Preface

Since the end of the age of sail a ship has been any large buoyant watercraft. Ships are generally distinguished from boats based on size, shape and cargo or passenger capacity. Ships are used on lakes, seas, and rivers for a variety of activities, such as the transport of people or goods, fishing, entertainment, public safety, and warfare. Historically, a "ship" was a vessel with sails rigged in a specific manner. Ships and boats have developed alongside humanity. In armed conflict and in daily life they have become an integral part of modern commercial and military systems.

Fishing boats are used by millions of fishermen throughout the world. Military forces operate vessels for combat and to transport and support forces ashore. Commercial vessels, nearly 35,000 in number, carried 7.4 billion tons of cargo in 2007. Total number of ships as of 2011 is about 104,304. Ships were a key in history's great explorations and scientific and technological development. Navigators such as Zheng He spread such inventions as the compass and gunpowder.

Ships have been used for such purposes as colonization and the slave trade, and have served scientific, cultural, and humanitarian needs. After the 16th century, new crops that had come from and to the Americas via the European seafarers significantly contributed to the world's population growth. Maritime transport has shaped the world's economy into today's energy-intensive pattern.

Some components exist in vessels of any size and purpose. Every vessel has a hull of sorts. Every vessel has some sort of propulsion, whether it's a pole, an ox, or a nuclear reactor. Most vessels have some sort of steering system. Other characteristics are common, but not as universal, such as compartments, holds, a superstructure, and equipment such as anchors and winches. For a ship to float, its weight must be less than that of the water displaced by the ship's hull. There are many types of hulls, from logs lashed together to form a raft to the advanced hulls of America's Cup sailboats. A vessel may have a single hull, two in the case of catamarans, or three in the case of trimarans. Vessels with more than three hulls are rare, but some

experiments have been conducted with designs such as pentamarans. Multiple hulls are generally parallel to each other and connected by rigid arms. Hulls have several elements. The bow is the foremost part of the hull. Many ships feature a bulbous bow. The keel is at the very bottom of the hull, extending the entire length of the ship. The rear part of the hull is known as the stern, and many hulls have a flat back known as a transom. Common hull appendages include propellers for propulsion, rudders for steering, and stabilizers to quell a ship's rolling motion.

Other hull features can be related to the vessel's work, such as fishing gear and sonar domes. Hulls are subject to various hydrostatic and hydrodynamic constraints. The key hydrostatic constraint is that it must be able to support the entire weight of the boat, and maintain stability even with often unevenly distributed weight. Hydrodynamic constraints include the ability to withstand shock waves, weather collisions and groundings. Older ships and pleasure craft often have or had wooden hulls. Steel is used for most commercial vessels. Aluminium is frequently used for fast vessels, and composite materials are often found in sailboats and pleasure craft. Some ships have been made with concrete hulls.

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– Shiven Arora