American Museum of Natural History

# What Rocks on Your Block?

## Fifth Avenue Building Stones Walking Tour

**Teacher's Guide**

## Introduction

The following guide was created to help fellow educators design small walking tours around their schools, so students can explore a variety of rock types. While this particular tour covers a few blocks and avenues in Midtown East, you can easily apply this exploration method to any area you see fit! Please feel free to use the ideas presented here as a guide to making your own building-stone tour that's tailored to both your teaching style and your students' preferred inquiry-based learning methods.

## Rationale for Experiential Learning

As an educator, I often hear the comment, "There's only so much you can do in the classroom." While the NY State Physical Setting/Earth Science curriculum provides a good foundation for a general background in Earth science, academic time constraints prevent it from delving into any one topic in much depth.

Supplementing traditional content curriculum with experiential learning activities allows both educators and students to enlarge their perspectives and gain a better understanding of the material being taught. Experiential learning offers excellent opportunities for educators and students to go beyond the generic curriculum and engage with the finer points of the subject. Experiential activities also allow multiple learning styles to shine and flourish, helping students develop greater motivation.

## Timeframe

2-3 class periods

## Materials

- StoryMaps Walking Tour
- Student Worksheets
- Venn Diagram and Data Tables Student Worksheet
- Phone or digital camera
- Pen or pencils and clipboards
- Copies of Earth Science Reference Tables (optional)
- Rock samples of photos of rock samples (optional)

## Objective

This walking tour uses the constructed world to teach geology and Earth science. Although building stones lack their original context, they offer students excellent opportunities to practice their observational skills. Additionally, the tour allows us to connect the cross-cutting concepts of science, architecture, art, and history.

## Key Goals & Takeaways

This activity works best when presented toward the end of the unit on rocks and minerals. That way, students can recognize what they've learned in the classroom and apply their new skills to real-world examples. However, the timing is not crucial; you can schedule the tour at any time that fits your calendar.

At the end of the tour, students should be able to do the following:

- Recognize the differences among igneous, sedimentary, and metamorphic rock types.
- Identify distinguishing characteristics that allow them to classify each station's rock.
- Identify examples of characteristics associated with key rock-forming processes (such as interlocking crystals, embedded fossils, and foliation).
- Identify a variety of minerals present at each station.
- Recognize the correlation between grain/sediment size and texture.

## Strategies and Suggestions

The best part of experiential learning is, of course, the experience! Allowing students to explore and investigate at their own pace and according to their individual learning styles should not be undervalued. If you take the walking tour near the end of the rocks and minerals unit, students should already be familiar with most or all of the concepts they will encounter. Below is a list of strategies and suggestions that you may find useful.

- Be sure students are familiar with each task before they begin it.
- Allow students to work in small groups (groups larger than four can become difficult).
- Suggest students touch and feel the rocks at each station. This gives them a better idea of how mineral crystals and sediment grains can yield specific rock textures.
- Encourage students to take multiple pictures at each station.
- Bring along a few copies of the Earth Science Reference Tables as an identification guide. There are always a couple of students who like to identify the rocks first!
- Bring some familiar rock samples from the classroom for comparison. Not too many, though—the weight can add up! You might want to bring large, laminated photos instead.
- At the conclusion of the tour, ask students to explain briefly what they observed at each station.

## Standards

### Physical Setting/Earth Science Core Curriculum Standards

**Standard 4**
Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science.

**Key Idea 3**
Matter is made up of particles whose properties determine the observable characteristics of matter and its reactivity.

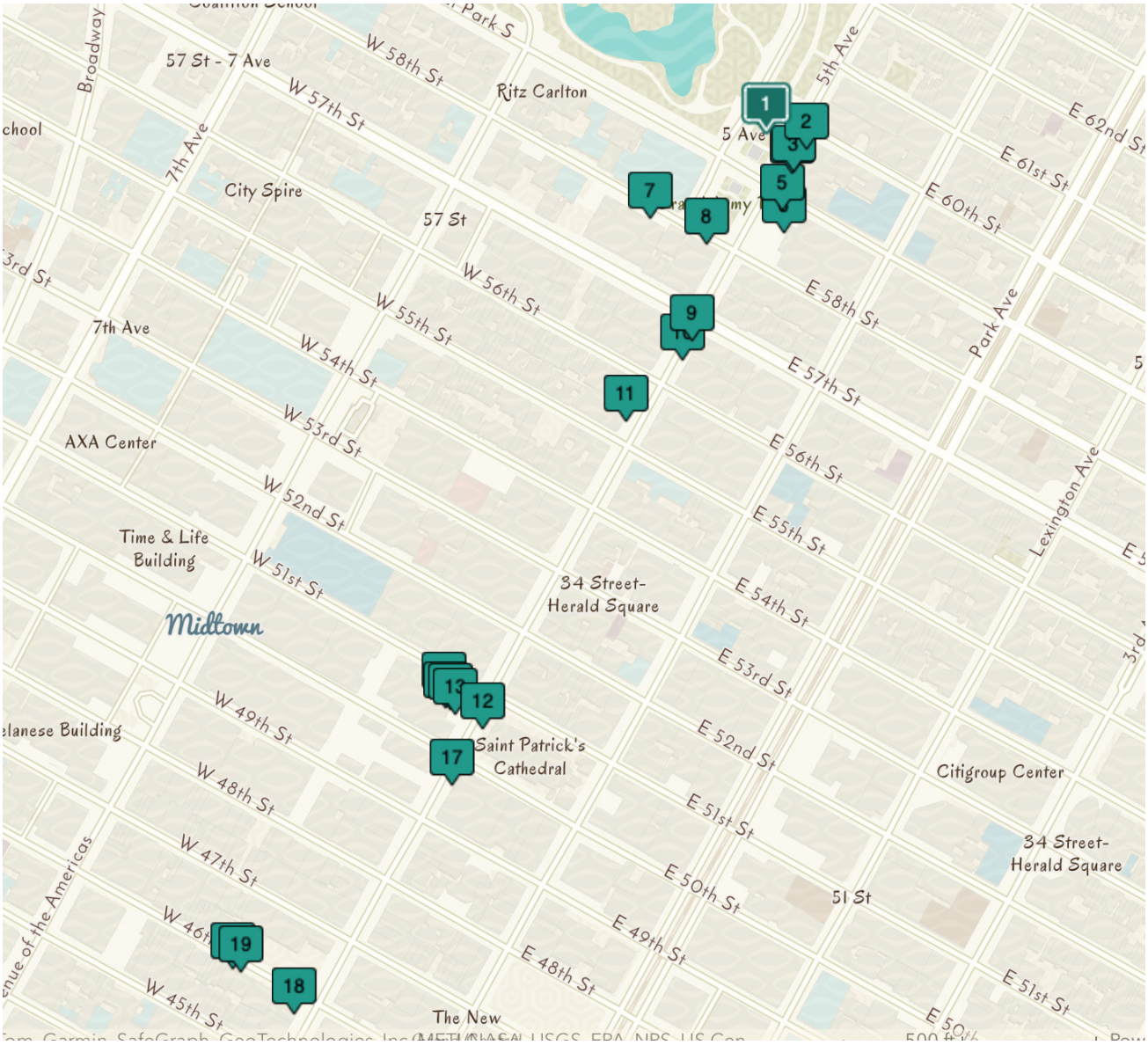
**Performance Indicator 3.1**
Explain the properties of materials in terms of the arrangement and properties of the atoms that compose them.

**Major Understandings 3.1a, 3.1b, & 3.1c**
- Minerals have physical properties determined by their chemical composition and crystal structure.
- Minerals are formed inorganically by the process of crystallization as a result of specific environmental conditions
- Rocks are usually composed of one or more minerals

## Procedure

1. Use the map below and the StoryMaps Walking Tour to find the following stops. Have students take photos and answer the worksheet questions for each stop. (Please feel free to change any part of the activity so that it best suits your students' needs and learning styles.)

    - Stop 1: Grand Army Plaza
    - Stop 2: Building at 785 5th Avenue
    - Stop 3: Harry Cipriani
    - Stop 4: Delvaux at 781 5th Avenue
    - Stop 5: Plaza outside the GM Building and the Apple Store
    - Stop 6: The GM Building
    - Stop 7: 9 West 57th Street
    - Stop 8: Bergdorf Goodman
    - Stop 9: Tiffany & Co
    - Stop 10: Trump Tower
    - Stop 11: Fifth Avenue Presbyterian
    - Stop 12: St. Patrick's Cathedral
    - Stop 13: Rockefeller Center, Atlas Statue
    - Stop 14: Rockefeller Center, Entryway
    - Stop 15: Rockefeller Center Plaza, Inside
    - Stop 16: Rockefeller Plaza, International Building
    - Stop 17: Sak's Fifth Avenue
    - Stop 18: Philippine Consulate
    - Stop 19: 10 West 46th Street
    - Stop 20: 16 West 46th Street




2. Back in the classroom, you can have students use their worksheets to complete the Venn Diagram and Data Tables worksheet.

# ANSWER KEY

## What Should Student Responses Look Like?

Observational assignments like this walking tour generally produce a variety of answers. Understand that student responses may not match the answers you're imagining. They might surprise you—perhaps in good ways! That said, the tour is designed to explore specific content pieces that are clearly recognizable. If the students miss these, be sure to point them out. The following is a list of important points to note at each location.

| Stop Number | Rock Name | Rock Type | Rock Texture | Crystal or Sediment Size | Special Features |
|---|---|---|---|---|---|
| Stop 1 | Granite | Igneous | Intrusive | Coarse grained | Contains large fedlspar crystals |
| Stop 1 | Bluestone | Sedimentary | Clastic | Medium/fine | The rock shows sedimentary layering (bedding) |
| Stop 2 | Serpentinite | Metamorphic | Deformed (weakly foliated) | Varied | The rock has a wavy texture which formed during metamorphism |
| Stop 2 | Limestone | Sedimentary | Bioclastic | Large | Contains lots of marine invertebrate fossils, mostly as very small fragments. This rock is known as the Indiana Limstone |
| Stop 3 | Limestone | Sedimentary | Bioclastic | Large | Contains molds of marine mollusk shells |
| Stop 4 | Serpentine | Metamorphic | Deformed | Large | The texture looks like a breccia with angular fragments |
| Stop 5 | Gneiss | Metamorphic | Foliated | Large | Sometimes called a migmatite |
| Stop 6 | Marble | Metamorphic | Non-foliated | Large | Also contains gold-colored cubes of pyrite |
| Stop 7 | Travertine | Sedimentary | Chemical | Large | Layered. This can also be called a limestone |
| Stop 8 | Marble | Metamorphic | Non-foliated | Large | Also contains gold-colored cubes of pyrite |
| Stop 9 | Granite | Igneous | Intrusive | Large | Contains large quartz and feldspar |

| Stop Number | Rock Name | Rock Type | Rock Texture | Crystal or Sediment Size | Special Features |
|---|---|---|---|---|---|
| Stop 9 | Limestone breccia | Sedimentary | Chemical or clastic | Large | Contains broken marine invertebrate fossils |
| Stop 10 | Gabbro | Igneous | Intrusive | Large | Sometimes called bronzite |
| Stop 11 | Arkose | Sedimentary | Clastic | Large | Called a brownstone |
| Stop 12 | Marble | Metamorphic | Non-foliated | Large | This is weakly metamorphosed, almost still a limestone |
| Stop 13 | Granite | Igneous | Intrusive | Large | Contains large plagioclase and quartz |
| Stop 13 | Siltstone | Sedimentary | Clastic | Medium | Shows weak sedimentary layering |
| Stop 14 | Granite | Igneous | Intrusive | Large | Contains pink feldspar |
| Stop 14 | Limestone | Sedimentary | Chemical | Large | Contains small fragments of marine invertebrate fossils |
| Stop 15 | Serpentinite | Metamorphic | Deformed | Large | The rock has a wavy texture which formed during metamorphism |
| Stop 16 | Limestone | Sedimentary | Chemical | Large | Contains marine invertebrate fossils, including large coiled gastropods called Maclurites |
| Stop 17 | Marble | Metamorphic | Non-foliated | Large | This is very weakly metamorphosed, almost still a limestone. Contains nice examples of fossilized corals. |
| Stop 18 | Pyroclastic breccia | Volcanic | Igneous/ sedimentary | Large | This is a mix of sediments and volcanic clasts |
| Stop 19 | Gabbro | Igneous | Intrusive | Large | This is sometimes called larvikite |
| Stop 20 | Charnockite | Igneous | Intrusive | Large | Very similar to a granite but contains the mineral pyroxene |

| Stop Number | Examples of Possible Student Observations |
|---|---|
| Stop 1 | There are two different examples of granite. One has larger grains than the other. The granite has pink feldspars. The bluestones show fine layering and you can see silt/sand grains. |
| Stop 2 | The green rock looks wavy and crumpled. |
| Stop 3 | This rock has pieces of fossils inside it. |
| Stop 4 | This rock has big angular fragments. It looks like rocks within a rock. |
| Stop 5 | This grey rock is really squiggly and has a swirly texture. |
| Stop 6 | This rock is white. It has a few small gold minerals in it. |
| Stop 7 | This rock has holes in it. It also has vertical layers. |
| Stop 8 | This rock is white. It has a few small gold minerals in it. |
| Stop 9 | This rock has big pink grains that are rounded and chunky looking. |
| Stop 10 | This rock is very shiny. It's hard to see the minerals unless you move your eye around and see it shine. |
| Stop 11 | This rock is brown and looks crumbly. |
| Stop 12 | This rock is grey and looks very uniform. |
| Stop 13 | This rock is pink and white and has big crystals. |
| Stop 14 | The walls here have tons of tiny broken fossils. |
| Stop 15 | This rock is very squiggly and looks really smooth. |
| Stop 16 | It's hard to see because it is dark, but you can find shells and fossils here. |
| Stop 17 | This rock has fossils in it. |
| Stop 18 | This rock has lots of broken other bits in it. It also looks crumbly. |
| Stop 19 | This rock is grey/blue and is very shiny. |
| Stop 20 | This rock is grey/white but has a few small purple/red minerals in it. |