CAREER PATHS

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MARINE ENGINEERING

Express Publishing

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MARINE ENGINEERING

Book 1

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Scope and Sequence

Unit	Topic	Reading context	Vocabulary	Function
1	The Purpose of Marine Engineering	Webpage	cargo, fit to purpose, marine engineering, military, naval architecture, offshore, passenger, port, ship, ship theory, trade, vessel, voyage	Asking for clarification
2	Merchant Ships	Cover letter	barge, bulk carrier, container ship, cruise ship, ferry, icebreaker, liner, merchant ship, reefer, Ro-Ro, tanker, tug	Describing experience
3	Warships	Lecture notes	aircraft carrier, amphibious vessel, anti-, attack, destroyer, frigate, mine countermeasure vessel, submarine, warship, weapon	Expressing a desire
4	Parts of a Ship 1	Report	bay, bilge, bulwark, cabin, forecastle, hull, keel, mast, superstructure, weather deck	Making a suggestion
5	Parts of a Ship 2	Email	bulkhead, compartment, companionway, deck, head, ladder, overhead, partitioning, passageway, watertight door	Giving directions
6	Mooring Equipment	Report	anchor, bitt, buoy, capstan, chain, cleat, fender, fouling, ground tackle, line, winch	Discussing needs
7	Common Materials	Webpage	alloy, aluminum, fiberglass, glass, insulation, lacquer, lumber, nylon, paint, polymer, -resistant, sealant, steel	Agreeing
8	Properties of Materials	Feedback form	brittle, conductor, ductile, elastic limit, hardness, insulator, load-bearing, luster, malleable, natural, synthetic, tensile	Expressing confusion
9	Measurements 1	Guide	Celsius, cubic meter, cubic yard, degree, Fahrenheit, gallon, kilogram, liter, pound, temperature, ton, metric ton, volume, weight	Confirming information
10	Measurements 2	Memo	cable length, degree, depth, fathom, foot, kilometer, league, length, meter, nautical mile, statute mile, speed, width, yard	Pointing out a problem
11	SI Units	Poster	base unit, convert, derived unit, energy, force, joule, Kelvin, Newton, Pascal, pressure, SI	Correcting an error
12	Basic Math	Chart	add, divide by, equals, -hundred, less, minus, multiply by, over, plus, subtract, times	Asking about progress
13	Large Numbers	Email	cubed, exponent, integer, leading zero, place, rounding error, scientific notation, significant figure, squared, to the nth power, trailing zero	Showing understanding
14	Analyzing Quantities	Guide	decimal number, fraction, improper fraction, mixed number, -out of-, percent, point, quantity, reduce, whole number	Expresssing possibility
15	Describing Change	Report	decline, decrease, expand, fluctuate, increase, plummet, rise, shrink, stabilize, steady	Expressing sympathy

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MARINE ENGINEERING

Book 2

Captain John W. Mackey
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Scope and Sequence

Unit	Topic	Reading context	Vocabulary	Function
1	The Scientific Method	Abstract	conclusion, control group, experiment, experimental group, hypothesis, independent variable, observation, problem, result, scientific method, testable	Expressing disbelief
2	Accounting	Textbook chapter	accounting, consumption, closed system, extensive quantity, final, generation, initial, input, intensive quantity, open system, output, universal accounting equation	Expressing confusion
3	Rate Processes	Report	diameter, driving force, flow rate, flux, inlet, outlet, rate, rate process, resistance, viscosity	Expressing concern
4	Energy	Course description	act on, chemical energy, conserve, electromagnetic radiation, energy, heat, kinetic energy, potential energy, release, thermal energy, transfer, work	Offering an example
5	Basic Physics	Course Introduction	aerodynamics, conservation, fluid dynamics, gas, gravity, hydrodynamics, law, liquid, matter, momentum, motion, solid, thermodynamics, velocity	Correcting a misconception
6	Stress	Email	compression, elastic behavior, elongation, fail, internal force, plastic behavior, shear, strain, stress, stretch, tension	Expressing disappointment
7	Water Movements	Textbook chapter	crest, current, duration, eddy, fetch, strength, swell, tide, trough, wake, wave	Reviewing information
8	Flotation	Report	buoyancy, capsize, center of gravity, deadweight, density, displacement, draft, equilibrium, float, fully loaded, lightweight, rise, sink, tonnage	Describing a problem
9	Principles of Stability	Webpage	ballast, directional stability, dynamic capsize, heel, intact ship, loading conditions, longitudinal, right, stability of attitude, static capsize, transverse, trim	Asking for an explanation
10	Damaged Stability	Article	collision, confined, flood, floodable length, founder, margin line, penetration, plunge, reserve of buoyancy, run aground, spring a leak, subdivision	Showing disagreement
11	Hull Construction	Lecture notes	air draft, beam, camber, deadrise, freeboard, moulded depth, moulded draft, parallel, perpendicular, sheer, symmetrical, waterline, waterplane	Expressing lack of understanding
12	Resistance	Lecture notes	adjacent, appendage resistance, corrosion, divergent waves, drag, fouling, frictional resistance, magnitude, particle, resist, structural roughness, transverse waves, wave-making resistance	Correcting an error
13	Propulsion	Webpage	airfoil, blade, cavitation, circulation, lift, overall propulsive efficiency, paddle wheel, propeller, propulsion, propulsor, sail, shaft power, thrust, torque, water jet	Offering assistance
14	Power	Encyclopedia article	combustion chamber, diesel, electric motor, engine, engine room, fuel, gas turbine, generator, inboard motor, internal combustion, outboard motor, steam engine	Asking for an opinion
15	Nautical Directions	Schedule	abaft, aft, amidships, astern, athwartships, below, bow, forward, port, starboard, stern, topside	Giving directions

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MARINE ENGINEERING

Book 3

Captain John W. Mackey
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Express Publishing

Scope and Sequence

Unit	Topic	Reading context	Vocabulary	Function
1	Seakeeping	Report Summary	at sea, active fin, active tank, bilge keel, emergence, green seas, grounding, impact, passive tank, seabed, seakeeping, slamming, stabilization system, wetness, wave data	Expressing relief
2	Onboard Systems	Webpage	autopilot, auxiliary, backup, communication, distribution system, GPS, HVAC, integrated, navigation, potable water, power, radar, radio, refrigeration	Expressing uncertainty
3	Emergency Preparedness	Poster	abandon ship, CO_2 alarm, contain, damage control deck, emergency bilging, engineers call, fire alarm, freeing port, lifeboat, man overboard, muster station, ration, red risk zone, V-line	Discussing a hypothetical situation
4	Climate Factors	Textbook chapter	abnormal wave, atmospheric pressure, corrosive, freak wave, gust, hail, ice, mold, polar waters, precipitation, rain, salinity, seawater, steady, solar radiation, wind, storm	Discussing consequences
5	Environmental Concerns	Letter to the editor	ballast water, biocide, compactor, comminuter, garbage, greenhouse gas, incinerator, oil, pollution, sewage, treatment, VOC	Making an admission
6	Launching and Docking	Memo	barricade, cribbing, dock, docking plan, dry dock, floating dock, launch, launch cradle, rail, shiplift, slipway, slope, transfer, wet dock	Asking about experience
7	Vessel Movements	Textbook chapter	abreast, attract, fixed, heave, overtake, passing vessel hydrodynamics, pitch, pressure field, repel, roll, surge, sway, yaw	Showing understanding
8	Maneuvering	Email	advance, angle of attack, balanced, heading, put over, rudder, steady turning radius, steer, tactical diameter, transfer, turning circle, unbalanced	Making an assumption
9	Human Factors	Webpage	air quality, frequency, fit, humidity, illumination, motion-induced fatigue, motion-induced interruption, motion sickness, nausea, noise, odor, tight space, vibration, vulnerable	Making a suggestion
10	The Design Process	Employee manual	concept design, configuration, contract design, dependency diagram, detail, detail design, estimate, interdependency, requirement, route, testing, type ship	Confirming information
11	Design Technology	Email	CAD, consistency, database, exploded view, input, interactive, model, output, photorealistic rendering, software, virtual, 2-D, 3-D	Expressing enthusiasm
12	International Regulations	Webpage	certificate of registration, challenge, comply, convention, flag state, IMO, international, jurisdiction, MECP, MSC, port state, regulation, SOLAS, summer freeboard	Expressing intention
13	Safety Assessments	Email	alternative, classification society, constraint, flexible, FSA (formal safety assessment), novel, performance standard, prescriptive standard, probability, scenario, standard, trend	Expressing lack of necessity
14	Education	Cover letter	bachelor's degree, doctoral, graduate, internship, master's degree, MBA, materials science, mathematics, PhD, physical science, power systems, technology, thesis, undergraduate	Expressing a desire
15	Careers	Webpage	analyst, consultant, government agency, inspector, management, marine engineer, maritime law, naval architect, oil exploration, shipbuilding, ship engineer, systems engineering	Expressing interest

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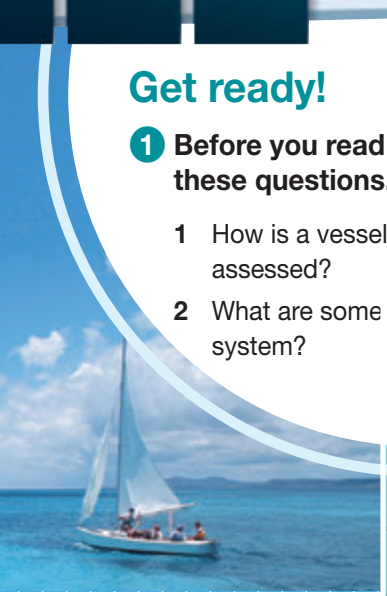
1 Seakeeping

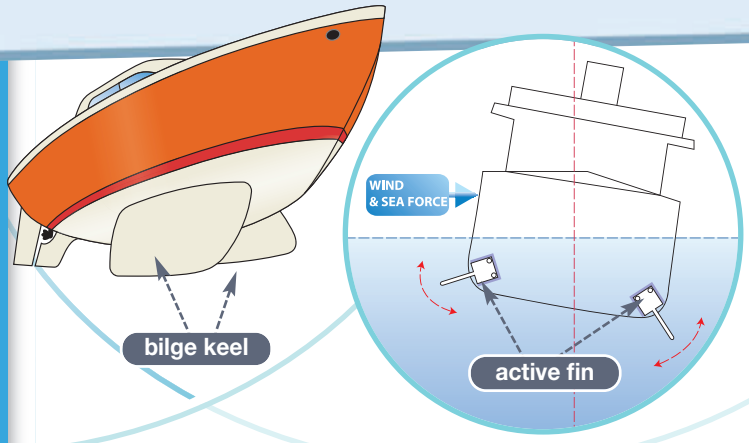
Get ready!

1 Before you read the passage, talk about these questions.

1 How is a vessel's seakeeping performance assessed?

2 What are some features of a stabilization system?





Reading

2 Read the report summary. Then, complete the table.

Seakeeping Test	Result of Test
Unbalanced loads	1 _____
2 _____	The vessel sustained minor damage, but remained mostly unharmed.
Stabilization system	3 _____
4 _____	Hull and deck coatings were vulnerable to moderate wetness and slamming.

Kelso Enterprises, Inc.

Model: R420

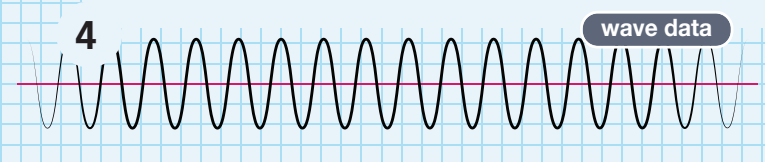
Testing Round: 2

Chief Analyst: Timothy Lewis

We recently concluded our second round of testing on the R420 design. These tests were intended to assess the vessel's overall seakeeping performance. We used modeling software to simulate the vessel's likely conditions **at sea**.

For the most part, the results were good. The **stabilization system** performed well under typical weather conditions. Even with unbalanced loads, propeller **emergence** did not occur. Also, the retractable **active fins** performed as intended. They're more costly than **bilge keels**, but they are also more efficient. Additionally, we performed tests of the vessel's durability in the case of **grounding**. The **impact** with the simulated **seabed** caused only minor damage.

There were, however, some areas of concern. For one, **wave data** suggest powerful waves along this vessel's intended route. But the stabilization system became less effective under these severe conditions. This is likely a result of the **passive tank** system. Instead, an **active tank** might offer better stability control. Furthermore, severe waves lead to **green seas**, so surface durability is also a concern. Unfortunately, the current hull and deck coatings did not withstand weathering tests very well. They wore down after moderate **wetness** and **slamming**. The designers should seek new coatings.



Vocabulary

3 Match the words or phrases (1-7) with the definitions (A-G).

1 __ at sea
2 __ active fin
3 __ passive tank
4 __ grounding
5 __ green seas
6 __ slamming
7 __ stabilization system

A a set of parts that reduce unwanted movements of a vessel

B a stabilizing feature in which water flows back and forth within the vessel

C large waves that wash onto the deck of a vessel

D a process in which a vessel comes into contact with the sea floor

E the impact of waves repeatedly striking a ship's hull

F a part of a vessel that can be repositioned to stabilize movement

G happening while a vessel is traveling in the ocean

4 **Read the sentence pairs. Choose which word or phrase best fits each blank.**

1 **emergence / seakeeping**

A The engineers conducted tests to determine the vessel's _____ performance.

B Shifting loads on the ship caused propeller _____ .

2 **seabed / bilge keel**

A A _____ is a common stability feature on a ship.

B Ideally, vessels should not come in contact with the _____ .

3 **impact / active tank**

A The vessel could not withstand the _____ with a larger ship.

B The maintenance worker replaced the water pump in the _____ .

4 **wave data / wetness**

A Analysts relied on _____ to plot a relatively steady course.

B Reinforcing the hull prevents excessive _____ beneath the coating.

5 **Listen and read the report summary again. How are vessels protected against wetness?**

Listening

6 **Listen to a conversation between an analyst and an engineer. Mark the following statements as true (T) or false (F).**

1 __ The vessel's previous model performed well in grounding tests.

2 __ The vessel's bilge keel is effective under typical conditions.

3 __ The woman suggests using a passive tank.

7 **Listen again, and fill in the blanks.**

Engineer: I'm glad to hear that. So **1** _____ _____ _____ went well?

Analyst: Yes. The hull can withstand substantial impact from **2** _____ _____ _____ .

Engineer: That's a relief. I know our last model had some serious problems in that area.

Analyst: Yes, it did. This one is definitely much better.

Engineer: Now, **3** _____ _____ _____ ? Was the new bilge keel effective?

Analyst: Well, it's hard to say. I think the bilge keel is okay, at least under typical conditions. But there are some other stability problems.

Engineer: Uh oh. Like what?

Analyst: The **4** _____ _____ _____ under severe conditions.

Engineer: Well, then, it sounds like **5** _____ _____ _____ *didn't* work very well.

Analyst: Actually, I think your problem is **6** _____ _____ _____ . It doesn't give the crew enough control.

Speaking

8 **With a partner, act out the dialogue from Task 7. Then switch roles.**

USE LANGUAGE SUCH AS:

How did the vessel do ...? / That's a relief.

I think your problem is ...

Student A: You are an engineer. Talk to Student B about:

- the seakeeping performance of a vessel
- parts of the vessel that performed well
- parts of the vessel that performed poorly

Student B: You are an analyst. Talk to Student A about the seakeeping performance of a vessel.

Writing

9 **Use the report summary and the conversation from Task 8 to write a report about a vessel's seakeeping performance. Include: improvements since the previous round of testing, the results of the test, and recommendations.**

Glossary

add [V-T-U12] To **add** a quantity to another quantity is to increase it by that amount.

aircraft carrier [N-COUNT-U3] An **aircraft carrier** is a large vessel that can transport aircraft, and which also serves as a place for aircraft to take off and land.

alloy [N-COUNT-U7] An **alloy** is mixture of two metals, or a mixture of a metal and a non-metal.

aluminum [N-UNCOUNT-U7] **Aluminum** is a strong, lightweight metal.

amphibious vessel [N-COUNT-U3] An **amphibious vessel** is a vessel that can travel both on land and in the water.

anchor [N-COUNT-U6] An **anchor** is a heavy, metal device that is dropped to the sea floor in order to hold a vessel in place.

anti-aircraft [N-UNCOUNT-U3] An **anti-aircraft** vessel is designed to attack aircraft.

attack [V-T-U3] To **attack** something is to try to hurt or damage it.

barge [N-COUNT-U2] A **barge** is a flat-bottomed vessel that is often used to transport cargo in harbors and shallow areas, and may or may not have its own onboard power.

base unit [N-COUNT-U11] A **base unit** is one of seven standard SI units that is the foundation of other SI units.

bay [N-COUNT-U4] A **bay** is a space in a vessel where cargo or equipment is stored.

bilge [N-COUNT-U4] The **bilge** of a vessel is the lowest area within a ship, which often collects water that must be pumped out.

bitt [N-COUNT-U6] A **bitt** is a set of two posts that are used to secure lines onboard a vessel or along a dock.

bow [N-COUNT-U4] The **bow** is the front end of a ship.

brittle [ADJ-U8] If something is **brittle**, it breaks or cracks easily when it is bent or stretched.

bulk carrier [N-COUNT-U2] A **bulk carrier** is a cargo ship that carries loose materials in large cargo bays, rather than transporting them in containers.

bulkhead [N-COUNT-U5] A **bulkhead** is a watertight barrier that separates different areas of a ship to avoid flooding.

bulwark [N-COUNT-U4] A **bulwark** is a part of a vessel's hull that extends above a deck.

buoy [N-COUNT-U6] A **buoy** is a floating object that is easy to see, and is often used to mark a location in the water.

cabin [N-COUNT-U4] A **cabin** is a room in a vessel where a person stays or sleeps.

cable length [N-COUNT-U10] A **cable length** is a unit of distance that is used for maritime measurements, and varies depending on the application. It is generally equal to about 219.46 meters (720 feet) in the United States, and about 185.32 meters (608 feet) in the United Kingdom.

capstan [N-COUNT-U6] A **capstan** is a large piece of equipment that a large or heavy rope is wound around.

cargo [N-UNCOUNT-U1] **Cargo** is anything that is transported in a vessel besides equipment for operating the vessel and people.

Celsius [ADJ-U9] If a measurement is **Celsius**, it uses the temperature scale in which water boils at 100 degrees and freezes at 0 degrees.

chain [N-COUNT-U6] A **chain** is a series of metal rings that are attached to each other, and is used to hold things together.

cleat [N-COUNT-U6] A **cleat** is a metal bar that is used to secure lines onboard a vessel or along a dock.

companionway [N-COUNT-U5] A **companionway** is an opening between two decks of a vessel, and allows people to pass between the decks along a stairway or ladder.

compartment [N-COUNT-U5] A **compartment** is an enclosed area, or room, within a vessel.

conductor [N-COUNT-U8] A **conductor** is a material that allows electricity to flow through it easily.

container ship [N-COUNT-U2] A **container ship** is a cargo ship that transports goods in large, secure containers.

convert [V-T-U11] To **convert** something is to change it into a different form or mode of expression.

cruise ship [N-COUNT-U2] A **cruise ship** is a passenger ship that carries people who are traveling for pleasure, and usually returns them to their place of departure.

cubed [ADJ-U13] If a quantity is **cubed**, it is multiplied by itself two times, or raised to the power of three.

CAREER PATHS

MARINE ENGINEERING

Career Paths: Marine Engineering is a new educational resource for maritime industry professionals who want to improve their English communication in a work environment. Incorporating career-specific vocabulary and contexts, each unit offers step-by-step instruction that immerses students in the four key language components: reading, listening, speaking, and writing. ***Career Paths: Marine Engineering*** addresses topics including types of vessels, parts of a ship, principles of flotation, fluid dynamics, and design technology.

The series is organized into three levels of difficulty and offers a minimum of 400 vocabulary terms and phrases. Every unit includes a test of reading comprehension, vocabulary, and listening skills, and leads students through written and oral production.

Included Features:

- A variety of realistic reading passages
- Career-specific dialogues
- 45 reading and listening comprehension checks
- Over 400 vocabulary terms and phrases
- Guided speaking and writing exercises
- Complete glossary of terms and phrases

The **Teacher's Guide** contains detailed lesson plans, a full answer key and audio scripts.

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