

Lesson: How big is the Intrepid?

Grades: 3-8th Grade

Duration: 45 minutes

National Learning Standards:

Measurement

NM-MEA.3-5.2, NM-MEA.6-8.2

Apply appropriate techniques, tools and formulas to define measurements.

Number and Operations

NM-NUM.3-5.3, NM-NUM.5-3.3

Compute fluently and make reasonable estimates.

Overall Goal:

Students will understand the relative size of Intrepid in comparison to human structures or natural formations.

Objectives:

Students will:

- Determine the length of the Intrepid and the height human made structures or natural formations in their surrounding areas*
- Graph the lengths*
- Use math methods to determine the relationship in size to each other.*

Background Information:

The Intrepid Sea, Air & Space Museum is housed in the former USS Intrepid, a retired WWII Essex Class aircraft carrier that is now located on the west side of Manhattan. The USS Intrepid, built between 1941 and 1943 for the Pacific Theater of WWII, participated in naval engagements at the Marshall Islands, Truk, Peleliu, Palau, Okinawa, Wake Island and was involved in the largest naval engagement in history: The Battle for Leyte Gulf. After WWII, *Intrepid* was decommissioned and went through conversion into a modern attack carrier.

In the early 1960's *Intrepid* became a NASA prime recovery vessel and from 1966 to 1968 *Intrepid* served three tours of duty in the Vietnam War. She spent the early 1970's on training exercises, sailing along Europe's Atlantic coast and in the Mediterranean Sea, engaging in anti-submarine warfare before being decommissioned in 1974. The USS Intrepid was opened as the Intrepid Sea, Air & Space Museum in 1982.

Aircraft Carrier Massive size:

Essentially an aircraft carrier's function is two-fold which explains its massive size: as a floating airport and a "city" at sea.

An aircraft carrier acts as an airport to allow aircraft to launch, be recovered and stored on its 900 foot long decks. The Intrepid's flight deck was equipped with two catapults that assisted in launching aircraft off the front of the flight deck in a quick fashion. To land on a carrier's flight deck, tailhooks located on the back of the aircraft grabbed onto arrestor cables which allowed planes to stop quickly, similar to a controlled crash. For storing and maintenance, Intrepid was built with a hangar located below the flight deck which could hold up to ½ of its contingent. Other technologies similar to an airport were housed aboard the Intrepid including

radar, air traffic control and an array of communication devices to keep the ship connected with its pilots.

As a “city” the Intrepid was home to some 3000 sailors that lived on board the ship. This fact called for the men to have many of the necessities that they would enjoy at home. Facilities aboard the Intrepid included sleeping quarters, eating (“mess”) areas, mailroom, barber, sick bay, dentist office, mission ready rooms, office areas and more.

Because of its massive size, Intrepid is likened to the size of a skyscraper lying on its side. Intrepid is only 150 feet shorter than New York City’s Chrysler Building, however she is 595 feet taller than the Statue of Liberty. Teachers are encouraged to research the height of different structures or formations near them to compare with Intrepid’s size. They can even have their students measure the length of their school to compare to Intrepid rather than use the suggested monuments in this package if they feel they can make better connections for their students.

Materials:

Picture of USS Intrepid

Pencils

Graph Paper

Procedure:

- Teacher will introduce the students to the USS Intrepid by showing a picture of the ship
 - Trigger questions:
 - *What kind of ship is the Intrepid?*
 - *What is its function?*
 - *How big do you think it is?*
- Teacher will ask students to think about large buildings or monuments that they know of in the United States. Some examples are given to you on a supplemental page with this packet.
 - Trigger questions:
 - *Are there any large buildings or monuments near us?*
 - *Where are they?*
 - *Are they in a city, or a town?*
 - *How tall are they and are they bigger or smaller than Intrepid?*
- Students will use graph paper and pencils to graph the heights of Intrepid and graph the heights of structures. Students should use bar graphs to show their results and include a legend on the side of their paper.
- The y-coordinate will list the length of Intrepid and the heights of the chosen structures. Based on chosen structures, teacher will determine the increments of the graph paper.
- Teacher will provide students with a list of structures by writing them on the board or allowing the students to pick from a list that you will provide.
- On the x-coordinate, students will write the Intrepid and the names of three (3) structures.
- Teachers should encourage students to make comparisons between the buildings they have graphed and Intrepid. Simple mathematical computations can be used to determine differences in height. Teachers can ask students to calculate by using percentages, fractions or simple addition and subtraction.

Structures and Land Formation Heights

The Alamo (San Antonio, TX): 30 feet
American International Building (New York, NY): 952 feet
Aon Center (Chicago, IL): 1136 feet.
Bank of America Plaza (Atlanta, GA): 1039 feet
Bank of America Plaza (Dallas, TX): 921 feet
Bank of America Tower (New York, NY): 1200 feet
Capital Building (Washington, DC): 752 feet
Carnegie Hall Tower (New York, NY): 757 feet
Chase Tower (Chicago, IL): 850 feet
Chase Tower (Indianapolis, IN): 830 feet
Chicago Board of Trade Building (Chicago, IL): 322 feet
Chicago Spire (Chicago, IL): 2,000 feet
Chicago Water Tower (Chicago, IL): 154 feet
Christ Church (Philadelphia, PA): 196 feet
Chrysler Building (New York, NY): 1046 feet
Columbia Center (Seattle, WA): 937 feet
Comcast Center (Philadelphia, PA): 975 feet
Delicate Arch (Arches National Park near Moab, Utah): 52 feet
Empire State Building (New York, NY): 1,250 feet
Four Seasons Hotel and Tower (Miami, Florida): 794 feet
Freedom Tower (under construction) (New York, NY): 1,362 feet
GE Building (New York, NY): 850 feet
Golden Gate Bridge (San Francisco, CA): 746 feet
Goldman Sachs Tower (Jersey City, NJ): 781 feet
Hancock Building (Chicago, IL): 1127 feet
Hancock Place (Boston, MA): 790 feet
High Point State Park (Sussex Co, NJ): 1,803 feet
IDS Center (Minneapolis, MN): 781 feet
Independence Hall (Philadelphia, PA): 135 feet
JP Morgan Chase Tower (Houston, TX): 1002 feet
Key Tower (Cleveland, OH): 947 feet
Milwaukee City Hall (Milwaukee, WI): 353 feet
Mt. Rushmore (Near Keystone, SD): 500 feet (president face- 60 feet)
New York Times Building (New York, NY): 1046 feet
One Liberty Place (Philadelphia, PA): 945 feet
Philadelphia City Hall (Philadelphia, PA): 548 feet
Prudential Tower (Boston, MA): 907 feet
Renaissance Tower (Dallas, TX): 886 feet (including spire)
Republic Plaza (Denver, CO): 714 feet
Sears Tower (Chicago, IL): 1,450 feet
Space Needle (Seattle, WA): 605 feet
Statue of Liberty (New York Harbor, New York): 305 feet (base of the pedestal to the torch)
St. Louis Arch (St. Louis, MO): 630 feet
Stratosphere Tower (Las Vegas, NV): 1362 feet
SunTrust Plaza (Atlanta, GA): 871 feet
Terminal Tower (Cleveland, OH): 708 feet
Transamerica Pyramid (San Francisco, CA): 853 feet
Trinity Church (New York, NY): 279 feet
Trump Building (New York, NY): 927 feet

Trump World Tower (New York, NY): 861 feet
Two Prudential Plaza (Chicago, IL): 995 feet
U.S. Bank Tower (Los Angeles, CA): 1018 feet
U.S. Steel Tower (Pittsburg, PA): 841 feet
Washington Monument (Washington, DC): 556 feet
Washington Mutual Tower (Seattle, WA): 771 feet
Water Tower Place (Chicago, IL): 859 feet
Wells Fargo Plaza (Houston, TX): 992 feet
Williams Tower (Houston, TX): 901 feet
Willis Tower (Chicago, IL): 1451 feet
Wrigley Building (Chicago, IL): 398 feet

Student Worksheet Questions/Answer Key:

Once students have graphed their structures, they will make comparisons between the length of Intrepid and the structures that they just graphed heights using the following sentence structure:

Intrepid's flight deck is _____ feet _____ than _____.

Shorter/taller

building/land structure.

Once the students have finished writing down this information, students will take a guess and answer the following questions:

Take a guess!

Why do you think the Intrepid is so large?

The Intrepid acted as an airport at sea. It had to be large enough to not only provide a runway for the planes taking off and landing, but also had to be large enough to provide space to store its contingent of aircraft (about 100 during WWII). It also held sleeping quarters, eating areas, office and several other areas that would allow the men the same amenities that they can enjoy on land.

How many people do you think would work on a ship as large as Intrepid?

As many as 3000 men could serve on board the Intrepid at one time during its career. This pales in comparison to office buildings like the Empire State Building which accommodates 21,000 workers everyday. However, just as much area was used to live on the Intrepid as there was to work.

Glossary

After completing the pre-lessons associated with Intrepid Geography, students should have a basic understanding of the following terms and concepts:

Aircraft Carrier: A large warship that carries planes and has a long flat deck for takeoffs and landings.

Comparison: The act of examining resemblances.

Flight Deck: The upper deck of an aircraft carrier; used as a runway.

Function: What something is used for.

Graph: Chart that represents data.

Hangar Deck: A deck, below the flight deck of a carrier, where aircraft are parked and serviced.

Height: The vertical dimension of extension; distance from the base of something to the top.

Length: The linear extent in space from one end to the other; the longest dimension of something that is fixed in place.

Monument: A type of structure either explicitly created to commemorate a person or important event or which has become important to a social group as a part of their remembrance of past events.

Pacific Ocean: An ocean bordered by the American continents, Asia, and Australia: largest ocean in the world; divided by the equator into the North Pacific and the South Pacific.

Pacific Theater of WWII: One of four major naval theatres of war of World War II that pitted forces of Japan against those of the United States and other allies.

Skyscraper: A building that protrudes above the surrounding built environment and changes the overall skyline of the city it is in.

WWII: A war fought from 1939 to 1945, in which Great Britain, France, the Soviet Union, the United States, China, and other allies defeated Germany, Italy, and Japan.

Lesson: Living on Intrepid

Grades: 4-8

Duration: 1 class period

National Learning Standards:

Social Studies

NSS-USH.K-4.1

Understands family life now and in the past, and family life in various places long ago

Understands the history of the local community and how communities in North America varied long ago

NSS-USH.5-12.8

Understands the causes and course of WWII, the character of the war at home and abroad, and its reshaping of the US role in world affairs

Overall Goal:

Students will discover the way that men lived on the Intrepid during WWII and recognize the similarities and differences between themselves and the sailors.

Objectives:

Students will:

- Brainstorm what their personal essential items are*
- Determine from their list if these essential items would be the same as the sailors*
- Draw or write these essential items on the worksheet provided titled “Living on Intrepid!”*
- Determine which if any of their items would have been available during the 1940’s*
- Discuss cultural differences between the 1940’s and present day*

Back Ground Information:

Men who lived aboard the Intrepid did not have a lot of room to keep personal items. The average sailor kept his uniforms, work clothes and personal items in a three-man locker. All clothes were Navy issued, so essentially crew members only had small drawers in side their locker where they could keep their personal items. According to former crew members that we interviewed, this was limited to smaller items such as shaving kit, pencil, paper, wallet, photographs, letters, etc. Because of the limited amount of room on a Navy ship, even an aircraft carrier, space had to be maximized, hence using vertical space for suspended beds or “racks” and lockers.

The pictures below give one a good sense of what the living areas of a ship would look like for the average sailor.



Materials:

Giant post-it notes or tag board
Markers
Worksheet: "Living on Intrepid!"

Procedure:

Teachers will break students up into groups or pairs.

Students should brainstorm some of the items they would consider to be essential in their lives and write these down on their post-it notes/tag board. If it helps the students to conceptualize their list, they can first write down things they do during the day first and then decide what items they would need to complete those tasks. Example: they need a toothbrush and tooth paste to brush their teeth.

Teachers will bring students back together to share ideas and write these ideas on the board.

Teachers will introduce the three-man locker and ask students what, if anything from their lists would be able to fit into the drawers. Some may list i-pod or hand held gaming devices.

Students can either write or draw these items into the space provided on the three-man locker worksheet.

For an extension lesson or discussion, teachers can discuss with students what items on their list were available during the 1940's and discuss how people lived without the items that we find so necessary today.

Glossary

Amenity: A thing or circumstance that is welcome and makes life a little easier or more pleasant; convenience

Berthing: an enclosed room generally on a ship or an aircraft

Chapel: A place of worship in a civil institution such as an aircraft carrier

Crew: the men who man a vehicle or a ship: seafarers

Enlisted: in the Military of the United States this is any rank below a commissioned officer or warrant officer.

Essential: basic and fundamental, absolutely necessary.

Liberty Card: Card that is used for identifying sailors that are part of a ship's crew when they are off ship for R&R (Rest and Relaxation).

Mess: On a ship, this area is what is used for a main eating area for crew members.

Quarters: area on a ship designated for people to live in

Racks: literally, a framework for holding objects. On the Intrepid they were suspended bunks where enlisted men slept.

Sick Bay: On a ship, this area is the equivalent of a hospital or where people go when sick or wounded to be brought back to health.

Three-man locker: a storage compartment for clothes and valuables that are stacked one on top of the other totaling three. One locker was assigned to each enlisted man.

Lesson: Where was the USS Intrepid built compared to where I live?

Grades: 4-8

Duration: 1 – 2 class periods depending on teacher interest and student age (45 minutes each)

National Learning Standards:

Geography

NSS-G.K-12.1

Understand how to use maps and other geographical representations, tools, and technologies to acquire, process, and report information from a spatial perspective.

NSS-G.K-12.4

Understand the characteristics, distribution, and migration of human populations on Earth's surface.

NSS-G.K-12.6

Understand how to apply geography to interpret the past.

Social Studies

NSS-USH.5-12.8

Understands the causes and course of WWII, the character of the war at home and abroad, and its reshaping of the US role in world affairs

Overall Goal:

Students will be able to identify where the Intrepid was built and determine how far away that is from where they live.

Objectives:

Students will:

- Determine where their city and state is located*
- Determine where Newport News, VA is located*
- Use directional language to describe where Virginia is compared to their home state.*
- Use ruler and scale to determine mileage between their home city and Newport News, VA*

Pre-knowledge Needed:

- Students should be somewhat familiar with directions like north, south, east and west.
- Students should be familiar with the position of their home state within the United States.

Back Ground Information:

The Intrepid Sea, Air & Space Museum is housed aboard the former WWII aircraft carrier, USS Intrepid. Construction began on Intrepid on December 1, 1941, just 6 days before the bombing of Pearl Harbor, HI which propelled the United States into WWII. By 1945, some 13 million men had been either drafted or joined the military, coming from every part of the nation and from all walks of life.

Aircraft carriers were built quickly for the War. They were convenient in two ways. Since aircraft did not have the long range capability of traveling to the Pacific Ocean for combat, they could be carried by these large ships to their destinations. As well, en route and during battles, naval aviators and crews performed various practice flights, flight operations and participated in combat missions using the aircraft carrier as their base of operations.

Intrepid was built at Newport News Shipping and Drydock Company located in Newport News, VA at the mouth of the Jamestown River. She was commissioned (became active) in August, 1943. Her first home was at Naval Station Norfolk (also located in Virginia) very close in proximity to Newport News. Virginia's Atlantic Coastal Plain is an area of lowlands that stretch 100 miles into inland Virginia and is covered largely by salt marshes and swamps. It is low-lying areas like these close to the sea that allow for man made ports and large ship building areas to be more easily created.

Transportation of the day would allow sailors few travel options to use in reporting to Intrepid. Trains, planes and automobiles were all available during this time period; however some transportation types may have been limited depending on the starting point of the crew member's journey or his socio-economic background. Also, based on the rationing of fuel and other industrial materials along with commercial air travel still being a limited resource it is plausible that train and bus transportation may have been preferable and more available than car or aircraft. This however needs more research conducted to give accurate accounts specific to Intrepid.

Materials:

Scale map of the continental United States with state outlines
Pen/pencil
Ruler

Procedure for worksheet: "How Far Would You Travel?"

Teachers will review the "How Big is Intrepid?" lesson.

Teachers will tell students that they are going to do a mapping activity.

Teachers will hand out maps of the United States to the students and let them know that they are going to be determining the distance of their home states to Virginia.

Teachers will first discuss with students the use of maps and the use of scale to determine distances from one point to another.

- Trigger Questions:
 - *What is a map?*
 - *What do maps tell us?*
 - *How do we know directions on a map?*
 - *What is scale?*
 - *Why would we use a ruler for this activity?*

Students will fill in their map to show directions of north, south, east and west. If teachers prefer, students can also label the Atlantic and Pacific oceans, Mexico and Canada. Discuss map insets (like Alaska and Hawaii and discuss their relevance to the map) with students as well.

Teachers will introduce to the students where Intrepid was built.

- Trigger Questions:
 - *Why would a large ship like Intrepid be built?*
 - *Where can a ship like Intrepid be built?*
 - *Would it be easier to build a ship inland or on the coastline?*
 - *Where are large coast lines along the United States?*
 - *What states are on those coast lines?*

Teachers will introduce Virginia's location on the east coast of United States and it being where Intrepid was built.

- Trigger Questions:
 - *Where is Virginia?*
 - *On which coastline of the United States is Virginia located?*
 - *Where is that in relation to where you live? East? North? West? South? ***

Teachers should introduce the fact that men who served on Intrepid came from many different parts of the country including their own state. Students should determine the distance from their home states to Virginia using their rulers and map scale and complete their worksheet questions. As an extension to this activity, teacher can talk about the geographical features between their own state and Virginia.

***If students already live in Virginia, they can use local maps to determine distances. The teacher can also introduce Hunter's Point Navy Base near San Francisco, where Intrepid spent time before going to the Pacific Ocean during WWII. It's quite possible that men left their home states to join Intrepid's crew in California. Hawaii and Alaska would not work for this activity with the Intrepid supplied map.*

Student Worksheet “How Far Would You Travel” Questions/Answer Key (Teacher will need to fill in this information themselves):

I live in _____ . (Students should write the name of their state in the blank)

If I had to travel from _____ (students should write in the name of their state) to _____ (state where Intrepid was stationed), I would have to travel _____ (students should write in the directions that they would have to travel here).

Students will need to write the names of the states located between their own states and where Intrepid was located.

Students will use the ruler and write in a full complete sentence how far away their state is from Virginia (or other if necessary). The map scale in the student workbook is approximately 2 cm for every 300 miles.

Note to Elementary School Teachers:

If students are in elementary school, teachers can skip the 2nd classroom period and proceed to next lesson.

Procedure for 2nd Class Period (Suggested for Middle School Students)

Teachers will talk to the students about the need for men to fight in WWII

- Trigger Questions:
 - *How many people do you think needed to participate in WWII?*
 - *Why do you think it was necessary for this many people to participate in the war?*
 - *Where do you think these people came from?*
 - *How many people do you think participated from our state?*

Teachers will talk about how men who fought in WWII came from many states including theirs and would have needed to travel from where they lived to Intrepid when she was stationed in Norfolk VA. Teachers should ask students to pretend that they are men who were going to serve on board Intrepid during this time period. How would they have gotten from their home states to Virginia?

- ~Trigger Questions:
 - *What kind of transportation was available in the 1940's?*
 - *How do you think people traveled from one place to another?*
 - *How long would it take to get there?*

Students will use worksheet with math problems relating to distance, rate and time to determine how long it would take for people to travel to Virginia using different modes of transportation. Students can discuss what their preferred method may have been or as an extension, students can discuss why or why not certain methods of transportation were used. If the students are from Virginia or a close-by state teachers could discuss other places where men may have had to report to Intrepid. During WWII Intrepid spent a lot of time at Hunter's Point Naval Shipyard in Alameda, CA where more men may have been assigned to be part of Intrepid's crew after leaving Virginia.

Student Worksheet "Getting to Intrepid (page 1 of 2)" Questions/Answer Key (Teacher will need to fill in this information themselves for page 2 of 2):

Here is an example of what your word problem will look like:

A car traveled at 40 miles per hour for 1200 miles.

From the sentence above, fill in the following:

distance= 1200 miles
rate= 40 miles per hour

How many hours did it take the car to get to its destination?

Here's the math: $t=d/r$
 $t=1200/40$
 $t= 30$ hours

Glossary:

Coast Line- is the outline or contour of a coast; shoreline.

Continental United States- is the territory of the United States that is within North America between Canada and Mexico, and the adjacent territorial waters.

Direction- is the spatial relation between something and the course along which it points or moves.

Distance- is the size of the area between two places.

Draft- is mandatory military service.

Dry Dock- is a narrow basin that can be flooded to allow a load to be floated in and rest on a platform.

East Coast- is a region of the eastern United States along the Atlantic coastline, especially the urban corridor from Boston to Washington, D.C.

Geographic Features- are components of a planet that can be referred to as locations, sites, areas, or regions (and therefore may show up on maps).

Harbor- is such a body of water having docks or port facilities.

Inset- a small picture inserted within the bounds of a larger one.

Map- is a representation, usually on a flat surface, as of the features of an area of the earth or a portion of the heavens, showing them in their respective forms, sizes, and relationships.

Miles- are units of distance on land in English-speaking countries equal to 5280 feet, or 1760 yards.

Military- is an organization authorized by its nation to use force against another country or to defend its own country from attack by other nations.

North America- is the northern continent of the Western Hemisphere, extending from Central America to the Arctic Ocean.

Port- is a city, town, or other place where ships load or unload.

Rate- is a unit of measurement related to how fast or slow a moving object is going.

Relations- are connections between people, groups or concepts.

Ruler- is a measuring stick consisting of a strip of wood, metal or plastic with a straight edge that is used for drawing straight lines and measuring lengths.

Scale- is the ratio of a single unit of distance on the map to the corresponding distance on the ground.

State- is a sovereign political entity in international public law.

Stationed- is a term used when military personnel, like soldiers, sailors, airmen and marines, are sent to a certain place to do their work.

Time- is a unit of measurement that determines the duration of an event or action.

Transportation- is the act of moving something from one location to another.

World War II- was a global military conflict which involved most of the world's nations. The United States, England, France and USSR (the Allies) made up the major forces that fought against Japan, Germany and Italy (the Axis).