**1. How many ping pong balls would it take to fill an average-sized school bus? Describe each step in your thought process.**

First I would need to find out how big an average-sized school bus is. Searching on Google, I found that a regulation bus is about 480” in length, between 113”  to 132” in height, and 102” wide. For simplicity sake, let’s say the average school bus has the dimensions 480” length x 120” height x 8’ 6” wide. The easiest way to estimate this is try and make the school bus into a long rectangle. In the front of the bus is the engine and hood, which is a strange shape. Let’s assume that we won’t be putting any ping pong balls under the hood, so we can just chop it off and then we won’t need to include that in our calculations. By looking a picture of a school bus (<http://www.tirebalancingbeads.com/product_images/uploaded_images/school-bus2.jpg>), it looks like the width of front part of the bus (where the hood and engine are located) is about the width of the tire plus a little bit (to include the front bumper). Well how big are bus tires? According to Google, they’re about 42” tall. Let’s also assume that school busses use four tires of the same size because that is pretty standard on most regular cars. By looking at the same picture of a school bus, it looks like the front bumper of the bus (the extra part) is about half the tire size. So we can subtract 42” + 21” = 63” from the total length of the bus, which gives us a bus length of 480”’ - 63” = 417”.  
  
Now the school bus isn’t really 120” tall because the tires make it taller than it really is. By looking at the picture, it looks like the tires lift the bus up about half of the tire’s height. So we can subtract half of the tires height from the bus’ height, which gives us 120” - 21” = 99”. The school bus is mostly uniformly wide, so we can still use our initial estimate of 102” wide. So now we have a bus volume of 417” \* 99” \* 102” = 4210866 cubic inches.  
  
Inside of the bus, there are seats that take up space that we need to account for. According to Google, it says that there are about 25 seats (including the driver seat) inside an averaged sized school bus. I also found a link that says a typical school bus seat is 39” in length. I was unable to find the height of the back of the seat. Let’s assume school busses are mostly used for middle schoolers. The average height of a middle schooler is 5’ 5”, so the height of the back seat needs to be atleast half of that, so we can round up and use a number like 3’. The width of those seats don’t look that big in pictures, and I want to estimate less than half a foot, so let’s go with 4”. Therefore the back of a school bus seat is 39” x  4” x 36” = 5616 cubic inches. The bottom part of the seat (the part you actually sit on) has the same length, but the width is going to be a little bigger because you want more cushion to sit on, so let’s estimate 5”. The height will not be as big, and I estimate about 24”.  So the bottom part of the seat is 39” x 5” x 24” = 5616 cubic inches. The total volume of the seats in the bus is 25 \* (5616” + 4680”) = 257400 cubic inches. So let’s subtract the volume of the seats from the volume of the bus which gives us 4210866” - 257400” = 3953466 cubic inches.  
  
How big is a ping pong ball? Well according to Google it is 2.045 cubic inches. If we divide the volume of the bus by the volume of a ping pong ball, we get 3953466 / 2.045 = 1933235 ping pong balls can fit in an average school bus. However, that number is an overestimate because it’d be impossible to use up all the space in the bus. When ping pong balls stack, there are gaps in between them, and that results in wasted space. So we can try to calculate a more accurate estimation by taking into account the space inbetween the ping pong balls. We can do that by assuming each ping pong ball takes up as much space as if it were shaped like a cube. The diameter of a ping pong ball is about 1.57 inches, so if it were shaped like a cube its volume would be 1.57^3 = 3.87 cubic inches. Therefore, we could fit about 3953466 / 3.87 = 1021567 ping pong balls in an average sized school bus.  
  
**2. Why would you use a liquid layout?**  
When designing a website for a large audience, you need to consider all the different permutations of your website’s user experience. Each visitor could have a different screen resolution, browser, and operating system. Depending on those variables, one user may be having a different experience compared to another user.   
  
One solution to this problem is to use a fixed width website layout. This helps ensure, although does not guarantee, that every user will be seeing the same website. Since the width is fixed in every browser, all the elements in your website will stay the same no matter how big the browser window is. However, if the user has a larger screen resolution, there will be an excessive amount of white space surrounding your layout, which may not be desirable. Additionally, if the user has a smaller screen resolution, the browser may force the user to use a horizontal scroll bar to view your website.  
  
A liquid layout attempts to dynamically enhance the user experience by adjusting to the user’s screen and browser settings. Liquid layouts also address some of the issues that fixed width layouts have such as excessive white space, and forcing the use of horizontal scrollbars. Since your layout automatically adjusts to the browser size, your website is future proof in case a higher or lower resolution becomes more popular later. However, creating a liquid layout is generally more difficult than a fixed layout because you have to figure out how to extend your website both horizontally and vertically. But if you have the means to do so, and if it will increase the usability of your site, you should opt to use a liquid layout because you are able to fully take advantage of the fact that web browsers are dynamic and not static. Users should be able to experience the website you are trying to present to them, and they should not be limited by their screen resolution or browser. Liquid layouts allow developers to create full width layouts without having to worry about the user’s screen and browser resolutions. This ultimately enhances the user experience and requires less maintenance in the future than a fixed width layout.