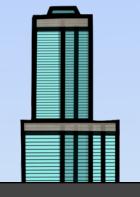
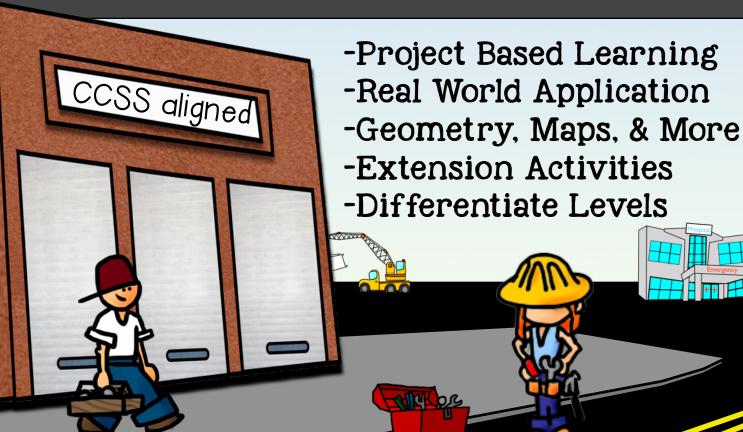


Imagine, Design, and Build a City with this 2D & 3D Adventure!



BUILDING A CITY WITH MATH



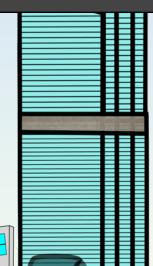


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p62-64 Phase Six: Tourism

p65-67 Phase Seven: Challenge

p68-78 Differentiated Phase Two:

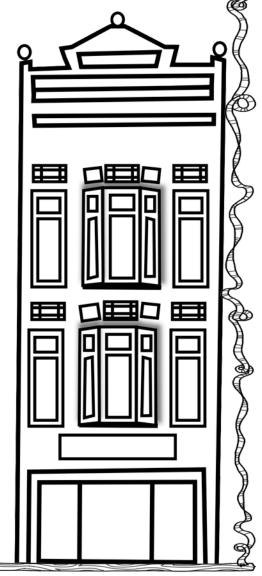
Design and Build sections

79-80 Credits

6000000000000









About this Project



Geometrocity is a project based learning activity where students will take their geometry skills and design their own city. This multi-tiered activity allows for immediate differentiation because of it's size, and students may complete parts or the entire project based on your choosing. This project doesn't just focus on math skills, as there are components of social studies (mapping skills), writing, problem solving and comprehension skills too.

Students will be creating a city that uses 2D and 3D, practicing both plane and solid geometry. Students will utlize many types of geometric skills such as building nets to create buildings and structures along with designing parts of a city with shapes, lines, angles, and more.

Geometrocity is broken into SEVEN phases.

Those phases are:

Phase One: Permits

-Reviewing and previewing geometric terms and visuals. Creating a mini-map.

Phase Two: Design & Build

-Up to nine city sections can be built. Each page has 10-14 requirements that must be completed.

Phase Three: Construction

-Putting our city together for the world to see.

Phase Four: Building Up

-Using nets and 3D to make the city rise above the paper.

Phase Five: Assessment

-Three types of self-assessments for students. Self, Individual, and group work.

Phase Six: Tourism

-Create a postcard to persuade visitors to come.

Phase Seven: Challenge

-5 extra higher level challenges for students that want to create more.

This project aims to focus on geometry, but there are so many other elements of learning present which include problemsolving, making inferences, collaboration, communication, independent learning, and more.

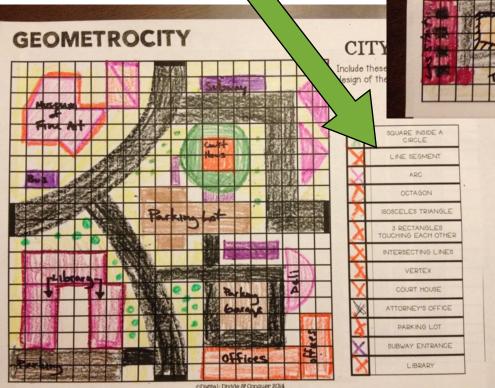
Tips & Ideas:

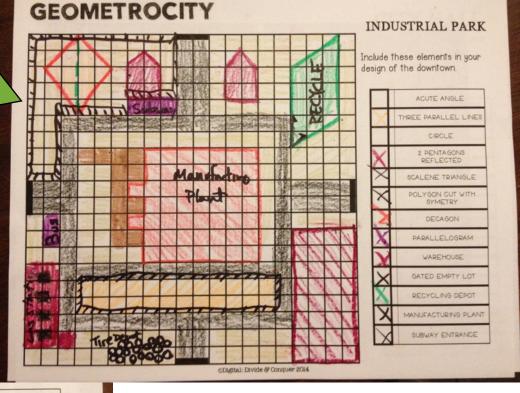
- This project can be done individually or within a group. It is up to teacher discretion. Teachers can assign this for individuals or as a group project with each participant taking sections and they work together to build a city.
- In my classroom, I will project files like this on our whiteboards so that students and teachers can discuss the instructions and objectives.
- Included at the beginning of this file are some pages filled with different types of maps. Use these as an opportunity to show the differences.
- I've included a set of images giving examples of different phases of the project.
- As student begin to construct their city they may want to add cardboard underneath their paper for increased stability.

MATH Common Core Standards
CCSS.MATH.CONTENT.3.G.A.1
CCSS.MATH.CONTENT.3.G.A.2
CCSS.MATH.CONTENT.4.G.A.1
CCSS.MATH.CONTENT.4.G.A.2
CCSS.MATH.CONTENT.4.G.A.3
CCSS.MATH.CONTENT.5.G.B.3
CCSS.MATH.CONTENT.5.G.B.4
CCSS.MATH.CONTENT.5.G.B.4

During the design phase, students will create the city on sections that look like this.

As long as users follow the checklist on the right side of the page they, may design it however they would like.





Labeling, coloring, and details are extremely important. The more you have the better your city will look.

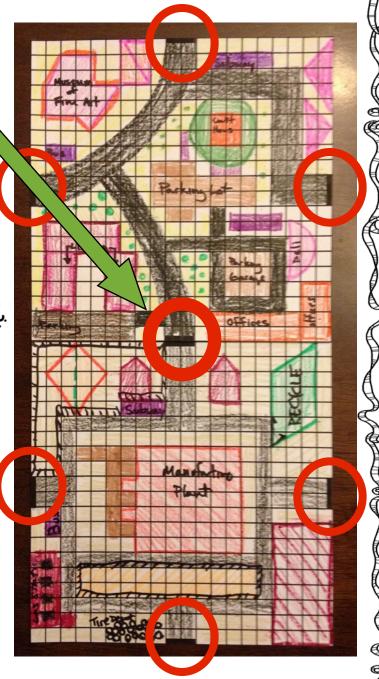
Try and use as many geometry elements as you build each section.



These finished sections of PHASE TWO have been cut out. Notice how they can match up anyway because the roads match up.

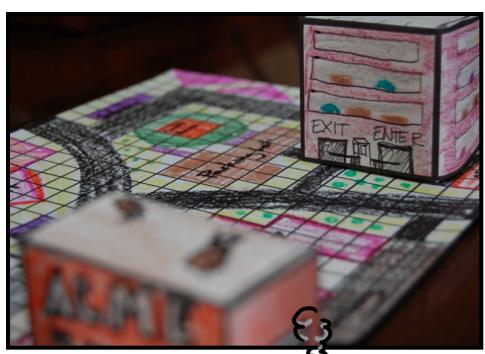
It is important to always have roads at each point. That way you can move your city around or you can match it up with a classmates.



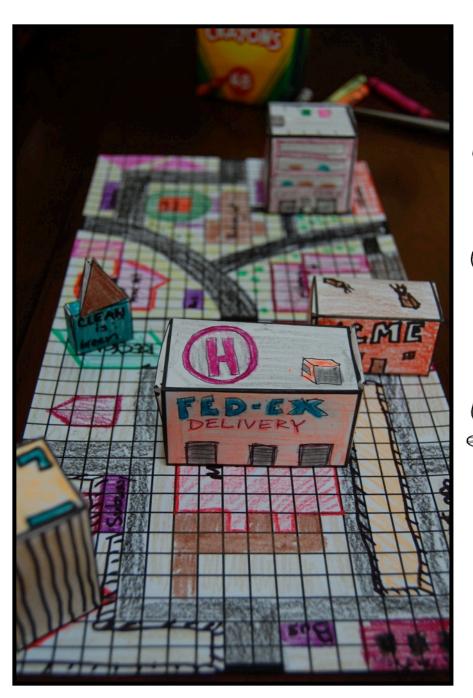


Here's a look at some of the finished nets that have turned the city into a 3D city from PHASE THREE: Building Up.

There are multiple net sizes to choose from that are small to large. Don't forget that they can be added to another one too.









PHASE SEVEN: CHALLENGE

Raised Railway

Skyscraper



Highway





Mapping Skills

Over the next four pages, you will see different types of maps.

One was created a long time ago, while the others were made more recently. Look closely and discuss with your classmates and teacher some of the differences and similarities between them.

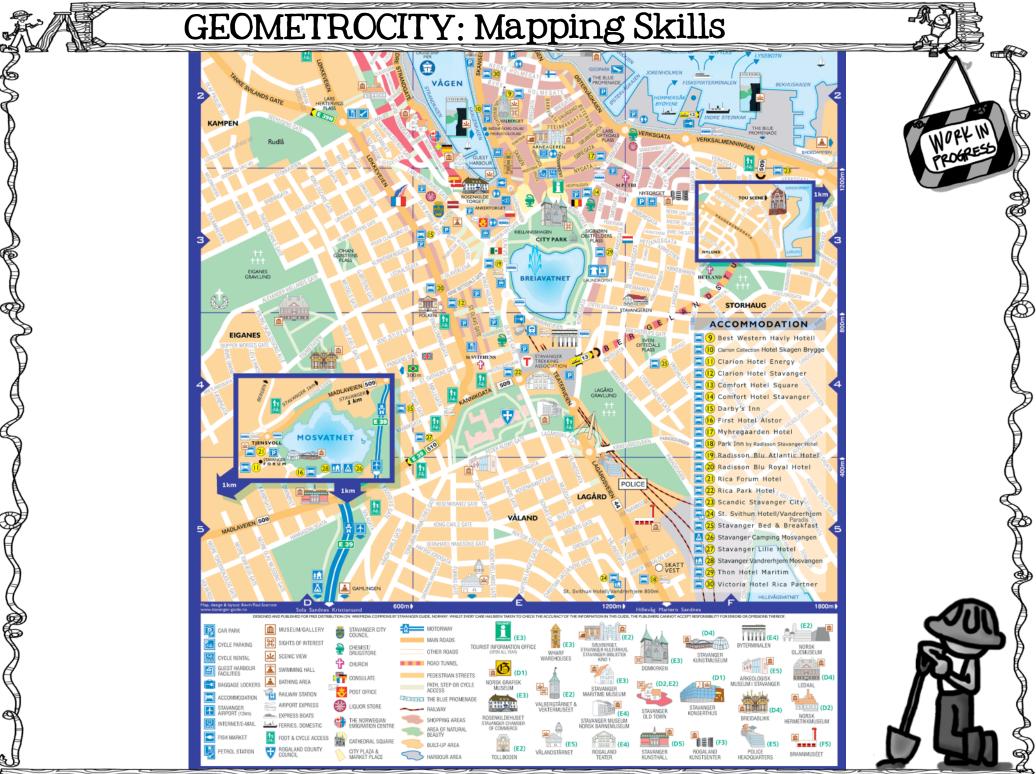
Use these questions to drive the discussion:

- How is each map different from the others?
- . How is each map the same as all the others?
- What is each map focusing on? How do you know?
- · Which is more appealing to you? Why?
- . What kinds of patterns do you see?

There are also a handful of websites for students to use to improve mapping skills:

- Social studies maps: http://classroom.jc-schools.net/basic/ssmaps.html
- National Geographic: http://education.nationalgeographic.com/education/mapping/kd/?
 ar>a=5
- World maps: http://www.yourchildlearns.com/map-





The objective of this project is to create a city from scratch by using learned geometry skills and concepts such as:

• Plane Geometry

Symbols

2D Shapes

Solid Geometry

Coordinates

• 3D Shapes

Polygon

• Area &

Transformations

Angles

Perimeter

And More

**This project can be completed independently or as a group (your teacher will make that decision).

You are encouraged to be CREATIVE and use your IMAGINATION with this city. Use your classmates, the Internet, and other resources to make sound decisions. Look at maps, pictures, videos, and collaborate with others to build your ideal city.

As you move through this project there will be certain requirements that must be met, too, but they will be stated clearly for you to see.

Many of the math concepts are used daily in real-world situations such as architecture and design. It is important you recognize the real-world applications of lessons learned in school.

You'll be demonstrating your skills within geometry to create a city made of math, Geometrocity.





To:(your name here)

From: City Council of Geometrocity

Congratulations! You have been chosen to design a new city for us. There were thousands of applicants, but we chose you! We think that your knowledge and skills are just what is needed to create this new city.

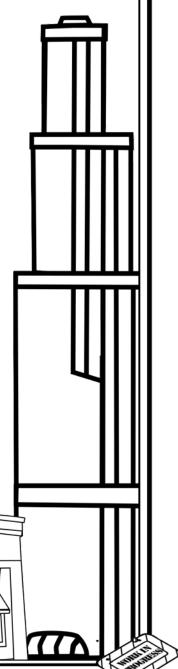
Your job is to create a city filled with math concepts: geometry, to be more specific. Many people don't know this but all cities, towns, and buildings are created with math skills as a foundation. This city will be no different and it will be important for you to showcase your geometrical skills to make this a successful place.

You are the architect. You will determine whether this city succeeds or becomes bogged down in city politics and never develops. As lead architect, you will be tasked with creating city infrastructure such as buildings, roads, parks, and more. Along the way, you will have specific design elements that must be incorporated with each portion of the city.

This entire project can be completed individually or you may work with a team. The city council feels comfortable that you'll make the correct decision.

We look forward to seeing your work.

Sincerely, City Council

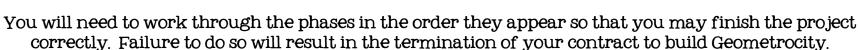


Building Schedule



This project will be broken up into THREE phases.

PERMITS, DESIGN, & CONSTRUCTION

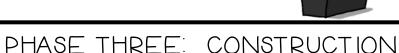


PHASE ONE: PERMITS

Mr. Mayor and the City Commissioner have a set of tasks for you to complete to prove you understand geometry enough to build their city. If you pass you'll get the permits to begin building. Let's hope you know your geometry.

PHASE TWO: DESIGN & BUILD

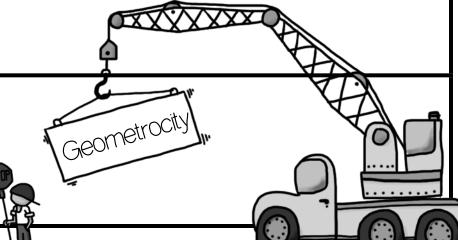
You and your team begin to build the city. There are nine different sections of the city. In each section there are rules and requirements you must follow. Before you begin working on Phase Two you will read a tutorial to assist you.



It's time to put your city together.

Cutting, gluing, and assembling is your job.

*All the sections from PHASE TWO will begin and merge together and a city will rise.

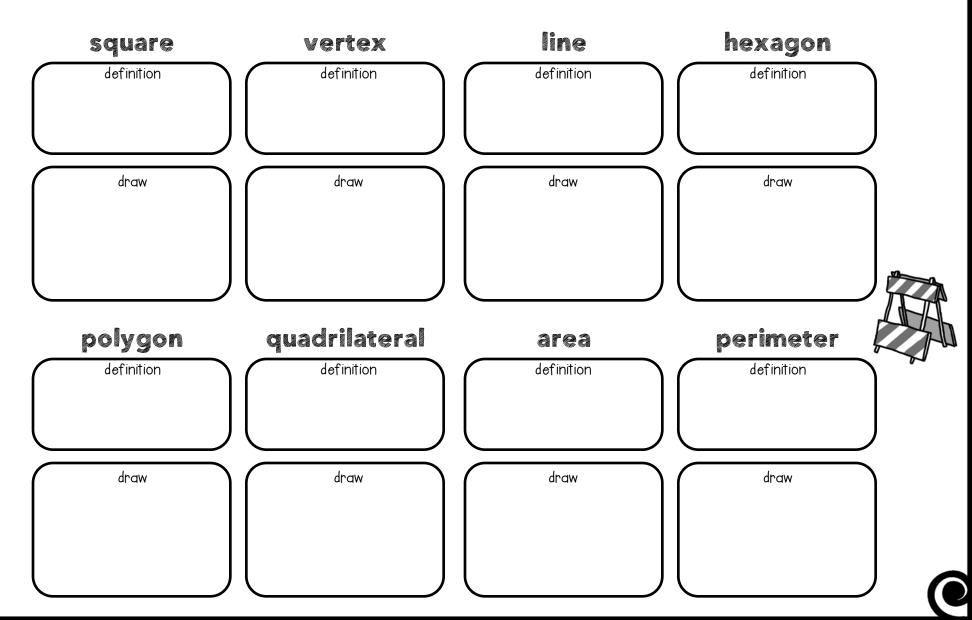




PHASE ONE: PERMITS



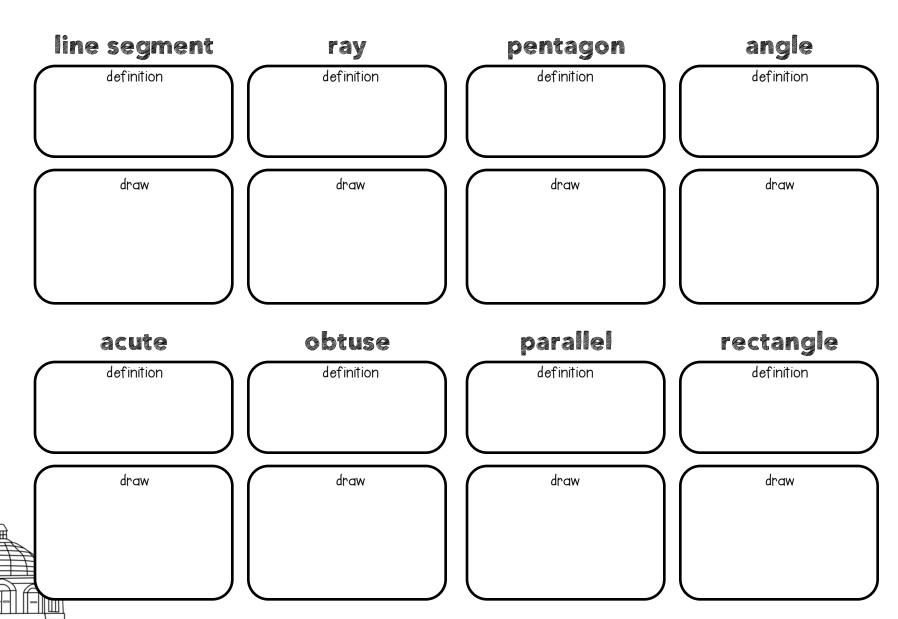
Mr. Mayor is all about the politics, so you're not done yet. Now he wants you to define the geometry terms listed below and draw a picture of each one.



PHASE ONE: PERMITS



Mr. Mayor is all about the politics, so you're not done yet. Now he wants you to define the geometry terms listed below and draw a picture of each one.



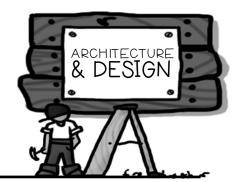
PHASE TWO: DESIGN & BUILD



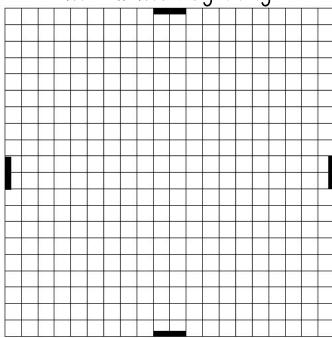
On the next few pages you'll build your city using these sections:

- Downtown
- Suburbs
- City Hall

- Industrial Park
- Business DistrictPark District
- City Living
- Public WorksEntertainment



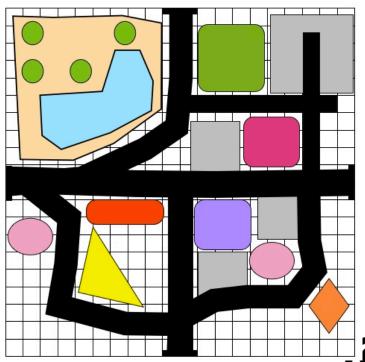
Each section looks like this at the beginning.

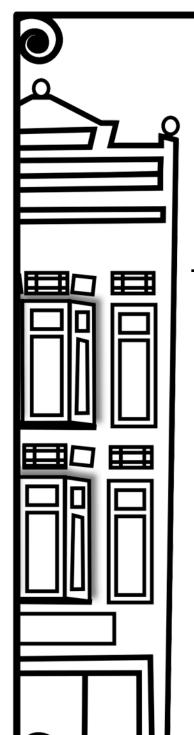


Your job is to fill this section using the listed requirements and your creativity to build Geometrocity.



You get to make it look like this.







PHASE TWO:

DESIGN & BUILD



CHECKLIST

Over the next few pages on the right side of the paper will be a checklist. You must include all of these elements into each of the sections.

You'll notice that the first 7-9 items are geometry and the last few are areas within a city. You may combine some of these elements together if you want.

Check off each one when you complete it to help you - stay organized.

You are encouraged to add many more elements to each section to create a thriving city.

	2 SQUARES					
	PENTAGON					
	4 POINTS					
	RECTANGLE					
	RIGHT TRIANGLE					
X	ELLIPSE					
	OBTUSE ANGLE					
	PARALLEL LINES					
X	ROTATION					
X	PARKING GARAGE					
	SKYSCRAPER					
	HOTEL					
	RESTAURANT					

LABELING

You should label your geometry answers as best as possible through highlighting with markers, colored pencils, pens, or crayons.

Try and make the geometry pop out, but also blend in at the same time. This can be a difficult skill, but with practice you'll accomplish it.

DO TRY and label buildings, roads, parks, and other aspects of the city.

You will have to write neat and small. TAKE YOUR TIME! Make it take just as long as real road construction.

GOOD LUCK!

PHASE TWO: DESIGN & BUILD



Each section has four black bars on each side. Look at the images below for reference.

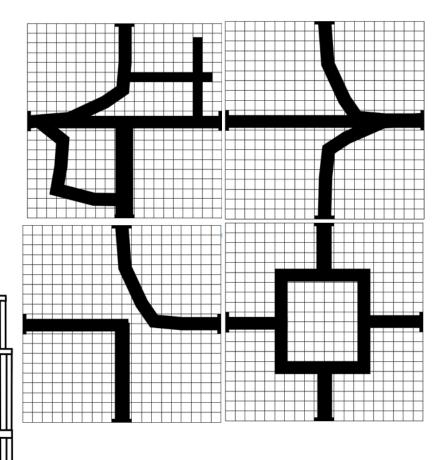
**You MUST have roads coming in and out at each black bar per section. You may add more roads in each inside each section.

Each section has four black back bars like these on each side.

These will be used as markers to connect each section together.

The roads must begin and exit on those spots so you may piece it together when you are all finished.

See how all the roads can connect below.

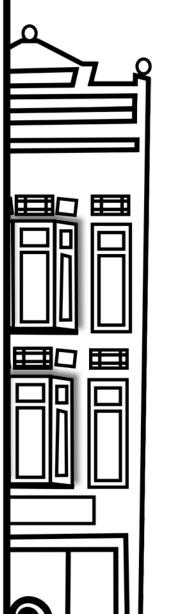




PHASE TWO: DESIGN & BUILD



Use this list of places to assist you in building your city.



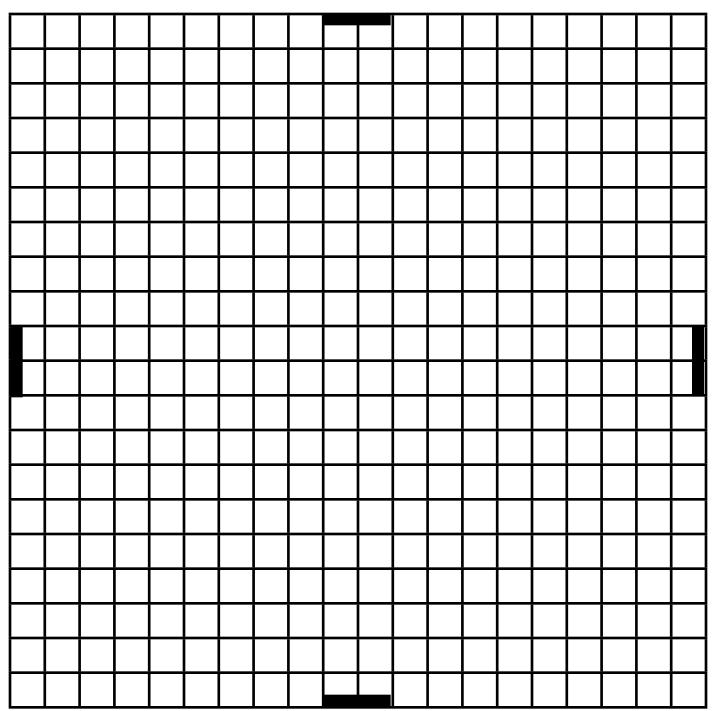
apartment block duplex cathedral store diner skyscraper library coffee shop dry cleaners courthouse prison school barber shop gym college

house road bungalow church pharmacy station tower museum mall laundromat nursing home park daycare book store arena salon

condo highway terrace temple restaurant police station building theater shopping center department store hospital gas station airport beach stadium toy store

street intersection garage office fast food first station town hall bakery drive-in county building jail bowling alley bank snack shop concert venue arcade

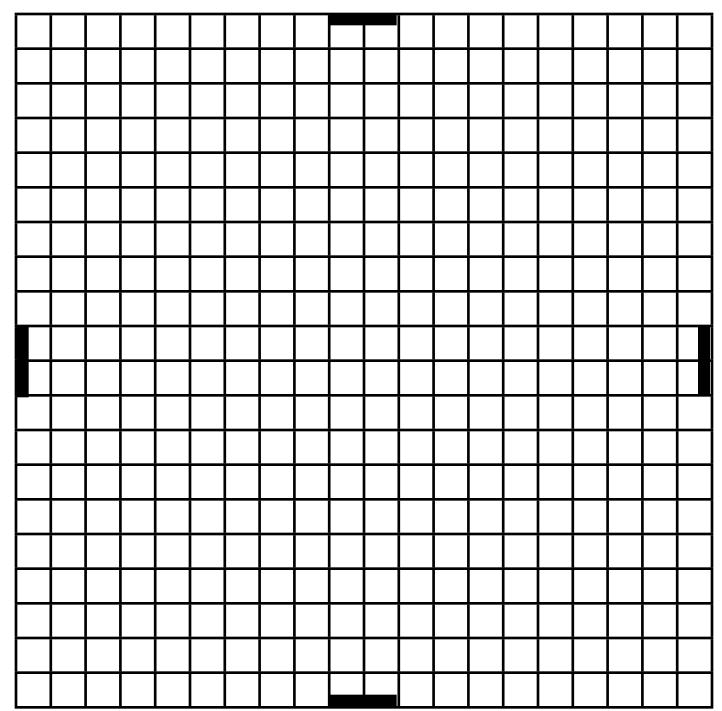




DOWNTOWN

Include these elements in your design of downtown.

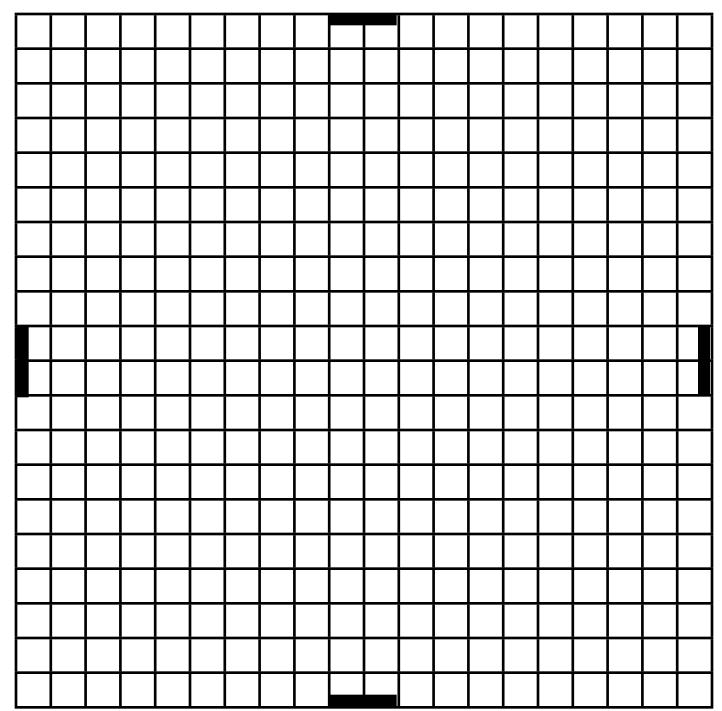
2 SQUARES				
PENTAGON				
4 POINTS				
RECTANGLE				
RIGHT TRIANGLE				
ELLIPSE				
OBTUSE ANGLE				
PARALLEL LINES				
ROTATION				
PARKING GARAGE				
SKYSCRAPER				
HOTEL				
RESTAURANT				



SUBURBS

Include these elements in your design of the suburbs.

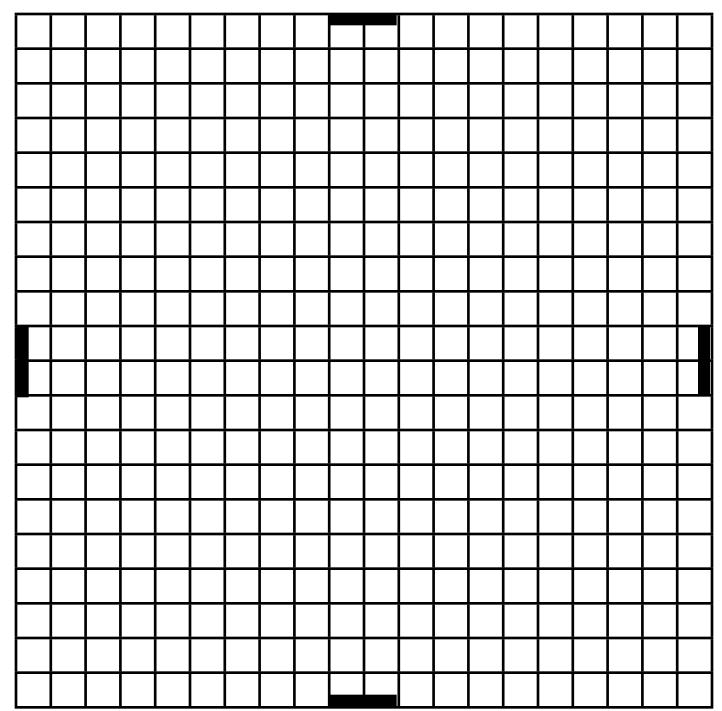
4 RECTANGLES					
5 SQUARES					
SCALENE TRIANGLE					
LINE SEGMENT					
RHOMBUS					
TRAPEZOID					
INTERSECTING LINES					
OBTUSE ANGLE					
CHURCH					
SCHOOL					
GAS STATION					
PHARMACY					
PARK					



CITY HALL

Include these elements in your design of city hall.

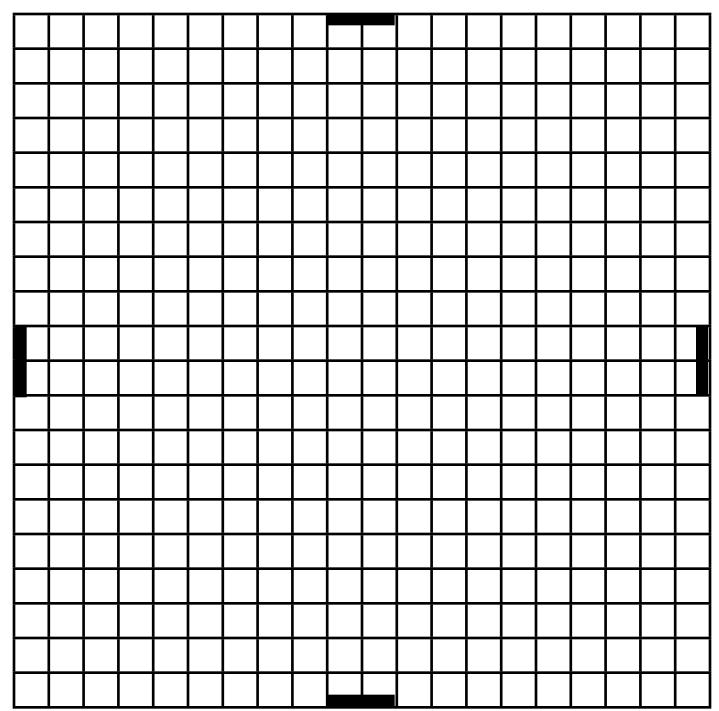
SQUARE INSIDE A CIRCLE				
LINE SEGMENT				
ARC				
OCTAGON				
ISOSCELES TRIANGLE				
3 RECTANGLES TOUCHING EACH OTHER				
INTERSECTING LINES				
VERTEX				
COURT HOUSE				
ATTORNEY'S OFFICE				
PARKING LOT				
SUBWAY ENTRANCE				
LIBRARY				



INDUSTRIAL PARK

Include these elements in your design of the industrial park.

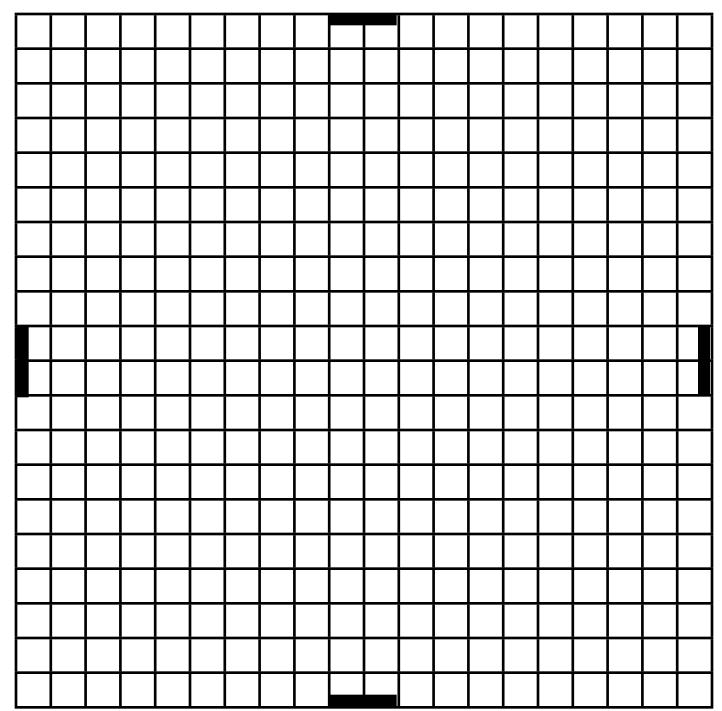
ACUTE ANGLE			
THREE PARALLEL LINES			
CIRCLE			
PENTAGON			
SCALENE TRIANGLE			
POLYGON CUT WITH SYMMETRY			
DECAGON			
PARALLELOGRAM			
WAREHOUSE			
GATED EMPTY LOT			
RECYCLING DEPOT			
MANUFACTURING PLANT			
SUBWAY ENTRANCE			



PUBLIC WORKS

Include these elements in your design of the public works.

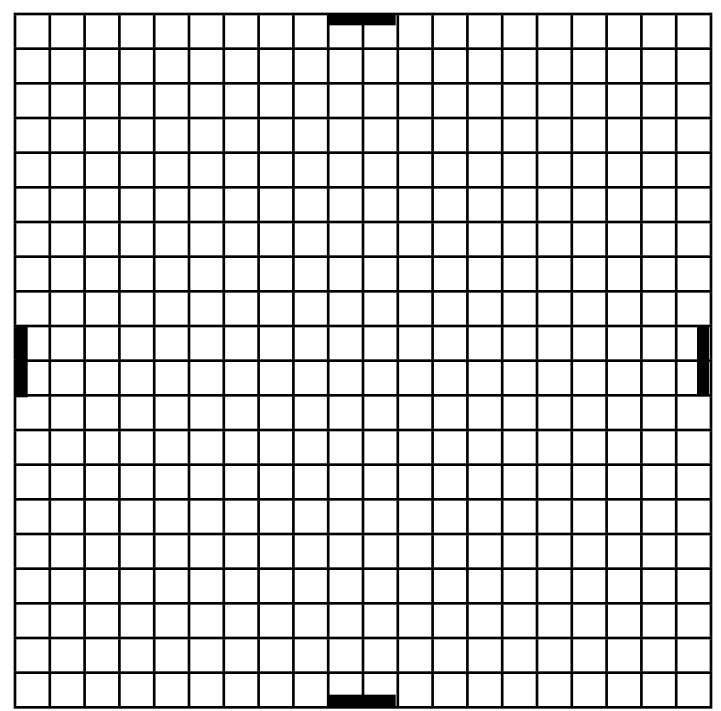
THREE TRIANGLES				
LINE OF SYMMETRY THROUGH A POLYGON				
PENTAGON TOUCHING A RECTANGLE				
2 EQUILATERAL TRIANGLES				
OCTAGON				
INTERSECTING LINES				
OBTUSE ANGLE				
POLICE STATION				
FIRE HOUSE				
CITY WATER				
TRAIN STATION				
SEWAGE TREATMENT FACILITY				
POST OFFICE				



BUSINESS DISTRICT

Include these elements in your design of the business district.

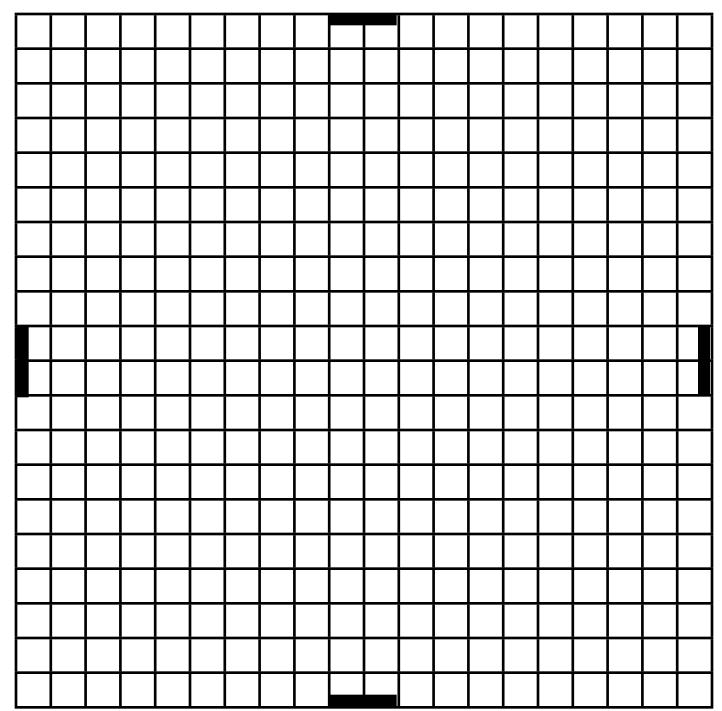
LINE OF SYMMETRY			
SCALENE TRIANGLE			
STRAIGHT ANGLE			
2 RECTANGLES SHOWING A REFLECTION			
2 SQUARES			
3 TRIANGLES ALL CONNECTED			
ELLIPSE			
BANK			
HOTEL			
5 TAXIS			
PAWN SHOP			
OFFICE BUILDING			
COFFEE SHOP			



PARK DISTRICT

Include these elements in your design of the park district.

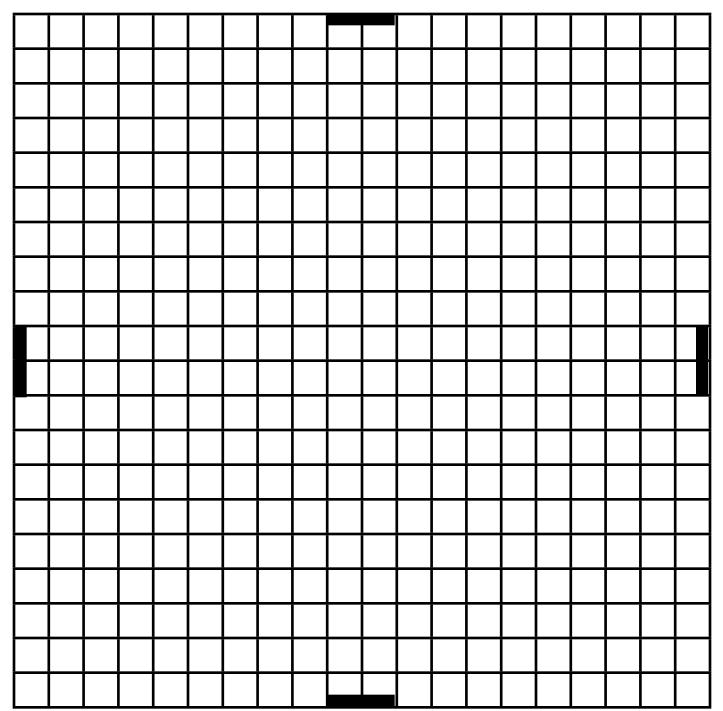
RHOMBUS			
ARC			
CIRCLE			
ACUTE ANGLE			
HEXA GON			
PERPENDICULAR LINES			
ISOSCELES TRIANGLE			
VERTEX			
BASEBALL FIELD			
PARK			
FOREST PRESERVE			
PARK			
POND			



CITY LIVING

Include these elements in your design of city living.

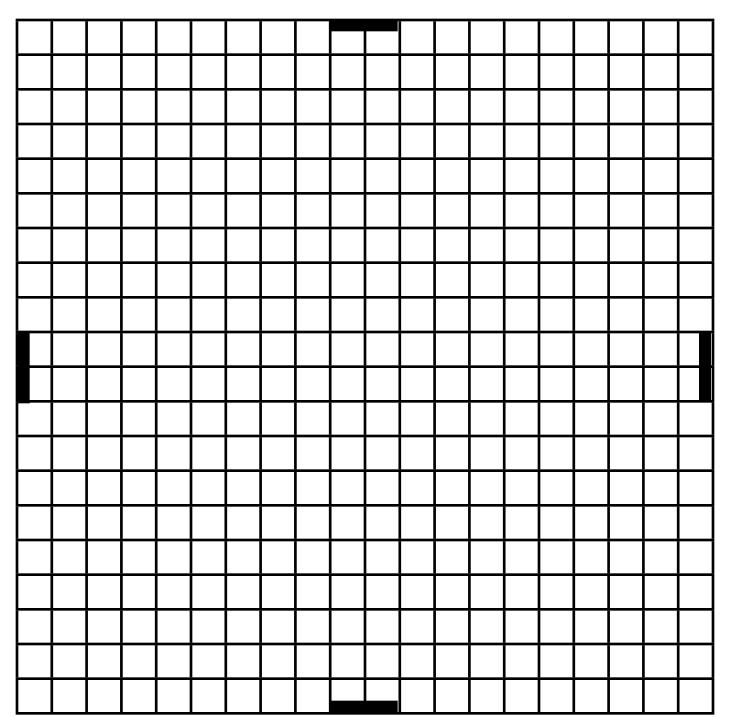
TRAPEZOID			
LINE INTERSECTING TWO PARALLEL LINES			
HALF-CIRCLE			
STRAIGHT ANGLE			
POLYGON			
4 POINTS			
TWO RAYS WITH THE SAME ENDPOINT			
LINE SEGMENT			
3 APARTMENT BUILDING			
LAUNDRY MAT			
DOG PARK			
GROCERY STORE			
FAST FOOD EATERY			



TOURIST ATTRACTION

Include these elements in your design of tourist attractions.

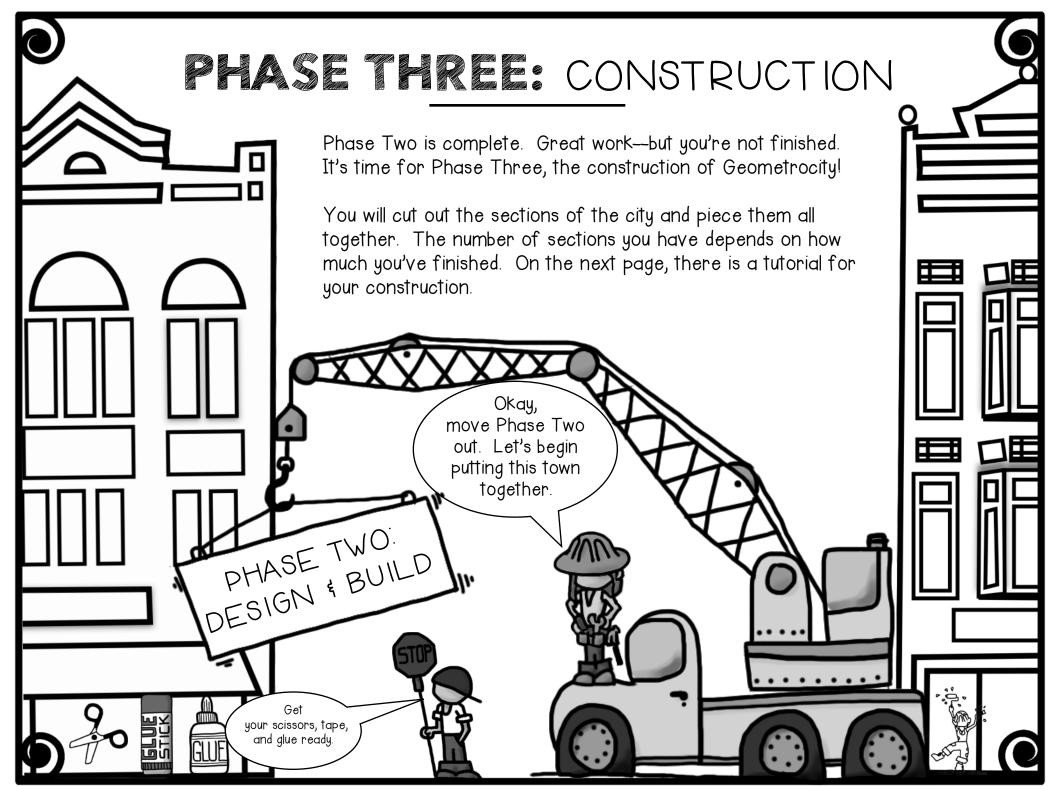
_					
	CIRCLE INSIDE A SQUARE				
	SQUARE CUT INTO FOUR EQUAL PARTS				
	ARC				
	ACUTE ANGLE				
	RADIUS				
	10 VERTICES				
	ASYMMETRICAL SHAPE				
	SEPTAGON				
	MUSEUM				
	OPERA HOUSE				
	SPORTS ARENA				
	ZOO				
	AQUARIUM				



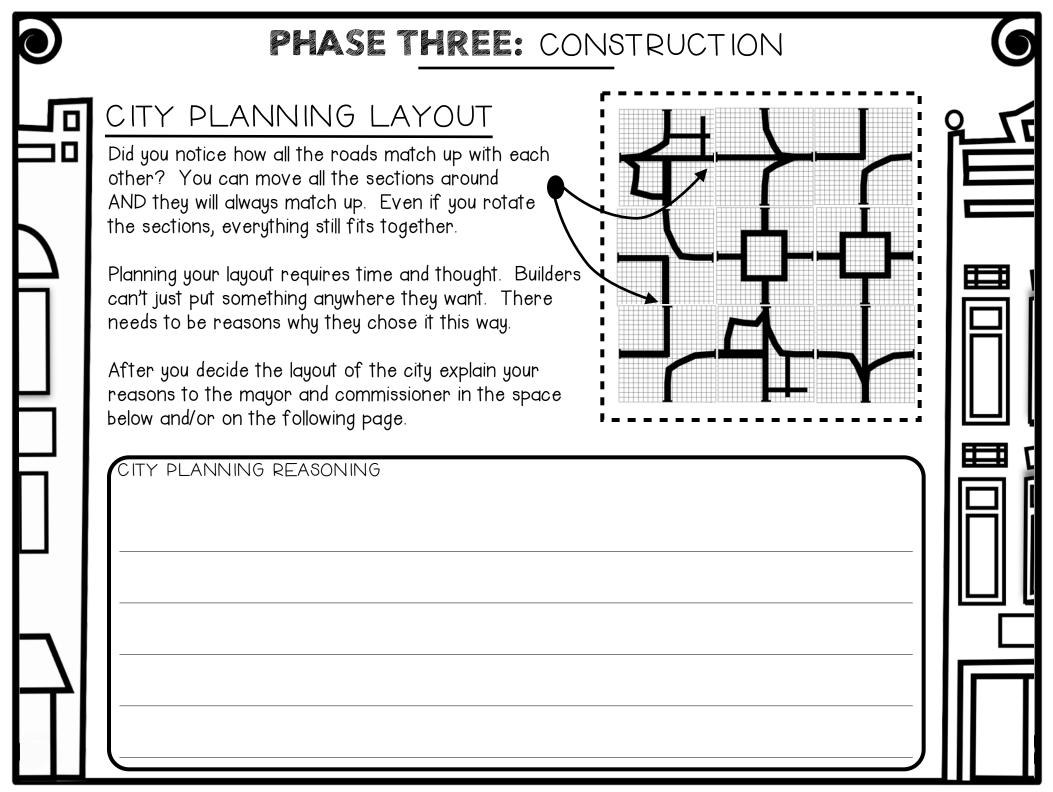
ENTERTAINMENT

Include these elements in your design of the entertainment.

LINE WITH 3 SEGMENTS			
IRREGULAR POLYGON			
INTERSECT			
KITE			
NONA GON			
COMPLIMENTARY ANGLE			
REFLECTION OF 2 RHOMBUS'			
TANGENT			
MOVIE THEATER			
MUSEUM			
3 RESTAURANTS			
3 ATM MACHINES			
DANCE HALL			



PHASE THREE: CONSTRUCTION When all the sections are cut out, Take each section from lay them down and begin to visualize Phase Two and cut them out. how you would like your city to look. If you cut out nine sections it would look something like this. GO SLOW when cutting! REMEMBER: Add color to all the city sections. It adds details and looks great. Go to the next page after you cut and laid out all your pieces.





PHASE FIVE: ASSESSMENT

6



SELF ASSESSMENT

Now that you've finished Geometrocity, let's assess how well you think you did with the project. Answer each question by circling the numbers that fits best.

I know the geometry terms.	every single one	most of them	needed help with a couple	more practice needed
I was able to follow the directions.	all the time	most of the time	asked a friend	asked the teacher
Geometry is	great	good	okay	boring
What was the most difficult part of this project?				
I included many details in my work		YES	NO	
I did my best work.	excellent	good	fair	needs improvement
All my work is legible and neat	excellent	good	fair	needs improvement
My ideas were	awesome	good	average	I could do better
If I could add more to this project it would be to				

PHASE FIVE: ASSESSMENT

SELF ASSESSMENT: INDEPENDENT WORK Circle an answer for each statement below.

During this project I...

worked hard	needs improvement	fair	good	excellent
focused when I needed to	needs improvement	fair	good	excellent
felt confident in my abilities	needs improvement	fair	good	excellent
stayed on task	needs improvement	fair	good	excellent
communicated with teachers and students appropriately	needs improvement	fair	good	excellent
was a complex thinker	needs improvement	fair	good	excellent
used resources to help me	needs improvement	fair	good	excellent

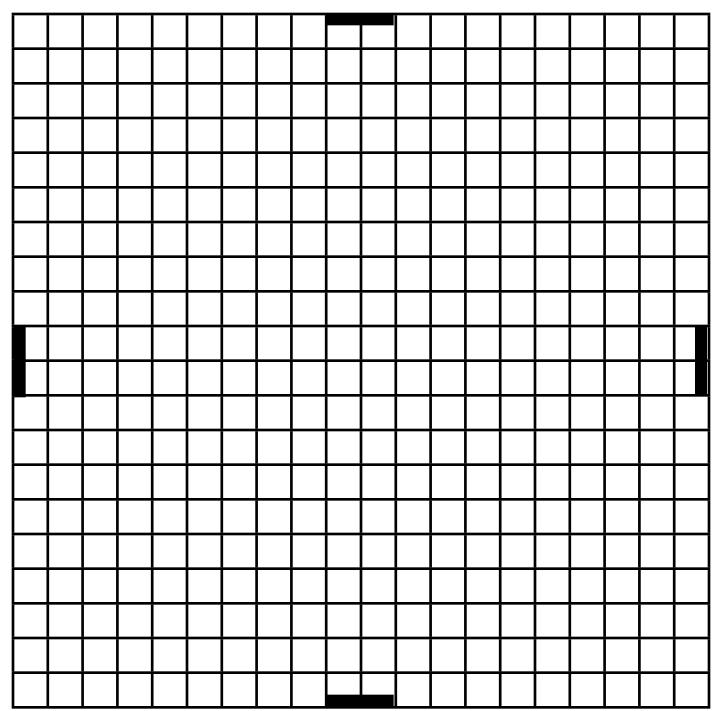


SELF ASSESSMENT: GROUP WORK

Circle an answer for each statement below.

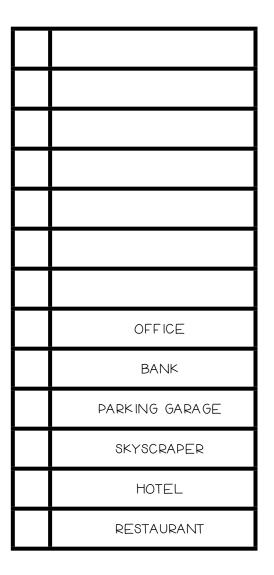
During this project I...

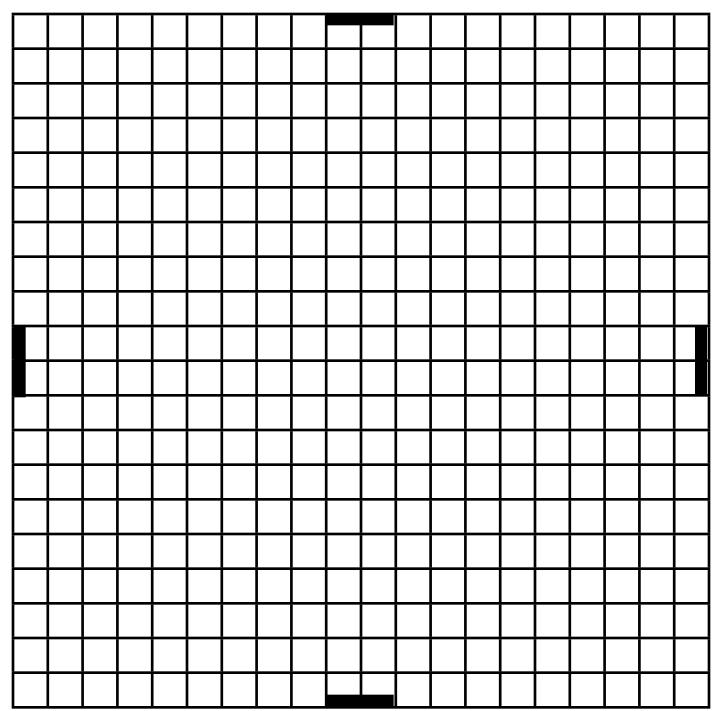
	communicated with my team	needs improvement	fair	good	excellent
	collaborated with my team	needs improvement	fair	good	excellent
	demonstrated respect to all teammates.	needs improvement	fair	good	excellent
7	solved complex problems with my teammates.	needs improvement	fair	good	excellent
	shared responsibilities with my team.	needs improvement	fair	good	excellent
	celebrated great ideas with my team!	needs improvement	fair	good	excellent
	stayed focused and on task with my team.	needs improvement	fair	good	excellent



DOWNTOWN

Include these elements in your design.

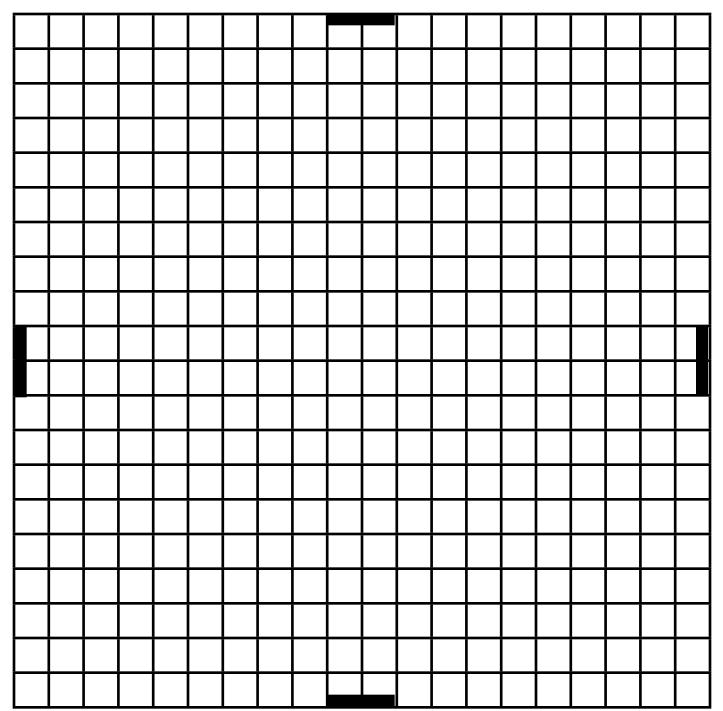




SUBURBS

Include these elements in your design.

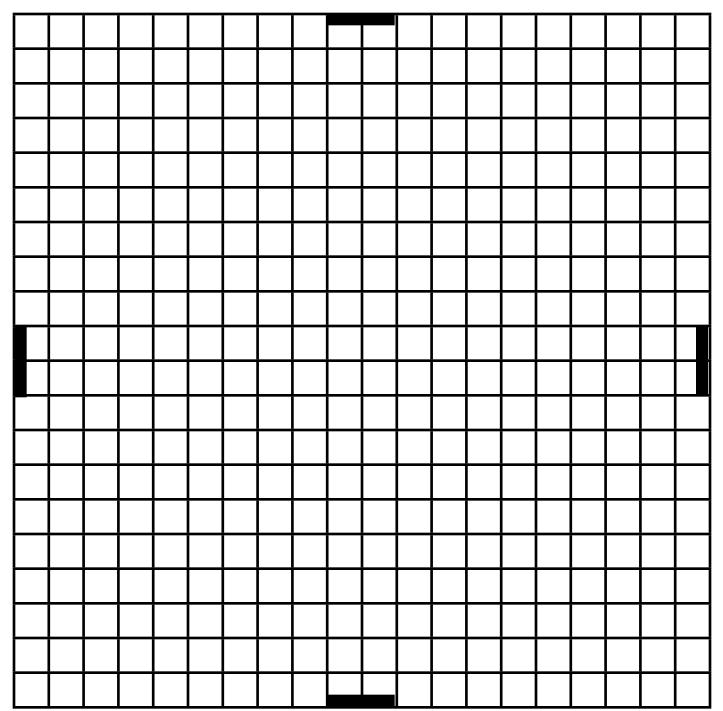
SHOPPING CENTER
GROCERY STORE
SCHOOL
GAS STATION
NEIGHBORHOOD
PARK



CITY HALL

Include these elements in your design.

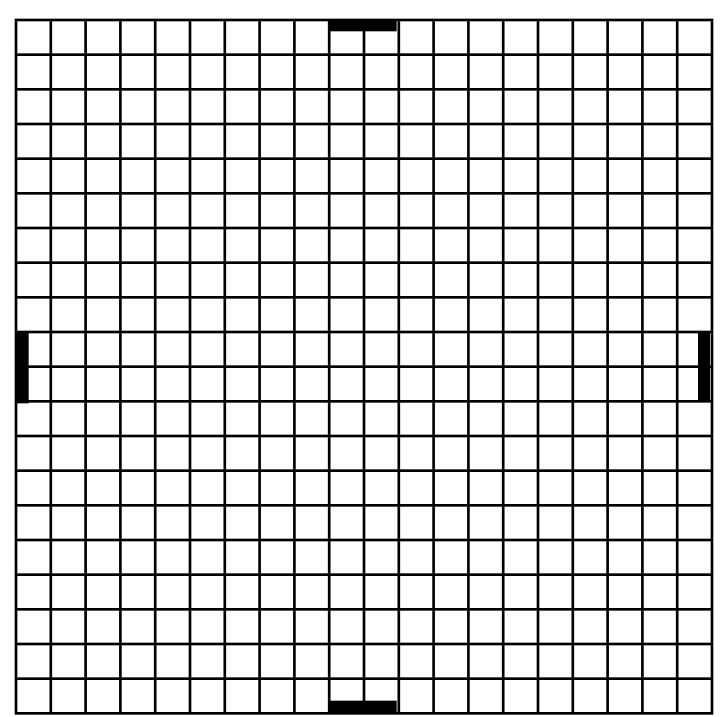
JA IL
COURT HOUSE
ATTORNEY'S OFFICE
PARKING LOT
SUBWAY ENTRANCE
LIBRARY



INDUSTRIAL PARK

Include these elements in your design.

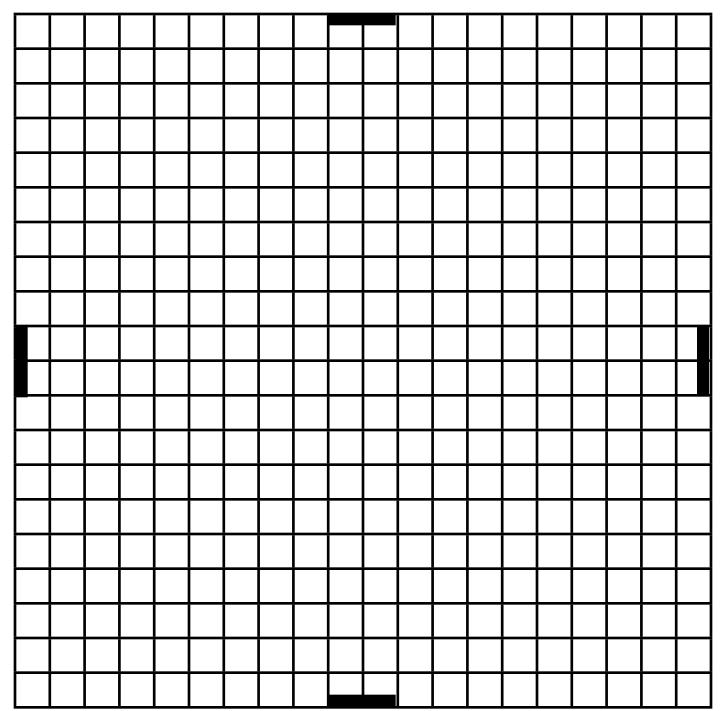
FACTORY
WAREHOUSE
GATED EMPTY LOT
RECYCLING DEPOT
MANUFACTURING PLANT
SUBWAY ENTRANCE



PUBLIC WORKS

Include these elements in your design.

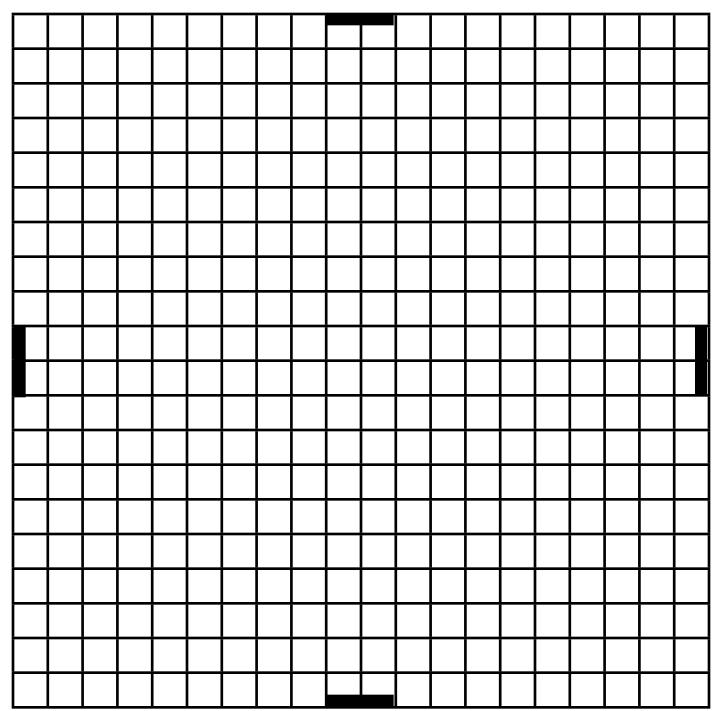
POLICE STATION
FIRE HOUSE
CITY WATER
TRAIN STATION
SEWAGE TREATMENT FACILITY
POST OFFICE



BUSINESS DISTRICT

Include these elements in your design.

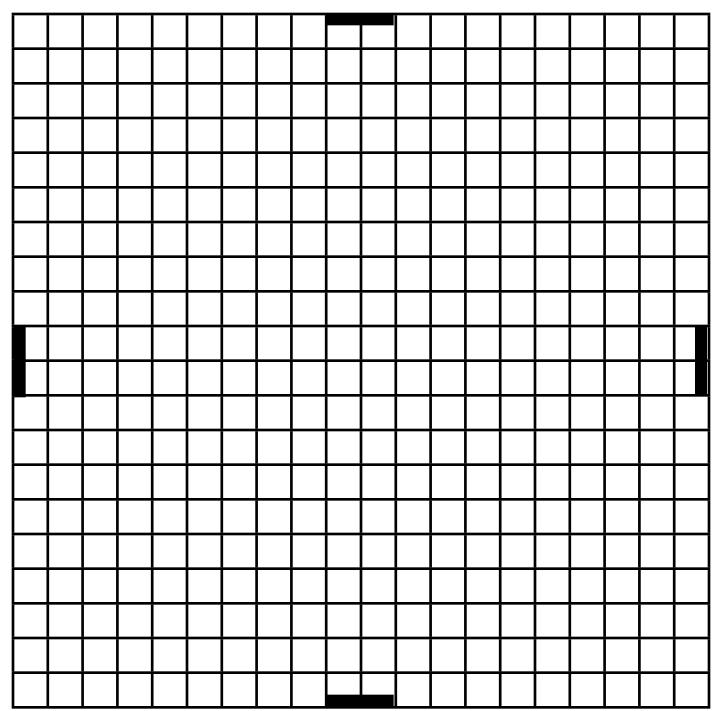
BANK	
HOTEL	
5 TAXIS	
PAWN SHOP	
OFFICE BUILDING	
COFFEE SHOP	



PARK DISTRICT

Include these elements in your design.

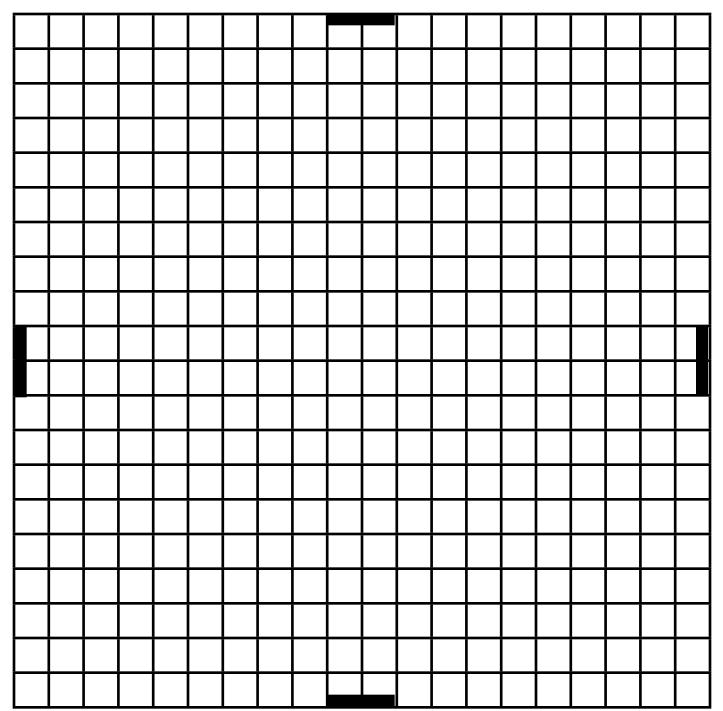
	BASEBALL FIELD
	PARK
	FOREST PRESERVE
	PARK
	POND



CITY LIVING

Include these elements in your design.

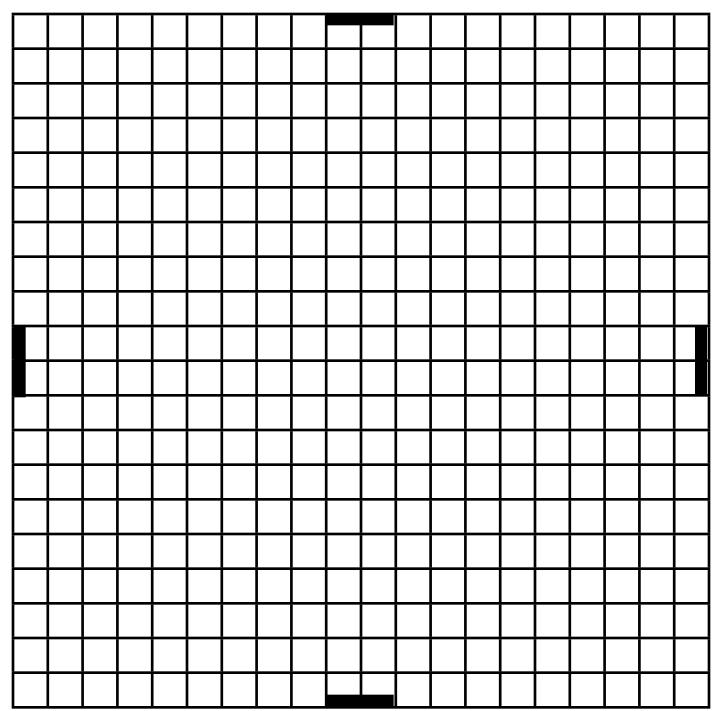
BEAUTY SHOP
3 APARTMENT BUILDING
LAUNDRY MAT
DOG PARK
GROCERY STORE
FAST FOOD EATERY



TOURIST ATTRACTION

Include these elements in your design.

	MUSEUM
	OPERA HOUSE
	SPORTS ARENA
	Z00
	AQUARIUM



ENTERTAINMENT

Include these elements in your design.

MOVIE THEATER
MUSEUM
3 RESTAURANTS
3 ATM MACHINES
DANCE HALL















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