

DESIGN A VEHICLE

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BACKGROUND INFORMATION FOR TEACHERS

Transportation is vital to communities, especially large urban and suburban centers like the New York City Metropolitan region. The Metropolitan Transportation Authority (MTA) operates a transit network that spans three states, covers over 5,000 square miles and moves over 8 million people each day. All transportation, however, is not equal, and the systems that move many people together are what make living in or near New York City possible for many residents.

Public transportation began in New York City in 1827 with the introduction of the Omnibus, a horse-drawn carriage that could accommodate approximately twelve people. Passengers boarded through a back door and paid a fare of twelve cents, which many residents could not afford. Compared to our transportation lines today, omnibuses had a short range and were slow and bumpy. As the city's population grew, vehicles got bigger and faster, and routes got longer as people moved further away from lower Manhattan.

As the population expanded to outer boroughs such as Brooklyn and the Bronx, and the City of New York consolidated the five boroughs in 1898, public transportation became crucial to sustaining the growth and life of the city. Technological advances allowed engineers to leave behind horse power in favor of steam and then electricity. Public transportation like trolleys and elevated trains moved millions of people each day in and out of the heart of the city where jobs were concentrated, helping to strengthen the commercial and business life of the city, as well as develop outlying residential neighborhoods.

An underground rapid transit system in New York City was conceived in the 1870s after London had begun operating the world's first subway lines in 1863. Though New York City had the will and the ingenuity, it took many years of ideas and development, and a terrible blizzard in 1888, for construction of the subway to begin. The blizzard effectively demonstrated the vulnerability of having all transit on street level, and was the last big push for city authorities to organize a commission to realize the subway.

The first subway line was called the IRT (Interborough Rapid Transit System) and stretched from City Hall station in Lower Manhattan to 145th St in Harlem. Today this original line is part of the 4,5,6, the Times Square shuttle and the 1 train lines. It took less than five years to build 9.1 miles of tunnels and 28 stations, and opened in October of 1904. As the system of tunnels grew over the following decades, the expansion of all transit lines tried to keep pace with the growing city. Today there are 472 stations, about 720 miles of tracks, and over 6600 subway cars carrying over five million riders each day.

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PRE-VISIT

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GRADE LEVELS: Pre-K – 2nd Grade

LEARNING STANDARDS

SOCIAL STUDIES: K.6, K.7, 1.2, 1.5a,b,c, 1.6, 1.8, 1.9, 1.10b,c, 2.1c, 2.5b, 2.6a,b

ESTIMATED TIME: One 45-60-minute period

PRE-VISIT OBJECTIVES

- Students will know the difference between public transportation and other forms of transportation
- Students will reflect on their personal connections to public transportation
- Students will use observation and close looking skills to examine archival images of different vehicles through time
- Students will share ideas and build knowledge by listening and participating in group discussions.

MATERIALS

- Chart paper and marker
- Projector or smartboard
- Book, *How Little Lori Visited Times Square* by Amos Vogel
- Image 1: *The Omnibus*, 1827 - 1907
- Image 2: *Last Day of Bleeker Street Line*, July 26, 1917 (Horsecar)
- Image 3: *New York City Interborough Open Trolley*, ca. 1910 (Trolley)
- Image 4: *Fifth Avenue Coach Company Bus #321*, ca. 1920 (Double-decker bus)
- Image 5: MTA Local City Bus #761 (Contemporary bus)

ESSENTIAL QUESTION

How does public transportation help a community and how has it changed over time?

INTRODUCTORY DISCUSSION (10 minutes)

- Ask students to think about the word transportation. What does it mean? As students provide answers, create a chart of the different kinds of vehicles they mention.
- Read *How Little Lori Visited Times Square* by Amos Vogel and have the students list the modes of transportation in the story and which are modes of public transportation.
- Public transportation runs on a fixed route, on a fixed schedule, and can carry many people at once. This is different from your family car, taxi, or motorcycle. What kinds of vehicles are used for public transportation? Have you ever been on public transportation? Where did you go?
- Continue the discussion by asking the students why they think public transportation is helpful in New York City.
- Add to the chart a list of the reasons why they think public transportation is helpful.

TRANSITION TO ACTIVITY (3-5 minutes)

- Transportation is important for moving people around New York City because the city is large with many residents.
- In New York City, public transportation helps 5.5 million people travel to work, school, and many other destinations each day.
- People who have jobs in the transportation industry are community helpers or workers because they serve an important role that helps the community. Ask students to list some of the roles they imagine are important for public transportation. For example, a subway conductor, train dispatcher, station agent, and bus operator.
- Divide the class into four groups.

ACTIVITY: Buses Over Time (20 minutes)

Each of the four groups will examine one of the following images together. Pass out copies of images to the groups.

1. *The Omnibus*, 1827 - 1907
2. *Last Day of Bleecker Street Line*, July 26, 1917
3. *The Trolley*, 1888 – 1957
4. *Fifth Avenue Coach Company Bus #321*, ca. 1920

- These images show different buses over time. Buses have been helping city residents move around New York City since 1827.

Use the following prompts to guide close looking:

- Close your eyes for a moment and imagine you are the driver or operator of this vehicle. What can you hear, see, and smell?
- What are the streets like?
- What helps the vehicle move?
- Where is the driver?
- How might it feel to ride on this vehicle?

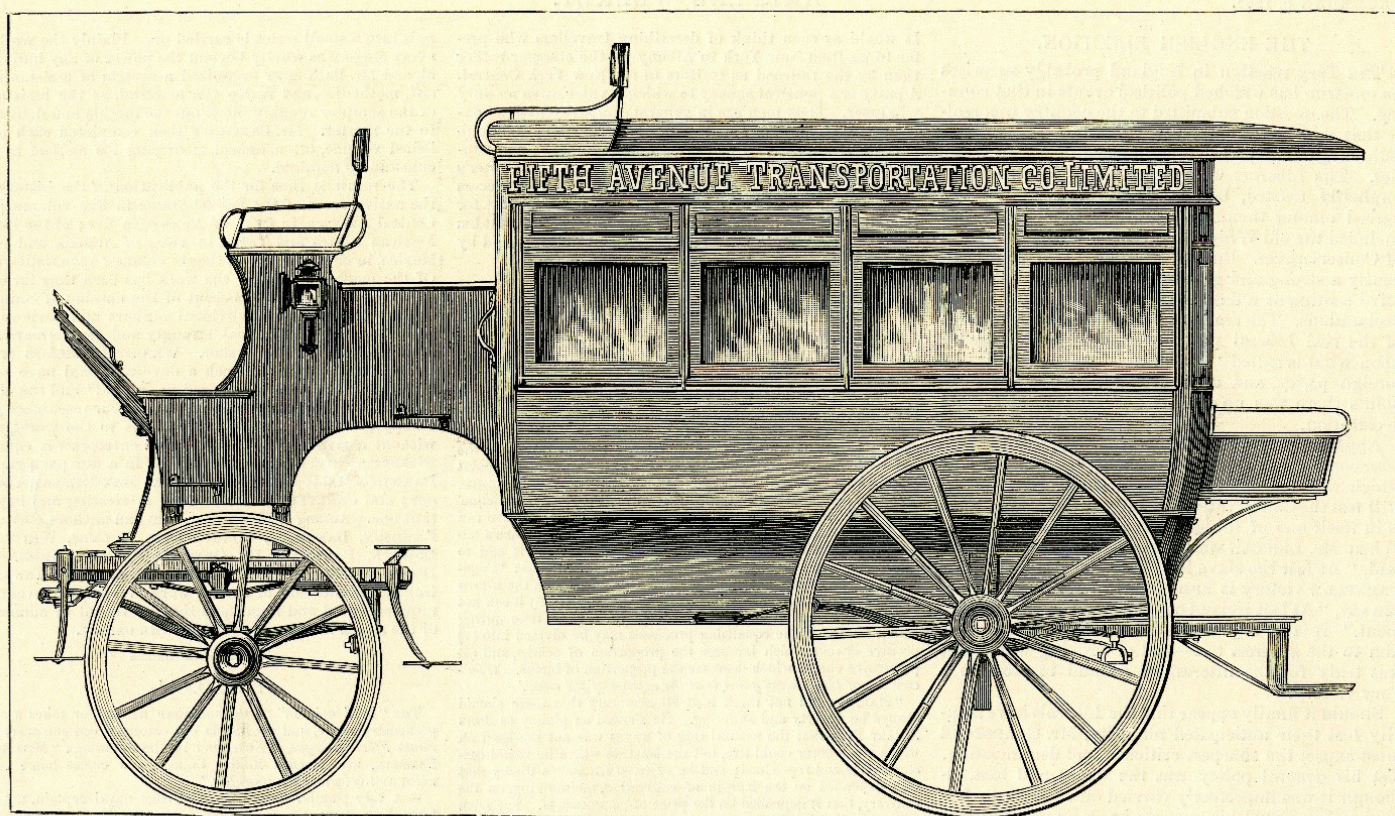
- Once groups have examined their image, they can walk to other tables to view the other vehicles.
- After each group has had a chance to look at all the images, have the students return to the rug or their table and invite them to share with each other what they noticed in the images and their ideas about what it might have been like to travel on or drive the vehicle. Ask one or two students to share their ideas and observations, holding up the images or projecting them as each one is discussed. Paraphrase and connect responses to encourage group learning.
- Project or pass out copies to each student of the MTA Local City Bus #761. How is this the same or different from the buses we just looked at in groups? Ask for responses and facilitate a group discussion with the class to talk about how buses have changed over time, weaving in background information about the vehicles.

WRAP-UP/CONCLUSION (3 minutes)

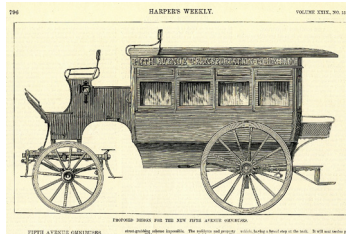
- We have learned a lot about public transportation in New York City and we saw, in the images, how buses have changed over time.
- Has this exploration changed how you feel about riding on the bus today? Why?
- Encourage students to continue thinking about how public transportation helps our community.

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PRE-VISIT IMAGES



PROPOSED DESIGN FOR THE NEW FIFTH AVENUE OMNIBUSES.



The Omnibus, 1827 - 1907

Omnibuses were the first kind of public transportation in New York City. They began service in 1827 with routes in Manhattan that carried passengers from Lower Manhattan to points north, and back again. Passengers entered from a door in the back of the wagon and paid a fare of approximately twelve cents. Omnibuses could reasonably carry 12-15 people but were often more crowded and were uncomfortable. Bouncing along cobblestone streets made for a slow ride. The driver sat on top of the vehicle to ensure a good view of the street and maximum control of the horse. He would have had to feed and house his horse.





Last Day of Bleecker Street Line, July 26, 1917

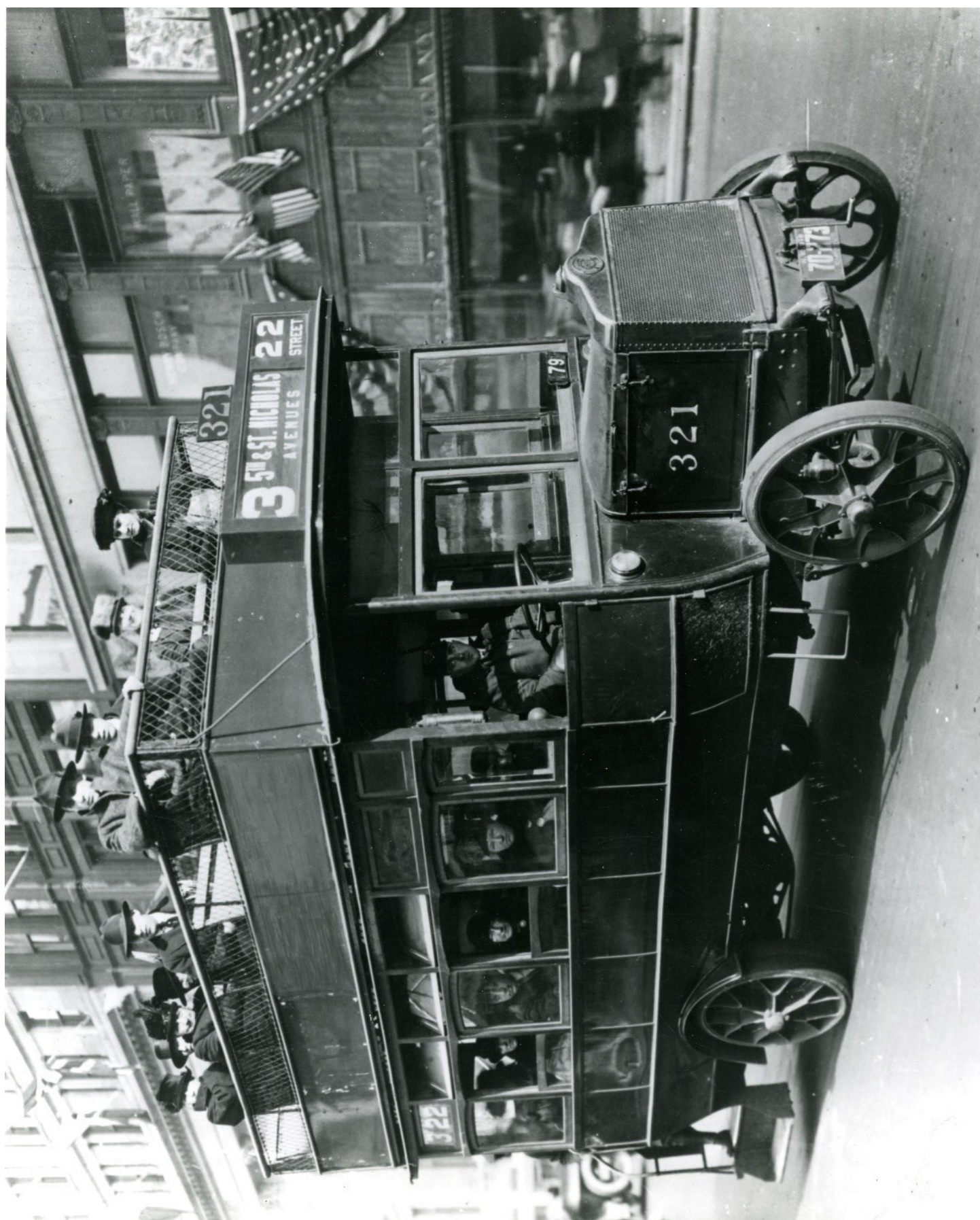
A coach builder named John Stephenson designed a new kind of 'bus' in 1832. It was called a horsecar, or streetcar. This vehicle could carry twice as many passengers as an omnibus and instead of large wooden wheels, Horsecars had small metal wheels and ran along on tracks or rails embedded in the street. This ensured a smoother, faster, and more comfortable ride. The driver stood in the front of the vehicle where he had a clear view and could control the two horses needed to pull such a heavy vehicle. The conductor helped passengers board at the rear and took their fares. There were many horsecar lines in New York City which helped move more residents faster than before.





New York City Interborough Open Trolley, ca. 1910

By the 1890s electric motors could move large vehicles and eventually all horsecar lines were closed or replaced with electric streetcars known as trolleys. Trolleys ran on tracks in the street and were powered by overhead wires and trolley poles on the roof, or from cables that ran in a conduit (ditch) between the rails, underneath the vehicle. Electric trolleys were quieter and faster than horsecars and could fit more passengers onboard. The driver stood at the front of the vehicle by the door and passengers put the fare into a turnstile or fare box upon entering.





Fifth Avenue Coach Company Bus #321, ca. 1920

The Fifth Avenue Coach Company was the first to operate motor buses in New York City. In 1907 double-decker buses began picking up passengers along routes down Fifth Avenue in Manhattan. The fare was ten cents for the upper deck and five cents below. The driver was in a cab at the front of the motorbus, separated from the passengers. The conductor stood at the back, near the stairs, and took fares as passengers boarded.





MTA Local City Bus #761

Today the newest city buses are filled with technology, such as WiFi and charging ports, and can accommodate passengers who use wheelchairs. Some bus routes have extra-long vehicles and the ability for passengers to purchase tickets in advance of boarding. Today bus drivers are referred to as bus operators because they drive the bus, open and close the doors, and collect fares. The MTA runs the largest public bus system in North America, about 40 percent larger than the next-largest city, Los Angeles. Each weekday, the MTA provides more than 2 million bus rides on 326 routes, with a fleet of more than 5,700 buses.

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POST VISIT

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GRADE LEVELS: Pre-K – 2nd Grade

LEARNING STANDARDS: Please see Pre-Visit materials

ESTIMATED TIME: One 45-60-minute period

POST-VISIT OBJECTIVES

- Students will compare the streets of the past with the streets of today through examining historical photographs
- Students will reflect on their personal connections to public transportation
- Students will use observation and critical thinking skills to examine images of a new subway car design
- Students will use their imaginations and fine motor skills to draw an invented vehicle of the future
- Students will share ideas and build knowledge by listening and participating in group discussions

MATERIALS

- 60 -second clip of film, Lower Broadway, 1903
- Image 1. *Broadway & Pine St*, 1905
- Image 2. *R211 Subway Car Prototype*
- Drawing paper
- Drawing/coloring supplies

ESSENTIAL QUESTION

How does public transportation help a community and how has it changed over time?

INTRODUCTORY DISCUSSION (15-20 minutes)

- In the early 1900s, the streets of New York City were very crowded with horses and people, and the way people traveled was not as organized as it is today.
- Share the short video Lower Broadway, 1903. (<https://www.loc.gov/item/00694372/>) and look at Image 1: Broadway & Pine St, 1905. Have students watch closely for details that might look the same or different to city streets today.
- Pose some or all of the following questions:
 - What is happening in this video/image?
 - What kinds of transportation do you see?
- In what ways is this street different or the same as the streets today?
- Allow time for the discussion to build. Paraphrase students' responses and connect the answers to encourage group learning.

TRANSITION TO ACTIVITY (2 minutes)

- Today trains and buses are safer and more efficient and reliable than vehicles in the early 20th century.
- Ask students to use their imaginations to consider ways to make transportation even better in the future so it can continue to be useful for the changing needs of the city.

ACTIVITY: A Vehicle of the Future (20 minutes)

- Students will work in pairs or small groups to discuss images of the R211 subway car prototype and then independently to draw and label their vehicle of the future.
- Hand out images of R211 subway car prototype
- This is a model of a new train car that is going to be on letter lines and the Staten Island Railway.
- New features include:
 - Wider doors
 - WiFi
 - Charging ports for technology such as cell phones, tablets, and computers
 - Some of the trains will have open gangways - no doors at the end of the car - to provide unobstructed access throughout the length of the train.
- Students will discuss their reactions to this new design in pairs or small groups.
- After viewing a new model for a train, students will then design their own vehicle of the future using their imagination. What problems would this design solve?

WRAP-UP/CONCLUSION (3 minutes)

- Encourage students to share their drawings individually or set up a gallery walk to view images on tables or desks.
- Encourage students to think about how public transportation helps people travel the city, and ways that it might be even better in the future.
- Have students do a gallery walk to view artwork created.

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POST VISIT IMAGES





Broadway and Pine Street, July 7, 1905

Photographs captured city life and the changes occurring throughout the city in the early twentieth century as the subway was being constructed. Images from before construction began, during construction, and after completion were taken to ensure that there was evidence of the impact of construction. This photograph was taken less than a year after the subway opened in 1904, with the tunnel already finished underneath this part of Broadway. The photo shows how busy the street was with pedestrians and vehicles.





R 211 subway car prototype, Hudson Yards Station

The move toward a first-in-class subway car is critically necessary and an essential part of modernizing the subway system. The New Technology R211 cars feature 58-inch door spans, which are eight inches wider than standard doors on existing cars. The expanded doors are designed to reduce delays with faster boarding and less time in each station. The cars also include digital displays that will provide real-time information about service and stations, new grab rails including double-poles, brighter lighting, signage, and safety graphics. Some of the initial R211 cars will feature, as a pilot program, an open gangway located at the ends of the cars. This open design features soft accordion-like walls, and allows riders to move freely between cars to reduce crowding and distribute passenger loads more evenly throughout the train.

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LEARNING STANDARDS

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LEARNING STANDARDS

GRADE LEVELS: Kindergarten – 2nd Grade

Social Studies

K

- K.6 Maps can be used to represent places; Schools, communities or neighborhoods can be represented and located on a map; New York City is made up of five boroughs; Neighborhoods reflect the languages and traditions of the people who live there; Communities change over time; Communities have landmarks, monuments and architecture; Communities have forms of transportation; People in neighborhoods rely on each other for goods services and assistance
- K.7 Physical Environment affects the way people live; People can change their environment

1st

- 1.2 Different events and people shape a community and a country's history; Historical events are told through stories, folklore
- 1.5 a,b, c Maps and Map skills (Standard 3)
- 1.6 a, b, c Communities meet people's needs (Standard 3)
- 1.8 Historical sources inform people about life in the past
- 1.9 Communities meet people's needs; People use tools, science and technology to meet their needs
- 1.10 b, c Community Workers (Standards 4 and 5)

2nd

- 2.2 Communities are diverse; A community is strengthened by the diversity of its members
- 2.1c New York City communities are connected by a system of bridges and tunnels; people in New York City travel in a variety of ways; People all over the world visit New York City; New York City is made up of neighborhoods that reflect diversity
- 2.5b Geographic features influence how and where communities develop
- 2.6a, b Changes over time can be examined by using evidence such as maps, population charts, photographs, paintings, newspapers, biographies and other historical artifacts; New York City has changed over time and will continue to change in the future

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RESOURCES +
GLOSSARY OF TERMS

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RECOMMENDED RESOURCES

CHILDREN'S BOOKS

How Little Lori Visited Times Square by Amos Vogel and Maurice Sendak

A Subway for New York by David Weitzman

Lost in NYC: A Subway Adventure by Nadja Spiegelman

The Secret Subway by Shana Corey & Red Nose Studio

RESOURCE BOOKS

The City Beneath Us: Building the New York Subways
by New York Transit Museum with Vivian Heller

VIDEOS

https://archive.org/details/What_Happened_1901

<https://archive.org/details/Arteries1941> (particularly 3:01-4:53)

DESIGN A VEHICLE

GLOSSARY OF TERMS

Bus Operator – the person who drives the bus and opens and closes the doors

Construction – the building of something, typically a large structure.

Elevated Train – trains that run on elevated tracks above the streets

Horsecar – a surface vehicle that rides on rails embedded in the street, pulled by one or two horses

Immigrant – a person who moves from one country to another country to live permanently

Innovation – a new method, idea, or product

Invention – something newly designed or created, or the activity of designing or creating a new thing

Public Transportation – Transportation that runs on a fixed schedule, has a fixed route, and is for many people

Omnibus – a wooden wagon pulled by a horse

Rapid Transit – a form of high-speed urban passenger transportation such as a subway or elevated railroad system.

Streetcar – a surface vehicle that rides on rails embedded in the street

Sandhog – a person who works underground constructing tunnels

Subway – an underground electric railway (in New York City we refer to the whole system as the subway even though about 40% of the system is above the ground)

Train Conductor – the person who opens and closes the doors and makes announcements on the train

Train Operator – the person who drives or operates the train

Trolley – a surface vehicle that runs on rails embedded in the street, powered by electricity, either from overhead wires or an underground conduit

Tunnel – an artificial underground passage, especially one built through a hill or under a building, road, or river.