AOE IED Integrated Unit: Ship Shape

Lesson 1.1

Introduction to Engineering Design

Call of the Sea

In this lesson, students are introduced to the various types of engineering associated with ship design. Students learn the types of work ship designers engage in and what level of education is necessary for work in this field. Students will also hear from a practicing naval engineer, where possible.

This lesson is expected to take one class period (additional time will be necessary if a guest speaker or site visit is included).

Lesson Framework

Learning Objectives

Each student will:

- Describe the field of naval architecture.
- Distinguish between various careers available within the field of naval architecture.
- Identify and use the specialized vocabulary associated with parts of ships and ship design.

Academic Standards

- Students will develop an understanding of the characteristics and scope of technology. (ITEA Standards for Technological Literacy, Standard 1)
- Students will develop an understanding of the core concepts of technology. (ITEA Standards for Technological Literacy, Standard 2)
- Students will develop an understanding of the relationships among technologies and the connections between technology and other fields of study. (ITEA Standards for Technological Literacy, Standard 3)
- Students apply a wide range of strategies to comprehend, interpret, evaluate, and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics). (NCTE Standards for the English Language Arts, Standard 3)
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge. (NCTE Standards for the English Language Arts, Standard 8)

Assessment

Assessment Product	Assessment Criteria
Descriptive report on four postsecondary programs associated with ship design.	None provided

Prerequisites

- None

Instructional Materials

Teacher Resources

- Teacher Resource 1.1.1—Presentation: Ship Shape
- Teacher Resource 1.1.2—Reading: Background Information

Student Resources

- Student Resource 1.1.1—Worksheet: Ship Taxonomy
- Student Resource 1.1.2—Worksheet: Shipyard Scavenger Hunt

Equipment and Supplies

- Computer lab with Internet access
- Index cards, sticky notes, or small scraps of a paper

Lesson Steps

Step	Min.	Activity
		CLASS PERIOD 1

Step	Min.	Activity
1	**15**	**Taxonomy: Ships** Pass out the Ship Taxonomy worksheet (or have students create their own in their engineering notebook or on a blank sheet of lined paper). Give students a few minutes to write down as many words associated with ships as they can. After students have come up with as many words as they can, have them share their lists in pairs or small groups for a few additional minutes. This should give students the opportunity to briefly discuss any unfamiliar words with their neighbors. Finally, create a master list of words for the class using chart paper or an overhead transparency. As a class, group the words from the master list into naturally emerging categories. Possible categories might include types of ships, parts of ships, names of ships, and so on. To facilitate this grouping exercise, you may wish to write individual terms on sticky notes.
2	**20**	**Direct Instruction: Ship Shape** Using Teacher Resource 1.1.1—the Ship Shape PowerPoint presentation, as a guide, introduce the fields of engineering in the marine environment, particularly naval architecture.
3	**5**	**Internet Scavenger Hunt: Shipyard Scavenger Hunt** Have students complete the Shipyard Scavenger Hunt worksheet in pairs. Alternatively, you can have them do this activity as homework.
		CLASS PERIOD 2
4	**45**	**Guest Speaker and/or Site Visit (if available): Naval Architect** Invite a practicing naval architect or marine engineer to give a talk about the field. Regional chapters of the American Society of Naval Engineers or the Society of Naval Architects and Marine Engineers have K-12 education outreach programs and are possible sources of guest speakers. Your local university may have a department of ocean engineering with professors or graduate students who are willing to give a talk. Local shipyards, boat builders, and boat repair facilities can be found in the phone book in metropolitan coastal regions. If your community is located near a major body of water, have students visit a ship- or dockyard. Your local port authority may also have educational outreach programs, although they may be more associated with trade than with naval architecture. Site visits can be done either as a field trip during the day or as an optional trip students arrange on their own time.

Step	Min.	Activity
5	**5**	**Reflection: Exit Ticket** Have students reflect on their introduction to field of naval architecture and marine engineering. Pass out index cards or sticky notes. Ask each student to identify 1. An interesting or surprising fact they learned about engineering. 2. Something they would like to learn more about related to this field. Have a few students share their responses. Collect the comments as students leave the room for your reference. HOMEWORK Have students find and report on at least four postsecondary educational programs related to naval architecture and ocean engineering careers.

AOE IED Integrated Unit: Ship Shape

Lesson 1.1

Call of the Sea

Student Resources

Resource	Description
Student Resource 1.1.1	Worksheet: Ship Taxonomy
Student Resource 1.1.2	Worksheet: Shipyard Scavenger Hunt

Student Resource 1.1.1

Worksheet: Ship Taxonomy

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Student Resource 1.1.2

Worksheet: Shipyard Scavenger Hunt

Directions: Draw a diagram of a ship. Locate and label the following parts or places on the ship.

- Bow
- Stern
- Hull
- Draft
- Freeboard
- Boom
- Mast
- Deck
- Keel
- Rudder
- Port side
- Starboard side

Directions: Using the Internet, find one example of a ship that fits each of the following criteria. Cut and paste a picture of the ship and the URL where you found it into this document.

- The oldest ship
- The oldest ship that is still seaworthy
- The largest passenger ship
- The largest ship of any kind
- The fastest ship
- The ship that can carry the most amount of cargo

AOE IED Integrated Unit: Ship Shape

Lesson 1.1

Call of the Sea

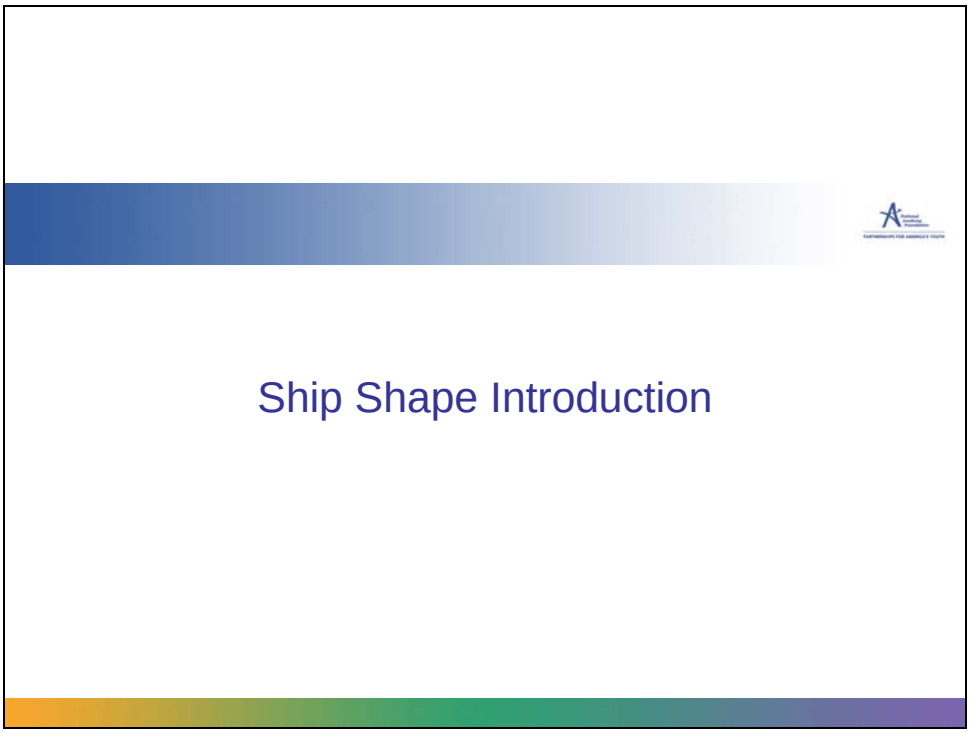
Teacher Resources

Resource	Description
Teacher Resource 1.1.1	PowerPoint Presentation: Ship Shape
Teacher Resource 1.1.2	Reading: Background Information

Teacher Resource 1.1.1

PowerPoint: Ship Shape

In order to open the presentation, right-click on the image below and then select Presentation Object/Open from the menu.



Teacher Resource 1.1.2

Reading: Background Information

For more information, see www.sname.org and www.navalengineers.org

The role of maritime professionals is vital to the world economy. Ninety-five percent of the world's goods are transported by ship. Naval architects and engineers design and build vessels and other ocean structures to transport and protect the delivery of people and goods around the world. These ships and structures include aircraft carriers, high-speed ferries, submarines, sailboats, fishing vessels, cruise ships, tankers, tugboats, yachts, underwater robots, and oil rigs. The fields of naval architecture, marine engineering, and ocean engineering are essential to maritime security, national defense, environmental protection, and especially international trade. These professions are interrelated, and all address our use of the seas, coastal waterways, lakes, and rivers. They involve a variety of engineering and physical science skills, including hydrodynamics; material science; and mechanical, civil, electrical, chemical, and ocean engineering.

Naval architects must have a general understanding of all engineering disciplines because they generally start the process of designing a ship. After they determine its basic size and shape, they address hull form and resistance, propulsion power requirements, ship structure, weight distribution, stability, and the efficient location of the many compartments throughout the ship.

Marine engineers are responsible for designing mechanical systems for propulsion and auxiliary services and for selecting the associated equipment such as steam boilers and turbines, diesel and gas turbine internal combustion engines, gears, and propellers, as well as their controls. Many marine engineers have served as officers aboard ship, operating the power plant and managing vital services such as generating electricity and supplying fresh water.

Ocean engineers concern themselves with work both on and below the surface of the sea. They study ocean movements and their effect on ships and other watercraft, both on the surface and below it. An ocean engineer may design small subsurface vehicles and devices intended for deep submergence that perform ocean bottom scanning, salvage operations, object recovery, and submarine rescue. The work includes structural, propulsive, and hull-form design for resisting deep ocean pressure, and selection of materials for this hostile environment. An ocean engineer, Dr. Robert Ballard, located the wreckage of the *Titanic.*

Mechanical engineers design specific items of machinery such as cranes, hoists, elevators, and equipment for anchoring, steering, controlling submarine depth, or moving weapons and other supplies within the ship and between ships at sea. Knowledge of fluid systems is required for designing fuel, lubrication, and water installations, as well as for fire suppression, compressed air, and heating, ventilation, and air conditioning.

Civil engineers specify the actual structure of the ship including framing, shell, decks, bulkheads and equipment foundations. They ensure that the ship can withstand the weight of cargo loading and the impact of waves. Combat ships must be able to withstand battle damage from weapons such as missiles, torpedoes and underwater mines.

Electrical engineers provide for the generation and distribution of electricity throughout the ship for lighting, power, system controls, and various other ship services. Today's ships also require a multitude of electronic navigation and communication systems, and for military craft, combat systems as well.

AOE IED Integrated Unit: Ship Shape

Lesson 1.2

English Language Arts

Sailing the Wine Dark Sea

In this lesson, students engage in the cooperative learning activity of literature circles. Students select their reading from a list of possible sailing-themed works and meet in small groups for discussion. In their literature circle, students take on different roles in analyzing and interpreting the text.

This lesson is expected to take one day for introduction and up to five days in literature circle discussions.

Lesson Framework

Learning Objectives

Each student will:

- Read and critically discuss a sea story with a group of peers independently.
- Determine various characters' traits from narration, dialogue, and monologues in text.

Academic Standards

- Students read a wide range of print and non-print texts to build an understanding of texts, of themselves, and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works. (NCTE Standards for the English Language Arts, Standard 1)
- Students read a wide range of literature from many periods in many genres to build an understanding of the many dimensions (e.g., philosophical, ethical, aesthetic) of human experience. (NCTE Standards for the English Language Arts, Standard 2)
- Students apply a wide range of strategies to comprehend, interpret, evaluate, and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics). (NCTE Standards for the English Language Arts, Standard 3)
- Students participate as knowledgeable, reflective, creative, and critical members of a variety of literacy communities. (NCTE Standards for the English Language Arts, Standard 11)
- Students use spoken, written, and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information). (NCTE Standards for the English Language Arts, Standard 12)

Assessment

Assessment Product	Assessment Criteria
Packet containing the assignments for each literature circle role played by student.	None provided

Prerequisites

- None

Instructional Materials

Teacher Resources

- Teacher Resource 1.2.1—Reading: Background Information
- Teacher Resource 1.2.2—Reading: *Moby Dick* Excerpt
- Teacher Resource 1.2.3—Reading Suggestions: Sea Stories

Student Resources

- Student Resource 1.2.1—Handout: Literature Circles
- Student Resource 1.2.2—Handout: Story Selection Ballot

Equipment and Supplies

- Sea stories

Lesson Steps

Step	Min.	Activity
		CLASS PERIOD 1
1	**10**	**Reading: Moby Dick** Ask students where they go or what they do to “escape”? That is, what activity do they engage in to take their mind off problems? Introduce the idea that going to sea

Step	Min.	Activity
		(much like "going west") has long been a popular escape for people. Ask students to speculate what the allure of sea might be. Read aloud the opening paragraph of *Moby Dick* to the class. How does Ishmael feel before setting to sea? What do you think is the appeal of the sea? Allow students to discuss any personal experiences or impressions they have with the sea and with sailing.
2	**10**	**Class Discussion: Sea Stories** Ask students to think of any books (or movies) that take place primarily at sea, and compile a list for the class. Discuss why the sea and ships might be a popular setting for fiction.
3	**10**	**Direct Instruction: Literature Circles** Pass out the Literature Circles handout, and explain to the class that they will be conducting their own literature circle discussions on short sea stories. You may wish to alter the possible roles assigned to students based on the literature you have them read or your goals for the class. Other possible literature circle roles include: • New Critic (Identify key passages) • Character Analyst (What do we know about the characters?) • Biographical Critic (What do we know or learn about the author?) • Director (for drama) (Give instructions to actors for key passages) • Engineer (Identify physical and/or logical structures) • Historian (Information and inferences about history) • Narratologist (Identify authorial strategies) • Stylist (Sentence-level strategies) • Feminist (What is stated/implied about the role of women?) • Devil's Advocate (Identify and attack weaknesses) • Cinematographer (How would this work as a movie?) • Philosopher King (What are the themes or big ideas?) • Musician (Where is this language most pleasing to the ear?) • Egotist (What's in this for me?) • Artist (How would this translate into a painting?)
4	**15**	**Cooperative Learning Group (Fishbowl): Literature Circles** Introduce the concept of the literature circle to the class if they have not participated in one in the past. If students are unfamiliar with literature circles, take some time to model appropriate discussion techniques using the "fishbowl" cooperative learning method. Select a small group of students to participate in the discussion, and explain their roles to them. Have the entire class read a short passage of text of your choice. The selected group should then model the appropriate behavior for each of their roles as the remainder of the class observes.

Step	Min.	Activity
5	**5**	**Book Selection: Literature Circles** Pass out the Story Selection Ballot. The stories on the ballot are suggestions only; due to time limitations and flexibility, are all either short stories or excerpts from longer works. Edit the ballot to reflect a selection that is appropriate and available to your own class. Briefly describe each story and have students fill out their ballots. Collect the ballots and assign students to a literature circle based on their selections. Ideally, each group would have four to five members. Set up and assign a reading schedule for each group. You may wish to have students take their ballots home and decide in the next class period.
		CLASS PERIODS 2–6
6	**Varies**	**Small Group Discussion: Literature Circles** Over the course of the several class periods (not necessarily consecutive, but at least at scheduled intervals) have students meet in their literature circles to discuss their reading. Assign literature circle roles for each group member at the same time as assigning the reading. HOMEWORK Before each literature circle session, students should read their assigned story and complete the task associated with their literature circle role.
7	**5**	**Reflection: Literature Circles** Have students collect the materials they have completed for each of their reading groups into a single packet, and turn it in.

AOE IED Integrated Unit: Ship Shape

Lesson 1.2

Sailing the Wine Dark Sea

Student Resources

Resource	Description
Student Resource 1.2.1	Handout: Literature Circles
Student Resource 1.2.2	Handout: Story Selection Ballot

Student Resource 1.2.1

Handout: Literature Circles

Directions

As part of the Ship Shape integrated unit, we will be reading a selection of maritime stories in literature circles. Literature circles are kind of like book clubs, but with more direction. What does that mean?

- You will meet regularly with a small discussion group.
- Each group member has an assigned task or role in the group.
- You will need to bring specific materials related to the role or task you have been assigned.
- After each class discussion, students in groups will switch roles so that everyone has a chance to try a different role.
- Group meetings aim to be *open, natural conversations* about the material under discussion. You are not constrained to playing only your assigned role. But if the group ventures into territory that one student has prepared notes for, he or she can step in and give more detailed information.
- At the conclusion of the unit, everyone will turn in a packet containing the materials they have prepared for their individual class discussions.

Roles for this assignment include

- **Moderator (bring questions)**: Your job is to get your group restarted when they have broken down. You should develop a list of questions that your group might want to discuss about the reading. Don't worry about small details; your task is to help people identify and talk over the "big ideas" in the story and share their reactions. Usually the best discussion questions come from your own thoughts, feelings, and concerns as your read. *Bring at least five good, open-ended questions to class with you.*
- **Psychological Critic (analyze motivations)**: Your job is to watch carefully what the characters say and do and to try to make plausible, high-probability inferences, based on their words and actions, about how their minds work. What motivates each character? What is his or her state of mind? What shapes his or her point of view? *Bring to class a short psychological profile of each major character in the reading.*
- **Lexicographer (identify vocabulary)**: Your job is to pay special attention to vocabulary. If anyone has questions about word meaning, you're responsible for clearing up their questions. *Bring to class a listing of at least 10 vocabulary words, phrases, proverbs, or other short passages that you think might be hard to understand or interpret, along with explanations in your own words.*
- **Anthropological Critic (observe culture)**: These stories all focus on the sea and sailing at various times in history. What observations and inferences can you make about the culture at that time based on what you have read in this section? What beliefs and behaviors seem strongest or most important? What factors affect the point of view of each of the characters? What new information do you have from this reading that allows you to understand this culture better? What conflicts exist within the culture? *Bring to class with you a 50–100 word paper summarizing your observations and inferences about the dynamics of the culture in this reading.*

Student Resource 1.2.2

Handout: Story Selection Ballot

Directions: We will be meeting in literature circles to read and discuss excerpts from at least two of the stories listed below. Rank the choices from 1 to 10: 1 indicates the story that interests you the most, and 10 indicates the story that interests you the least.

AOE IED Integrated Unit: Ship Shape

Lesson 1.2

Sailing the Wine Dark Sea

Teacher Resources

Resource	Description
Teacher Resource 1.2.1	Reading: Background Information
Teacher Resource 1.2.2	Reading: *Moby Dick* Excerpt
Teacher Resource 1.2.3	Reading Suggestions: Sea Stories

Teacher Resource 1.2.1

Reading: Background Information

For more information, see www.literaturecircles.com.

Literature circles are small, peer-led discussion groups that have chosen to read the same story, poem, article, or book. While reading each group-assigned portion of the text (either in or outside of class), each member makes notes to help them contribute to the upcoming discussion, and everyone comes to the group with ideas to share. Each group follows a reading and meeting schedule, holding periodic discussions on the way through the reading assignment. When they finish a reading, the circle members may share highlights of their reading with the wider community; then they trade members with other finishing groups, select more reading, and move into a new cycle. Key characteristics of traditional literature circles are:

- Students *choose* their own reading materials.
- *Small temporary groups* are formed, based upon book choice.
- Different groups read *different books.*
- Groups meet on a *regular, predictable schedule* to discuss their reading.
- Students use written or drawn *notes* to guide both their reading and discussion.
- Discussion *topics come from the students.*
- Group meetings aim to be *open, natural conversations about books,* so personal connections, digressions, and open-ended questions are welcome.
- In newly forming groups, students may play a rotating assortment of task *roles.*
- The teacher serves as a *facilitator*, not a group member or instructor.
- Evaluation is by *teacher observation and student self-evaluation,*
- A spirit of *playfulness and fun* pervades the room.
- When books are finished, *readers share with their classmates*, and then *new groups form* around new reading choices.

Teacher Resource 1.2.2

Reading: *Moby Dick* Excerpt

Call of the Sea

Call me Ishmael. Some years ago—never mind how long precisely—having little or no money in my purse, and nothing particular to interest me on shore, I thought I would sail about a little and see the watery part of the world. It is a way I have of driving off the spleen, and regulating the circulation. Whenever I find myself growing grim about the mouth; whenever it is a damp, drizzly November in my soul; whenever I find myself involuntarily pausing before coffin warehouses, and bringing up the rear of every funeral I meet; and especially whenever my hypos get such an upper hand of me, that it requires a strong moral principle to prevent me from deliberately stepping into the street, and methodically knocking people's hats off—then, I account it high time to get to sea as soon as I can. This is my substitute for pistol and ball. With a philosophical flourish Cato throws himself upon his sword; I quietly take to the ship. There is nothing surprising in this. If they but knew it, almost all men in their degree, some time or other, cherish very nearly the same feelings towards the ocean with me.

Moby Dick, p. 1
By Herman Melville

Teacher Resource 1.2.3

Reading Suggestions: Sea Stories

Comments

Below are some possible suggestions for sea adventures for use in literature circles. The amount of "sea" in the adventures varies, and the stories listed at the end have a higher reading difficulty that those at the beginning. Descriptions are taken from editorial reviews.

1. *Stowaway* by Karen Hesse
   To 11-year-old Nicholas Young, the tall masts of the exploratory ship *Endeavour* look like an answer to his fervent prayers. On the run from his demanding father and the cruel butcher who employed him, Nick finds adventure beyond his wildest imaginings when he stows away on the ship of legendary Captain James Cook. Once he is discovered and put to work, Nick becomes party to some amazing sights. He meets indigenous natives of Tahiti, New Zealand, and Australia, wonders at the sight of kangaroos, and shudders with horror when confronted with cannibalism. Nick survives a hurricane, a near shipwreck on the Great Barrier Reef, and a deadly bout with typhoid to become one of the few original crew members to successfully circumnavigate the globe with Cook and arrive safely back in England. He notes in his worn journal shortly before sighting his homeland's shore: "We have truly led the way, charting the path for all who come after. I don't know I shall ever feel so again as I feel now. That any of us shall."

2. *The Voyage of the Frog* by Gary Paulsen
   Paulsen's admirers will be satisfied with his latest survival story, this time set in the open sea. The author ranges through his accustomed territory, focusing on both the actual aspects of the voyage and the wisdom brought on by one boy's isolation in the elements. David Alspeth, 14, sails into the Pacific on the 22-foot Frog to scatter the ashes of the boat's owner, his beloved uncle Owen. A freak storm leaves David adrift for days in which he encounters sharks, a near-collision with a tanker, and the awful dragging loneliness of sitting in a becalmed boat. In that tedium, however, the boy finds a relationship with the boat and the elements themselves, and when the wind returns David discovers how far he has traveled (in more than miles).

3. *Jim Davis: A High-Sea Adventure* by John Mansfield
   Originally published in 1911, this is an old-fashioned adventure story set in England in the early nineteenth century. On a snowy night, 12-year-old Jim Davis stumbles across a group of nightriders who are delivering contraband goods to the interior of the country. He meets one of the smugglers, enters the bandits' hidden cave, and is captured and forced to join two of their expeditions. Furious battles ensue, and Jim becomes a fugitive until finally returning home. Masefield was England's poet laureate, and his prose has a poet's grace and attention to detail. The language, however, doesn't get in the way of the rip-roaring plot, which taps into the rich vein of classic sea stories, such as *Treasure Island.* A glossary in the back explains the many obscure nautical terms.

4. *Booty: Girl Pirates on the High Seas* by Sara Lorimer
   Not really about sailing; the book is made of brief but colorful accounts of 12 women who terrorized sailors in waters throughout the world, from the ninth century to the 1930s. Subjects range from Alfhild, a Viking who roamed the Baltic and North Seas, to Lai Choi San of Macao, who was probably the original "Dragon Lady." Americans include Mary Read and Anne Bonny. Through these fascinating misfits, readers get a close-up view of many cultures and times, and each life is made vivid and memorable. Synarski's bold, quirky, color illustrations and a variety of eye-catching typefaces create the amusing impression of a demented picture book. One chapter includes a

glossary and explains pirate arcana. Unfortunately, the sketchy bibliography doesn't offer much practical guidance to students: many of the books listed would not be easily found, and some of these tales are more folklore than history in any case. Pirates are not usually considered to be positive role models, and Lorimer's matey gusto and humorous slant might raise hackles in some quarters; but while her enthusiasm for her subject is contagious, the author does not gloss over the cruelties inflicted, and hardships endured, by these women. Booty offers some fresh perspectives on the past, and it should attract graphic-novel fans as well as the most reluctant of readers.

5. *Victory* by Susan Cooper
   Thirteen-year-old Molly, who has recently moved from present-day London to Connecticut with her family, longs for home. While visiting a bookstore, she is drawn to an edition of Robert Southey's *Life of Nelson*, which has an unusual artifact secreted inside. In alternating chapters, Cooper tells a second story, set in the early 1800s, about an 11-year-old English lad, Sam, who is captured by a press gang and taken to serve on HMS *Victory.* Two years later, wounded during the Battle of Trafalgar, Sam tends dying Vice-Admiral Lord Nelson. In the present-day narrative, Molly returns to England for a week and visits the restored *Victory*. Overcome by powerful sensations, she finds herself channeling Sam's experiences during the fateful battle. Later, Molly realizes the nature of the tie between herself and Sam and what she must do to set things right for both of them. Cooper uses a present-tense, third-person narrative to tell Molly's story, while Sam's unfolds in past-tense, first-person reflections. Both tales are so involving that readers will find themselves reluctant to let go of one narrator and switch to the other at a chapter's end. Seamlessly weaving details of period seamanship into the narrative, Cooper offers a vivid historical tale within the framework of a compelling modern story.

6. *We Didn't Mean to Go to Sea* by Arthur Ransome
   In this latest adventure (following Pigeon Post, winner of the Carnegie Medal), the Walker family has come to Harwich to wait for Commander Walker's return. As usual, the children can't stay away from boats, and this time they meet young Jim Brading, skipper of the well-found sloop Goblin. But fun turns to high drama when the anchor drags, and the four young sailors find themselves drifting out to sea - sweeping across to Holland in the midst of a full gale! As in all of Ransome's books, the emphasis is on self-reliance, courage, and resourcefulness.

7. *Pirates!* by Celia Rees
   This swashbuckling adventure features all of the elements of a grand pirate tale: sword fights, duels, charming rogues, true love, murder, and the odd severed head. Narrator Nancy Kington joins a pirate crew to escape an arranged marriage to a deliciously evil Brazilian, a former pirate himself. She takes along Minerva, a slave who not too surprisingly turns out to be her half sister. The pirates, in one of many happy coincidences, are captained by Mr. Broom, who had already befriended Nancy on an earlier voyage. Quickly adapting to the life, the two young women survive storms, capture, mutiny, and more. This crew manages to steal with little or no bloodshed, except when the victims are clearly villainous themselves. Nancy comes to relish the excitement of sea life, but still hopes to reunite with the young man she loves, who serves with the British Navy. The narration is well paced and engrossing, giving readers a strong feel for the times without bogging down in details. Nancy describes the practice of slavery and the rights of women perceptively, but fairly convincingly for a 1725 character of her background and experience. The first 100 pages are less exciting than the rest of the book, but they set the stage nicely for the involving exploits that follow. The inevitable showdown with the Brazilian provides a satisfying page-turner of a climax. While a few of the supporting characters seem a bit wooden, and some plot twists stretch credulity, this is a rip-roaring adventure with an engaging female heroine.

8. *Chuck Dugan is AWOL* by Eric Chase Anderson
   Anderson (brother of film director Wes Anderson) debuts with a whimsical little tale, which, though billed as fiction for grownups, falls into the no man's land between graphic novel and children's book. The story follows Naval Academy dropout, blueblood heir, junior inventor and master of disguise Chuck Dugan, 18, as he tries to stop his mother from marrying his father's arch-enemy,

"The Admiral," and find the buried treasure his deceased father left for him. The pace is breathless, breaking only for quirky illustrations of a room, a character, a prop or an invention (the Powered Submersible Bicycle, for instance). Backstory—why would Chuck's mother want to marry the sociopathic Admiral? What is the buried treasure?—is largely ignored in favor of wacky forward momentum. Like a junior James Bond (minus the ladykiller business), Chuck wiggles his way out of messes just at the last minute: he escapes the Admiral's thugs via a propeller bike (which doesn't actually work) and narrowly avoids drowning when a pirated submarine rescues him.

9. *The Wreckers* by Iain Lawrence (part of High Seas Trilogy)
   The Wreckers by Iain Lawrence (Delacorte, 1998) is an adventure story in the tradition of Treasure Island and Kidnapped. Fourteen-year-old John Spencer is on his father's boat, when wreckers on the coast of Cornwall lure the ship onto their rocky shore with a false beacon. A 13-year-old girl, Mary, helps him to stay alive, find his father, and stop the wreckers from continuing these crimes. Both John and Mary are portrayed as equally brave and capable. The story is very exciting, and somewhat graphic and violent, with many twists and surprises. Each chapter ends on a suspenseful note. This book will be especially interesting for middle school boys, and could lead to an interest in books such as Treasure Island.

10. *Treasure Island* by Robert Louis Stevenson
    Robert Louis Stevenson's classic adventure magically captures the thrill of a sea voyage and a treasure hunt through the eyes of its teenage protagonist, Jim Hawkins. Crossing the Atlantic in search of the buried cache, Jim and the ship's crew must brave the elements and a mutinous charge led by the quintessentially ruthless pirate Long John Silver. Brilliantly conceived and splendidly executed, it is a novel that has seized the imagination of generations of adults and children alike. Treasure Island is also the best and most influential of all the stories about pirates.

11. *A High Wind in Jamaica* by Richard Hughes
    Richard Hughes's celebrated short novel is a masterpiece of concentrated narrative. Its dreamlike action begins among the decayed plantation houses and overwhelming natural abundance of late nineteenth-century Jamaica, before moving out onto the high seas, as Hughes tells the story of a group of children thrown upon the mercy of a crew of down-at-the-heel pirates. A tale of seduction and betrayal, of accommodation and manipulation, of weird humor and unforeseen violence, this classic of twentieth-century literature is above all an extraordinary reckoning with the secret reasons and otherworldly realities of childhood.

12. *The Dark Frigate* by Charles Boardman Hawes
    In 17th century England, an accident forces orphaned Philip Marsham to flee London in fear for his life. He signs on with the Rose of Devon, a dark frigate. When the ship is seized in by a devious group of men, Philip is forced to accompany these "gentleman of fortune" on their murderous expeditions.

13. *The Terror* by Dan Simmons
    Hugo-winner Simmons (*Olympos*) brings the horrific trials and tribulations of arctic exploration vividly to life in this beautifully written historical, which injects a note of supernatural horror into the 1840s Franklin expedition and its doomed search for the Northwest Passage. Sir John Franklin, the leader of the expedition and captain of the *Erebus*, is an aging fool. Francis Crozier, his second in command and captain of the *Terror*, is a competent sailor, but embittered after years of seeing lesser men with better connections given preferment over him. With their two ships quickly trapped in pack ice, their voyage is a disaster from start to finish. Some men perish from disease, others from the cold, still others from botulism traced to tinned food purchased from the lowest bidder. Madness, mutiny and cannibalism follow. And then there's the monstrous creature from the ice, the thing like a polar bear but many times larger, possessed of a dark and vicious intelligence.

14. *A Voyage for Madmen* by Peter Nichols
    In 1968 there remained one major nautical challenge yet to be accomplished: sailing single-handedly nonstop around the world. Nine men set out to achieve it in one of the most widely

publicized yacht races. What could possess nine otherwise sane and responsible men to risk their lives, careers, and the well-being of their families by undertaking such a reckless endeavor? Nichols introduces the reader to the contestants, giving a vivid portrayal of the men attempting the feat. He expertly tells their individual stories in great detail: why they entered the race, what they had staked on winning, and their struggles at sea. He weaves their story together to form a comprehensive account of the race that reads like a suspense novel. Readers will eagerly turn the pages to discover how some were defeated by the ocean or the race's harsh rules and the lengths to which one contestant went to be declared the winner. An interesting slice of history that makes for a worthy seagoing adventure story.

15. *Master and Commander* by Patrick O'Brien
This, the first in the series of Jack Aubrey novels, establishes the friendship between Captain Aubrey, Royal Navy, and Stephen Maturin, ship's surgeon and intelligence agent, against the thrilling backdrop of the Napoleonic wars. Details of life aboard a man-of-war in Nelson's navy are faultlessly rendered: the conversational idiom of the officers in the ward room and the men on the lower deck, the food, the floggings, the mysteries of the wind and the rigging, and the road of broadsides as the great ships close in battle. Students may be familiar with the movie starring Russell Crowe.

16. *The Far Side of the World* by Patrick O'Brien
Captain Jack Aubrey sets sail for Cape Horn, determined to intercept an American frigate before it can wreak havoc on the British whaling trade. As always, he is accompanied by intelligence operative Stephen Maturin, and as always, Aubrey has no idea of what his companion is up to. Another impeccably written adventure; by the end you should be able to identify a mizzen topsail in your sleep.

17. *The Perfect Storm* by Sebastian Junger
Toward the end of October 1991, a storm of colossal scale plagued much of the East Coast with devastating floods. At sea, the New England fishing boat Andrea Gail suddenly found herself in the very center of the tempest. A Perfect Storm chronicles the boat's ill-fated voyage in horrifying detail. The boat is armed with the latest navigational tools and signaling systems, but the wind-swept sea brushes all precautions aside with careless ease. The boat and its crew disappear suddenly and completely. At times, the author seems to dwell unnecessarily on gruesome detail. In one passage, he discusses the physiology of drowning at excruciating and tasteless length. But for the most part, this is a thrilling and suspenseful tale, full of fine writing and haunting images.

18. *Maiden Voyage* by Tania Aebi
This is the story of an 18-year-old New York City girl and her exciting solo circumnavigation of the globe on a 26-foot sloop with only a cat for company. Aebi had little previous experience, so most of what she learned was "on the job" and from people she met en route. One of the most appealing aspects of this particular single-handed sailing account is Aebi's naivete and the caring response that she encountered all over the world. Her 27,000-mile, three-year trek is usually attempted only by practiced sailors, and her survival was achieved by pluck, inventiveness, helping hands, and a good deal of luck.

19. *Kon-Tiki* by Thor Heyerdahl
Kon-Tiki is the record of an astonishing adventure -- a journey of 4,300 nautical miles across the Pacific Ocean by raft. Intrigued by Polynesian folklore, biologist Thor Heyerdahl suspected that the South Sea Islands had been settled by an ancient race from thousands of miles to the east, led by a mythical hero, Kon-Tiki. He decided to prove his theory by duplicating the legendary voyage. On April 28, 1947, Heyerdahl and five other adventurers sailed from Peru on a balsa log raft. After three months on the open sea, encountering raging storms, whales, and sharks, they sighted land -- the Polynesian island of Puka Puka.

20. *An Eye of the Fleet* by Richard Woodman
Nathaniel Drinkwater's life at sea begins with the HMS CYCLOPS's capture of the SANTA

TERESA during Admiral Rodney's dramatic Moonlight Battle of 1780. Subsequently, Drinkwater's courage and initiative are put to the test as the CYCLOPS pursues American privateers threatening British trade and is later dispatched to the swamps of South Carolina, where many lives are lost both at sea and ashore. Gradually, Drinkwater matures into a capable and self-assured sailor. As he contends with enemy forces, the tyranny of the CYCLOPS's midshipman, and the stark contrast between the comfort of home life and the brutality of naval service, he finds strength and sustenance in the love of his beloved Elizabeth.

21. *The Keeper's Son* by Homer Hickam
A gutsy Coast Guard officer battles German submarines and 17 years of unfettered guilt on the North Carolina coast in 1941 and 1942 in this high adventure yarn. This is the first novel of a planned series about rough and tumble Coast Guard Lt. Josh Thurlow and his unusual patrol boat crew during WWII. Josh, 31, is a career officer assigned to Killakeet Island, along North Carolina's treacherous Outer Banks. Both he and his father-the keeper of the Killakeet Lighthouse-are haunted by the loss at sea and presumed death of Josh's two-year-old baby brother 17 years earlier. Shaken from his brooding by the appearance of German U-boats, Josh must try to protect the merchant ships torpedoed every night offshore. His patrol boat is small and ill-equipped, and his crew is a wacky group of casual islanders who aren't sure they really want to fight anybody. A talented U-boat commander named Krebs becomes Josh's honored enemy, but another U-boat skipper is a far more ruthless and dangerous adversary. Josh must fight both, as well as his suspicions that his little brother may not be dead after all; the reappearance of a childhood sweetheart leavens the mix. Hickam provides a vivid and convincing portrayal of life under the sea in a U-boat, as well as on the surface in a fragile patrol boat. Well-crafted characters, gripping naval warfare and colorful island life come together in this dynamic and exciting tale.

22. *Two Years Before the Mast* by Richard Henry Dana, Jr.
Tracing an awe-inspiring oceanic route from Boston, around Cape Horn, to the California coast, *Two Years Before the Mast* is both a riveting story of adventure and the most eloquent, insightful account we have of life at sea in the early nineteenth century. Richard Henry Dana is only nineteen when he abandons the patrician world of Boston and Harvard for an arduous voyage among real sailors, amid genuine danger. The result is an astonishing read, replete with vivid descriptions of storms, whales, and the ship's mad captain, terrible hardship and magical beauty, and fascinating historical detail, including an intriguing portrait of California before the gold rush.

AOE IED Integrated Unit: Ship Shape

Lesson 1.3

English Language Arts

Lost at Sea

In this lesson, students review the literary devices authors use to creating powerful and moving text. Students identify the use of such devices in excerpts from two novels, *The Open Boat* and *Life of Pi*. Students then apply use of literary devices in their own creative writing.

This lesson is expected to take two class periods.

Lesson Framework

Learning Objectives

Each student will:

- Identify examples of figurative language use.
- Describe the literal meaning and analyze the abstract meaning portrayed in each type of figurative language.
- Appreciate the author's intent in including figurative language in his or her writing.
- Understand the purpose and importance of using figurative language to create vivid images in writing.
- Create their own examples of figurative language by writing a sea narrative using similes, metaphors, and personification.

Academic Standards

- Students apply a wide range of strategies to comprehend, interpret, evaluate, and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics). (NCTE Standards for the English Language Arts, Standard 3)
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes. (NCTE Standards for the English Language Arts, Standard 5)
- Apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language, and genre to create, critique, and discuss print and non-print texts. (NCTE Standards for the English Language Arts, Standard 6)

Assessment

Assessment Product	Assessment Criteria
Literary Devices vocabulary cards	None provided

Prerequisites

- None

Instructional Materials

Teacher Resources

- Teacher Resource 1.3.1—Reading: Background Information
- Teacher Resource 1.3.2—Reading: “The Open Boat” Excerpt

Student Resources

- Student Resource 1.3.1—Worksheet: Literary Devices
- Student Resource 1.3.2—Handout: Vocabulary Card Instructions
- Student Resource 1.3.3—Reading: *Life of Pi* Excerpt
- Student Resource 1.3.4—Worksheet: Lifeboat Design Brief

Equipment and Supplies

- 3 by 5-inch ruled index cards

Lesson Steps

Step	Min.	Activity
		CLASS PERIOD 1
1	**20**	**Reading: “The Open Boat”** Read aloud the opening of Stephen Crane’s short story “The Open Boat.” Before beginning, tell students that they will be listening to a paragraph or two about some

Step	Min.	Activity
		passengers on a boat. Provide students with a few anticipatory questions to guide their listening: • Is the boat small or large? • Do you think the passengers are enjoying themselves, or not? • Would you want to be in this boat? Ask students to respond to the questions, and to explain what clues from the text prompted their answers. You may want to make a transparency of the passage so students can provide specific examples from the text. As students respond, underline or highlight the literary devices students that students select. Ask students if they can identify, define, and distinguish between the various literary devices in use (e.g., metaphor, simile, personification).
2	**30**	**Vocabulary: Literary Devices** Ask students what is the purpose of using these literary devices in writing? Why not describe events literally? Students should recognize that figurative language and other literary devices appeal to the imagination and make reading more interesting. Pass out the Literary Devices worksheet. Review each term, and have the class come up with an example of each, either from the earlier reading, or a well-known example from classic or popular media. HOMEWORK Make vocabulary cards of the terms from the Literary Devices worksheet.
		CLASS PERIOD 2
3	**20**	**Reading: *Life of Pi*** Hand out the excerpt from *Life of Pi* and have students read the excerpt, either silently or as a class. Set up the reading for students by briefly describing the protagonist, Pi Patel. At minimum, explain that Pi is a teenager from India. His father, a zookeeper, has decided to move the family to Canada, and they make the move by ship. The excerpt they will be reading is a passage that describes the sinking of the ship that is carrying Pi's family to their new home. Before they read, ask students to consider how they might react to being on a sinking ship. Have students keep the following questions in mind: • What is Pi's state of mind? • Who is Richard Parker? What do we know about him, and why does Pi try to save him? • What is Richard Parker doing as Pi attempts to save him?

Step	Min.	Activity
4	**15**	**Class Discussion: *Life of Pi*** Is the passage vivid? Can you imagine yourself in Pi's place? What does the author do to convey a sense of actually being present? Have students re-read the passage, looking to identify techniques the author uses to make the passage come alive. Alone or in pairs, have students underline or highlight language that draws them into the narrative. Have students share their examples with the rest of the class. Together, the class should make a master list identifying the literary devices in use.
7	**15**	**Writing: Descriptive Sailing Passage** Have each student write a short paragraph about sailing employing figurative language. Have a few students share their passages. Collect passages for review.

AOE IED Integrated Unit: Ship Shape

Lesson 1.3

Lost at Sea

Student Resources

Resource	Description
Student Resource 1.3.1	Worksheet: Literary Devices
Student Resource 1.3.2	Handout: Vocabulary Card Instructions
Student Resource 1.3.3	Reading: *Life of Pi* Excerpt
Student Resource 1.3.4	Worksheet: Lifeboat Design Brief

Student Resource 1.3.1

Worksheet: Literary Devices

Good authors use a variety of tools to create emotional mood, an attitude, setting, and characters. Literary devices are one of the most effective ways for an author to draw a setting more artfully or to persuade more eloquently. Deliberate constructions and choices of language allow authors to convey meaning in particular ways. Some of the more common literary devices used to evoke specific responses in the reader are listed here.

Term	Example
Figurative language: Use of language that is not meant literally. Figurative language includes metaphors, similes, hyperboles, personification, onomatopoeia, irony, and oxymorons.	
Alliteration: Repeated consonant sounds occurring at the beginning of words or within words.	
Anthropomorphism: Portrayal of animals or inanimate objects as if they were humans (e.g., talking, humanlike appearance, feelings, and motivations). See also ***personification***, which is slightly different.	
Foreshadowing: Hints in a story about future events in the narrative, often of unpleasant events to come.	
Hyperbole: A description with extreme exaggeration used for dramatic effect.	
Imagery: Language that describes something in detail, using words to substitute for and create sensory stimulation, including visual imagery and sound imagery.	
Metaphor: A direct relationship where one thing or idea substitutes for another. Metaphors do not use the words *like* and *as*.	

Student Resource 1.3.1

Worksheet: Literary Devices, Continued

Term	Example
Onomatopoeia: Where sounds are spelled out as words, or when words describing sounds actually sound like the sounds they describe.	
Personification: Speaking of an inanimate object or abstract concepts as having human qualities but not as if they were actually people. (Not to be confused with anthropomorphism.)	
Repetition: Where a specific word, phrase, or structure is repeated several times, usually in close proximity, to emphasize a particular idea.	
Simile: A comparison between two things described as being similar to another. Similes usually contain the words *like* or *as,* but not always.	

Student Resource 1.3.2

Handout: Vocabulary Card Instructions

Directions

Make *handwritten* vocabulary flash cards using 3 by 5-inch ruled index cards in the following format:

Blank Side

1. Write the word.
2. Draw or cut out and paste on a symbol, logo, or icon that will help you to remember the word.

INDOMITABLE

Ruled Side

1. Etymology
2. Part(s) of speech
3. Definition(s)
4. Synonyms
5. Sentence using the word

Etymology: From the Latin, indomitabilis meaning "untameable."
in- "not" + domitare "to tame"

Part of speech: Adjective

Definition:
Incapable of being overcome, subdued, or vanquished;
unconquerable

Synonyms:
Steadfast, dogged, invincible, obstinate, staunch, unbeatable,
unflinching, resolute

Sentence:
The team's indomitable spirit helped them win the game, despite
being down by 20 points at halftime.

Student Resource 1.3.3

Handout: Excerpt from *Life of Pi,* by Yann Martel pp. 97–98

The ship sank. It made a sound like a monstrous metallic burp. Things bubbled at the surface and then vanished. Everything was screaming: the sea, the wind, my heart. From the lifeboat I saw something in the water.

I cried, "Richard Parker, is that you? It's so hard to see. Oh, that this rain would stop! Richard Parker? Richard Parker? Yes, it is you!"

I could see his head. He was struggling to stay at the surface of the water.

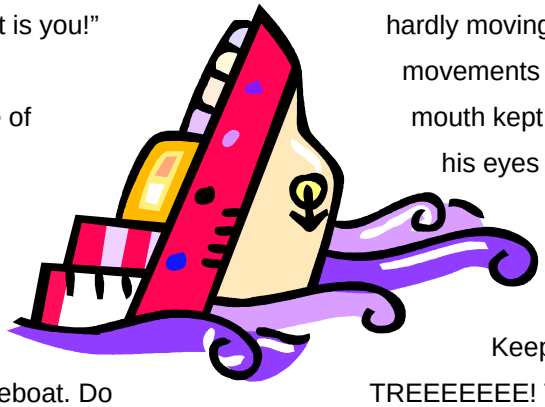
"Jesus, Mary, Muhammad, and Vishnu, how good to see you, Richard Parker! Don't give up, please! Come to the lifeboat. Do you hear this whistle? TREEEEEEE! TREEEEEEE! TREEEEEE! You heard right. Swim, swim! You're a strong swimmer. It's not a hundred feet."

He had seen me. He looked panic-stricken. He started swimming my way. The water about him was shifting wildly. He looked small and helpless.

"Richard Parker, can you believe what has happened to us? Tell me it's a bad dream. Tell me it's not real. Tell me I'm still in my bunk on the Tsimtsum and I'm tossing and turning and soon I'll wake up from this nightmare. Tell me I'm still happy. Mother, my tender guardian angel of wisdom, where are you? And you, Father, my loving worrywart? And you, Ravi, dazzling hero of my childhood? Vishnu preserve me, Allah protect me, Christ save me, I can't bear it! TREEEEEEE! TREEEEEEE! TREEEEEE!"

I was not wounded in any part of my body, but I had never experienced such intense pain, such a ripping of the nerves, such an ache of the heart.

He would not make it. He would drown. He was hardly moving forward and his movements were weak. His nose and mouth kept dipping underwater. Only his eyes were steadily on me.



"What are you doing, Richard Parker? Don't you love life? Keep swimming then! TREEEEEEE! TREEEEEE! TREEEEEEE! Kick with your legs. Kick! Kick! Kick!

He stirred in the water and made to swim.

"And what of my extended family—birds, beasts and reptiles? They too have drowned. Every single thing I value in life has been destroyed. And I am allowed no explanation? I am to suffer hell without any account from heaven? In that case, what is the purpose of reason, Richard Parker? Is it no more than to shine at practicalities—the getting of food, clothing and shelter? Why can't reason give greater answers? Why can we throw a question further than we can pull in an answer? Why such a vast net if there's so little fish to catch?"

Student Resource 1.3.3

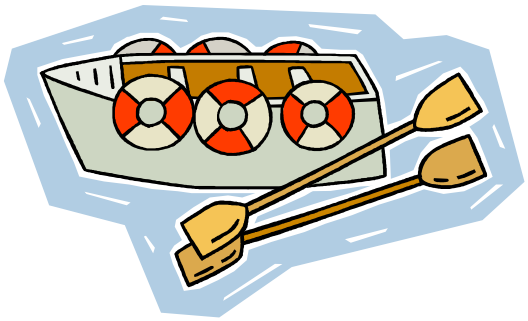
Reading: Excerpt from *Life of Pi*, Continued

His head was barely above water. He was looking up, taking in the sky on last time. There was a lifebuoy in the boat with a rope tied to it. I took hold of it and waved it in the air.

"Do you see this lifebuoy, Richard Parker? Do you see it? Catch hold of it! HUMPF! I'll try again. HUMPF!

He was too far. But the sight of the lifebuoy flying his way gave him hope. He revived and stared beating the water with vigorous, desperate strokes.

"That's right! One, two. One, two. One, two. Breathe when you can. Watch for the waves. TREEEEEE! TREEEEEE! TREEEEEE!"



My heart was chilled to ice. I felt ill with grief. But there was no time for frozen shock. It was shock in activity. Something in me did not want to give up on life, was unwilling to let go, wanted to fight to the very end. Where that part of me got the heart, I don't know.

"Isn't it ironic, Richard Parker? We're in hell yet we're still afraid of immortality. Look how close you are? TREEEEEE! TREEEEEE! TREEEEEE! Hurrah, hurrah! You've made it, Richard Parker, you've made it. Catch! HUMPF!

I threw the lifebuoy mightily. It fell in the water right in front of him. With his last energies, he stretched forward and took hold of it.

"Hold tight, I'll pull you in. Don't let go. Pull with your eyes while I pull with my hands. In a few seconds you'll be aboard and we'll be together. Wait a second. Together? We'll be together? Have I gone mad?"

I woke up to what I was doing. I yanked on the rope.

"Let go of that lifebuoy, Richard Parker! Let go, I said. I don't want you here, do you understand? Go somewhere else. Leave me alone. Get lost. Drown! Drown!"

He was kicking vigorously with his legs. I grabbed an oar. I thrust it at him, meaning to push him away. I missed and lost hold of the oar.

I grabbed another oar. I dropped it in an oarlock and pulled as hard as I could, meaning to move the lifeboat away. All I accomplished was to turn the lifeboat a little, bringing one end closer to Richard Parker.

I would hit him on the head! I lifted the oar in the air.

He was too fast. He reached up and pulled himself aboard.

"Oh my God!"

Ravi was right. Truly I was to be the next goat. I had a wet, trembling, half-drowned, heaving and coughing three-year-old adult Bengal tiger in my lifeboat. Richard Parker rose unsteadily to his feet on the tarpaulin, eyes blazing as they met mine, ears laid tight to his head, all weapons drawn. His head was the size and color of the lifebuoy, with teeth.

I turned around, stepped over the zebra and threw myself overboard.

Student Resource 1.3.4

Worksheet: Lifeboat Design Brief

Read chapter 50 of Life of Pi and pay careful attention to the description of the lifeboat. Has the author provided enough information for you to imagine the lifeboat? Using the information provided in the excerpt, generate a design brief that would produce this lifeboat. Remember that a design brief is a tool that engineers use to concisely identify the problem, solution expectations, and project constraints. An engineer will often return to the design brief throughout a design process to assess the progress and validity of his or her creative work.

Designer **(Who is responsible for designing this project?)**

Target Consumer **(Who is the end user of this product?)**

Problem Statement **(What problem or situation is this design intended to address?)**

Design Statement **(What would be considered a successful solution?)**

Constraints **(What limitations and/or criteria must be met?)**

1.

2.

3.

4.

5.

6.

7.

8.

AOE IED Integrated Unit: Ship Shape

Lesson 1.3

Lost at Sea

Teacher Resources

Resource	Description
Teacher Resource 1.3.1	Reading: Background Information
Teacher Resource 1.3.2	Reading: “The Open Boat” Excerpt

Teacher Resource 1.3.1

Reading: Background Information

Life of Pi is a novel by Canadian author Yann Martel. The protagonist, Piscine Molitor Patel, an Indian boy from Pondicherry, explores the issues of religion and spirituality from an early age and survives 227 days shipwrecked in the Pacific Ocean.

The novel begins when Pi's father, a zookeeper, moves his family and the zoo's animals by ship to Canada for a new start. The ship sinks, however, and Pi finds himself lost at sea on a lifeboat. He soon discovers, to his terror, that he shares the 26-foot vessel with a female orangutan, a spotted hyena, an injured zebra, and a three-year-old adult Bengal tiger named Richard Parker. What follows is a tale of survival in its rawest form, as Pi must deal with immediate human needs such as thirst, hunger, and shelter, all under the watchful eyes of a predator.

The book has three parts, but works as a whole as well. The first part is a young boy's rumination on spirituality and Indian life. The second part (comprising most of the text) is a blend of a detailed and realistic survival memoir and a fantastic allegory in a medieval style. The last part, when Pi is rescued and the truth of his entire experience at sea is called into question, offers more insight into the dual thirst for survival and faith.

The last part also offers the reader a choice to actually choose the story version they prefer. Martel shows two ways of looking at the same reality and requires a leap of faith to choose the "better" story.

Teacher Resource 1.3.2

Reading: “The Open Boat” (Excerpt)

None of them knew the color of the sky. Their eyes glanced level, and were fastened upon the waves that swept toward them. These waves were of the hue of slate, save for the tops, which were of foaming white, and all of the men knew the colors of the sea. The horizon narrowed and widened, and dipped and rose, and at all times its edge was jagged with waves that seemed thrust up in points like rocks.

Many a man ought to have a bath-tub larger than the boat which here rode upon the sea. These waves were most wrongfully and barbarously abrupt and tall, and each froth-top was a problem in small boat navigation.

…

A seat in this boat was not unlike a seat upon a bucking bronco, and, by the same token, a bronco is not much smaller. The craft pranced and reared, and plunged like an animal. As each wave came, and she rose for it, she seemed like a horse making at a fence outrageously high. The manner of her scramble over these walls of water is a mystic thing, and, moreover, at the top of them were ordinarily these problems in white water, the foam racing down from the summit of each wave, requiring a new leap, and a leap from the air. Then, after scornfully bumping a crest, she would slide, and race, and splash down a long incline and arrive bobbing and nodding in front of the next menace.

“The Open Boat,” p. 1
By Stephen Crane

AOE IED Integrated Unit: Ship Shape

Lesson 1.4

World History

Storming the Beach

In this lesson, students learn about the decisions leading up to the successful invasion of Normandy by reading primary sources from that era.

This lesson is expected to take four class periods.

Lesson Framework

Learning Objectives

Each student will:

- Identify the importance of the Normandy invasion to the overall Allied strategy for 1944–1945.
- Explain why Normandy was chosen as the Allied invasion point.
- Describe and explain the importance of the preparations that occurred prior to the invasion.
- Analyze the various factors that contributed to its success.
- Identify on a map locations that were important to the war in northern Europe.

Academic Standards

- Students apply a wide range of strategies to comprehend, interpret, evaluate, and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics). (NCTE Standards for the English Language Arts, Standard 3)
- Compare and analyze the ways nations and organizations respond to conflicts between forces of unity and forces of diversity. (NCSS Curriculum Standards for Social Studies, Standard 6D)
- Analyze and evaluate conditions, actions, and motivations that contribute to conflict and cooperation within and among nations. (NCSS Curriculum Standards for Social Studies, Standard 6F)
- Evaluate the role of technology in communications, transportation, information processing, weapons development, or other areas as it contributes to or helps resolve conflicts. (NCSS Curriculum Standards for Social Studies, Standard 6G)
- The causes and course of World War II, the character of the war at home and abroad, and its reshaping of the U.S. role in world affairs. (NCHS National Standards for U.S. History—Era 8, Standard 3)

- Explain the major turning points of the war and contrast military campaigns in the European and Pacific theatres. (NCHS National Standards for U.S. History—Era 8, Standard 3B)
- Evaluate the wartime aims and strategies hammered out at conferences among the Allied powers. (NCHS National Standards for U.S. History—Era 8, Standard 3B)

Assessment

Assessment Product	Assessment Criteria
Primary Sources Interpretation Question	None provided

Prerequisites

- Working knowledge of world history events prior to 1943

Instructional Materials

Teacher Resources

- Teacher Resource 1.4.1—Reading: Background Information
- Teacher Resource 1.4.2—Transparency: Political Map of the World, May 1943
- Teacher Resource 1.4.3—Transparency: Political Map of Europe, May 1943
- Teacher Resource 1.4.4—Video Clips: http://www.pbs.org/wnet/secrets/lessons/lp_dday_videos.html

Student Resources

- Student Resource 1.4.1—Handout: Mediterranean Invasion Analysis
- Student Resource 1.4.2—Reading: Joint Staff Planners Report, “Invasion of the European Continent from Bases in the Mediterranean in 1943–1944, May 8, 1943”
- Student Resource 1.4.3—Reading: Joint War Plans Committee Report, “Invasion of the European Continent from the United Kingdom in 1943–1944, May 8, 1943”
- Student Resource 1.4.4—Reading: Digest of Operation “Overlord”
- Student Resource 1.4.5—Worksheet: Beach Defenses

Equipment and Supplies

- Computer lab with Internet access
- Transparency projector

Lesson Steps

Step	Min.	Activity
		CLASS PERIOD 1
1	**20**	**Map Interpretation: Invading Europe 1943** Display a political map of the world (and/or Europe) prior to D-day. Ask students to identify possible points of invasion based the map and justify their suggestions. If students have difficulty identifying points, remind them that invasion into a hostile territory typically originates from friendly territories. The ability to move troops over physical geography is also important to consider. Record the possible invasion points on the board.
2	**30**	**Primary Source Reading: Joint Staff Planners Report** Hand out the Joint Staff Planners Report reading and Mediterranean Invasion Analysis handout. Have each student read the report. Tell the class that this report contains a summary of the analysis of potential invasion points and that their purpose in reading it is to discover which locations were considered and why they were rejected. In pairs, have students identify and mark the possible invasion locations discussed in the report on the map in the handout. Discuss how the possible invasion points compare to those identified by the class during the preceding discussion. What did the Allies ultimately choose as their invasion route?
		CLASS PERIOD 2
3	**50**	**Primary Source Reading: Joint War Plans Committee Report** Once the decision had been made that the primary invasion of Europe would be launched from the United Kingdom into northern France, strategic planning needed to begin in earnest. Write the following statements on the board in anticipation of the reading. Ask students if they agree or disagree and to give a reason for their position. It is not expected their reasoning will have any particularly valid foundation. These anticipatory questions are intended to prompt students to read more deliberately, since they will already have some opinions in mind. • Bombing the enemy prior to an invasion should be avoided since it will give the enemy warning that the invasion is coming. • If you have to cross water to invade a territory, it is important make sure the first position you take from the enemy includes places where more boats can land. • When invading an enemy territory, you should wait until all possible troops that are available can be deployed at the same time. • It is not a good idea to try to fight wars on two fronts (in two different locations) at the same time. Hand out the Joint War Plans Committee Report reading. Have students read the report, then answer and discuss the associated questions.

Step	Min.	Activity
		CLASS PERIOD 3
4	**50**	**Primary Source Reading: Operation Overlord Digest** Students can explore the selection of the specific beach location for invasion through reading the Operation Overlord Digest. Have students consider the following questions during reading and discuss them afterward. • What was the objective of Operation Overlord? • What three areas were considered for landing? • What are the advantages of each area? • What were the disadvantages of each area? • Which area was ultimately selected?
		CLASS PERIOD 4
5	**50**	**Video Clips: Beach Invasion Innovations** Discuss how the challenges and obstacles faced in war often lead to rapid scientific and engineering advances. Have students watch PBS video clips on technological advances developed during World War II to overcome Rommel's beach defenses against the Allied invasion. Students should first answer the associated questions individually. Discuss their responses as a class.
6	**#**	**Additional Optional Activities: Normandy Invasion** Encyclopædia Britannica's guide to the Normandy invasion (http://www.britannica.com/dday) includes many interesting learning activities that use video clips and interviews of World War II veterans.

AOE IED Integrated Unit: Ship Shape

Lesson 1.4

Storming the Beach

Student Resources

Resource	Description
Student Resource 1.4.1	Handout: Mediterranean Invasion Analysis
Student Resource 1.4.2	Reading: Joint Staff Planners Report, “Invasion of the European Continent from Bases in the Mediterranean in 1943–1944, May 8, 1943”
Student Resource 1.4.3	Reading: Joint War Plans Committee Report, “Invasion of the European Continent from the United Kingdom in 1943–1944, May 8, 1943”
Student Resource 1.4.4	Reading: Digest of Operation “Overlord”
Student Resource 1.4.5	Worksheet: Beach Defenses

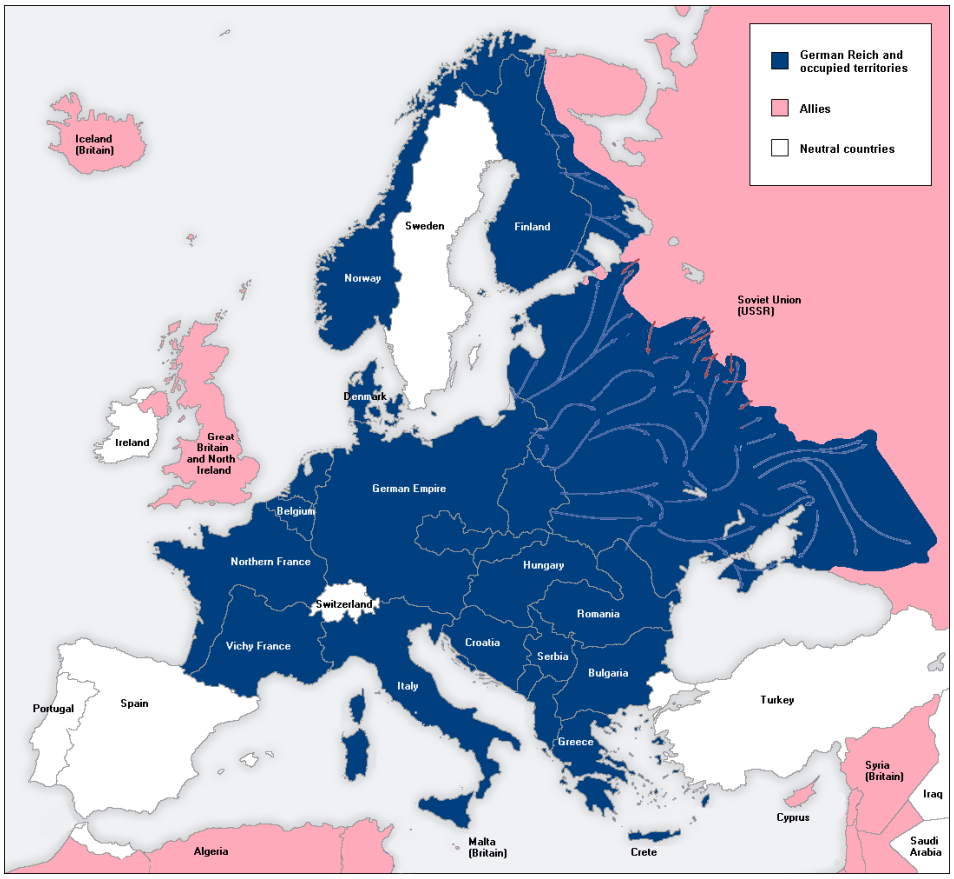
Student Resource 1.4.1

Handout: Mediterranean Invasion Analysis

Directions

Read the Joint Staff Planners report titled “Invasion of the European Continent from Bases in the Mediterranean.” The report is an analysis of potential invasion sites around the Mediterranean Sea.

Find and label the Mediterranean Sea. Work with a partner to identify and mark on the map the five potential invasion points (A, B, C, D, and E) around the Mediterranean that are described in the report.



Discussion Questions

1. Why was the Mediterranean ultimately rejected as the invasion route?

2. Why were France and Italy the primary countries considered during analysis?

3. Why do you think Italy was considered less suitable than France for invasion?

Student Resource 1.4.2

Reading: Joint Staff Planners Report

"Invasion of the European Continent from Bases in the Mediterranean in 1943–1944, May 8, 1943"

INVASION OF THE EUROPEAN CONTINENT
FROM BASES IN THE MEDITERRANEAN IN 1943-44
Reference: J.C.S. 272

REPORT BY JOINT STAFF PLANNERS

1. A detailed examination of the merits and possibilities of the defeat of the EUROPEAN AXIS by operations launched from the MEDITERRANEAN is contained in Enclosure "A".

2. The courses of action examined and conclusions reached are indicated below:

a. Invade EUROPE via the IBERIAN PENINSULA

(1) Rejected. Not suitable strategically.

b. Invade EUROPE via SOUTHERN FRANCE

(1) Retained for further examination. Suitable -- would create the "Second Front." Feasibility questionable -- would require seizure of SARDINIA and CORSICA; adequate land-based air cover cannot be provided and doubtful if shipping capabilities could support an operation of this magnitude until late 1944. Acceptable only if we are prepared to face heavy losses in ships and personnel.

(2) The inherent decisive possibilities warrant retention for further examination.

c. Invade EUROPE via ITALY and SOUTHERN FRANCE

(1) Rejected. Suitable only in eliminating ITALY from the war. Not suitable as ITALY is not a vital AXIS area, would require substantial diversion of shipping to maintain Italian economy. Perhaps feasible but large forces required (estimated 40 to 50 divisions), adequate land-based air cover not available, and the shipping problem comparable to or worse than SOUTHERN FRANCE. Chances of a successful conquest of ITALY appear acceptable, but further exploitation toward FRANCE extremely doubtful.

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JCS memo, 1-4-74
By RHP, NLR, Date FEB 19 1974

a18e02

d. Invade EUROPE via ITALY and HUNGARY or GREECE and YUGOSLAVIA

(1) Rejected. The conclusion reached in 2 c. above is equally applicable.

e. Invade EUROPE via EASTERN MEDITERRANEAN - TURKEY, GREECE and the AEGEAN ISLANDS

(1) Rejected. Not logistically practicable (except as provided for limited operations in J.C.S. 293).

f. Reexamination of "Invade EUROPE via SOUTHERN FRANCE."

(1) Rejected. Reexamination in connection with other courses of action with a view to improving our chances of success indicate little hope of achieving such a position.

3. Conclusion

The application of the tests of suitability, feasibility, and acceptability to the various routes from the MEDITERRANEAN region for reentry to the Continent, and there to engage the AXIS armies in decisive combat, rejects them all as being unsound.

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By RHP, NLR, Date FEB 19 1974

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Student Resource 1.4.3

Reading: Joint Staff Planners Report

"Invasion of the European Continent from Bases in the United Kingdom in 1943–1944, May 8, 1943"

INVASION OF THE EUROPEAN CONTINENT FROM
THE UNITED KINGDOM IN 1943 –1944

Report by Joint War Plans Committee

1. A detailed examination of the merits and possibilities of the defeat of the EUROPEAN AXIS by a bomber offensive and air-ground invasion of the Continent from the UNITED KINGDOM is contained in Enclosure "A".

2. It is estimated that GERMANY has 7 offensive divisions available on short notice to oppose an invasion effort. These forces could be increased in time to a grand total of 60 divisions. She also has about 1254 planes in the area (747 fighters) which could be increased to 1766 (1158 fighters) by stripping all areas except the MEDITERRANEAN and Eastern Front. In addition to a coastal defense zone varying from 5 to 15 miles in depth, she has four additional defensive belts which must be reduced or neutralized before the "West Wall" is reached.

3. The projected bomber offensive against GERMANY may be expected to so reduce her ability to wage modern war as to create favorable conditions for a reentry to the Continent unless GERMANY is able to build up timely and effective counter-measures.

4. By maximum utilization of shipping and UNITED KINGDOM port facilities for the movement of UNITED STATES Forces, and by placing increased emphasis on the conversion of British defensive divisions into offensive units, it is estimated that 36 divisions can be made available for cross-channel operations by April 1, 1944.

5. If 6 divisions with supporting troops are moved from the MEDITERRANEAN to the UNITED KINGDOM in the last quarter of 1943, there will be no increase in divisions available but the addition of battle tested troops will be an added insurance for the success of the initial assault.

6. Landing craft required for a cross-channel movement on April 1, 1944, can be provided if production is increased within limits which will not jeopardize Destroyer Escort (DE) and combatant class programs and if certain delays are accepted in the build up of UNITED STATES landing craft now allocated to the PACIFIC.

7. The two most promising areas for assault operations, the CAEN and COTENTIN PENINSULA sectors, will afford port facilities for a build up in 12 months of 912,000 men. By extending this bridgehead to include the SEINE RIVER and the ports of LE HAVRE and ROUEN, the build up in 12 months would be 4,012,000 men, or about 100 divisions. This force would be capable of major operations.

Questions

1. Why would a bombing campaign be carried out before a land invasion?
2. How would the results of this campaign affect the outcome of the land invasion?
3. Why was the date of April 1, 1944 chosen?
4. What would be required in order to achieve this goal?
5. Where did military planners think was the best place to land in France?
6. What were the benefits of this location?

Student Resource 1.4.3

Reading: Joint Staff Planners Report

"Invasion of the European Continent from Bases in the United Kingdom in 1943–1944, May 8, 1943"

8. It should be noted that consideration of cross-channel operations in this study has been confined to the first movement and the availability of landing craft for this purpose as compared with the requirements of C.C.S. 105/2. The build up immediately thereafter and the requirements in APA's, AKA's, AP's, AK's, etc. have not been examined.

9. It is recommended that:

a. The bomber offensive be given first priority in build up and its execution be facilitated.

b. As the bomber offensive progresses, its effects should be continuously examined and integrated with other factors; the results of these examinations to be used in determining the date for cross-channel operations.

c. A balanced invasion force be built up in the UNITED KINGDOM as rapidly as possible for the purpose of an early invasion in the event of a collapse of GERMANY.

d. Production in landing craft be increased by:

(1) Increasing the tailing on program of LST's to 12 per month for a total of 108 additional LST's.

(2) Increasing the present rate of LCI(L)'s from 16 per month to 20 per month and present program from 192 to 300.

e. Planned allocations of UNITED STATES landing craft to the PACIFIC be changed as follows (figures in parentheses represent allocations as presently planned):

	1943		1944		
	3rd Quarter	4th Quarter	1st Quarter	2nd Quarter	3rd Qtr.
LST	25 (38)	0 (22)	0 (0)	35 (0)	0 (0)
LCI (L)	0(34)	0 (36)	30 (36)	60 (24)	40 (0)

NOTE: This recommendation is subject to adjustment if incompatible with proposed operations in the Pacific and Far East.

f. With the exception of the above allocations, all UNITED STATES production (less assignments to UNITED KINGDOM) be sent to the ATLANTIC area during this period.

g. The target date of April 1, 1944 be accepted for operations from the UNITED KINGDOM. These operations to be conducted with the forces available in the UNITED KINGDOM on 1 January 1944. The target date coincides with the completion of the fourth phase of the bomber offensive and is subject to revision in the light of the results obtained.

h. The area selected for the assault contain sufficient port capacities to build up the 100 division force required for major operations on the Continent.

7. How would the planned invasion of Europe affect the war in the Pacific?

8. Why do you think military planners would be willing to make this change?

Student Resource 1.4.4

Reading: Digest of Operation "Overlord"

Object.

1. The object of Operation "Overlord" is to mount and carry out an operation, with forces and equipment established in the United Kingdom, and with target date the 1st May, 1944, to secure a lodgement on the Continent from which further offensive operations can be developed. The lodgement area must contain sufficient port facilities to maintain a force of some twenty-six to thirty divisions, and enable that force to be augmented by follow-up shipments from the United States or elsewhere of additional divisions and supporting units at the rate of three to five divisions per month.

Selection of a Lodgement Area.

2. In order to provide sufficient port facilities to maintain these large forces, it will be necessary to select a lodgement area which includes a group of major ports. We must plan on the assumption that ports, on capture, will be seriously damaged and probably blocked. It will take some time to restore normal facilities. We shall thus be forced to rely on maintenance over beaches for an extended period.

3. A study of the beaches on the Belgian and Channel coasts shows that the beaches with the highest capacity for passing vehicles and stores inland are those in the Pas de Calais [assumed here to be the area between Gravelines and the River Somme] and the Caen-Cotentin area. ["Caen area" is taken as that between the River Orne and the base of the Cotentin Peninsula; "Cotentin area" is the peninsula in which Cherbourg is situated.] Of these, the Caen beaches are the most favourable, as they are, unlike the others, sheltered from the prevailing winds. Naval and air considerations point to the area between the Pas de Calais and the Cotentin as the most suitable for the initial landing, air factors of optimum air support and rapid provision of airfields indicating the Pas de Calais as the best choice, with Caen as an acceptable alternative.

4. Thus, taking beach capacity and air and naval considerations together, it appears that either the Pas de Calais area or the Caen-Cotentin area is the most suitable for the initial main landing.

5. As the area for the initial landing the Pas de Calais has many obvious advantages such that good air support and quick turn round for our shipping can be achieved. On the other hand, it is a focal point of the enemy fighters disposed for defense, and maximum enemy air activity can be brought to bear over this area with the minimum movement of his air forces. Moreover, the Pas de Calais is the most strongly defended area on the whole French coast. The defenses would require very heavy and sustained bombardment from sea and air: penetration would be slow, and the result of the bombardment of beach exits would severely limit the rate of build-up. Further, this area does not offer good opportunities for expansion. It would be necessary to develop the bridgehead to include either the Belgian ports as far as Antwerp or the Channel ports Westwards to include Havre and Rouen. But both an advance to Antwerp across the numerous water obstacles, and a long flank march of some 120 miles to the Seine ports must be considered unsound operations of war unless the German forces are in a state not far short of final collapse.

6. In the Caen-Cotentin area it would be possible to make our initial landing either partly on the Cotentin Peninsula and partly on the Caen beaches, wholly in the Cotentin or wholly on the Caen beaches. An attack with part of our forces in the Cotentin and part on the Caen beaches, is, however, considered to be unsound. It would entail dividing our limited forces by the low-lying marshy ground and intricate river system at the neck of the Cotentin Peninsula; thus exposing them to defeat in detail.

7. An attack against the Cotentin Peninsula, on the other hand, has a reasonable chance of success, and would ensure the early capture of the port of Cherbourg. Unfortunately, very few airfields exist in the Cotentin, and that area is not suitable for rapid airfield development. Furthermore, the narrow neck of the Peninsula would give the Germans an easy task in preventing us from breaking out and

expanding our initial bridgehead. Moreover, during the period of our consolidation in the Cotentin the Germans would have time to reinforce their coastal troops in the Caen area, rendering a subsequent amphibious assault in that area much more difficult.

8. There remains the attack on the Caen beaches. The Caen sector is weakly held; the defenses are relatively light and the beaches are of high capacity and sheltered from the prevailing winds. Inland the terrain is suitable for airfield development and for the consolidation of the initial bridgehead; and much of it is unfavourable for counter-attacks by panzer divisions. Maximum enemy air opposition can only be brought to bear at the expense of the enemy air defense screen covering the approaches to Germany; and the limited number of enemy airfields within range of the Caen area facilitates local neutralization of the German fighter force. The sector suffers from the disadvantage that considerable effort will be required to provide adequate air support to our assault forces and some time must elapse before the capture of a major port.

   After a landing in the Caen sector it would be necessary to seize either the Seine group of ports or the Brittany group of ports. To seize the Seine ports would entail forcing a crossing of the Seine, which is likely to require greater forces than we can build up through the Caen beaches and the port of Cherbourg. It should, however, be possible to seize the Brittany ports between Cherbourg and Nantes and on them build up sufficient forces for our final advance Eastwards.

   Provided that the necessary air situation can first be achieved, the chances of a successful attack and of rapid subsequent development are so much greater in this sector than in any other that it is considered that the advantages far outweigh the disadvantages.

The Lodgement Area Selected.

9. In the light of these factors, it is considered that our initial landing on the Continent should be effected in the Caen area, with a view to the eventual seizure of a lodgement area comprising the Cherbourg-Brittany group of ports (from Cherbourg to Nantes).

Opening Phase up to the Capture of Cherbourg.

10. The opening phase in the seizing of this lodgement area would be the effecting of a landing in the Caen sector with a view to the early capture and development of airfield sites in the Caen area, and of the port of Cherbourg.

11. The main limiting factors affecting such an operation are the possibility of attaining the necessary air situation; the number of offensive divisions which the enemy can make available for counter attack in the Caen area; the availability of landing ships and craft and of transport aircraft; and the capacity of the beaches and ports in the sector.

12. Although the strength of the G.A.F. [German Air Force, or Luftwaffe] available in 1944 on the Western front cannot be forecast at this stage, we can confidently expect that we shall have a vast numerical superiority in bomber forces. The first-line strength of the German fighter force is, however, showing a steady increase and although it is unlikely to equal the size of the force at our disposal, there is no doubt that our fighters will have a very large commitment entailing dispersal and operations at maximum intensity. Our fighters will also be operating under serious tactical disadvantages in the early stages, which will largely offset their numerical superiority. Before the assault takes place, therefore, it will be necessary to reduce the effectiveness of the G.A.F., particularly that part which can be brought to bear against the Caen area.

13. The necessary air situation to ensure a reasonable chance of success will therefore require that the maximum number of German fighter forces are contained in the Low Countries and North-West Germany, that the effectiveness of the fighter defense in the Caen area is reduced and that air reinforcements are prevented from arriving in the early stages from the Mediterranean. Above all, it will be necessary to reduce the overall strength of the German fighter force between now and the date of the operation by destruction of the sources of supply, by the infliction of casualties by bringing on air battles, and, immediately prior to the assault, by the disorganization of G.A.F. installations and control system in the Caen area.

14. As it is impossible to forecast with any accuracy the number and location of German formations in reserve in 1944, while, on the other hand, the forces available to us have been laid down, an attempt has been made in this paper to determine the wisest employment of our own forces and then to determine the maximum number of German formations which they can reasonably overcome. Apart from the air situation, which is an over-riding factor, the practicability of this plan will depend principally on the number, effectiveness, and availability of German divisions present in France and the Low Countries in relation to our own capabilities. This consideration is discussed below (paragraph 35).
15. A maximum of thirty and a minimum of twenty-six equivalent divisions are likely to be available in the United Kingdom for cross-Channel operations on the 1st May 1944. Further build-up can be at the rate of three to five divisions per month.
16. Landing ships and craft have been provided to lift the equivalent of three assault divisions and two follow-up divisions, without “overheads,” and it has been assumed that the equivalent of an additional two divisions can be afloat in ships.
17. Airborne forces amounting to two airborne divisions and some five or six parachute regiments will be available, but, largely owing to shortage of transport aircraft, it is only possible to lift the equivalent of two-thirds of one airborne division simultaneously, on the basis of present forecasts.
18. Even if additional landing ships and craft could be made available, the beaches in the Caen area would preclude the landing of forces greater than the equivalent of the three assault and two follow-up divisions, for which craft have already been provided. Nevertheless, an all-round increase of at least 10 per cent. in landing ships and craft is highly desirable in order to provide a greater margin for contingencies within the framework of the existing plan. Furthermore, sufficient lift for a further assault division could most usefully be employed in an additional landing on other beaches.
19. There is no port of any capacity within the sector although there are a number of small ports of limited value. Maintenance will, therefore, of necessity be largely over the beaches until it is possible to capture and open up the port of Cherbourg. In view of the possibilities of interruption by bad weather it will be essential to provide early some form of improvised sheltered waters.
20. Assuming optimum weather conditions, it should be possible to build up the force over the beaches to a total by D plus 6 of the equivalent of some eleven divisions and five tank brigades and thereafter to land one division a day until about D plus 24.

Proposed Plan.

Preliminary Phase.

21. During the preliminary phase, which must start forthwith, all possible means including air and sea action, propaganda, political and economic pressure, and sabotage, must be integrated into a combined offensive aimed at softening the German resistance. In particular, air action should be directed towards the reduction of the German air forces on the Western front, the progressive destruction of the German economic system and the undermining of German morale.
22. In order to contain the maximum German forces away from the Caen area diversionary operations should be staged against other areas such as the Pas de Calais and the Mediterranean Coast of France.

Preparatory Phase.

23. During this phase air action will be intensified against the G.A.F., particularly in North-West France, with a view to reducing the effectiveness of the G.A.F. in that area, and will be extended to include attacks against communications more directly associated with movement of German reserves which might affect the Caen area. Three naval assault forces will be assembled with the naval escorts and loaded at ports along the South Coast of England. Two naval assault forces carrying the follow-up forces will also be assembled and loaded, one in the Thames Estuary and one on the West Coast.

The Assault.

24. After a very short air bombardment of the beach defenses three assault divisions will be landed simultaneously on the Caen beaches, followed up on D Day by the equivalent of two tank brigades (United States regiments) and a brigade group (United States regimental combat team). At the same time, airborne forces will be used to seize the town of Caen; and subsidiary operations by commandos and possibly by airborne forces will be undertaken to neutralize certain coast defenses and seize certain important river crossings. The object of the assault forces will be to seize the general line Grandcamp-Bayeux-Caen.

Follow-up and Build-up Phase.

25. Subsequent action will take the form of a strong thrust Southwards and South-Westwards with a view to destroying enemy forces, acquiring sites for airfields, and gaining depth for a turning movement into the Cotentin Peninsula directed on Cherbourg. When sufficient depth has been gained a force will advance into the Cotentin and seize Cherbourg. At the same time a thrust will be made to deepen the bridgehead South-Eastwards in order to cover the construction and operation of additional airfields in the area South-East of Caen.

26. It is considered that, within fourteen days of the initial assault, Cherbourg should be captured and the bridgehead extended to include the general line Trouville-Alencon-Mont St. Michel. By this date, moreover, it should have been possible to land some eighteen divisions and to have in operation about fourteen airfields from which twenty-eight to thirty-three fighter-type squadrons should be operating.

Further Developments after Capture of Cherbourg.

27. After the capture of Cherbourg the Supreme Allied Commander will have to decide whether to initiate operations to seize the Seine ports or whether he must content himself with first occupying the Brittany ports. In this decision he will have to be guided largely by the situation of the enemy forces. If the German resistance is sufficiently weak, an immediate advance could be made to seize Havre and Rouen. On the other hand, the more probable situation is that the Germans will have retired with the bulk of their forces to hold Paris and the line of the Seine, where they can best be covered by their air forces from North-East France and where they may possibly be reinforced by formations from Russia. Elsewhere they may move a few divisions from Southern France to hold the crossings of the Loire and will leave the existing defensive divisions in Brittany.

    It will therefore most probably be necessary for us to seize the Brittany ports first, in order to build up sufficient forces with which we can eventually force the passage of the Seine.

28. Under these circumstances, the most suitable plan would appear to be to secure first the left flank and to gain sufficient airfields for subsequent operations. This would be done by extending the bridgehead to the line of the River Eure from Dreux to Rouen and thence along the line of the Seine to the sea, seizing at the same time Chartres, Orleans and Tours.

29. Under cover of these operations a force would be employed in capturing the Brittany ports; the first step being a thrust Southwards to seize Nantes and St. Nazaire, followed by subsidiary operations to capture Brest and the various small ports of the Brittany Peninsula.

30. This action would complete the occupation of our initial lodgement area and would secure sufficient major ports for the maintenance of at least thirty divisions. As soon as the organization of the L. of C. in this lodgement area allowed, and sufficient air forces had been established, operations would then be begun to force the line of the Seine, and to capture Paris and the Seine ports. As opportunity offered, subsidiary action would also be taken to clear the Germans from the Biscay ports to facilitate the entry of additional American troops and the feeding of the French population.

Command and Control.

31. In carrying out Operation “Overlord” administrative control would be greatly simplified if the principle were adopted that the United States forces were normally on the right of the line and the British and Canadian forces on the left.

Major Conditions Affecting Success of the Operation.

32. It will be seen that the plan for the initial landing is based on two main principles—concentration of force and tactical surprise. Concentration of the assault forces is considered essential if we are to ensure adequate air support and if our limited assault forces are to avoid defeat in detail. An attempt has been made to obtain tactical surprise by landing in a lightly defended area—presumably lightly defended as, due to its distance from a major port, the Germans consider a landing there unlikely to be successful. This action, of course, presupposes that we can offset the absence of a port in the initial stages by the provision of improvised sheltered waters. It is believed that this can be accomplished.

33. The operation calls for a much higher standard of performance on the part of the naval assault forces than any previous operation. This will depend upon their being formed in sufficient time to permit of adequate training.

34. Above all, it is essential that there should be an over-all reduction in the German fighter force between now and the time of the surface assault. From now onwards every practical method of achieving this end must be employed. This condition, above all others, will dictate the date by which the amphibious assault can be launched.

35. The next condition is that the number of German offensive divisions in reserve must not exceed a certain figure on the target date if the operation is to have a reasonable chance of success. The German reserves in France and the Low Countries as a whole, excluding divisions holding the coast, G.A.F. divisions and training divisions, should not exceed on the day of the assault twelve full-strength first-quality divisions. In addition, the Germans should not be able to transfer more than fifteen first-quality divisions from Russia during the first two months. Moreover, on the target date the divisions in reserve should be so located that the number of first-quality divisions which the Germans could deploy in the Caen area to support the divisions holding the coast should not exceed three divisions on D Day, five divisions on D plus 2, or nine divisions by D plus 8.

    During the preliminary period, therefore, every effort must be made to dissipate and divert German formations, lower their fighting efficiency and disrupt communications.

36. Finally, there is the question of maintenance. Maintenance will have to be carried out over beaches for a period of some three months for a number of formations, varying from a maximum of eighteen divisions in the first month to twelve divisions in the second month, rapidly diminishing to nil in the third month. Unless adequate measures are taken to provide sheltered waters by artificial means, the operation will be at the mercy of the weather. Moreover, special facilities and equipment will be required to prevent undue damage to craft during this extended period. Immediate action for the provision of the necessary requirements is essential.

37. Given these conditions—a reduced G.A.F., a limitation in the number or effectiveness of German offensive formations in France, and adequate arrangements to provide improvised sheltered waters—it is considered that Operation “Overlord” has a reasonable prospect of success. To ensure these conditions being attained by the 1st May, 1944, action must start now and every possible effort made by all means in our power to soften German resistance and to speed up our own preparations.

Offices of the War Cabinet, S.W.1,
30th July, 1943.

Student Resource 1.4.5

Worksheet: Beach Defenses

The Allied invasion of Normandy on June 6, 1944 was not a complete surprise to Germany. For two years prior, Field Marshal Erwin Rommel had been fortifying the entire French coastline in anticipation of an invasion attempt. His defenses were formidable; however, Allied intelligence had discovered the defenses in place, giving Allied engineering time to develop some effective countermeasures.

1. **Teller mines on posts.** Rommel expected an invasion at high tide, since that would mean the Allied forces would have less distance to run under fire. He spiked the lower beach with wooden posts that had mines attached to the top. At high tide, these mines would be unseen underwater, deadly traps awaiting the boats bringing the Allied forces to shore.

   Possible countermeasure:

2. **Hedgehogs.** Further up the beach, Rommel placed a line of thousands of star-shaped steel obstacles nicknamed “hedgehogs.” At high tide, boats passing over the hedgehogs would be shredded from below.

   Possible countermeasure:

3. **Barbed wire and mines buried in the sand**. In the months leading up to the invasion, German troops fortified the upper beach with miles of barbed wire and thousands of mines.

   Possible countermeasure:

4. **Machine gun emplacements.** Overlooking the beaches, Hitler and Rommel built up machine gun emplacements that would be ready to gun down troops as soon as the reached the land.

   Possible countermeasure:

AOE IED Integrated Unit: Ship Shape

Lesson 1.4

Storming the Beach

Teacher Resources

Resource	Description
Teacher Resource 1.4.1	Reading: Background Information
Teacher Resource 1.4.2	Transparency: Political Map of the World, May 1943
Teacher Resource 1.4.3	Transparency: Political Map of Europe, May 1943
Teacher Resource 1.4.4	Video Clips: Beach Invasion Innovations http://www.pbs.org/wnet/secrets/lessons/lp_dday_videos.html

Teacher Resource 1.4.1

Reading: Background Information

By late 1943 the debate between the British and the Americans over which strategy to pursue in Europe was finally settled. The campaign in Italy was proceeding slowly, and while Italy had been forced out of the war that seemed to be having little effect on Germany's overall war effort. The Soviet Army was now on the offensive in the east, while Stalin continued his demands for a more determined effort from the West. Finally, the main arguments against a second front in France—that the Allies did not possess unchallenged control of the Atlantic and the skies over Western Europe—had both vanished. Allied military planners therefore came to an agreement: a cross-channel invasion would take place in spring 1944.

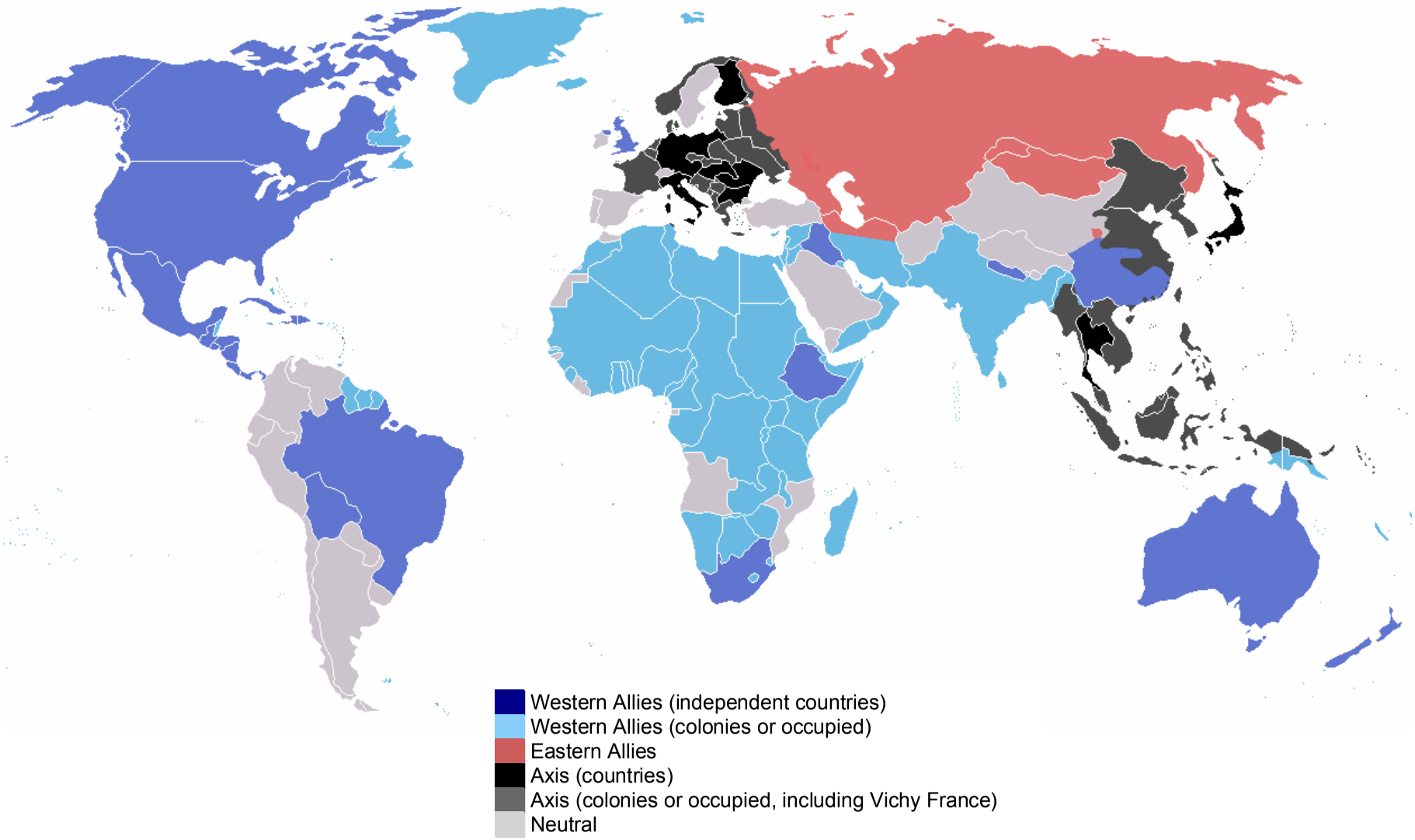
Even before the invasion took place, however, the British and Americans conducted a massive campaign of aerial bombardment of cities across German-occupied Europe. Given the technology of the times, it proved extremely difficult to pinpoint particular factories or other strategic targets. Therefore, the Allies resorted to what was called "area bombing"—basically dropping tons of explosives from high altitudes on enemy cities, in the expectation that something important was bound to be destroyed. This resulted in the deaths of hundreds of thousands of German civilians from 1943 to 1945. While the actual effect of the bombing on German industry is debatable, there is little doubt that it forced the enemy to divert fighter aircraft away from the front lines and toward the defense of the homeland. Thus, when the cross-channel invasion took place, there was no serious interference from the Luftwaffe.

Even without significant aerial support, the German coastline had formidable defenses. Rommel had been anticipating an invasion attempt, and the entire French coastline was heavily fortified. Hedgehogs, log ramps, posts, and Belgian gates lashed with mines made up four lines of obstacles in the water. The beaches themselves were mined and covered in barbed wire entanglements, as well as defended by machine gun emplacements and other manned fortifications.

At high tide, the water defenses were expected to impede the advance of Allied landing craft. High tide was thought to be the most likely time for an assault, as that would minimize the distance troops would need to cross under fire. However, the Allies made the decision to invade at low tide, when the majority of obstacles in the water would be exposed. To minimize landing time and prevent soldiers from being gunned down during the beach crossing, the Allies developed two new types of landing craft. The first was the Higgins boat, a flat-bottomed craft with a forward ramp that allowed for rapid disembarkation of troops and tanks. The second was the amphibious duplex-drive (DD) tank, a tank that could swim to shore. In addition to new landing craft, a number of attachments were designed for tanks (e.g., flails) to defeat beach defenses such buried mines and barbed wire.

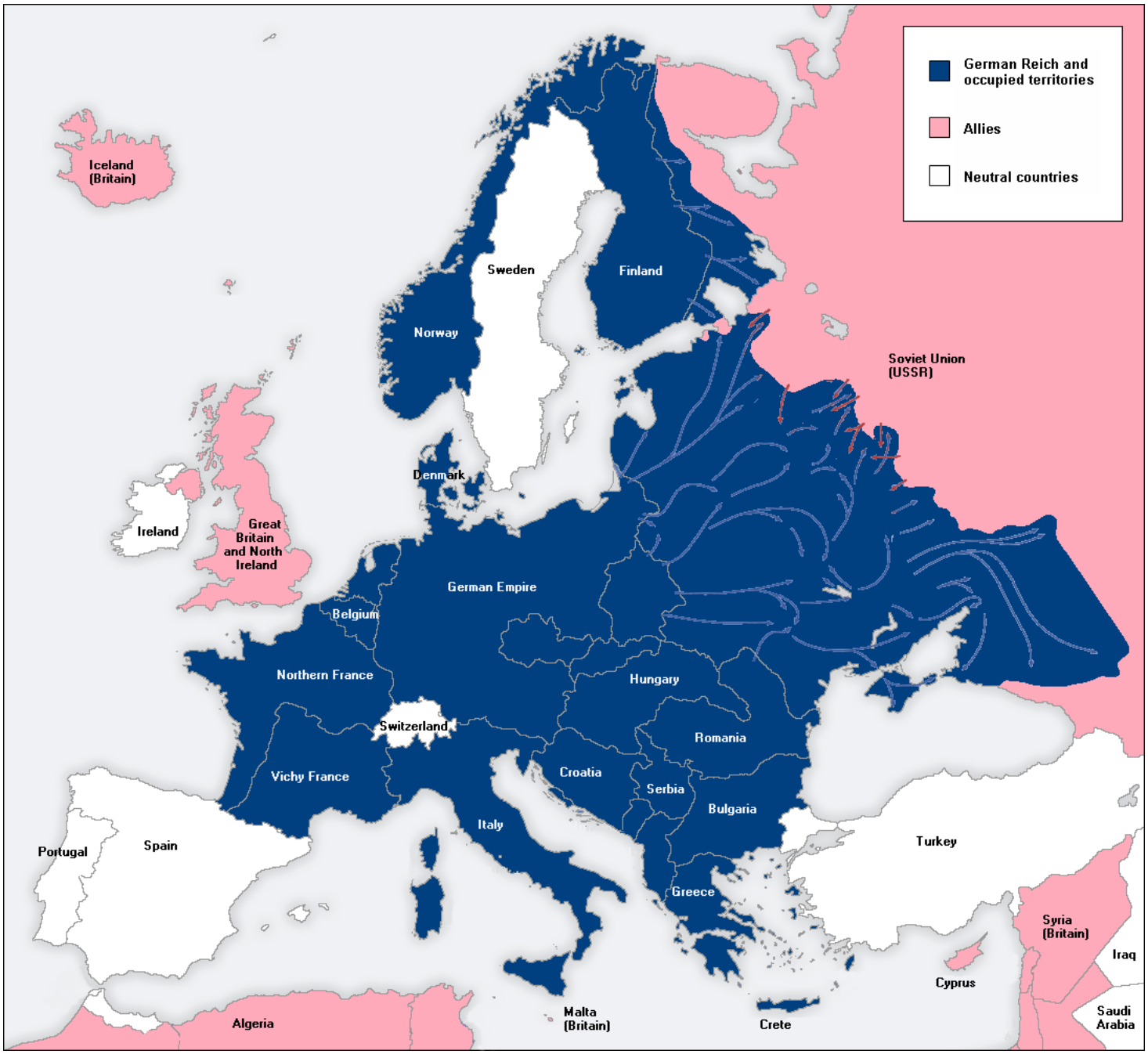
Teacher Resource 1.4.2

Transparency: Political Map of the World, May 1943



Teacher Resource 1.4.3

Transparency: Political Map of Europe, May 1943



Teacher Resource 1.4.4

Video Clips: Beach Invasion Innovations

Discuss how the challenges and obstacles faced in war often lead to rapid scientific and engineering advances. Have students watch PBS video clips on technological advances developed during World War II to overcome Rommel's beach defenses against the Allied invasion. Students should first answer the associated questions individually. Discuss their responses as a class.

Video clips: http://www.pbs.org/wnet/secrets/lessons/lp_dday_videos.html