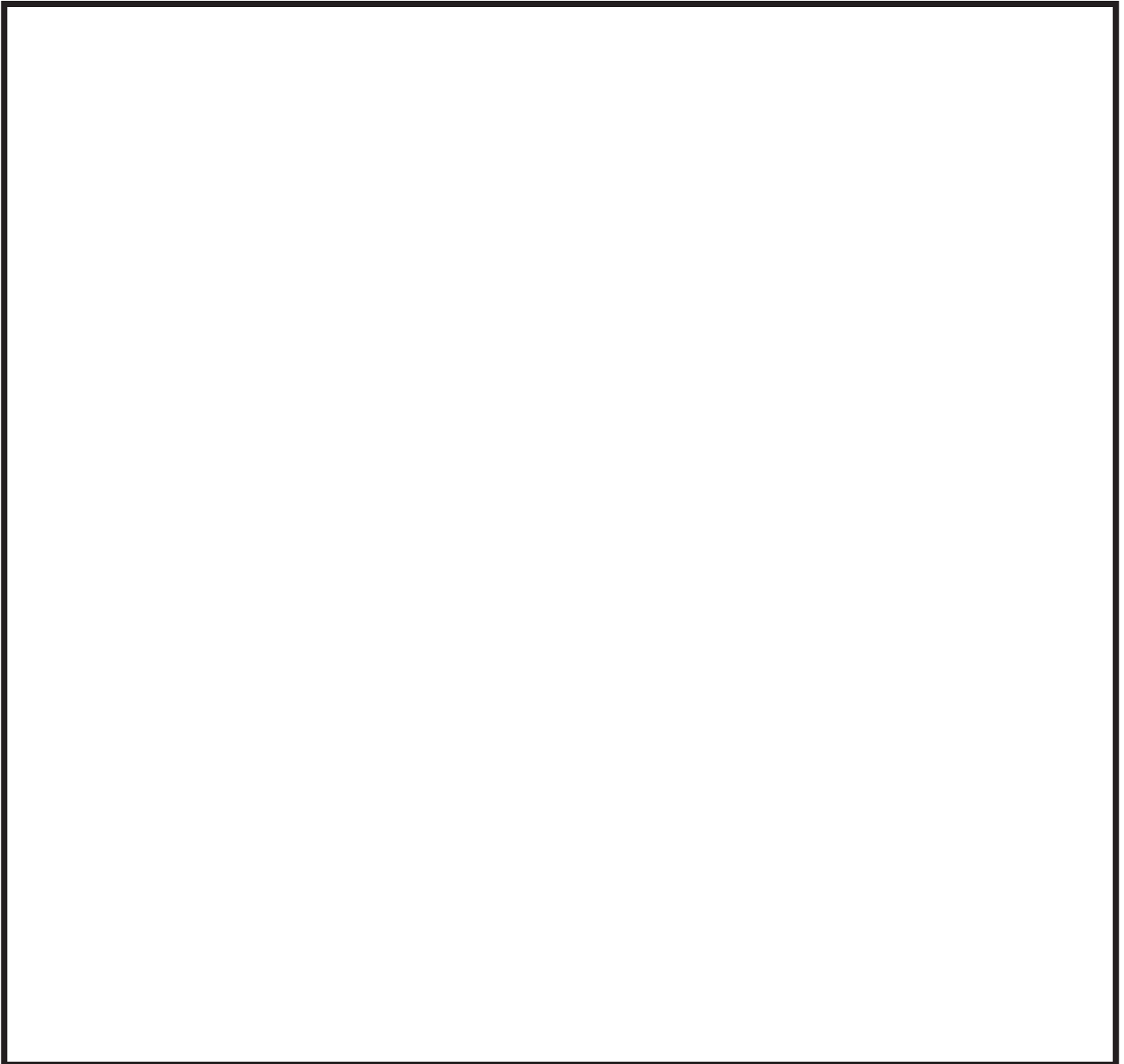


Research lands to identify the location of your plan. Where do you want to develop?

Address: \_\_\_\_\_

City, State, Zip \_\_\_\_\_

Locate public land surveys to get the dimensions of the land you are interested in developing. Write the specs here.

A large, empty rectangular box with a black border, intended for writing the specifications of the land of interest.



What is the cost of the project? Identify all of the costs associated with the project.

Find real-world numbers as best you can. Call local contractors, explaining that you are doing a project, and ask them if they would give you a ball-park figure to work with. Call a land realtor explaining your project and request information regarding the sell of the land. Call your City Planning Department... they are an excellent resource! (This is a GREAT opportunity to practice your public speaking skills- don't cheat the process).

Write where and how you accessed information for your calculations.

A large, empty rectangular box with a black border, intended for the student to write their answers to the questions above.

How much does the purchase of the land cost?

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What do you need to develop the land for your project? What are the costs associated with this work?

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How much will the construction cost?

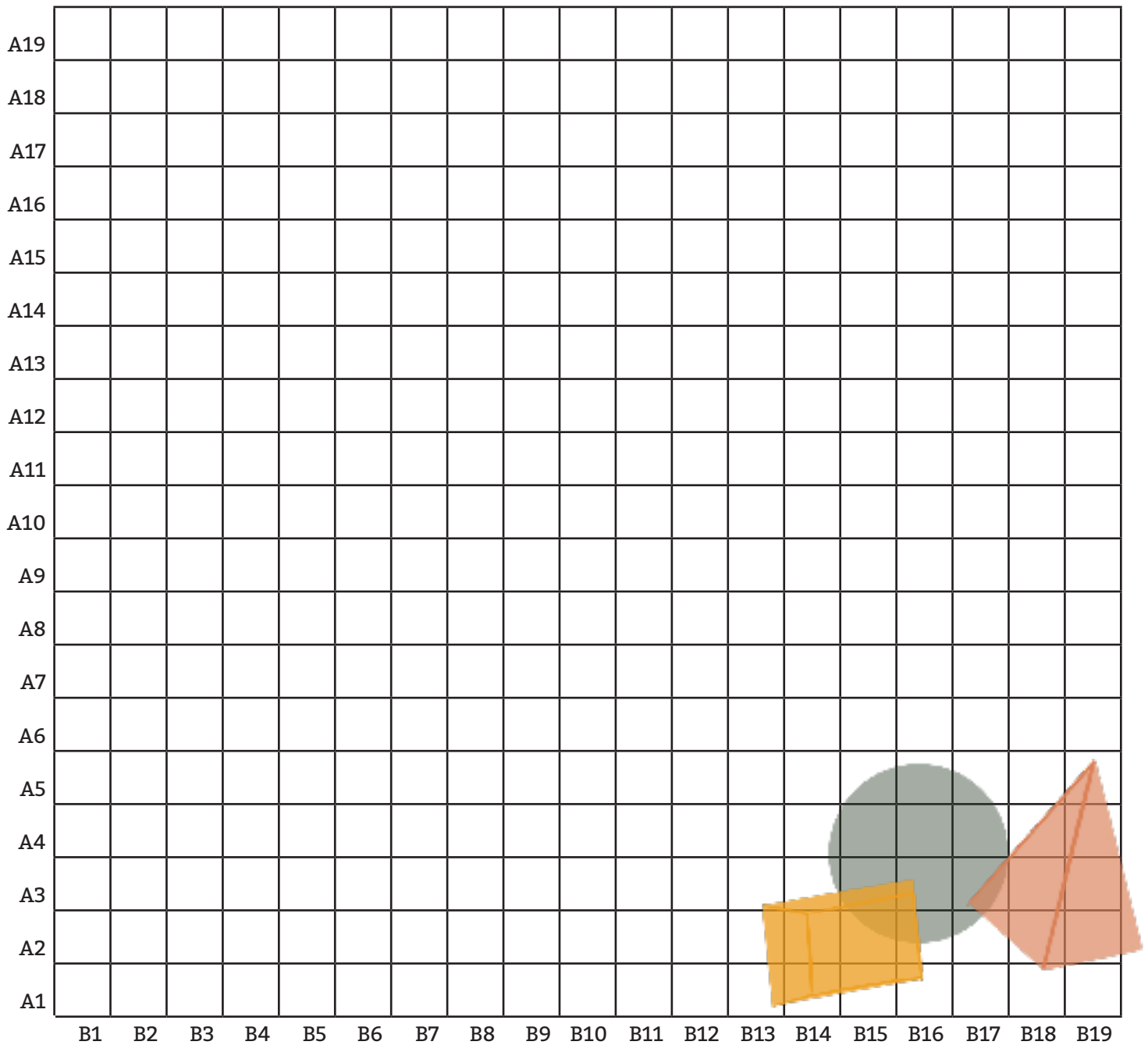
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# Comprehensive: TASK 4 the ARCHITECTURE

Draw a replica of the land you are developing and the project you will be developing onto the land. Draw and label using identifiable geometric shapes (circle, cube, rectangle, square, cone, cylinder, hexagon, etc). Label each geometric shape and the area and perimeter of land.



C27																						
C26																						
C25																						
C24																						
C23																						
C22																						
C21																						
C20																						
C19																						
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	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12	D13	D14	D15	D16	D17	D18	D19			

# Comprehensive: **TASK 5** construction REPORT

Answer the following questions based on what you designed on the previous pages:

Choose 3 buildings or structures in your town to measure. Write down their measurements here.








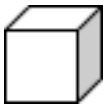

Name of Building	Area	Perimeter

Choose 3 buildings or structures in your town. Write the ordered pair for its approximate location.

Example: (B16, A5) or (D10, C21)

Name of Building	Ordered Pair Location

What shapes did you use in constructing your design?  
 Write a number 0-10 on the line beside the name/picture of each geometric shape that you might have used.

 Circle _____	 Square _____	 Triangle _____
 Rectangle _____	 Diamond _____	 Pentagon _____
 Cone _____	 Cube _____	 Cylinder _____

What fraction of your shapes are quadrilaterals? Percentage?

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What fraction of your shapes are 2-dimensional? Percentage?

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What fraction of your shapes are 3-dimensional? Percentage?

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What fraction of your shapes are polygons? Percentage?

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Comprehensive: **TASK 6**

# Presentation & Reflection

Present your work and ideas before your city planners. Call your local government to arrange this. Be sure to include in your presentation, the following:

- Data collected from demographics and research
- Data collected from your public survey
- Mock budget that you drafted based on real-world numbers
- Written explanation of the public benefit from your project
- Visual demonstrations (i.e. poster, power point, pamphlet, etc..)

Write to share about your experience with this project.

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Videotape your presentation experience and upload your video privately to Youtube. Write your URL code here:

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# Comprehensive Project Rubric

	Neatness	Creativity	Effort	Mathematic Understanding
Mastery	The project was completed very neatly with great attention to detail.	The child utilized their imagination and displayed out-of-the-box thinking when designing their city.	The child put a lot of time and effort into this project, taking great pride in their work.	The child showed thorough understanding of shapes, measurement, ordered pairs, data collection, and graphing throughout the project.
Progressing	The project was completed somewhat neatly. The child displayed some attention to detail.	The child showed some creativity when designing their city.	The child put some time and effort into this project, sometimes taking pride in their work.	The child showed some understanding of shapes, measurement, ordered pairs, data collection, and graphing throughout the project.
Developing	The project was incomplete or completed messily with little or no attention to detail.	The child showed little creativity and/or interest when designing their city, needing much prompting along the way.	The child showed disinterest and put little effort into the project.	The child showed little to no understanding of shapes, measurement, ordered pairs, data collection, and graphing throughout the project.