



Designing The New York City of the Future

The activities in this section require students to use the past and the present to speculate on what the future might bring. Students must conduct research to learn the visions of some influential New Yorkers then take these visions forward.

Activity1

Your students are not the first to be called on to speculate about the future of New York City. Below are the names of some influential men who speculated at the turn of the 20th century about the future of New York City. They all had some very interesting visions for what the city would look like in the future. Help your students discover these visions:

Hugh Ferris
Harvey Wiley Corbett
Hudson Maxim
Raymond Hood

Divide your students into teams and have each team research the vision of **one** of these men. After their research is completed have each team present their research findings to the class.

Each team's presentation must include the pluses and the minuses of the vision they researched.

Each team's presentation must include the next step in the vision researched. A team must incorporate the researched vision as part of their own vision for New York City at the end of the 21st Century.

Presentations may be written and read, drawn/sketched or performed.

Video your students' presentations.

Activity 2

Have your students speculate everything and anything related to **the Empire State Building** at the end of the 21st century.

Will the Empire State Building exist at the end of the 21st Century?

Will the Empire State Building look different at the end of the 21st Century? How might it be different?

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What changes will happen in New York City by the end of the 21st century that might cause changes in the Empire State Building?

On what are you basing your thoughts?

Activity 3

Have your students write a script for a NY SKYRIDE experience located at the Empire State Building at the end of the 21st century.

Materials Needed

- Access to the Internet or to other research tools
- Historical photographs of New York City
- Drawing supplies
- Students' memory of the Empire State Building NY SKYRIDE

Good Websites About the Past and the Future of New York City

1. http://thenonist.com/index.php/thenonist/permalink/hugh_ferriss_delineator_of_gotham/ --- This website has a lot of information about Hugh Ferriss. It also has some of his drawings.
2. <http://www.loggia.com/parti/frontage/ferriss.html> --- This is a short report about Hugh Ferriss' use of light and scale.
3. <http://davidszondy.com/future/futurepast.htm> --- This is a personal site that presents all kinds of ideas from the past for the future. It's fascinating!
4. http://www.skyscraper.org/PROGRAMS/NYMODERN/nym_corbett.php --- This link takes you to part of the Skyscraper Museum's site. It presents a video lecture about Harvey Wiley Corbett.
5. <http://sirius-archives.si.edu/ipac20/ipac.jsp?uri=full=3100001~!209964!0&term=#focus> --- This is a Smithsonian Institution site. It has some beginning information about Raymond Hood and a few suggested links to other sites.
6. <http://walkingoffthebigapple.googlepages.com/thenewyorkofraymondhood,architect> --- This site presents a bit more information about Raymond Hood and the buildings he designed in New York City.
7. http://www.skyscraper.org/EXHIBITIONS/FUTURE_CITY/NEW_YORK_MODERN/walkthrough_1_900.php --- This is another link to the Skyscraper Museum. In this section you will find a bit of information about Hudson Maxim.

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Building The Tallest Tower

This activity helps students focus on some of the variables associated with engineering and the construction of skyscrapers and tall buildings. Student teams will be asked to construct their own *tall building or tower* from some unusual materials. Their results will be evaluated based on the height, the stability and the beauty of their creation as well as on how they functioned as part of a team.

Background:

In preparation for constructing the tower, review some engineering principles with your students. Here are some principles that might be relevant:

1. wind force
2. width of the base
3. use of building materials
4. ground substance
5. beams and columns and their connections

Activity 1

The object of this activity is for students to build the tallest free-standing tower possible **using two sheets of newspaper**. Students **can not** use tape, staples, glue, or other materials to help make the tower. They **can** bend, fold, or tear the newspaper as they see appropriate.

Towers will be judged on **height, stability and beauty**. Teams will be judged on **how well their members worked together**.

Organize your students into **teams** for this activity. Each team must go through the following steps in building their tower:

- discuss the concept for their tower
- find a way to test their theory for building their tower
- discuss the process for the construction of their tower
- share the responsibility for their tower's construction
- choose a member who will act as a judge for the contest along with a member from each of the other teams

After teams have constructed their towers have them discuss the following:

- Why their tower stood or did not stand.
- What they could have done differently.
- One additional material they could add to make their tower stronger
- How well their team worked together

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What they should have done differently as a team

After students have constructed their towers change the variables, one at a time and see what the results are. For example:

Create a gentle wind and see what happens.

Change the type of paper used.

Materials Needed

Two sheets of newspaper for each student team
Clean, level construction space
A camera for videoing the competition
Photographs of the worlds tallest skyscrapers

Activity 2

The object of this activity is for students to build the tallest free-standing tower possible **using a single sheet of paper and tape.**

Organize your students into teams and give each team the following materials:

- one piece of 8 1/2 x 11-inch paper
- one piece of 1/2 -inch x 1-foot scotch tape
- scissors
- ruler
- pencil

Instruct each team to construct the tallest tower possible using the paper and tape provided. No other materials are allowed. Teams may not substitute different materials for the ones they have been given.

Each tower must be free-standing. It must not be attached to, or lean against any other surface (e.g. floor, wall, desk, etc.). Towers must stand for 10 seconds. Towers must also have some aesthetic qualities ---

Towers will be judged on **height, stability and beauty.** Teams will be judged on **how well their members worked together.**

After students have constructed their towers have them discuss the following:

- Why their tower stood or did not stand.
- What they could have done differently.

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What one additional material they could add to make their tower stronger.
How well their team members work together?
What they should have done differently as a team?

After students have constructed their towers change the variables, one at a time and see what the results are. For example:

Create a gentle wind and see what happens.

Change the type of paper used.

Materials Needed

- One piece of 8 1/2 x 11-inch paper
- One piece of 1/2 -inch x 1-foot scotch tape
- Scissors
- A ruler
- A pencil
- A camera for videoing the competition

Activity 3

Have students complete the competition again, as in the two activities presented above. This time they must use one of the following set of materials:

Toothpicks and Gum Drops --- Give each team a box of toothpicks and a bag of soft gum drops. The same rules as above will apply.

or

Newspaper and Paper Clips/Masking Tape --- Give each team 20 sheets of paper and 20 paperclips.

Materials Needed

- 1 box of tooth picks for each student team



1 bag of soft gumdrops for each student team

20 sheets of newspapers for each student team

A camera for videoing the competition

Good Websites for Constructing Towers

- 1 <http://www.pbs.org/wgbh/buildingbig/skyscraper/basics.html> --- This is a PBS site about the basics of constructing skyscrapers.
- 2 <http://en.wikipedia.org/wiki/Skyscraper> -- This is a wikipedia site but it has information about a good collection of skyscrapers.
- 3 <http://skyscraperpage.com/> --- This site has technical statistics about today's skyscrapers.
- 4 <http://www.hem.com/Video/buildingtowers.html> --- This is a humorous video about building a tower.
- 5 <http://www.vermontguardian.com/commentary/032007/TwinTowers.shtml> --- This site presents one theory about the collapse of the Twin Towers.



Your Own Design for Manhattan

In this activity students must combine math skills and visual literacy with information about community planning, human psychology and history. They are asked to create a design for a site in the middle of Manhattan. Students are given the dimensions of the vacant space, a formula for space versus buildings and the direction that their design must be of value to the city. The rest is up to them. The activity also calls on students to work as co-operative members of a team.

Activity

Discuss with students everything that they learned about New York City from their visit there:

- The design of the city
- How residents use the city
- Street patterns
- Sidewalks
- Architectural details
- Building size, design, function
- Parks
- The affects of the using color
- Food
- Foot traffic
- Vehicular traffic
- Traffic safety
- Smells
- Sounds
- Shops and businesses
- Etc

Write/draw everything your students report for everyone to see and for later reference

Divide your students into small teams. Here's the scenario each team must address:

The Empire State Building has been torn down. The City is currently seeking proposals for what should be done with the site. Your team has been invited to submit a proposal. There are some requirements and parameters that you must consider. Here are these parameters:

The land you have to work with is 83,890 sq ft in area.

1/3 of total space must have interesting architectural details such as designs on buildings, fountains, sculpture 1/4 of available design space should consist of building structures. 3/4 of design

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space should consist of green space. Buildings may be of any size and shape as long as they fit esthetically with the neighborhood and meet current NYC zoning codes.

Buildings may be built of any materials as long as they meet current NYC zoning codes.

It must be possible to keep green spaces clean and safe.

The city must need and be able to use the space you design.

Have each team prepare a presentation to the class explaining their design for the space. This presentation should contain

The design itself

The architectural details they will include

Calculations to show how they fulfilled the spatial parameters requested

The function of the space they designed.

The needs the space is addressing.

Why they chose the design they did.

Material Needed

Chart paper

Pens

Pencils

Graph paper

Calculators

NYC Zoning Regulations www.nyc.gov/html/planets/html/zoning/



Good Websites About New York City Living and Cities of the Future

1. <http://www.mas.org/viewcategory.php?category=4> --- This website focuses on promoting a more livable New York City. It has information about NYC culture, neighborhoods, physical design, urban planning, contemporary architecture, historic preservation and public art.
2. <http://www.history.com/minisites/cityofthefuture> --- This site has information about the winners of a design and engineering competition for cities of the future.
3. <http://www.transfuture.net/> -- This is mainly a photo site but it has some very interesting designs for the future.
4. <http://www.victorycities.com/> --- This is one man's vision of the cities of the future.
5. <http://www.futurecity.org/> --- This site presents information about another engineering competition for the city of the future.
6. http://www.tenant.net/Other_Laws/zoning/zonch02.html --- This site links you to a handbook of information about New York zoning regulations.
7. <http://www.nyc.gov/html/dcp/html/subcats/zoning.shtml> --- This is the official website of the New York City Department of City Planning. You can find lots of information about the city's zoning here.
8. http://thenonist.com/index.php/thenonist/permalink/hugh_ferriss_delineator_of_gotham/ --- This website has a lot of information about Hugh Ferriss. It also has some of his drawings.
9. http://en.wikipedia.org/wiki/1916_Zoning_Resolution --- This is Wikipedia's information about New York's 1916 zoning regulations.
10. <http://www.nyc.gov/html/dcp/html/zone/zonehis.shtml> --- This is another link to the New York City Department of City Planning. This section gives you the history of zoning in the city.



Number Series, Proportions, Functionality and the Golden Ratio -And the Empire State Building! Really?

Some things about the Empire State Building are at the intersection of functionality, mathematics and mystery. People like Leonardo Da Vinci and Napoleon Bonaparte observed that there is something similar in all things that humans find beautiful. This common property seems to bring order to things and make us feel peaceful. Humans seem to be drawn to it. We feel uncomfortable when it's not there. It seems to turn up in a works of art and also in the built environment (in the front of the Parthenon, for instance). But what exactly is this common property? The name we have given it is the Golden Ratio or the Golden Mean. For centuries people have thought the Golden Ratio to have mysterious properties. The purpose of this activity is to see how the Empire State Building relates to the Golden Ratio --- or IF it relates to it. Wouldn't it be cool if the Empire State Building had magical powers!

Activity 1

Present students with the following definition of the Golden Ratio:

*In mathematics and the arts, two quantities are in the **golden ratio** if the ratio between the sum of those quantities and the larger one is the same as the ratio between the larger one and the smaller. The golden ratio is approximately 1.6180339887. The Golden Ratio is usually represented by the symbol called Pi.*

Since the early Greeks, a ratio of length to width of approximately 1.618 has been considered the most visually appealing.

Have students consider this:

The average adult female height in the US is 5.45 feet.

A typical door frame found in a building is constructed with the inside clearance of 7 feet.

Have your students verify this measurement. To do this, students will need to:

Measure the door frame to their classroom.

Then just to make sure, measure other door frames around the school building and at home.

Instruct students to find the ratio of the two ($5.45/7 = .77857$).

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Now have them construct the following series:

.77857

.77857

The next one in the series is the sum of these two, namely:

$$.7785714 + .7785714 = 1.5642857$$

To make the next number in the series, add the two previous numbers.

$$.7785714 + 1.5642857 = 2.3500000$$

The next is:

$$1.5642857 + 2.3500000 = 3.9142857$$

Have students **continue until the 17th member of the series** (you may want to have them use a spreadsheet)

What do you get? (Answer: 1250 which is the exact height of the Empire State Building from the street to the roof.)

“So what”, you say. Well, take any two (other than the first two) members of this series say 2.3500000 and 3.9142857. Divide the smaller by the larger. What do you get? (Answer: .62XXXXX or at least the higher one goes in the series the closer one gets to .62 – the Golden Ratio!

So the Empire State Building was built using the Golden Ratio!

Activity 2

Another way to get the same result is to construct something called the **Fibonacci Series**. It is built on the same principle but uses whole numbers.

Have students start the series with the two “seed numbers”.

1

1 (1+1=2)

2 (1+2=3)

3 (2+3=5)

5 (3+5=8)

8 (5+8=13)

Etc.

The 17th iteration is 1597.

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Now, have students multiply 1597 by the ratio of adult female height to door clearance ($4.45/7=.77857$) and you get:

$$1597 * .77857 = 1250!$$

Magic!

Have students discuss why they think this relationship exists? Did the architects purposely embed the golden ratio in the design as a mystery or because it is functional?

Activity 3

Pi

Have students do essentially the same as above, only notice that the sixth number of the series is $2*\text{Pi}$ or ($2 * 3.14 = 6.28$ and the sixth member of our scaled Fibonacci series is 6.264 ...if you start with adult female height being 4.50 feet instead of 4.45 feet the sixth number is 6.2857) Magic. Also notice that $4*\text{Pi}$ is 1% the height of the Empire State Building:

$$4 * 3.14 = 12.56 \text{ is approximately } 1\% \text{ of } 1250!$$

Have students research and then test the process on the following:

- The Chrysler Building in New York City
- The Metropolitan Life Building in New York City
- Their school building
- Notre Dame in Paris
- Playing cards
- A painting (we suggest one by Jan Vermeer or Piet Mondrian)
- A rose
- The Stock Market

Have your students create their own work of art using Pi.

Present you students with music composed by Eric Satie. Have them describe how this music related to the Golden Ratio.



Materials Needed

Photographs of the Empire State Building, the Chrysler Building, the Metropolitan Life Building, Notre Dame, etc.
Photographs of your school building
Playing cards
Art materials
Music composed by Eric Satie
Paintings by Jan Vermeer or Piet Mondrian

Good Websites for Information about the Golden Ratio

1. <http://goldennumber.net/goldsect.htm> --- This website defines the Golden Ratio/section/rectangle very nicely! It uses visuals to illustrate the concept.
2. <http://www.cyberspaceorbit.com/ironhart/goldensec.html> --- We can not identify the source of this site. It does provide good information about determining the Golden Ratio.
3. <http://www.mcs.surrey.ac.uk/Personal/R.Knott/Fibonacci/phi2DGeomTrig.html> --- This site has everything you could ever want to know about the Golden Ratio. However, once again, we can not verify the source of the site other than to say it was created by a Dr. Ron Knott.
4. <http://britton.disted.camosun.bc.ca/goldslide/jbgoldslide.htm> --- This site has information specific to the Golden Ratio and architecture and art. We can not verify the source of the site. Sorry!
5. <http://www.anselm.edu/homepage/dbanach/pyth4.htm> --- This site has information about the history of the Golden Mean.



A Closer Look At New York's Bridges

This activity is intended to be a follow-up to exploring the Queensboro and Brooklyn Bridges in New York City. It requires students to research the design and construction of these two bridges. It also requires them to focus on the changes these bridges brought to Manhattan and to the outer boroughs of the city. How bridges, in general, affect the economy and lifestyle of a region is a focus of this activity.

Activity

This activity calls for your students to research the Brooklyn Bridge or the Queensboro Bridge. The research for this activity is straight forward but the presentation of this research is not.

Divide your class into two teams and assign one of the two bridges to each of the teams. Each team's task is to research their assigned bridge then to present their bridge to the class **in story format**. They may not just present facts about it. Rather they must arrange these facts into a story with a timeline and characters and opinions, etc. Their presentation may be set either in an earlier time period or in the present day.

Each team's presentation must contain information about the following:

The style and design of the bridge.

The construction of the bridge.

How accepted the bridge was when proposed. Was everyone in favor of building the bridge?

The people who benefited from the building of this bridge. Who benefited the most? Who benefited the least?

What difference the construction of the bridge made to Manhattan when it was built.

How the opening of the bridge affected the city's economy.

Speculate what a bridge built here in 100 years might look like.

Bonus points will be awarded if a team is able to work-in a comparison of their assigned bridge with the bridge not assigned to them.

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Here are a few comparisons they might make:

- Are they the same type of bridge?
- Which has more *vehicular* traffic?
- Which has more pedestrian traffic?
- Which is a better spot for crossing the East River? Why?
- Compare early plans for both.
- Which is more pleasing to look at? Why?

Extra Bonus points will be awarded if a team is able to work in the importance of bridges to an island city such as Manhattan:

For reference, have students refer to:

- Robert Moses early plan for the Queensboro Bridge,
- Gustav Lindenthal's plan for the Queensboro Bridge
- The City That Never Was* by Rebecca Read Shanor

Materials Needed

- Access to the internet or other research tools
- Props and costumes, as requested by students

Good Websites About New York City Bridges

1. <http://www.pbs.org/greatprojects/> --- This is a wonderful PBS site that tells all about some of the greatest building projects in the United States. There is a separate section on building the George Washington Bridge in NYC.
2. <http://www.davefrieder.com/> --- This is Dave Freider's website. He is a photographer and bridge expert. He has some wonderful photographs of many of New York City's bridges.
3. <http://www.newyorkled.com/bridges.htm> --- This site gives photographs and videos of New York City bridges. It's a very complete site with lots of good information.
4. <http://www.nycroads.com/crossings/brooklyn/> --- Go to this site for up-to-the-minute information about conditions on the Brooklyn Bridge. The site also has a very nice summary of the history and construction of the bridge along with some interesting photographs.
5. <http://www.transalt.org/files/resources/bridges/> --- This site provides information about walking, biking or skating across New York City's bridges.
6. <http://www.mta.nyc.ny.us/bandt/index.html> --- This is the official website for the Metropolitan Transit Authority. It has information about all of New York City's bridges.
7. <http://www.ci.nyc.ny.us/html/dot/html/home/home.shtml> --- This is the official website for the New York City Department of Transportation.
8. <http://www.mcnyc.org/collections/abbott/a240-243.htm> --- This site has some really good photographs of the Queensboro Bridge.

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Good Books About Bridges

Burr, William **Report on Design and Construction of Queensboro Bridge** (New York, 1908)

Hopkins, H.J. **A Span of Bridges; An Illustrated History** (New York, Praeger Publishers, 1970)

Huxtable, Ada Louise **The Architecture of New York** (Garden City, Doubleday, 1964)

McCullough, David G. **The Great Bridge** (New York, Simon and Schuster, 1972)

New York City's MTA Brochure **Bridges and Tunnels Brochure**.

Reier, Sharon **The Bridges of New York** (New York, Quadrant Books, 1977)

Shannon, Rebecca Read **The City That Never Was** (New York, Penguin Group, Viking Press, 1988)

Steinman, David **The Builders of the Bridge: The Story of John Roebling and His Son** (New York, Harcourt Brace, 1945)

White, Norval and Willensky, Elliot, eds. **AIA Guide to New York City, Third Edition** (San Diego, Harcourt Brace Jovanovich, 1988)

Winpenny, Thomas R., **Manhattan Bridge. The troubled story of a New York monument**. (Easton PA, Canal History and Technology Press in association with the Smithsonian Institution, 2004)