

# THE CITY

# OF SHAPES

## A REAL WORLD

# PERIMETER & AREA

## MATH PROJECT

**CITY SERVICES**  
Your city needs all the services of a real city, including a police station, a fire station, a library, a school, and a park. Use the space below to design the layout of the city.

Note: You will notice that the dimensions of the shapes are given in units. They are not in feet.

**YOUR POLICE STATION IS VERY BASIC. IT IS SIMPLY USED TO KEEP THE CRIMINALS AWAY FROM THE PUBLIC. FOLLOW THE DIRECTIONS BELOW TO DESIGN THE INSIDE LAYOUT OF THE STATION.**

- The station is rectangular in shape. On the graph paper, draw a rectangle that is 11 by 10 units.
- Create a jail cell that is 3 by 4 units.
- Make a desk that is 4 by 8 units.
- Label each space and its dimensions.

**THE FIRE STATION IS VERY TRICKY. AFTER BEING CALLED TO A FIRE, THERE ARE ENOUGH SPACES TO PARK THE TRUCKS AND TO WORK.**

- The station is rectangular in shape. On the graph paper, draw a rectangle that is 11 by 10 units.
- Build a fire truck that is 3 by 4 units.
- Make a desk that is 4 by 8 units.
- Label each space and its dimensions.

**HOUSES FOR MANY MORE**  
You have a lovely row of houses. Since it is a row, you need to be grown. Fences need to be drawn. A SP...  
You are debating how much left-over "Houses for Many More" you should have. Your row of houses across your lot is 32 by 5 units long. Your area should be 160 square units.

**STEP #1**  
On your graph paper, draw a rectangle that is 32 by 5 units long. Your area should be 160 square units.

**STEP #3**  
Each rectangular lot is separated from the next by at least one row square units.

Find the total perimeter of the row of houses.

How much area remains for the grass?

If you made all of the lots, how much area would you have left for the grass?

**WHAT DO YOU NOTICE ABOUT PERIMETER AND AREA?**

**A HOUSE**  
Your city has a lovely row of houses. Each house is different. Use the space below to design the layout of the city.

**THE HAPPY HOUSE**  
Use a ruler to measure. Label the dimensions ON the graph paper.

Part of House	Area	Perimeter
House		
Roof		
Window		
Shades (Trapezoid)		
Planter		
Fence		

Which house would you like to live in?

**PERIMETER**  
The park is the center of your city. The square park is 10 by 10 units. You can scale it larger on a new graph paper, draw a large square. Follow the directions below.

**PETTING ZOO PONDERINGS**  
Your city is a bit too small for a zoo, so you opted for a petting zoo instead. Fill in the missing measurements on the drawing of the zoo below. (Remember, the drawings are not perfectly to scale.)

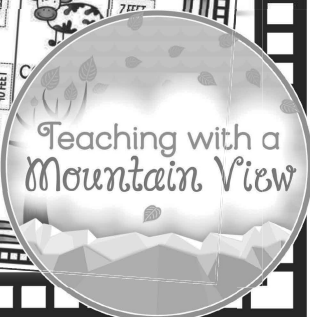
**PONY STABLE**  
AREA = 160 Ft<sup>2</sup>  
PERIMETER =

**PIG PEN**  
(Regular hexagon)  
PERIMETER = 120 FEET

**SHEEP PEN**  
AREA =  
PERIMETER =

**CHICKEN COOP**  
AREA =  
PERIMETER =

**NEW PARK ELEMENT**





# LAYING THE FOUNDATION

Have you ever dreamt of being a city planner? An architect? Even if the answer is “no,” you are about to embark on such a journey, building your own City of Shapes. All you need is some graph paper, a pencil, and the brilliant brain in your noggin, and you will be ready to create your very own city of dreams!

## \_\_\_\_\_ 'S CITY OF SHAPES

OFFICIAL NAME OF CITY: \_\_\_\_\_

POPULATION: \_\_\_\_\_

CITY SLOGAN: \_\_\_\_\_

Using the attached graph paper, construct your city. Fill in the chart below.

	Dimensions	Area	Perimeter
Firehouse	8 x 5		
Police Station	3 x 7		
Hospital	15 x 6		
School	14 x 5		
Outdoor Mall	30 x 6		
Movie Theatre	5 x 11		
Café & Grocery	4 x 6		
Petting Zoo	7 x 9		
Houses	32 x 5		
Park	11 x 11		
Pool	6 x 7		

# CITY SERVICES: THE DESIGN

Your city needs all the services of a regular city, including a police station, a fire station, and a hospital. Inside, you'll need space for a wide variety of work. Use this page to help design the inside spaces of your city's services!

Note: You will notice that the dimensions are different than the dimensions on your first city planner page. They have been scaled to fit your paper!



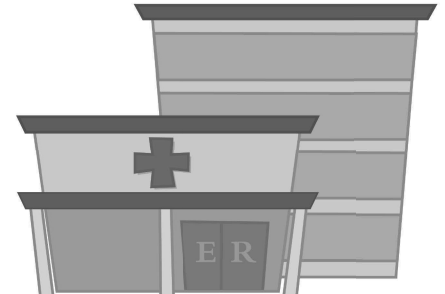
**YOUR POLICE STATION IS VERY BASIC. IT IS SIMPLY USED TO KEEP THE CRIMINALS AWAY FROM THE PUBLIC. FOLLOW THE DIRECTIONS BELOW TO DESIGN THE INSIDE LAYOUT OF THE STATION.**

- The station is rectangular in shape. On the graph paper, draw a rectangle that is 28 by 12 units long.
- Create a jail cell that is 11 by 10 units.
- Include a bathroom that is 3 by 4 units.
- Make a desk that is 4 by 8 units.
- Label each space and its dimensions.



**THE FIRE STATION IS A LITTLE BIT MORE TRICKY THAN THE POLICE STATION. AFTER ALL, THERE NEEDS TO BE ENOUGH SPACE TO HOUSE YOUR FIRE TRUCKS AND YOUR FIREFIGHTERS WHO WORK LONG SHIFTS.**

- The station is rectangular in shape. On the graph paper, draw a rectangle that is 32 by 20 units.
- Build two fire truck bays that are 16 units long by 8 units wide. They should be right next to each other, with a row of one unit between each bay.
- Make a bunk room where the firefighters will sleep. The dimensions are 9 by 5 units.
- In the remaining space, draw a kitchen for the firefighters. It can be any shape.
- Label each space and its dimensions.



**YOUR HOSPITAL IS SMALLER THAN MOST, BUT IT SERVES ITS PURPOSE FOR YOUR SMALL CITY! MAKE SURE YOU PLAN YOUR HOSPITAL SO THAT YOU HAVE ENOUGH ROOM FOR EVERYTHING THAT IS NEEDED!**

- The hospital is rectangular in shape. Draw a rectangle that is 30 by 12 units.
- Make a space for your Emergency room that is 8 units by 10 units. Inside, find space for ten beds with dimensions of 1 unit by 2 units.
- Design a waiting room that has space for at least 30 people. Each person needs AT LEAST one square unit of room.
- Include a check-in desk that is 11 units long and 3 units wide.
- Add a supply closet. Make sure it fits at least 20 square units of supplies.
- Label each space and its dimensions.

# CITY SERVICES: THE QUESTIONS

Now that you have your City Services all sketched out, take a moment to answer some questions and do some calculating. Be sure to use the page where you sketched out your services to answer the questions below.

## POLICE STATION

Find the AREA and PERIMETER of each of the spaces in your Police Station.



TOTAL AREA= \_\_\_\_\_  
TOTAL PERIMETER= \_\_\_\_\_

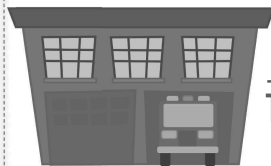
SPACE	A	P
Jail		
Bathroom		
Desk		

You need to add a waiting room with the remaining space. What is the largest rectangular waiting room you could make?

Each chair in the waiting room needs one square unit of space. How many chairs could you fit? Explain how you know.

## FIRE STATION

Find the AREA and PERIMETER of each of the spaces in your Fire Station.



TOTAL AREA= \_\_\_\_\_  
TOTAL PERIMETER= \_\_\_\_\_

SPACE	A	P
EACH Truck Bay		
Bunks		
Kitchen		

How much free space do you have in the fire station for supplies and other necessities for the station?

The city wants to buy a new fire truck. Do you have enough room to add another truck bay? Explain.

## HOSPITAL

Find the AREA and PERIMETER of each of the spaces in your Hospital.



TOTAL AREA= \_\_\_\_\_  
TOTAL PERIMETER= \_\_\_\_\_

SPACE	A	P
Waiting Room		
Emergency Room		
ALL Beds Combined		
Supply Closet		
Check in Desk		

When your city begins to grow, you plan to add a second floor on top of your hospital. If the second floor is exactly the same as your first floor, how many square units of space will you be adding to your hospital?



# A HOUSE FOR HUMANS

Your city has a lovely row of houses, built perfectly for the humans living there. Each house is different, though, and it's up to you to figure out the measurements for some of the beautiful houses being built.



## THE HAPPY HOUSE



## THE BLUE HOUSE

Use a ruler to measure, to the nearest unit, each of the parts of the house listed below. Label the dimensions ON the houses and find the Area and Perimeter of each part.

Part of House	Area	Perimeter
House		
Roof		
Window Shades (Trapezoids)		
Planter		
Fence		

Part of House	Area	Perimeter
House (Rectangle)		
Roof (Triangle)		
Windows		
Window Planters		
Chimney		

*Which house would you choose? Why?*



# HOUSES FOR MANY MORE

You have a total of 160,000 square feet in your city for houses and yards. Since it is impossible to have a piece of graph paper covering such a large area, you'll have to scale it down! Follow the directions below to sketch out your rectangular row of houses!

## STEP #1

On your graph paper, draw a rectangle that is 32 by 5 units long. Your area should be 160 square units.

## STEP #2

Each lot (rectangular space that includes a house and yard) where your houses are built should be 6,000 square feet. This is equal to 6 square units on your graph paper.

## STEP #3

Each rectangular lot must be separated from the next lot by at least one row of square units.

## STEP #4

You must fit at least 10 lots into the space, and they all must be the same shape and size. They should be in a straight row.

Find the total perimeter and area of all the houses.

How much area remains for sidewalks, trees, fences, etc.?

If you made all of the lots different sizes, how would that change the number of houses you could build? Explain.