Cruising

Wow. These ships are huge. The ship pictured above is the Carnival ship, Triumph. There have been several newsworthy cruise ship events this year. On February 10th, a Sunday morning, there was a fire in this Triumph's engine room and her propulsion system was damaged. The ship had a backup generator for electricity but no way to power the propulsion system or most of the electrical needs for such a huge operation. All 4,228 people on board (3,142 passengers and 1,086 crew members) were stranded on the ship in the middle of the Gulf of Mexico.

The ship was tugged to Alabama and finally docked on Thursday night, Feb 14th near midnight. The cruise was supposed to be a 4-day cruise but on the third day, the fire broke out. After the ship lost propulsion it took 5 days for the ship to be tugged to a port.

1. How long were those people on a ship that was prepared for a 4-day cruise?

I started wondering how much such a huge ship needs onboard to care for so many people. Here's what I've found. I wondered about water, food, and waste containment.

Water

The ship needs water for drinking, cleaning, laundry, showers, cooking, and ballast. It's estimated that each person on board requires 80 to 100 gallons of water a day.

2. How much water did this ship need to supply for all of those people for all of those days?

Luckily the ship doesn't have to carry that much water. The water on cruise ships comes from two places ... the ship's water tanks and the ocean. That means that the ship has to be ready for 4,288 daily showers, meals three times a day, dishes, pools and fountains, bottles for drinking and many other things.

I found data on the water needs for a 3,400-person cruise per day. 3,400 people on a ship will need about 200,000 gallons of water daily.

3. Use the numbers that I found to calculate how much water the people on the Triumph would need for their entire, unexpectedly-long cruise.

That is a lot of water. Before each trip, ships are stocked according to how many passengers and how long the journey. Water items loaded from ports include bottled and reserves which should equal about half the expected water needs. Reserve water is delivered to the ship for it's holding tanks but actually only accounts for 10% of all water used on board.

While sailing, ocean water is collected and run through the ship's filtration systems. After cleaning, it is sent into the tanks, where it can be used for staff and passenger needs, including cooking, cleaning, laundry, and drinking. The filtration system is massive and very advanced.

Water for showers, laundry, and washing is heated by first using that water as the coolant for the ships engines. Ships work diligently to economically meet all of their power needs.

Food

Cruise ships are known for their abundance of food. The US Department of Agriculture estimates that the average person in the United States eats ½ pound of meat, 1.6 pounds of dairy products, .2 pounds of fats and oils, .8 pounds of fruits, .7 pounds of vegetables, .5 pounds of grains, and .4 pounds of sugars per day for a total of 4.7 pounds of food per day.

4. Calculate how many pounds of food were necessary for all of those days and all of those people while the Triumph was at sea ... at a minimum.

Garbage and waste

At sea, each cruise ship needs to either store and carry back to port, or safely dispose of several kinds of waste. Cruise ships generate the following;

- "Gray water" from sinks, showers, laundries and galleys
- Sewage or "black water" from toilets
- Oily bilge water
- Hazardous wastes (including perchloroethylene from dry-cleaning, photo-processing wastes, paint waste, solvents, print shop wastes, fluorescent light bulbs, and batteries)
- Solid wastes (plastic, paper, wood, cardboard, food waste, cans, and glass)
- And air pollution from the ship's diesel engines

I found the following data about the quantities of waste created **per day** by a 3,000-passenger cruise ship. Use the following data to help me figure out how much of these types of waste was created by the Carnival ship, Triumph.

5.

For a 3,000 passenger ship (per day)	**For a 4,000 person ship**	**For a 7 day voyage**
255,000 gallons of non-sewage gray water		

Cruise ships are also permitted to release untreated gray water (non-sewage wastewater) from galleys, dishwashers, baths, sinks, showers, and laundries - anywhere they sail, except Alaska.

6.

For a 3,000 passenger ship (per day)	**For a 4,000 person ship**	**For a 7 day voyage**
30,000 gallons of sewage		

Cruise ships can lawfully release untreated sewage, or black water, anywhere beyond three miles from the shore (except in certain areas of Alaska). Ships are also required to have onboard waste treatment systems.

7. If you could, would you like to go for a swim near the cruise boat while you were more than three miles from shore?

Toxic chemicals generated by cruise ships are generally from photo developing, dry cleaning, painting and other activities. Ships are required to store these wastes onboard while under way, and then, once in port, to transfer them to a disposal facility.

8.

For a 3,000 passenger ship (per day)	**For a 4,000 person ship**	**For a 7 day voyage**
15 gallons of hazardous or toxic waste		

9.

For a 3,000 passenger ship (per day)	**For a 4,000 person ship**	**For a 7 day voyage**
7 tons of garbage and solid waste		

Cruise ships are barred from dumping plastics anywhere at sea and floatable garbage within 25 miles of shore. They are permitted, however, to dump garbage that has been ground into pieces smaller than one inch when they are three miles from shore, and they can dump unground garbage when they are at least 12 miles from shore.

10. List 2 or three concerns that these calculations have impressed upon you.

11. What concerns might arise if a ship's cruise time was extended by an emergency?

Now it is time to plan and budget for your own cruise ship. Give your ship a name and a destination. Include the total number of people on the ship and the length of the voyage.

Ship name_____ Destination_____

Total people on board_____ Length of voyage_____

Fill in the table below:

Items to be Budgeted for:	Quantity to be Budgeted for (don't forget proper units)
Water	
Food	
Non-sewage grey waste	
Sewage	
Hazardous or toxic waste	
Garbage and solid waste	

Sources: http://www.cbsnews.com/8301-201_162-57569542/passengers-finally-leaving-disabled-cruise-ship/
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