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Spices



What to do if your ship is in danger of sinking

Your challenge

The year is 1593 and you have been summoned by the King of Portugal. Every year, he sends out a fleet of massive cargo ships to Portugal's colonies in India. Here the ships load up with pepper and luxury goods such as silks and spices to bring back to Europe where they are sold for a huge profit. The King wants you to captain the fleet from Portugal's capital, Lisbon,

to the port of Goa in India. It is great honour to be asked, but the voyage is long and dangerous.

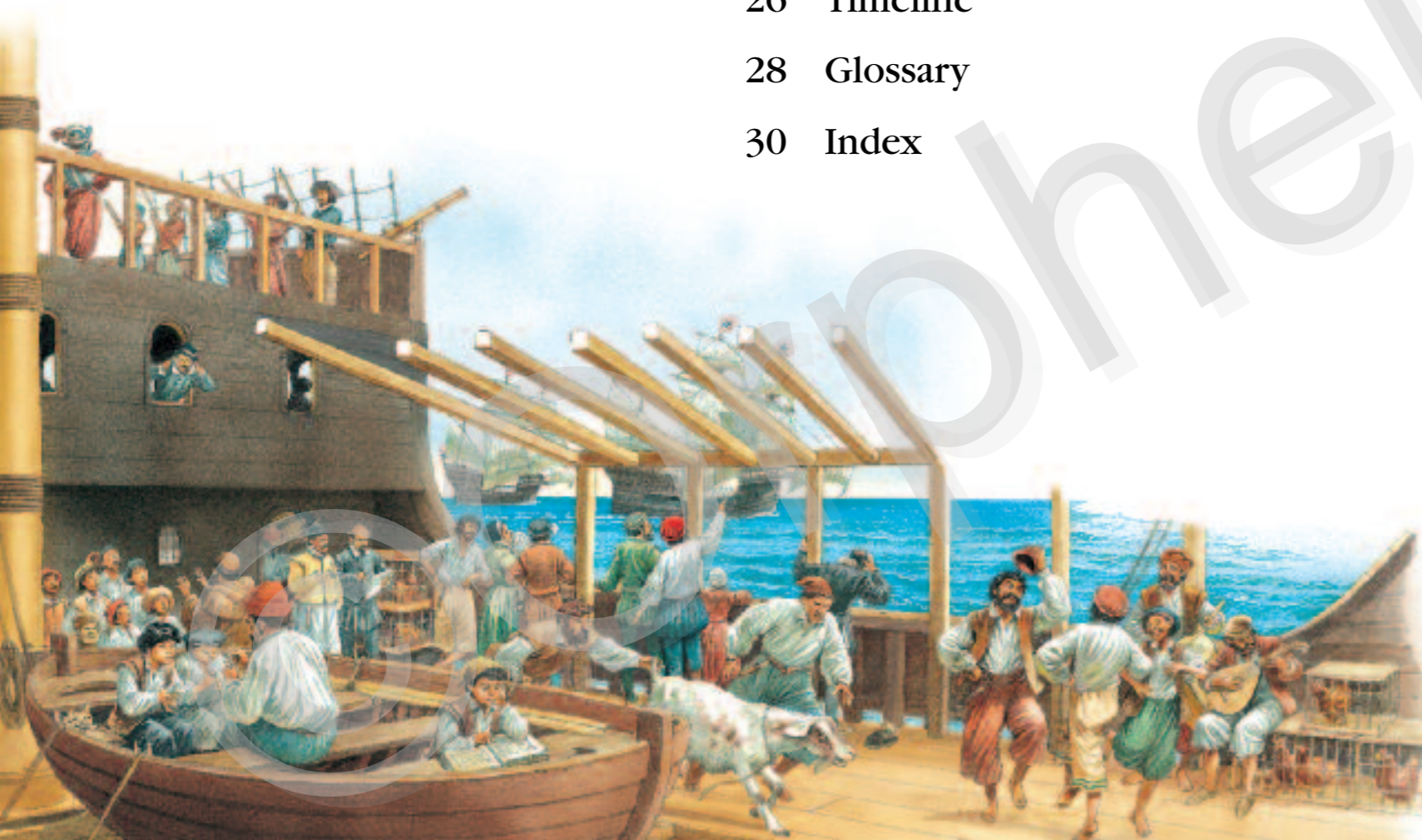
Some navigational aids



Your ship is newly built and waiting at the port of Lisbon to set sail. It is a massive vessel, called a carrack, or nau, specially designed to carry as much cargo as possible. It is your job to ensure you have the crew, food, water and other supplies necessary to complete the long

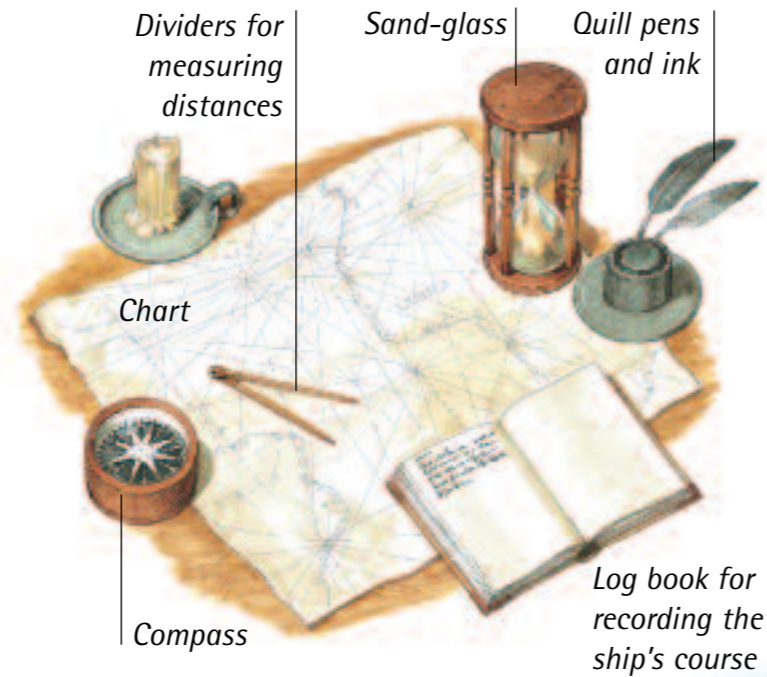
journey. You must navigate thousands of kilometres across two oceans, surviving storms and possible encounters with pirates. You must keep your crew and passengers fit and well, and successfully negotiate the purchase of the King's precious spices. It is a massive challenge, demanding exceptional seamanship. Are you ready to accept it?

"Furl the sails!"



Navigation

Finding your way across thousands of kilometres of ocean is one of the greatest challenges of your voyage. For this you rely almost entirely on your pilot, so be sure you recruit the best. It is his job to work out your position, speed and direction, and to issue orders to the helmsman (who steers the ship) and the boatswain to adjust the rudder and the sails to maintain your course. The pilot uses several instruments and techniques to help him.



The compass is the pilot's most valuable navigational tool. The magnetic needle always points north, so he can always find out the direction of travel. Time is measured by turning sand-glasses. Charts are useful for plotting position and working out distances.

At night your pilot can use an astrolabe to work out latitude by measuring the angle between the Pole Star, his eye and the horizon. He turns the pointer on the astrolabe until it lines up with the star, then reads off the angle marked by the pointer on the outside rim of the instrument. Finding out longitude—how far east or west you are—is unfortunately much more difficult than working out latitude. The best way is to keep detailed records of your speed and direction throughout the voyage.



To work out your speed, a log line attached to a weight is thrown from the rear of the ship. The line has equally spaced knots tied in it. A sand-glass is used to time for one minute and the number of knots that reel out in that time is counted. Multiplying this by 60 gives speed in knots per hour.

Using a cross-staff

Adjust the cross-piece until the top is in line with the sun, and the bottom with the horizon.

To find your ship's latitude—her distance north or south of the Equator—your pilot uses a cross-staff to measure the height of the sun at noon. This changes with latitude, so he can work out the north-south position from this measurement, which is read off from the scale on the staff.

Winding out the log

Counting the knots

Swinging the lead

Timing using a sand-glass

Examining the lead for mud or sand stuck to the tallow

Tallow

Lead weight

Log reel

Weighted log

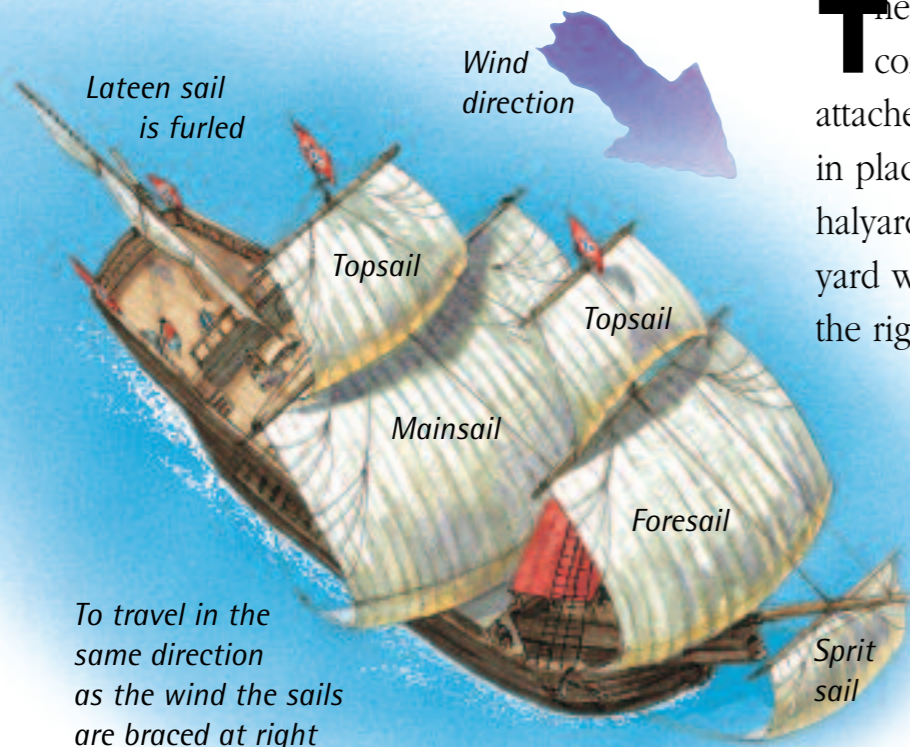
Lead



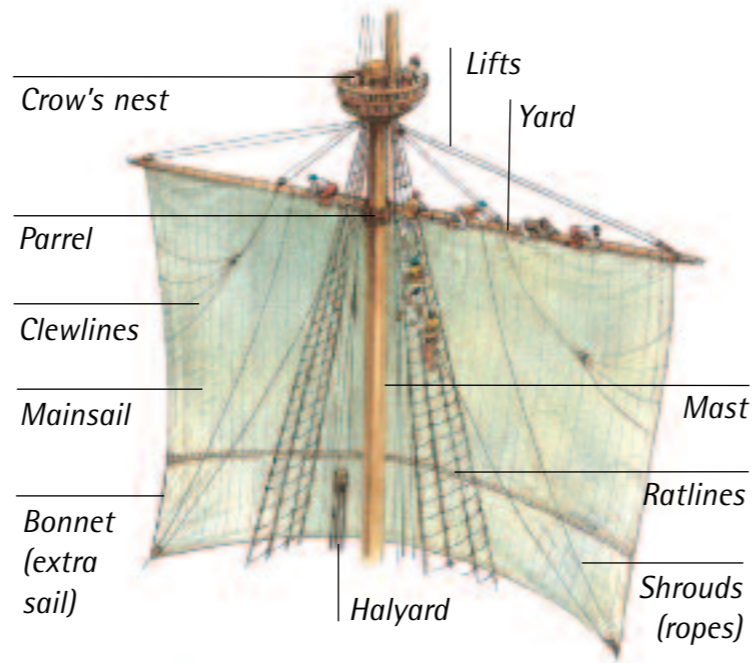
Near to shore you need to know the depth of water so that you don't run aground. A lead weight on a marked line dropped overboard can tell you this. Sticky tallow on the base of the lead weight will pick up mud from the sea bed. The type of mud can also indicate to a skilled navigator how close the ship is to shore.

Sailing your ship

You will need to sail your ship in all weathers and sea conditions, using only the power of the wind. Your crew, particularly the master, boatswain and helmsman, must be skilled in adjusting the sails to get the maximum advantage from the wind, and steering a safe passage through dangerous waters. Your ship has three masts: two have square sails and the third has a triangular, or lateen, sail.

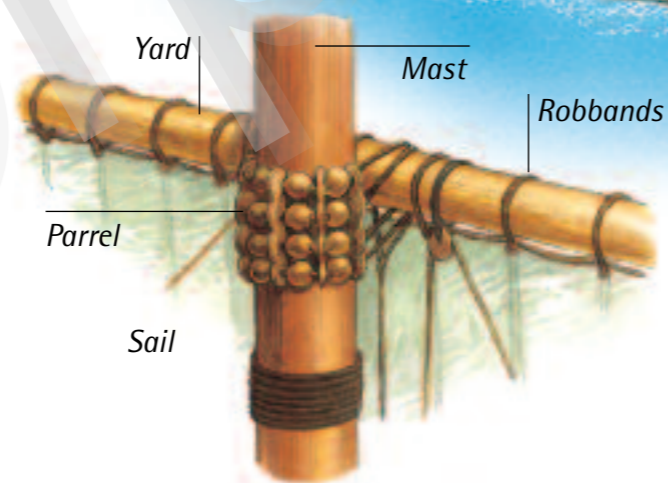


To travel in the same direction as the wind the sails are braced at right angles to the wind.

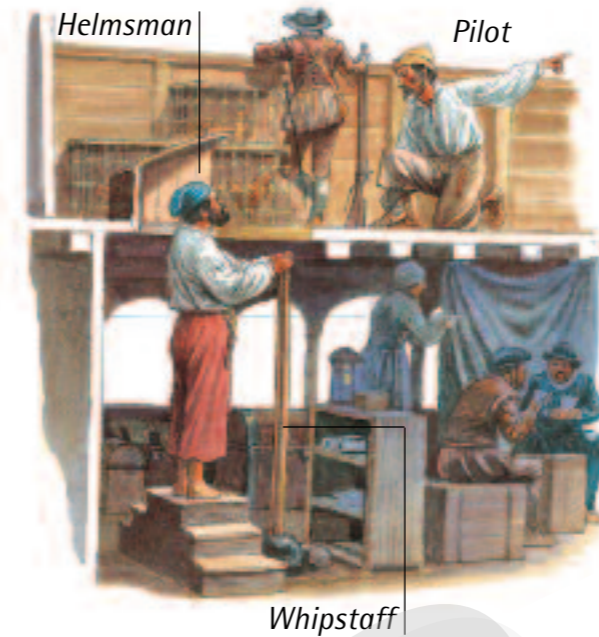


The sails, together with the ropes used to control them, are called the rigging. A sail is attached to the mast on a horizontal yard, held in place by lifts. It is hoisted into position by the halyards. Clewlines bunch the sail up against the yard when it is furled. Men climb up and down the rigging on rope ladders, called ratlines.

To change direction, adjust the angle of the square sails and unfurl the lateen sail to catch the wind, so the ship swings round.

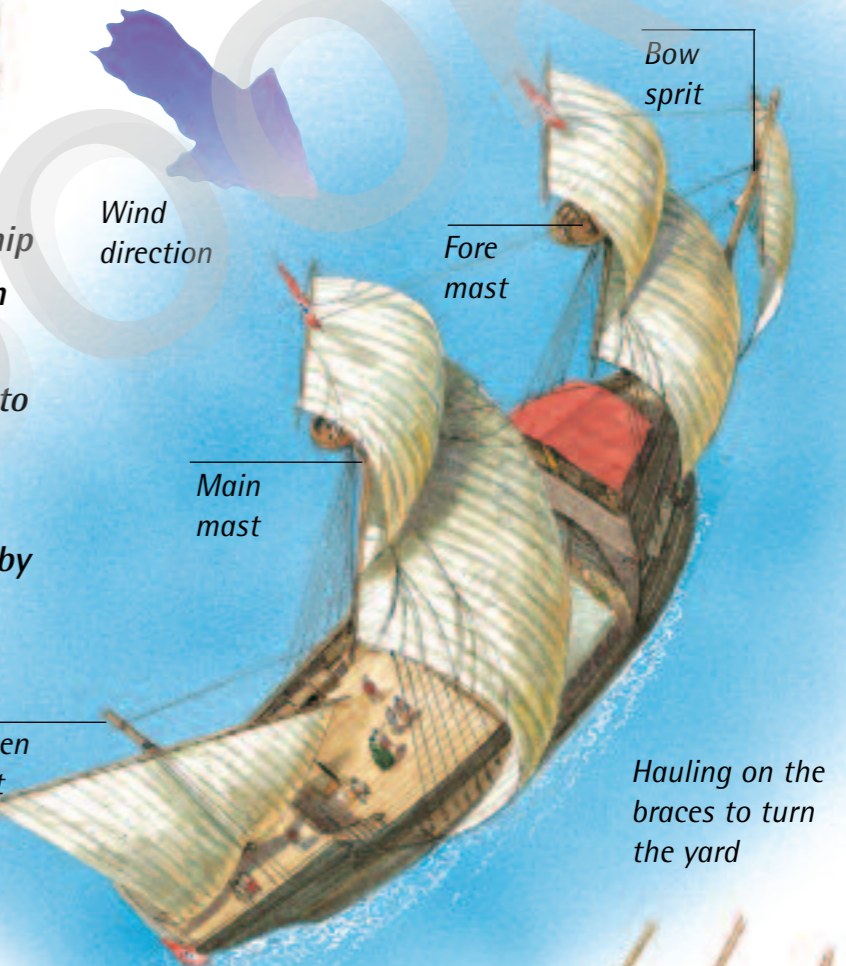
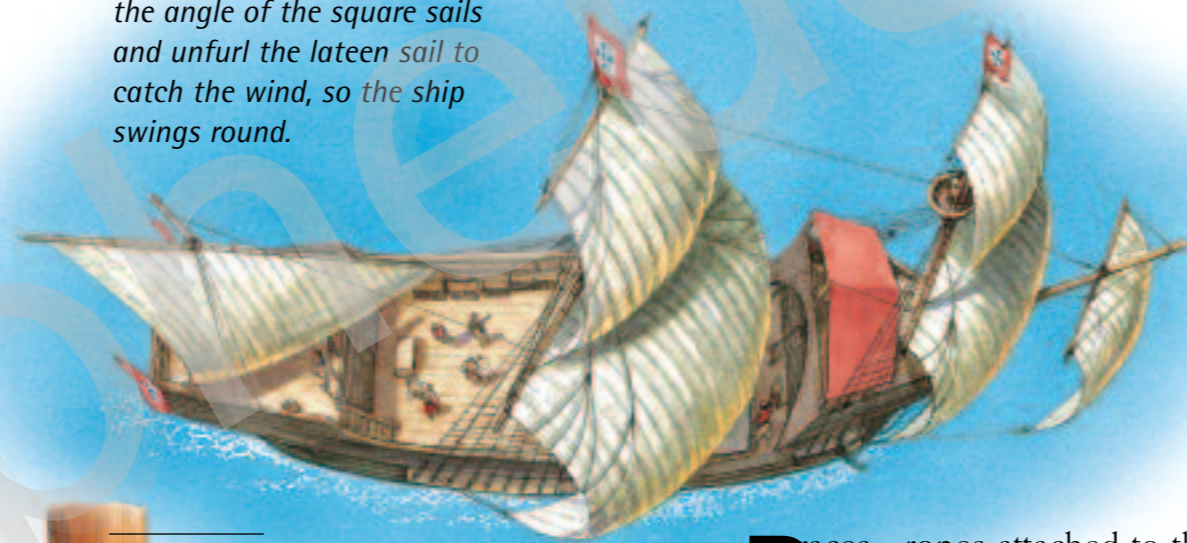


To change direction in a constant wind or to keep to your course if the wind changes direction, the position of the sails must be adjusted. The yards that support the sails are mounted on the masts using a swivel device, called a parrel. This allows the yards, and therefore the sails, to be moved round to the position required.



Wind provides the power to move your ship forwards. Steering requires a combination of adjustments to the sail and use of the rudder. Speed can also be controlled—up to a point—by use of sail. To slow down, for instance, reduce the sail area either by turning the yards parallel to the wind or by shortening (furling) sail.

Your ship is steered by the helmsman using a long handle, called a whipstaff. This is attached to the rudder at the back of the ship through a series of linked wooden rods. The helmsman stands on a platform below deck with a view of the sails through a hole in the ceiling. He receives instructions from the pilot.



With the sails at an even sharper angle to the wind, the ship is able to make a tight turn.

Braces—ropes attached to the end of the yards—are used to swing the yards around. To make full use of the wind, brace the yards at right angles to the wind direction so that the sails are filled. If you don't need the power of the wind because you want to slow down or maintain position, brace the sails parallel to the wind direction.

