

ACE YOUR CASE[®] III: MARKET-SIZING QUESTIONS

2nd EDITION



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INSIDER GUIDE

*Ace Your Case[®] III:
Market-Sizing Questions*

2ND EDITION

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AT A GLANCE

Why Case Interviews?

- To see your analytical and communication skills
- To see how resourceful and creative you can be
- To test how you perform under pressure

Market-Sizing Cases

- Test your ability to use numbers
- Often lead off longer cases
- Show how well you can keep your cool
- Can be solved using a few simple rules

Case-by-Case Rules for Market-Sizing Questions

- Use round numbers
- Show your work
- Use paper and a calculator

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OVERVIEW

► **THE BEST WAY** to prepare for a case interview is to practice. And by reading this book right now, you're well on your way to mastering the case-interview process.

This guide is all about market-sizing cases, and is part of the *Ace Your Case*® series. *Ace Your Case*® and *Ace Your Case*® II cover case interviews in general, offering an overview of the process, a guide to common frameworks for analysis, and information on how to solve just about any case that comes your way. *Ace Your Case*® IV focuses on business-strategy cases, while *Ace Your Case*® V covers operations problems. If you want to learn more about market sizing, this is the guide for you.

Market-sizing questions test your logic and your comfort with numbers. In a short interview for a quantitative-consulting position, the market-size question might be the only one you're asked. More likely, though, it'll be the start of a longer case problem—first you determine the market size, then you develop a strategy, and finally you address some operational issues. It may be a small part of the total interview, but you can't afford to get flustered at the thought of doing a calculation. Doing so may be enough to end your chances of being invited back.

► TIP

Try to make the interview more of a dialogue between equals than a one-sided Q&A. If you enjoy the conversation, your interviewer will too—and that will go a long way toward your landing the job.

A word about how to use this guide: Try to solve the questions first, without looking at the answers. Consider having a friend ask the question, then evaluate your answer against our recommended answers. If our “good answer” differs from yours, see whether there's something you can learn from our suggestions. But don't panic—there are usually

several ways to answer any case question. It's far more important to note the approach, as well as the interviewer's likely responses, which obviously won't be included in your answers. As you sharpen those skills, keep thinking to yourself, “I love these case questions!” Soon you'll find yourself talking like a consultant.

THE WETFEET WAY OF CRACKING A CASE QUESTION

What is the interviewer asking?

Everything there?

Think before you speak

Frameworks!

Explain your thinking

Evaluate your case so far

Take action

► **SO HOW EXACTLY** does one ace the case? Although each case question is different, we've devised an approach that, if used correctly, will take you a long way toward giving the consulting interviewer what he or she wants. Ours is a mnemonic device for acing your case. Simply think of the word “WetFeet.” Clever, huh? You probably won't use every step when calculating an estimate, but knowing these steps will help you determine what you need to do.

WHAT IS THE INTERVIEWER ASKING?

Listen carefully and take notes if necessary. Make sure you know what the interviewer is seeking. It's particularly important to keep this objective in mind as you work your way through the dense detail that may be coming your way. Stick to the question, too. If the interviewer asks for two recommendations, you won't impress her if you give six—instead, she'll see

you as someone who can't follow directions and who is likely to get too bogged down in minutia to deliver an organized report to a client.

EVERYTHING THERE?

Determine whether you've been given the whole picture. If the question is unclear, it's probably supposed to be. Ask your interviewer for clarification. In particular, if there seems to be a gaping hole, ask about it. The interviewer may be testing whether you realize there are missing pieces of the puzzle. If you hear a hint, a suggestion, or additional information, use it. Interviewers know what they are looking for and usually will try to steer you in the right direction.

THINK BEFORE YOU SPEAK

Any pause will feel like an eternity to you, so your impulse may be to blurt out the first thing that comes to mind. Don't. Take a moment to think through your ideas and decide how to present them. That moment won't seem long to your interviewer, and it will give you the time to make a stronger impression.

> TIP

The interviewer may hold back a key piece of information to see if you're savvy enough to ask for it. Don't be shy—say what you need.

FRAMEWORKS!

Identify a framework, or a combination of frameworks, to help you structure your answer. Be sure to tell your interviewer how you plan to proceed. Choosing a framework isn't the goal of the exercise, but it helps you structure an answer to the question. Your choice of framework won't impress the interviewer, but your ability to come up with a clear, logical answer will.

EXPLAIN YOUR THINKING METHODICALLY

Start with the most important issue first, and tell the interviewer why you think that point is so significant.

This method ensures that you deliver your most important insights first before time runs out.

EVALUATE YOUR CASE

As you go, think about your answer. Is it something that a business might logically do? Are their practical, but unconventional, approaches? Is there another way to approach the problem? Don't just ask yourself—ask your interviewer if you're on the right track.

TAKE ACTION

Wrap up your case by briefly summarizing how you have approached the problem and noting where you would go if you had more time. The goal of consulting is almost never just analysis. Usually, a consultant is looking for good, solid, data-driven recommendations the client can use.

DIFFERENT STROKES

Different consulting firms prefer different types of case questions—and different types of answers. And that makes perfect sense, as some firms concentrate on strategy, some on operations, and some on finance. Large firms with organized campus-interview programs probably have a list of predetermined cases and interviewers trained on how to use them before they show up at the career office. A smaller firm or one interviewing an experienced candidate may choose questions on an ad hoc basis.

As much as a firm may try to set a tone for everyone to follow, the individual recruiters have their own personalities, styles, and pet peeves. You can study up on what you think a Bain interview will be like, then discover your interviewer prefers to do things his way. Most interviewers will be great, but if you have one who is a jerk or who just happens to be having an off day, keep your cool, do your best, and remember as you leave the confines of the interviewing cubicle that your social life is going to be a lot more exciting over the next few months than his. By the way, there is such a thing as the stress interview, where the interviewer is

intentionally rude and plays mind games with you just to see how you react. Maintain steely resolve so that you can pass the interview and then have the pleasure of rejecting the firm. After all, do you really want to work at a place that treats people that way?

Keep in mind that interviewers usually approach undergrads differently than they do MBAs or other advanced-degree candidates. As you might expect, undergraduate case questions are usually less complex, less focused on specific business issues, and more focused on the skills that will be required of research analysts (or whatever the firm calls its undergraduate hires). In particular, the interviewer will often push the candidate to demonstrate resourcefulness, creativity in thinking about a problem, and ability to stick with a problem and get to the bottom of it. So if you're an undergrad, don't pass out when you read through the frameworks section of this report; your interviewer won't expect you to have mastered MBA-level concepts.

By contrast, most MBA students have had cases in their classes, so they should understand the frameworks and how to apply them. That's what business school is all about. If you're an MBA, start studying and be prepared for anything!

If your advanced degree is in another field or if you are interviewing years after school, you'll be expected to draw on your unique expertise, and the questions you get will be appropriate to your situation. If you are interviewing for a firm's forensic-accounting practice, you probably won't get a lot of strategy questions, but you may get questions designed to show how well you identify logical flaws in market-share data that relate to your ability to find financial fraud.

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OVERVIEW

› **CONSULTANTS LOVE TO** ask market-sizing questions. Not only are they easy to create, discuss, and evaluate, they also are highly representative of an important type of consulting work.

In their simplest form, market-sizing cases require the candidate to determine the size of a particular market (hence the name). In the real world, this information can be especially helpful when gauging the attractiveness of a new market. A market-sizing question might be pitched in a straightforward manner—“How large is the U.S. market for surfboards?” for example. Or it may be disguised as a complex query that requires the respondent to peel away the extraneous detail to identify the market-sizing issue at the core—“Should Fidelity should come out with a mutual fund targeted at high-net-worth individuals?” In a more highly developed variation, the interviewer might ask a strategy or operations case question that requires the respondent to do some market-sizing to come up with an appropriate recommendation.

Brainteasers are related to market sizing in that they usually involve some numbers, and you can make a lot of progress without knowing the trick if you think about the questions logically. It helps most if you had a middle-school math teacher who liked to use them—you might recognize the question and dazzle the interviewer with a logical approach to the solution that you memorized oh-so-many years ago. (Some interviewers like to give brainteasers to see how candidates handle stress; others realized that these questions don't offer much insight into a candidate's ability to solve business problems. Don't spend a lot of time preparing for them, but do stay calm if you are faced with one.)

THE SCORECARD

Market-sizing questions let the interviewer test your facility with numbers, analytical skills, and common sense. If you're asked to size the surfboard market, for instance, you'll need to make basic assumptions: How

many people surf? How many boards does a typical surfer own? How often will she get a new one? Are there other big purchasers besides individual surfers? Is there a market for used boards?

You'll also need to make a few basic calculations (*number of surfers* × *number of new boards per year* + *total quantity purchased by other types of customers*, and so on). As you work through these issues, the interviewer will get a glimpse of your common sense. (Did you assume that everyone in the U.S. is a potential surfer, or did you try to estimate the population in prime surfing areas like California and Hawaii?)

WHEN YOU'LL GET THESE

Market-sizing questions can pop up in all interviews. They are almost certain to make an appearance in undergraduate and advanced-degree interviews. Indeed, both undergraduates and PhDs report receiving exactly the same market-sizing questions in their respective interviews. MBAs also are likely to receive market-sizing questions; however, a common and more complex variation typical of an MBA interview involves assessing the opportunity for a new product. You might be asked whether your pharmaceutical company client should develop and market a drug for male-pattern baldness, for example. Part of the analysis would require you to estimate the market potential—the market size—for the drug.



MASTERING YOUR MARKET-SIZING QUESTIONS

Market-sizing questions can intimidate. But once you understand the rules (and practice your technique), you can come to view these cases as slow pitches right over the center of the plate. So, just how many golf balls are used annually in the U.S.? You don't know—and neither does your interviewer. In fact, your interviewer doesn't even care what the real number is. He does care, though, about your ability to use logic, common sense, and creativity to get to a plausible answer. And he wants to make sure you don't turn tail when you've got a few numbers to run, which brings us to the three rules for market-sizing questions.

Rule 1: Use Round Numbers

Even if you aren't a multivariate calculus stud, you can impress your interviewer with your number-crunching abilities if you stick to round numbers. They're much easier to add, subtract, multiply, and divide, and since we've already decided that the exact answer doesn't matter anyway, go ahead and pick something that you can toss around with ease. The population of New York? Ten million, give or take. The length of a standard piece of paper? Round 11 inches up to a foot.

Rule 2: Show Your Work

Case questions are the ultimate “show your work” scenarios. In fact, your exact answer matters less than the path you took to get there. Remember, the market-sizing question is merely a platform through which your interviewer can test your analysis, creativity, and comfort with numbers. Finally, almost all these questions are simple arithmetic. You probably won't even have to show off your ninth-grade algebra.

Rule 3: Use Paper and Calculator

If you feel more comfortable writing everything down and using a calculator, do! Most interviewers won't care if you use a pencil and paper to keep your thoughts organized and logical. And if pulling out a calculator to

multiply a few numbers keeps you from freaking out, then do it. Your interviewer will be more impressed if you are calm, cool, and collected.

Market-Sizing Cases and Frameworks

Market-size cases don't require frameworks the way that other types of business cases do, but there are helpful ways to break down the problems. For the most part, work from big to small: What is the largest market—the population of the U.S., for instance? What are subgroups that might need the product? How does this all flow? When you read through the cases, you'll get a sense for how to apply the process to other types of market-size calculations.

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MARKET-SIZING QUESTIONS

› **THE BEST WAY** to practice for market-sizing questions is to read and solve examples. Remember to focus on the process, not the answer. You won't get these exact questions, so don't memorize them. And anyway, the interviewer is testing your logic and poise, not your mastery of trivia. Save that for the local pub's quiz night.

Remember the rules for market-sizing questions:

1. Use round numbers.
2. Show your work.
3. Use paper and calculator.

CASE 1

**How many bars of dark chocolate are sold in the U.S. each year?
Is the market growing or shrinking?**

KEY QUESTIONS TO ASK

BASIC NUMBERS

TRACK THE NUMBERS DOWN

CASE 2

Purina is thinking of entering the penguin-food market. Can you help Purina evaluate whether there's a reasonable market for Penguin Chow?

KEY QUESTIONS TO ASK

BASIC NUMBERS

TRACK THE NUMBERS DOWN

How many adult diapers are sold each year in Ohio?

KEY QUESTIONS TO ASK

BASIC NUMBERS

TRACK THE NUMBERS DOWN

How many coffins are sold each week in Los Angeles?

KEY QUESTIONS TO ASK

BASIC NUMBERS

TRACK THE NUMBERS DOWN

How many cups does Starbucks use each week in its U.S. operations?

KEY QUESTIONS TO ASK

BASIC NUMBERS

TRACK THE NUMBERS DOWN

How much bamboo does the world's panda population eat?

KEY QUESTIONS TO ASK

BASIC NUMBERS

TRACK THE NUMBERS DOWN

What is the average number of chairs in a house?

KEY QUESTIONS TO ASK

BASIC NUMBERS

TRACK THE NUMBERS DOWN

How many pairs of jeans are sold in the U.S. each year?

KEY QUESTIONS TO ASK

BASIC NUMBERS

TRACK THE NUMBERS DOWN

How many unique people attend events at the Rose Bowl every year?

KEY QUESTIONS TO ASK

BASIC NUMBERS

TRACK THE NUMBERS DOWN

CASE 10

How many cats are there in the U.S.?

KEY QUESTIONS TO ASK

BASIC NUMBERS

TRACK THE NUMBERS DOWN

How much paint is used to paint the United Airlines fleet?

KEY QUESTIONS TO ASK

BASIC NUMBERS

TRACK THE NUMBERS DOWN

CASE 12

How big—in dollars—is the market for used shoes in the U.S.?

KEY QUESTIONS TO ASK

BASIC NUMBERS

TRACK THE NUMBERS DOWN

What is the total number of automobile tires sold in the U.S. each year?

KEY QUESTIONS TO ASK

BASIC NUMBERS

TRACK THE NUMBERS DOWN

How many sheets of paper would it take to completely encircle the earth at the equator?

KEY QUESTIONS TO ASK

BASIC NUMBERS

TRACK THE NUMBERS DOWN

How many pay phones are there in Manhattan?

KEY QUESTIONS TO ASK

BASIC NUMBERS

TRACK THE NUMBERS DOWN

CHAPTER 1
AT A GLANCE

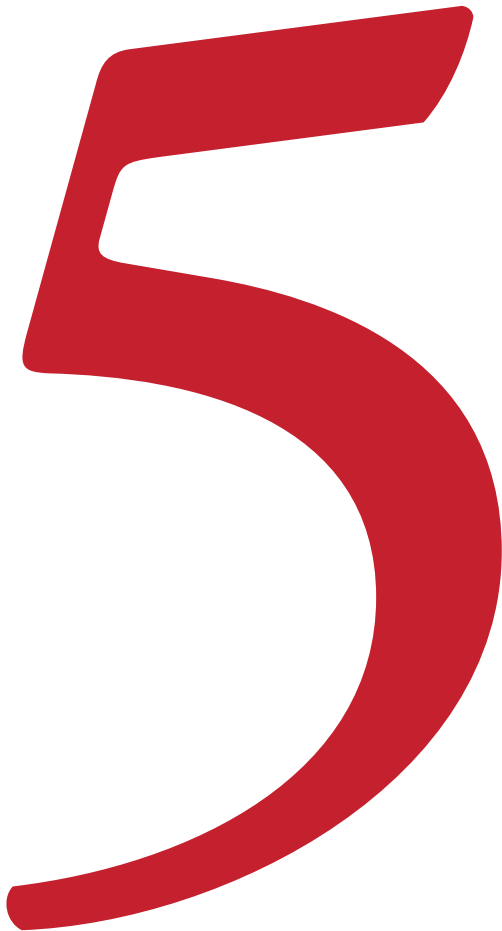
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COMPARING YOUR ANSWERS

NOW WE’LL WALK YOU through sample answers to each of the questions posed in “The Practice Range.” Although we believe our recommended answers are good, we know there are many others that are equally satisfactory, if not better. Remember, the destination is often less important to your interviewer than the road you take to get there. With that in mind, smooth sailing!

A quick note on the layout: Each question is followed by one or more bad answers (*really* bad in some cases) and a good response. The dialogue between the hypothetical recruiter and candidate appear in normal type; the WetFeet analysis and commentary appear in italics.

CASE 1

How many bars of dark chocolate are sold in the U.S. each year? Is the market growing or shrinking?

» *This is a straightforward market-sizing question, which would be good for undergraduates and advanced-degree candidates. It requires no special technical knowledge, and it focuses on a subject that is accessible by everyone: chocolate.*

Bad Answers

Candidate: Dark chocolate? I can’t stand the stuff. Based on my own experience, the total number is going to be close to zero.

» *Close to zero is the score you deserve for this answer. It lacks analysis, is flippant, and is self-centered.*

Candidate: Dark chocolate? I love the stuff. Based on my experience, the number is tens of millions.

» *Again the score you deserve for this answer is close to zero. It also lacks analysis, is flippant and self-centered, and it makes no effort to estimate the market at all. Why should they hire you if this is the best you can come up with?*

Good Answer

Candidate: Interesting question, and while I personally love dark chocolate, I have no idea how many others do. Last time I went to the grocery store, there was a decent selection, so it seems there are a lot of us. What we need to get our arms around is how many there are.

» *So far, so good. Grounding things based on personal observations at retailers is a reasonable starting point.*

Candidate: First, let me clarify the question a little. By “bars of dark chocolate” do you mean just the high-end stuff—the individual large chocolate bars they sell at Godiva’s—or are you including the stuff that people give out at Halloween like those little Hershey bars? And how about the truffles in chocolate assortments? Should I assume that we’re only talking about the 70 percent cocoa bars?

» *It’s generally a good idea to draw some boundaries around what you’re looking at. It buys you time to structure your thoughts and lets you verify that you’re answering the right question.*

Interviewer: Well, let’s keep it simple and assume that we’re talking about only those oversize bars that are labeled as dark chocolate and further assume that it’s a high-end product that probably isn’t packaged for Halloween treats. Truffles are a different kind of product, so let’s also disregard those. But don’t exclude the bars sold at grocery stores; they might be a big piece of the overall market.

Candidate: OK, that narrows it down a bit. It appears to me that there are a couple of basic questions that will let us to get a reasonable estimate. First, I suppose we need to know how many people in the U.S. buy the high-end chocolate bars. Then we need to know how often this group buys chocolate bars. Finally, we need to know the proportion of dark chocolate to milk chocolate among all the high-end bars people buy.

» *The candidate has structured her thought process so the interviewer can see where she's going. If there are problems with the approach, the interviewer may jump in with a question that could set her on a better path.*

TIP

Always lay out your thought structure before diving in so the interviewer has a chance to correct you if you're headed in the wrong direction.

Interviewer: That seems like a reasonable way to get our arms around this.

Candidate: OK, let's get an estimate of the number of consumers. There are about 300 million people in the U.S.—how many of them buy the high-end chocolate? There are a lot of Godivas, See's, and Fanny Mays in most of the big malls and airports. Then you've got all the grocery stores. Based on the number of outlets, I'd assume a pretty good proportion of the U.S. buys good chocolate. To break it down a little more, let's assume that a negligible amount of high-end chocolate is sold in rural areas. I recently read that more than half of the U.S. lives in cities or suburbs now. So that puts the total number of consumers at roughly half of the U.S. population, or 150 million people. Of course, this assumes that people in rural areas don't go to the cities and buy their chocolate or mail order it or something, but let's neglect them for now.

» *The candidate has taken a stab at it, and brought up a couple of confounding factors that she could look into if necessary.*

Candidate: Now, what proportion of the city dwellers buy high-end chocolate? I have no idea, so I'll just make a reasonable guess that 10 percent of people who have access to high-end chocolate buy it. That

gives us a total market of 15 million people who buy high-end chocolate.

Interviewer: That's a nice round number. Do you have any basis for it?

» *The interviewer asks the candidate to defend her rough estimate.*

Candidate: Not really. Just a couple of personal observations, like the fact that only the bigger grocery stores have a section of fancy chocolate bars and chocolate shops are at the nicer malls for the most part. This is a critical factor in the calculation, so I'd want to verify it by checking out an industry group trade site. I doubt if they'd put their individual product sales out there, but they probably have some information on their market.

» *The candidate offers a reasonable justification, and quickly adds how she could verify its accuracy.*

Candidate: Now the question is how often do these people buy chocolate bars? Again, I've got nothing to go by but my own personal experience. I usually buy a bar each time I go grocery shopping, or about one per week. But I'm sure there are plenty of people who buy more than that, and lots of people who only buy a chocolate bar occasionally. How to get a handle on relative proportions? That's a tough one, but to come up with an answer that's better than just extrapolating my own experience, let's segment the market into high-volume buyers (three bars per week), medium-volume buyers (one bar per week), and occasional buyers (one bar per month).

» *The candidate acknowledges that consumption of chocolate bars has some variation*

Candidate: If we assume that the buyers are evenly split among these segments, then we've got 5 million

high-volume buyers buying 3 bars per week, or 15 million bars times roughly 50 weeks per year, or 750 million bars; 5 million medium-volume buyers buying 1 bar per week, or 250 million bars; and 5 million people buying 12 bars per year, or 60 million bars. So we've got a total market for high-end chocolate bars of 1.06 billion chocolate bars. Since we're using round numbers, let's go with 1 billion bars per year.

Interviewer: That's a lot of chocolate bars!

» *This is an opportunity to revise your assumptions (Similar to "Is that your final answer?" on some game shows.) In this case, you have gone through the numbers and it all seems reasonable, so stick with it.*

Candidate: Yes, it does seem like a lot, and of course I'd want to check my math again. But a billion chocolate bars for 300 million people sounds like it's in the right ballpark. Now the final piece of the puzzle is what proportion of that chocolate is dark chocolate. I've read some health claims about dark chocolate being good for your heart—I suspect some folks buy it for that reason. I've seen a lot more dark chocolate on the shelves lately, and a lot of it has this health claim mentioned (very carefully, I might add), so the answer to the second part of the question is that I believe the market is growing. But how to get a handle on what proportion of the high-end chocolate sold is dark? I would think that shelf space would be a straightforward indicator, and to throw a simple number out there to make the math easy, I'd say it's about one-quarter dark chocolate versus other varieties.

» *Again, the candidate throws out a reasonable justification for what is really just a wild guess, but keeps the numbers simple and the math easy.*

Candidate: So one-quarter of 1 billion total bars of chocolate sold is a total of 250 million high-end dark chocolate bars sold in the U.S. each year.

Interviewer: I've got no idea how many dark chocolate bars are sold in the U.S., but I followed your reasoning, and I think that the number you arrived at is reasonable for throwing out in discussions with your client. Good job!

CASE 2

Purina is thinking of entering the penguin-food arena. Can you help Purina evaluate whether there's a reasonable market for Penguin Chow?

» *This question is out there. The interviewer is probably trying to assess how you handle off-the-wall queries, and whether you can field something that's far outside what you learned in school (unless you majored in zoology).*

Bad Answers

Candidate: Penguins only eat fish, or at least that's what all the nature documentaries show, so there must be no market at all for Penguin Chow. I'd say the answer is zero. Purina should concentrate on something else.

» *The candidate has taken a stab and has shown some limited knowledge of the subject matter. However, he hasn't really given the matter any thought, and he's provided no basis for judging how he handles the unusual. He needs to at least take a shot at it.*

Candidate: Penguins—what, are there about 20 of them in a couple of zoos? Maybe 200 penguins in the U.S. tops? That's not enough of a market to make it worth Purina's time and effort.

» *This is a better attempt, and the candidate at least tried to provide some rough numerical justification for his answer. However, his analysis is superficial, his estimate is straight conjecture, and he's dodged the question. If the interviewer asked it, the candidate must take the question seriously and make a game attempt to answer it.*

Good Answer

Candidate: Well, that's certainly not something I've given a lot of thought to. I don't think we covered the penguin market much in school—maybe I missed those classes. Based on my limited knowledge of penguins, I understand they mostly eat fish, so I would think the market for Penguin Chow would be limited.

» *The candidate acknowledges that it's an off-the-wall question, but he can't stop here.*

Candidate: I know that a big part of consulting is getting your arms around markets and trying to evaluate their size, and at base, I think this question isn't really all that different from trying to figure out how many preteens eat spicy Cheetos, so I'll go ahead and try to help my client with this new and exciting market area for Purina products.

OK, like any market, we've got to figure out two basic questions: How many consumers are there and how much do they consume? First, I'm assuming that the number of pet penguins in the world is negligible, so we're looking strictly at zoos as the market. Second, I need a bit more information about penguins—could they eat fish and supplement it with Penguin Chow, or is Purina thinking of selling some sort of prepackaged fish to feed to penguins?

» *The candidate first makes a reasonable assumption to try to size the market, then asks for some clarifying information from the interviewer.*

Interviewer: Interesting that you should ask. It turns out that penguins eat more than just fish, but they don't eat much vegetation. They mainly eat fish, squid, and krill. How does that change your evaluation?

Candidate: It doesn't really change things. The market for penguin food is the same. But it does set up some parameters that Purina is going to have to think about. I think of the company as mostly being a provider

of dry food in great big sacks. It's going to have to provide penguin food as some sort of frozen packaged product or in cans, and it had better think through the implications of a different market.

» *The candidate has taken the opportunity to demonstrate that he understands that distribution is an important part of the picture.*

Interviewer: Well, you may think of Purina as selling mainly big bags of dog food, but it turns out that it actually has a sophisticated pet-food business, and a good part of that is selling food in cans. So while frozen food may give Purina some new distribution challenges, providing food in cans is something that the company knows a great deal about.

TIP

Whether you're asked about Penguin Chow, glow-in-the-dark candy, or musical headbands, don't let an oddball question throw you off. Break it down logically, just as you would any other case question.

» *The candidate initially must decide whether to accept this softball (Purina already knows how to distribute food in cans) or whether to stick with frozen food as a new distribution challenge for Purina. But he decides that neither is directly related to the question he's trying to answer, so he refocuses.*

Candidate: I suppose the company could go either way. I think fish is usually best frozen, and I imagine zoos would want to provide the freshest food possible for their animals so Purina would have to figure out how to distribute frozen products. But we're wandering from the question, which is, How large is the market for Penguin Chow? We've already established that the market is penguins in zoos, so the next question is how many penguins live in zoos? To figure this out, we'll

need to know how many zoos there are in the world and how many penguins are in each zoo.

» *At this point, the candidate has to start throwing some numbers around.*

Candidate: I would guess that there are probably two or three cities big enough to have zoos in each state. Some states aren't going to have more than one zoo—I can't imagine Vermont or Rhode Island has more than a zoo apiece, but California and Texas probably have five or six each. Of course, not all zoos have penguins. So let's say for the sake of argument that there is an average of one zoo in each state that has a penguin exhibit, or 50 penguin exhibits in the U.S. And let's say that each exhibit probably has 10 penguins, so that's 500 penguins in the U.S.

» TIP

Even if you don't have a clue what a number should be, do your best to explain your assumptions. You have to start somewhere, so explain your thinking, clearly and completely.

» *The candidate and the interviewer have no idea how many penguins there are in zoos. But the candidate needs to progress logically toward an answer, and he's thrown out some reasonable assumptions that are probably close enough.*

Interviewer: That sounds reasonable. I would have guessed more, but I won't argue with you, since the numbers you threw out are reasonable. But that's only U.S. penguins. Is Purina's market limited to the U.S.?

Candidate: Thanks, that's right—I am going to use the U.S. zoo penguin population to extrapolate the worldwide zoo-penguin population. I believe Purina is multinational, so it serves markets worldwide. Now

the U.S. population is 300 million, or about 5 percent of the world's total. So we could just scale up U.S. population to world population and multiply by 20, which would be the reciprocal of 5 percent, to get a total of 10,000 zoo penguins. But I think that's an upper limit; I'm going to guess there aren't a lot of zoos in Africa with penguins, and I've got no idea about China and India. So let's just use a penguin to person ratio in the developed world to get started. There are about 900 million people in the U.S., Europe, and Japan, and I'm sure that Europeans and Japanese love penguins in their zoos just as much as we do, so let's say there are roughly 1,500 penguins in the developed world zoos. And for the sake of argument, let's assume that the rest of the world has a roughly equal number. They've got a lot more people, but I don't think the incidence of zoos in much of the rest of the world is as high as it is in the developed world. So that gives us a total of about 3,000 zoo penguins worldwide.

» *The candidate has used reasonable logic to estimate a number that he had absolutely no idea about walking into the interview, and he stated his assumptions as he walked through the process. He took a wild guess saying that there are the same number of penguins in the U.S., Europe, and Japan as everywhere else in the world, but the interviewer is not likely to contradict him and it's reasonable in this context. He also took a short cut assuming that the U.S., Europe, and Japan have three times the population of the U.S. alone. Actually, the U.S. population is about 300 million, EEC population is about 340 million, and Japan's population is about 130 million, so his guess of 900 million is high by 130 million. But using round numbers keeps the math easy, and he's in the ballpark.*

Candidate: So now that we know the number of zoo penguins, we need to know how much Penguin Chow each one would eat. How much does a penguin eat each day? That's tough to say. I would guess the average penguin weighs about the same as the average dog—

maybe 25 pounds. Now a dog eats about a pound or a pound and a half of food each day. But a penguin has to keep itself warm, so I'd guess it eats more than a dog, say 2.5 pounds per day.

» *The candidate uses reasonable numbers based on something we're all familiar with—dogs—and bumps it up to account for different conditions.*

Candidate: So the total market for Penguin Chow is about 2.5 pounds per day times 3,000 penguins, or 7,500 pounds of penguin food per day. And I suppose we should acknowledge that Purina isn't the only seller of food that penguins eat. A lot of zoos are probably going to stick with fresh fish and squid, and there may be competitors in the penguin-food market—I mean they are all eating something right now. Furthermore, they are probably going to feed their penguins a variety of foods. In other words, the 2.5 pounds of food each penguin eats per day isn't all going to be Penguin Chow.

TIP

If you get stuck on formulating a reasonable assumption, relate the problem to something similar and more familiar, to make it more tangible.

» *The candidate takes the analysis a step further by introducing some complicating factors.*

Candidate: So the total market for Purina Penguin Chow is going to be much smaller than 7,500 pounds per day, maybe one-third or less. So I would estimate that the total market for Penguin Chow is about 2,500 pounds per day. Based on this, it doesn't seem to me that the Penguin Chow market is a positive market for Purina products. If Purina does enter the market, there are going to be some significant hurdles—overtaking fresh fish and squid and whatever else these guys are already eating and delivering frozen products through

its normal distribution chain. Purina would need to make it expensive to make a reasonable profit, and there is a natural ceiling to the price it could charge—the price of fresh fish and squid. Overall, it seems to me that the penguin market isn't a great place for Purina to focus its energy.

Interviewer: Based on your analysis, I'd have to agree with you. I guess there's a reason that Purina doesn't currently offer Penguin Chow, and that's not likely to change soon.

» *The candidate has done a good job of assigning some reasonable parameters to estimate something he has absolutely no idea about. This is the kind of skill that consultants are paid for, and he's done a good job of walking the interviewer through the thought process to answer the question. Good job!*

» *Note: according to an article in the Journal of Marine Ornithology there were 2,157 penguins in American zoos in 1999, not the 500 our candidate estimated. But remember, the actual number isn't important, it's the thought process used to derive the number.*

CASE 3

How many adult diapers are sold each year in Ohio?

» *This is a slight twist on a standard question.*

Bad Answers

Candidate: Adults wearing diapers? Oh for God's sake, just shoot them!

» *Don't let the door slam you in the diaper on your way out.*

Candidate: Adult diapers? In school, we did a study on diapers for kids and the answer was something like 30 billion. Let's assume that adults use about half as much as babies and we get 15 billion per year.

» *Already know the answer? Don't blurt it out! The point of this exercise is to see how you solve problems, not how you retain information. Furthermore, this is a superficial analysis—why half? How many old people are there relative to babies? This is what your interviewer wants to hear, so delve into it!*

Good Answer

Candidate: Who'd have guessed that incontinence would come up in an interview? Just for the record, I don't use these products myself. But to take your question seriously, this seems like a straightforward market-estimation question. And that's going to involve a straightforward approach. I'd guess adults use a lot more than babies, since kids grow out of diapers in about two or three years, whereas adults can use them for quite a long time. Of course there are a lot fewer incontinent senior citizens than incontinent babies. Let's see. I think there are two parts to this: First, how many adult-diaper users are there in Ohio? Second, how many diapers does each adult use? Do you think that's reasonable?

» *The candidate acknowledges that it's a distasteful subject and laughs it off, then gets down to business. She throws out a few observations to organize her thoughts, then sets up the framework for how she's going to answer the question and asks for confirmation.*

Interviewer: I think a straightforward approach is a good way to answer a straightforward question.

Candidate: All right then, the first part is to estimate how many adult diaper users there are in Ohio. To get at that, I'm going to figure out the population of Ohio, then estimate what proportion uses adult diapers.

» *The candidate uses a framework to give the interviewer a map of where she's going.*

Candidate: Now the population of the U.S. is about 300 million, and divided evenly over 50 states, that works out to 6 million people per state. But of course state populations vary quite a lot—California has 26 or 28 million, while Wyoming has less than 1 million. Offhand, I don't know the population of Ohio. I know it's a big electoral state, and that means a big population

» *Good—the candidate brings in information from outside the problem to inform her estimate.*

Candidate: And I think it has about half the electoral votes of California, so let's say that Ohio's population is half of California's, or say 15 million to keep the numbers easy. The population of Ohio is an easy number to verify, and I'd certainly want to look up some census numbers before going much farther.

TIP

If you don't have the correct, detailed information on hand, work in an explanation of where you'd go to find that information.

» *The candidate demonstrates her ability to use independent information to inform her estimate, but notes where to get better information.*

Interviewer: Actually, the population of Ohio is about 11.5 million.

Candidate: OK, we'll use 11.5 million then. Since it's not a nice round number, I'm going to have to use a calculator to check my math.

» *Using a calculator is fine, and since the interviewer threw out a better number, it's a good idea to use it instead of the ballpark estimate.*

Candidate: Now, how many of the 11.5 million Ohioans use adult diapers? That's a tough one. You

have your disabled population, people with medical conditions, people in nursing homes.... The incontinence products take up a lot of shelf space at drug stores, so there must be a big market.

» *The candidate identifies various segments of the population who might use these products, then notes that the market must be sizeable based on her own observations at retailers.*

TIP

A good consultant is constantly observing and noting what's happening in the world around. Don't be afraid to incorporate your personal observations into your analysis.

Candidate: Let's try to put some rough limits on this. The biggest population of adult diaper users has got to be people of advanced age. They probably start using them around age 75, though of course some people never develop incontinence and others will develop it at a younger age. Now, how to segment the population. Lets say people live to be 85 on average. So 75 to 85 year olds would be...calculates...12 percent of the population. But that's assuming an equal number of people in each age group. We know that's not the case—there are lots more kids under five than people over 80; the population distribution looks like a pyramid—the biggest numbers are at the bottom. So for a ballpark estimate, let's say it's 6 percent. Again, we could easily verify this with census data. So 6 percent of 11.5 million is...calculates... about 700,000 people.

Interviewer: Are you assuming they all use incontinence products?

» *The interviewer has pointed out an important factor—not all of this age group is incontinent. The candidate should run with it.*

Candidate: No, plenty of folks never have to use them. I don't have a good feel for the proportion of old folks who are incontinent. I'd guess it's a substantial number—say about one-third. I'd want to make a few calls to nursing homes to get a better handle on that, but assuming one-third of people from 75 to 85 are incontinent, that would be 700,000 divided by three or...calculates...233,000.

» *The candidate takes the hint that the interviewer has tossed her and revises her estimate, while also pointing out where to verify the number she's using.*

Candidate: We've also got to include people who are disabled or have a medical condition that requires them to use these products. Again, I don't have a good feel for how much of the population below 75 is incontinent. Let's say 1 percent as a rough guess. We could verify this number using labor or health department statistics. But assuming 1 percent is correct, 1 percent of 11.5 million is 115,000.

Interviewer: Aren't you double counting the 75 to 85 age group?

Candidate: Yes, I suppose so, and I'm also assuming all the disabled population uses them, but I think it's within the accuracy of this calculation. We could knock it down a few thousand to account for that, but adjusting the number wouldn't increase the precision of the calculation, since we're just throwing some rough numbers around. Again, I'd want to get a better handle on the numbers, and I've mentioned some of the sources I'd use to check my assumptions.

TIP

Don't choke if the interviewer challenges any part of your analysis. Just take a moment to rethink and explain yourself and back up a few steps if necessary.

» *Good. The candidate acknowledges the issue, but reinforces the idea that this a back-of-the envelope number that she's working with, that she'd want to base it on better numbers if she could, and how she could do so.*

Candidate: So to continue on this track, we have 233,000 incontinent people in the 75 to 85 age bracket, and another 115,000 disabled or with a medical condition. That makes a little shy of 350,000 users of incontinence products in Ohio. The next step is to figure out how many of the products they are using. And if I could clarify what we are talking about, I understand there are a range of products—are we talking only about diapers?

» *The candidate clarifies another key assumption.*

Interviewer: Let's keep it simple and assume it's only diapers.

» *This actually makes it more complicated, but the candidate runs with it.*

Candidate: Well, as I said, there is a range of products and diapers are only a part of the picture. If we go based on shelf space, I'd say diapers take up about 75 percent of the shelf space, so that probably reflects about 75 percent of the products people buy.

» *The candidate comes up with a feasible rationale for what's really just a guess.*

Candidate: So let's assume that 75 percent of the incontinent population uses diapers. Seventy-five percent of 350,000 is...calculates...262,000. Let's call it 250,000 to keep the math simple.

» *Since the interviewer didn't let her run with a round number for population, the candidate needs to use a calculator, but simplifies assumptions wherever she can.*

Candidate: Now how many do they use? Babies use 10 or 20 diapers per day. Incontinent folks are probably in the same ballpark, but at the lower end, seeing as their systems are better developed. So let's say 10 per day. So 10 per day times 250,000 users works out to 2.5 million adult diapers per day in Ohio.

Interviewer: That's a lot more diapers than I want to think about. And a lot of it keys on numbers used per day. Can you think of a way to verify that number?

Candidate: That's a tough one, but I can think of two places. First, the manufacturers of the products must have a good feel for it. Second, I'd phone around to a couple of nursing homes and ask the nurses. And of course, I'd adjust the number if I had a basis for a better one.

» *The candidate throws out a couple of reasonable options and acknowledges a need to use better numbers if she has them.*

Interviewer: That seems like a solid approach, and you've come up with a good rationale and a defensible number. I agree that you're probably somewhere in the neighborhood. And I don't know about you, but I'd like to change to a different topic that's a little less unpleasant.

CASE 4

How many coffins do they sell each week in Los Angeles?

» *This is a standard market-sizing question, and the approach should be straightforward as well. The candidate must come up with some rough numbers, note what factors complicate the calculation, make some simplifying assumptions, and come up with an estimate.*

Bad Answers

Candidate: Not as many as they ought to! I can't stand L.A.

» *The candidate hasn't been to many interviews. What if the interviewer is a native Angeleno?*

Candidate: I'd say about 10,000.

» *Where'd that come from? How did you get there? As a consultant, you're not being paid to dream up numbers; you're being paid to take a transparent and structured approach to making an estimate.*

Good Answer

Candidate: I've never really thought about it, but I suppose it must be a big number because it's a big city. It's a bit morbid, but let's see—how can we come up with a good estimate? I suppose it would equal the number of Angelenos who die each week and get buried as opposed to cremated. I heard there's a movement out there to get buried in burlap bags as some sort of environmentally conscious alternative, so some others wouldn't use coffins either. I also understand death rates are not constant—for example, there's supposed to be a dip during the holidays because the prospect of seeing their loved ones makes people want to hang on a little longer. Are we talking about an average week? And are we talking about just L.A. proper, or are we talking about the L.A. metro area? Are we including people who die in L.A. but get buried elsewhere?

» *The candidate sets up a tentative road map to how he's going to work this out, and asks for a few key points of clarification.*

Interviewer: Let's try to keep it easy, and assume it's an average per week. The client actually wants to know the annual tally, but needs the weekly number to estimate their production requirements. And let's assume it's L.A. County, not just L.A. proper. Regarding the folks

who get buried elsewhere, I don't see how that figures into the question.

» *The interviewer keeps it simple and throws the candidate a hint.*

Candidate: Yes, I suppose you're right. If somebody gets buried out of state, the coffin goes with him, so I guess if you die in L.A., you're going to buy a coffin in L.A.

» *The candidate takes the hint.*

Candidate: OK, let's start with the easy part: total population. I think the total population of the L.A. metro area is somewhere around 10 million, and we could easily check that number. I know it's bigger than Chicago, which used to be the second largest city, and the Chicago metro area has about 8 million.

» *The candidate throws out a number and verifies it based on his own knowledge.*

Candidate: Now the tricky part—how many of them die each week? Hmm. That's tough to estimate. Let me throw out a nice round number of 1 percent and think through the implications of that. One percent a week would be more than 50 percent a year. No, that's way off. More like 1 percent a year would be more reasonable. If we assume a typical block has 40 homes, with 2.5 people per home, then 1 percent per year would be about one person per block per year. That's not outlandish. Can you give me any hints?

Interviewer: Nope. This is about trying to see how you figure things out.

» *This guy is tough! The candidate has to roll with it.*

Candidate: Well, I suppose I would figure it out by contacting the coroner's office to get an accurate

number. So let's go ahead and assume that I did that and the coroner gave me a number of 1 percent per year. That would 1 percent of 10 million, or 100,000 people per year, or about 2,000 people per week. Next we need to know how many of them get buried, as opposed to cremated. This is another tough one, and I'm sure somebody in L.A. has a better answer for this number than I do. I'd call the local cremation society to get a feel for this number. I would think that maybe a quarter of Angelenos get cremated, but I don't know. I know L.A.'s got a big Latino population, and they tend to be more traditional and thus less likely to be cremated. But I also know that cremation is considered a "green" choice, and Californians in general are environmentally conscious. So we have two competing factors that would affect the number of people who get cremated.

» *The candidate has introduced two factors that would affect the number of people who purchase coffins, and has identified an accurate source of information, the Cremation Society of Los Angeles.*

Candidate: So let's assume again, that I made the call, and the number they gave me was 25 percent of all deceased in L.A. get cremated. That leaves 75 percent of the 2,000 people per week who die in the L.A. metro area, or 1,500 people per week who are going to purchase coffins.

Interviewer: Actually, their families will purchase the coffins. The deceased have moved out of the coffin-purchasing market for good. So you came up with a number of 1,500 coffins purchased each week in L.A. metro area, and showed me how you got there. There are a couple of ballpark guesses in your analysis.

Candidate: Yes, I used a lot of round numbers and educated guesses, and of course I would want to nail them down better.

Interviewer: Sounds like a good plan. Thanks for walking me through your thought process. I think you came up with a good number at least for this level of detail, and I'm with you.

» *The candidate has done a nice job of summarizing the logical steps and highlighting key assumptions.*

CASE 5

How many cups does Starbucks use each week in its U.S. operations?

» *This is a relatively straightforward question that could be used with an undergraduate or advanced-degree candidate. Note, however, that there are a number of nuances that only a stronger candidate will recognize.*

Bad Answers

Candidate: Starbucks is evil. I only go to independent coffee shops, so I refuse to answer that question. Can you give me a question that isn't about a horrible corporate chain?

» *Typically, the candidate doesn't get to choose which questions he answers. It is never smart to refuse to answer a question. It would be better to try and work through the question instead. Excuses like the one given by the candidate are lame and suggest to the interviewer that the candidate lacks the ability to think outside his comfort zone—rarely in consulting are you ever given a problem that you know intimately.*

Candidate: My sister works at Starbucks. I have my cell right here; I'll just give her a call and find out for you.

» *It's almost always OK to pull out a calculator, but don't get out your phone. Here's the thing about market-sizing questions: Your interviewer doesn't want an exact answer. He wants to see your thought process. Once you get the job, you'll get to do primary research*

instead of making estimates—though you'll still spend a lot of time making informed estimates.

Good Answer

Candidate: Interesting question! You're asking just about paper cups, right? Because most stores sell reusable cups or holiday mugs and the like.

Interviewer: Let's focus on the paper cups only.

Candidate: OK, I guess the way that I am going to approach this is to work out how many drinks Starbucks sells each week, then I'll back out of an estimate of how many people bring their own cups.

» *Structure! Structure! Structure! Remember to take a moment to think about how you want to structure your answer before you start. In this example, the candidate does a nice job of laying out his proposed approach in a concise and simple manner.*

Candidate: I have two clarifying question before we get started. First, I'm assuming that we're only talking about company stores and not places that serve Starbucks coffee in their own cups, right? And second, I'm thinking that wastage is negligible. Starbucks runs a tight operation and that seems like a good assumption to me. Would you agree?

» *When in doubt, ask! Is everything there? It is always a good idea to ask clarifying questions instead of simply making assumptions. If the interviewer doesn't want to answer your question, she'll communicate that to you and you can simply make an assumption (out loud) about your question. If you don't communicate the fact that you are making an assumption to your interviewer, she may just assume that you've missed a critical piece of the case.*

Interviewer: What I am interested in knowing is how many cups Starbucks needs to support its own

operations each week. So, yes, you can ignore outside operations using Starbucks coffee. I agree that wastage is probably minimal, but we still need to account for it.

» *The candidate makes a point of frequently summarizing his progress with the calculations and the next steps. This is a good idea whenever you are focused on a long or multifaceted calculation. Not only does it ensure that the interviewer is still following along, but it also reminds you of the different steps so that you don't miss anything. It's time to take a moment to think, then get going.*

Candidate: OK. Let's focus first of all on how many drinks Starbucks serves each weekday and then each weekend day, as I would assume that the volume is different in those two categories. Then I'll throw in a third category—people who drink Starbucks every single day. Then, we need to know how many stores Starbucks operates and how many drinks each sells in the three different categories. I am going to guess there are somewhere between 5,000 and 10,000 Starbucks stores in the U.S. Let's go with 7,500 for now, though I'll probably have to pull out my calculator to keep going. Do you mind?

Interviewer: No, please do.

Candidate: Thank you. There are 300 million people living in the U.S., and if we divide that by 7,500 stores that works out to 40,000 people per restaurant. I'll estimate that 5 percent of those people go to Starbucks once during the week, another 5 percent go once during the weekend, and 5 percent go every single day.

» *When you are asked to estimate something, it's important that you end up with an estimated number. In this case, the candidate now has a number of stores to use and he is working toward a second estimate: the volume within each store. Evaluate by asking yourself whether your answer sounds reasonable, and if not,*

revisit your assumptions to try and come to a more realistic conclusion.

Interviewer: If you needed more exact numbers, what would you do?

Candidate: I'd start by checking the company's Web site. They may show these numbers in its financial statements. Or I could try calling the company.

Interviewer: OK, but for now, keep doing what you are doing. How many cups do these people use?

Candidate: All right. Now we can think about the number of drinks per store. We have 40,000 potential customers per store, but we only care about the Starbucks drinkers. Five percent go once a week, so that's 2,000 drinks. Another 5 percent go only on weekends, so that's an additional 2,000 drinks. And then 5 percent go every single day, so that's 2,000 times 7, or 14,000 drinks. So add those up, and there are 18,000 drinks served per week per store. Now, let's figure that 10 percent of those drinks go to people with their own cups, so I want to subtract 1,800, and that leaves me with 16,200. But then I also have to figure some waste, and I'll assume 1 percent of the paper-cup usage involves wasted cups. And that would be 162 cups. So then we subtract 162 from 162,000 for 16,038, and boy, am I glad I have a calculator!

» *The candidate identifies a nuance—people bringing their own cups—that might affect the calculation instead of just assuming it away. This demonstrates depth of thought to the interviewer.*

Interviewer: OK, that sounds reasonable. So what happens systemwide?

» *Rarely will an interviewer have a problem with your assumptions unless they are far off base or are steering the conversation in a direction the interviewer doesn't wish to go.*

Candidate: Well, with that 16,038 per store and 7,500 stores, the number of cups would be 1,202,850,000 per week.

Interviewer: That's a lot of cups!

Candidate: Yes, that does sound high. I may be being too aggressive by assuming that 15 percent of the population goes to Starbucks at least once a week. If the market penetration is lower than that, the company still has growth opportunities, so it will keep needing cups. If that penetration rate is accurate, I think it points to a huge opportunity for the company to increase revenue and lower expenses by encouraging customers to buy reusable cups and mugs.

TIP

Making educated guesses is part of what mastering a case question is all about. Go ahead and guess appropriately, just be sure to tell the interviewer you're doing so.

» *It's OK to let the interviewer know that you are making an educated guess. Always try and explain the basis for your guess so the interviewer knows that it is an educated one, and not pulled out of thin air. Here, the candidate identifies a potential problem—but also points out a potential opportunity.*

Interviewer: Great job. Now we are going to switch gears and talk about something a little bit different.

» *The candidate does a great job with this case. He applies a structure early on in the question and sticks to it. He also makes a point of frequently summarizing his progress with the case and his next steps, thus keeping himself aligned with the interviewer. The candidate also does a good job of highlighting the assumptions he is making and grounding them out loud whenever possible,*

demonstrating that he is comfortable doing this even when the material is not familiar to him.

The candidate explains exactly what he is going to do before he does it, keeping himself and the interviewer aligned. He also isn't afraid to do some math. Taking notes and using a calculator saves him from getting tripped up when the numbers started to get strange.

CASE 6

How much bamboo does the world's panda population eat?

» *This is a nonstandard brainteaser. There probably aren't a lot of people who have any idea how much bamboo the world's pandas eat. This is a test of your ability to take a strange undefined question in which you have no expertise, and assign some parameters to come up with an estimate. One key to this question is to define some data needs and identify where you might get that data.*

Bad Answers

Candidate: How much what does the who?

» *Where's the door?*

Candidate: I've got no idea.

» *Neither does your interviewer. Answer the question she asked.*

Good Answer

Candidate: Pandas?! This is way outside what I usually think about. I've never seen a panda, not even in a zoo. But since you asked, let me see if I can work through this. I guess it's a simple product of how many pandas there are and how much bamboo each one eats. And I'll tell you up front that I've got no idea of the answers to either question. Let me see if I can make some reasonable assumptions.

I don't know a lot about pandas, but I think they eat other foods besides bamboo, and I think most of them live in China. And I know that they are extremely rare, so there aren't an awful lot of them around.

» *The candidate states up front that this is not an area that she knows anything about. She brings the interviewer in on her limited knowledge of pandas, and outlines an extremely simple approach to answering the question.*

Interviewer: That's about all I know about pandas, too. That and they are awfully cute.

» *Good—you're not dealing with World Wildlife Fund's panda expert.*

Candidate: I suppose we ought to start with how many of them there are. Pandas are big animals—I think they are about the size of bears. That means that they need a lot of habitat to support them. I think I read that grizzlies need 200 square miles apiece, and pandas are probably similar. And I think they only live in China, and China's a big country. And since they subsist mostly on bamboo, they probably only live in southern China, where bamboo grows. I'm sure that a lot of wildlife biologists have spent a lot of time trying to estimate what the wild panda population is, and I certainly wouldn't want to second guess them. For the sake of a number, I'll throw 5,000 out there. Could be high or could be low, but I'd bet I'm within a factor of ten.

Interviewer: I won't contradict you. That's not a lot of animals, but then I guess that's why they are endangered.

Candidate: OK, let's assume there are 5,000 of them and we would contact the World Wildlife Fund to verify the number. WWF uses a panda as their logo, so they ought to know. Next we need to know how much bamboo they eat. That'll be a function of their

size, which will be a function of their age—young pandas are small and don't eat as much as big adult pandas. Now I know that a couple zoos have pandas, and we could contact them to find out how much bamboo a captive panda eats. But let's take a stab at it for this estimate, and use a call to the national zoo as a verification step. Pandas are about the size of bears, but I have a hard time estimating how much bears weigh. I've heard grizzlies can weigh a ton, but grizzlies are big, even for bears. So I would hazard a guess that a panda weighs a half ton, or 1,000 pounds. And how much does a 1,000-pound panda eat in a day? Again, I have no idea. I suppose your average person weighs 175 pounds and he probably eats 2 or 3 pounds of food per day, so that's 1 percent or 1.5 percent of his body weight. So for a panda that's probably somewhere around 10 or 15 pounds per day. And how much of that is bamboo? Probably most of it. And bamboo isn't exactly high protein, so they probably have to eat a lot of it, which suggests that they'd probably have to eat a lot more bulk than humans. Call it 25 pounds per day, and verify that with the national zoo. So—5,000 pandas eating 25 pounds of bamboo per day...that works out to 125,000 pounds of bamboo per day.

Interviewer: I have no idea what the real number is. But I followed your logic and the way you presented it, and it sounds reasonable to me. Your answer of 125,000 pounds a day works for this question. I wonder what it would actually be if we did the research you suggested?

CASE 7

What is the average number of chairs in a house?

» *This is a deceptively tricky question—though it centers around a topic accessible to everyone, it can get detailed quickly. Remember to continue to see the forest for the trees.*

Bad Answers

Candidate: I haven't lived in a house for a while, but I can tell you how many chairs are in the average apartment.

» *Again, you're going to have to answer the question that was asked. Remember that it's not the accuracy of the final answer, but rather the logic and structure of the thought process that got you there.*

Candidate: I'd say about 20.

» *Where'd this come from? How did you get there? Telling a consultant an answer without explaining how you got there is one way to bomb an interview.*

Good Answer

Candidate: Well, I've never really thought about this, but let's take a crack at it. Here are a couple of things that come to mind. First, there are lots of different types of chairs. I'm going to assume that when you say chairs, you mean all kinds of chairs—dining room chairs, desk chairs, living room chairs, patio chairs, and so on. Second, there are lots of different types of houses—small, medium, large—each with a different number of chairs. I'm also going to assume that we're excluding apartments, condos, and other types of residences in the analysis. So, to answer this question, I'm going to have to take the weighted average of the number of chairs in each house size.

» *This is a great start. The candidate has given an excellent overview of the problem; this establishes a lot of credibility with the interviewer. Additionally, the candidate has demonstrated an understanding of weighted averages, an oft-used analysis in consulting. When possible, try to show the interviewer early that you have cracked the case by providing an analytic framework. Also, note how the candidate has narrowed the scope by making some reasonable and simplifying assumptions.*

> TIP

If you have some fancy analytical tricks you learned in school to help you solve the case, by all means, whip 'em out now!

Candidate: First, let's talk about the different types of houses. For simplicity sake, I'm going to assume that there are three "buckets" of housing—small, medium, and large. Most of the houses are going to fall into the middle category, and there are likely more small houses than large ones. So I'm going to say that 50 percent of houses fall into the "medium" category, 30 percent fall into the small category, and 20 percent fall into the large category. Now what I need to do is figure out how many chairs there are in each type of home. Let's start out by figuring out how many chairs are in a small house, then move up progressively to estimate how many chairs are in the medium-sized and large houses.

» *Again, the candidate has done a good job of keeping the interviewer informed of where he is going and making key assumptions along the way. Establishing three buckets of houses is reasonable—avoid making the problem more complicated, particularly since it appears that this case is going to require you to keep track of quite a few numbers. Also, building up the number of chairs from small house to large house lets the candidate build upon earlier assumptions.*

Candidate: So, small houses probably have two bedrooms, two bathrooms, a living room, dining room, a kitchen, and probably one other room and small front and back yards. Of those rooms, the bedrooms and bathrooms probably won't have any chairs, so we can forget about those rooms for the time being. Now, let's make assumptions for the following rooms: The living room will probably have one large chair, the dining room will probably have room for four chairs, the "other" room might have one desk chair, and let's assume that the back yard has a small outdoor table

with four more chairs. So this is an average of ten chairs in the small house category.

The average medium-sized house will probably have an extra bedroom, maybe another bathroom, and larger dining rooms, living rooms, and outdoor space. Again, let's assume that the bedroom and bathrooms have no chairs, so there is no difference there. There are probably six chairs at the dining room table and likely one additional chair in the living room, so that's an additional two indoor chairs. For the sake of argument, let's assume that there are an extra two outdoor chairs in a medium-sized house. So that's a total of four extra chairs, or 14 chairs.

» *The candidate is progressing logically. Remember that the accuracy of the assumptions is not as critical as the logical path.*

Candidate: The same analytic framework will apply to large houses. Large houses will have more bedrooms and bathrooms, and larger living rooms, dining rooms, and outdoor space. Let's assume that the same increase in the number of chairs exists—that there are four more chairs in these rooms. However, these houses may also have additional rooms, such as a den. Let's assume that there are three chairs in this room. This means that large houses have seven more chairs than medium-sized houses, or 21 chairs. Therefore, the weighted average will be:

$$(10 \times 0.3) + (14 \times 0.5) + (21 \times 0.2) = 3 + 7 + 4.2 = 14.2 \text{ chairs}$$

» *Make sure that you've written your estimates down as you go, and write down the equation. Take your time figuring out the numbers. The interviewer would much rather wait while you do the math than have you be sloppy with the numbers.*

CASE 8

How many pairs of jeans are sold in the U.S. each year?

» *This is a straightforward question and there are several ways of answering it.*

Bad Answers

Candidate: I used to work for a retail company, so I have a good sense of how many jeans are sold.

TIP

Don't jump right to the answer even if you happen to have detailed knowledge of the subject matter. Remember, this is all about articulating your thought process.

» *As previously mentioned, the interviewer is not seeking a specific answer; rather, he or she is looking for how you think and make assumptions. You should use prior—and relevant—experience only for making logical assumptions and testing your final answer.*

Candidate: I don't really know anything about the jeans market.

» *As a future consultant, you will often work in industries where you have no experience; this is part of the joy—and pain—of consulting. An answer like this signals to the interviewer that you are not comfortable working in this type of uncertain environment.*

Good Answer

Candidate: So the question is how many pairs of jeans are purchased in the U.S. every year? There are a couple of ways of answering this question: One way would be to build from the ground up by estimating the jeans-wearing population and multiplying that number by the average number of new jeans each person buys each year. Another way would be to estimate the number of jeans a single company makes each year, then multiply

that by its market share. I'm going to try the first way because I think my estimates will be more accurate.

» *The candidate has given a preview of what she will be doing and also provided two ways of assessing the problem.*

Candidate: Now, let's assume—for the sake of round numbers—that there are 250 million people in the U.S. What percentage of the population buys jeans? Jeans seem to be a staple in most people's wardrobes, but for different reasons. Jeans are fashion statements for younger people, for instance, are leisure and comfort wear for middle-aged people, and are functional for a large set of workers—mechanics, farmers, and so on. I've even seen babies wearing jeans! They are also available in a range of prices, so no one is really priced out of the jeans market. I'd say, then, that about 80 percent of people wear jeans; this makes the total jeans market 200 million. The next step will be to determine how many pairs of jeans these 200 million people buy.

» *What the candidate has done well here is provide some insight into the jeans market and let that insight drive the assumptions. As a result, the candidate demonstrates some business savvy and intuition around customer behavior and price sensitivity. Also, note that the use of 80 percent results in a nice round number and that the candidate provides the interviewer with a road map of where she is going next.*

Candidate: My guess would be that the average jeans-wearer has approximately three pairs of jeans. I recognize that there will be a large range: Some people will only have one pair, others will have a quite a few, based on their needs and what they wear jeans for, but an average of three sounds about reasonable to me. Of course, if I were looking for exact market sizing, I would segment the market much more and see how many jeans each segment purchases.

» Although the candidate is clearly guessing, this is OK as long as the interviewer is aware of how the candidate would get more detailed information if she needed to.

Candidate: The next analysis involves estimating how often people buy jeans. Again, this is going to depend on what people are wearing jeans for: Those who wear jeans for style and fashion are likely to replenish more quickly than someone who wears jeans around the house only. But again I'm going to take a guess and say that the average jeans last around three years. Therefore, people are buying new jeans every three years, and if they have three pairs of jeans each, it follows that on average they will be buying one new pair of jeans each year. So if the entire population of jeans wearers buys one pair of jeans each year, there are about 200 million new jeans bought each year.

» The candidate has done a nice job of summarizing the logical steps and highlighting key assumptions.

CASE 9

How many unique people attend events at the Rose Bowl every year?

» This is an example of a question where you may have to ask the interviewer a couple of questions to develop a good response. Don't be afraid to ask questions, even when you are given a market-sizing analysis. Note also the simplifying assumptions that the candidate makes to avoid getting mired in a lot of messy numbers.

Bad Answers

Candidate: I don't know what the Rose Bowl is, so I'm uncomfortable answering the question.

» Don't show any trepidation about the question itself; you can figure it out!

Candidate: I don't like football.

» Where did this come from? All this shows is negativity.

Good Answer

Candidate: Well, I'm not really familiar with the Rose Bowl. I've heard of it, but I'm not sure exactly what it is and what it's used for. Can you give me a little more information?

» Asking questions is perfectly fine, and the interviewer would rather have you ask a couple of questions than blindly start trying to figure out the question.

Interviewer: The Rose Bowl is a large outdoor stadium in Pasadena, California, that is used for sporting events—UCLA plays its home football games there, there are a few large soccer matches, and occasionally the Rose Bowl hosts the Super Bowl—and concerts. It holds about 100,000 people.

Candidate: OK, well let's take the two types of events in turn. First, I'll analyze the sporting events. There is only one college football game per week, half of the games are away games, and the season is about 12 games. I'm going to assume that all the games are sold out. This means that there are six home games for a total of 600,000 people. Now, a lot of people will go to all the games—let's say 50 percent of the stadium is filled with repeat visitors. So this means that, for the first game, there are 100,000 different people, and that for each of the next five games there are 50,000 new people. Therefore there are 350,000 different people who go to college football games at the Rose Bowl.

» The candidate has organized the analysis well, discussing the sporting events separately from the concerts. He has also highlighted the key to this case—that there are repeat visitors that must be factored out of the analysis to avoid double counting. Remember: Don't worry if you don't know how many games are in a college football season; you will not get dinged for this!

Candidate: Now let's move to the soccer matches. I'm less comfortable with soccer, but let's give it a shot. I'm going to guess that over the course of the year there are ten soccer matches, and that each soccer match gets about 60,000 people, because the U.S. in general is less rabid about soccer than college football. However, soccer fans themselves are very loyal, so let's say that two-thirds of the people are the same for each game. This means that there are 60,000 for the first game, and 20,000 new people in each of the next nine games for a total of 240,000 people (60,000 + 180,000).

If the Rose Bowl holds the Super Bowl, it will be packed. As a simplifying assumption, I'm going to assume that there is no overlap between the Super Bowl crowd and the college football or soccer crowd. There probably is overlap in reality, but it may be small because the Super Bowl attracts a national crowd. So this means another 100,000 people.

» *The candidate has made some logical assumptions, one of which may be a stretch but which simplifies the analysis. As long as the candidate acknowledges that the assumption is simplistic, the interviewer should have no problem with it.*

Candidate: So now let's move on to the concerts. I'm going to assume that there are about 50 concerts in the Rose Bowl every year, roughly one a week. Some will sell out, others will not. Let's say that the average attendance at these concerts is 80,000. So this means that there are 4 million people that go to concerts at the Rose Bowl. Unlike sporting events, you're probably not going to get a lot of repeat visitors, so let's say that there is no overlap with college football, soccer, the Super Bowl, or other concerts.

Therefore, we have 4 million from concerts, 350,000 for college football, 240,000 for soccer, and 100,000 when the Super Bowl is in town. So I'd guess that about 4,690,000 different people per year visit the Rose Bowl.

» *The candidate has successfully avoided getting too detailed, which would create headaches in tracking all the numbers.*

CASE 10

How many cats are there in the U.S.?

» *This is a straightforward market-sizing question that would be good for undergraduates and advanced-degree candidates. It requires no special technical knowledge, and it focuses on a subject that (fortunately or unfortunately) is accessible to everyone: cats.*

Bad Answers

Candidate: Five million.

» *It's never good to just give a specific number answer, even if you happen to know the number. Remember, a cat statistician does not a consultant make. Rather, the interviewer is trying to see how you go about figuring out such an answer. After all, throughout your career as a consultant, you'll rarely find that you already know a needed number, and even if you do, you'll still have to show the client how you got the information.*

Candidate: I'm glad you asked that, because in my job at Ralston Purina, I was product manager for Cat Chow, and we assumed that...

» *OK, this sounds plausible. But, see the previous note. The interviewer wants to see how you think.*

Candidate: Too many.

» *Oops! We understand that there are many closet cat lovers in the consulting ranks, and, yes, even a few cat owners. Perhaps even your interviewer.*

Candidate: What do cats have to do with consulting?

» *Good question, bad answer.*

Good Answer

Candidate: So how many cats are there? Well, I think I'll start by trying to figure out the number of people in the U.S. who have cats. Let's assume that the population of the U.S. is 300 million. From here, we could try to figure out how many people in the U.S. have cats, but then we might be double counting the same cats. It's probably better to convert the population to households, then make assumptions about how many households have cats. So, in the spirit of round numbers, let's assume that every household has three people, so in the U.S. there are approximately 100 million households.

» *The candidate has started by choosing a few good round numbers with which to work. This will make the calculations much easier as she progresses. In addition, she has explained her thinking about the market size. Not only does this show the interviewer how she is thinking about the problem, but it gives him the opportunity to step in and provide assistance should she veer off track. Finally, the candidate has offered a simple but reasonable insight—it's better to think about cat owners as households rather than individuals to avoid double counting.*

Candidate: Now how many of those households have cats? Well, probably one in five have pets of some kind—so 20 million households have pets. Of those, maybe half have cats, so 10 million American households are cat-inhabited. Does that mean 10 million cats? Well, close. Some percentage of these households are probably havens for multiple cats: Say half of these households (5 million) have more than one cat—for the sake of argument, let's say they have two cats each.

» *The candidate is doing a good job of moving from big picture down to the small. She is also announcing her*

assumptions along the way, which makes it clear how she is coming up with her answer. Her assumptions also seem relatively reasonable, which might indicate a good level of common sense.

TIP

Start from big to small and work your way down to greater detail.

Candidate: So how many cats are there in the U.S.? Well, there are 5 million households with one cat each; that's 5 million cats. Plus 5 million households with two cats each; that's 10 million cats. So 15 million cats live in American households. But what about strays? Maybe there are half a million of those? So let's call it 15.5 million cats.

» *The round numbers came in handy. Although it would have been OK for the candidate to write down her numbers on a piece of paper, the problem and her round numbers let her get a ballpark estimate in her head. Also, at the end, she acknowledges and includes an important additional twist: strays.*

CASE 11

How much paint does it take to paint United Airlines' fleet?

» *This question might be used for undergrads, MBAs, or non-MBAs. It's a straightforward market-sizing question, but it will require a little bit of arithmetic—and geometry—as well as a few simplifying assumptions that make it tricky enough to trip up some MBAs.*

Bad Answers

Candidate: Aren't they bankrupt? They're probably not spending money on paint these days.

» *Funny, but not "ha ha" funny.*

Candidate: 135 million gallons.

» *Huh? Where'd that come from? The interviewer wants to gain insight into your thought process. Even though you may have heard that there are no wrong answers in consulting cases, this is a wrong answer.*

Candidate: I hate airplanes. Flying gives me hives. In fact just talking about flying makes me nauseated. Could you ask me something else?

» *Bad answer. Bad attitude. You hate flying, and you want to be a consultant? Ding!*

Good Answer

Candidate: How much paint? Let's start by trying to figure out how many planes are in United's fleet. United probably flies to a couple hundred cities in the U.S. and maybe 50 more internationally, so 250 cities. Some cities are served by two flights per day and others by 20 flights per day, so let's assume on average, five flights leave each city United serves each day—that's 1,250 flights. Some of those flights use the same plane, so let's assume 1,000 planes are required to service all of United's cities. And in the interest of round numbers, let's assume that 1,000 includes the planes that might be idle for maintenance or other reasons.

» TIP

Keep a piece of paper handy to track multiple assumptions.

» *Yikes! There are enough numbers and assumptions flying around here to warrant the use of a piece of paper. The candidate is making some whopping generalizations here, some of which are certainly inaccurate, but it doesn't really matter. If it took you a bit longer to get a fleet size estimate, don't worry. He has stated his assumptions and given general reasons for choosing them. None of the assumptions*

sound particularly outlandish. Also, it's nice that the candidate at least acknowledges he is aware that planes undergoing maintenance would add to the total.

The one thing that would have improved this answer is a framework. For example, the candidate might have said, "To calculate how much paint it will take, I'm going to start by estimating the number of planes in the fleet, figure out how much it will take to paint one plane, and then multiply the two numbers." Remember, frameworks don't need to be glamorous and complicated; they sometimes can simply be a road map of where you're going with the questions.

Candidate: Next we need to figure out how much paint it would take to give one plane a new coat of paint. This requires a bit of geometry and a whole bunch of logical assumptions. First, let's assume that we're not going to paint the wings or the tail, just the bodies of the birds. Next, let's take an average size plane—say, a 737—figure out its dimensions, and use it as a proxy for the whole fleet. So, I guess a 737 is about 100 feet long and 15 feet wide. The outside area of this plane—the part that's getting the paint—would be (*and this is where the geometry comes in*) the circumference of a circle ($\pi \times 15$ feet) \times 100 feet of length. So, the outside area of the plane is roughly 45×100 , or 4,500 square feet. So how much paint?

» *The applicant makes a nice simplifying assumption here—he totally drops the wings from the paint job. That's fine. The algebra part is a little tricky. Even if his answer is totally wrong—which it likely is—the understanding of how to calculate the surface area clearly shows that "this dude ain't afraid of no numbers." Don't panic if you didn't remember the formula for a circumference ($\pi \times$ diameter); you may lose points, but it's not a deal breaker.*

Candidate: Next let's assume that it takes one gallon of paint to paint a 10-foot-by-10-foot room (four walls and a ceiling). So a gallon of paint covers about 500 square feet of surface. Therefore, it would take about 9 gallons to paint the plane once, 18 gallons to give it 2 coats. To paint the whole fleet, then, would take about 18,000 gallons of paint.

» *The job seeker makes a clever transition here to figure out exactly how much paint it would take per plane. By equating the paint required to cover one room with paint required to cover a similar surface area on a plane, the candidate shows that he is resourceful and able to think creatively. Nice job!*

CASE 12

How big—in dollars—is the market for used shoes in the U.S.?

» *This is a straightforward market-sizing question, which would be appropriate for undergraduates and advanced-degree candidates.*

Bad Answer

Candidate: Used shoes—gross! Who would wear those, and what does that have to do with being a consultant? In any case, I would guess that the market is negligible. I doubt used shoes are a good that can be exchanged for dollars.

» *Sartorial snobbery is not high on the list of sought-after traits for consultants. Besides, it's not appropriate to base an entire answer on a personal opinion.*

Good Answer

Candidate: Wow. Haven't really thought about that market before. I tend to throw away my shoes after I wear them out. But I've seen shoes in second-hand stores before, and I imagine that there are lots listed on eBay, so there must be a demand.

So how best to estimate the market? One option

would be to do it from a channel perspective—meaning how many shoes are available in second-hand shops, online, garage sales, and so on. Another way to estimate the market would be to determine pure supply—meaning how many people sell their used shoes, multiply by an average price per pair, and assume that demand equals supply. The latter seems more intuitive to me, so I'm going to go down that road.

» *Excellent start. The candidate has laid out two options, demonstrated some intuition about the market by articulating which channels used shoes might be sold through, and proposed a method for estimating the market size.*

Candidate: OK, so how many people sell their used shoes? And, more important, what type of used shoes are sold? The shoes that I have seen at second-hand stores tend to be nicer, more expensive shoes that have been worn only a few times. I think I've seen some signs that say "Gently Worn," which implies that there is not a secondary market for shoes that have been "ungently" worn. The value equation also makes sense from the buyer's perspective: I can get great value from a pair of \$200 shoes that has been worn only a few times and now cost \$50. The value is not there for me if I buy a pair of \$50 shoes that are now \$15, because I probably would want to spend the extra \$35 and get that pair brand new. How am I doing so far?

» *Checking in with the interviewer is not a bad tactic during a market-sizing case. If you're off track, the interviewer will be forced to tell you. Plus, it gives you a little time to breathe.*

Interviewer: So far, so good. The used shoe market primarily consists of "gently worn," dressier shoes that tend to be more fashion-focused.

Candidate: Good. So let's say that that is the market that I'm defining: For ease and simplicity, the market

for second-hand shoes consists of these “gently worn,” dressier shoes. I recognize that this may not be completely accurate, but I am confident that this represents the lion’s share of the market.

» *Solid, simplifying assumptions.*

Interviewer: Given what you’ve said so far, how big is the market relative to the overall size of the shoe market?

Candidate: It’s going to be a tiny fraction of the market for two reasons: We’re dealing with a small segment of the market (dressy, fashion-focused shoes), and my guess is that most of the people who buy these shoes new aren’t selling them to second-hand stores or putting them up on eBay.

» *Well done and succinctly stated.*

Interviewer: I agree. So how are you going to estimate market size?

» *The interviewer wants numbers.*

» TIP

Evaluate your work as you go along and make adjustments as necessary.

Candidate: OK. If there are 300 million people in the U.S., let’s say that 5 percent of them buy these dressy, fashion-focused shoes that could be resold. That’s 15 million people, which actually sounds high now that I say it out loud. So to make the numbers work, let’s assume that that number is actually lower—somewhere around 10 million.

» *Notice how the candidate evaluated his work and lowered the estimates midstream. This will always score points with the interviewer, because one of the key skills*

you need in consulting is the ability to “pull up” and ask yourself whether the numbers make sense.

Candidate: Next I need to determine how many shoes are purchased each year first hand. The consumers who buy these shoes at retail are probably heavy consumers of shoes—I’m not talking about Sarah Jessica Parker’s character on *Sex and the City*, but someone who buys a new pair of shoes every month or two. So let’s say that that’s about 10 pairs of shoes each year per consumer, or 100 million pairs of shoes each year overall.

» *Notice that the candidate is using nice round numbers. Why makes things harder than they have to be?*

Candidate: The next step is going to be to figure out what percentage of this 100 million is sold to second-hand stores. This is going to be determined by two related factors: (1) how many people are willing to sell their shoes, and (2) whether there is a channel available to them that will sell their shoes. I think this percentage is going to be low: It just doesn’t seem likely to me that most of the people who are buying expensive shoes are going to take the time to sell them again. So I’m going to guess that roughly 5 percent of these consumers resell their shoes. This makes about 5 million pairs of shoes that are sold second-hand.

Finally, we need to convert this volume into dollars. As we’ve noted, these are expensive shoes that are going to be marked down significantly. The average price for a first-hand pair, I’d imagine, would be about \$150, and they’re probably going to be resold for less than half of that, so let’s say \$50. Five million pairs of shoes multiplied by \$50 per pair gives you a \$250 million market.

» *It doesn’t matter that this number is likely wildly off the actual market size. The candidate has done an excellent job of making assumptions, sticking to simple math, and applying some reasoned business judgment throughout the course of answering the question. Well done!*

CASE 13

What is the total number of automobile tires sold in the U.S. each year?

» *This is a straightforward market-sizing question, appropriate for undergraduates and advanced-degree candidates.*

Bad Answers

Candidate: I'd say about 1 million, give or take.

» *The purpose of this kind of case question is not to hear your final answer, but instead to give your interviewer an opportunity to hear how you think about problems with uncertain or unclear information. This answer neither demonstrates the candidate's thinking skills—the set of assumptions and analysis that he did to arrive at his number—nor gives the interviewer anywhere to go in terms of follow-up to assess the candidate's approach to problem solving. In general, never give the answer to a market-sizing question right out of the gate. A better strategy is to take a moment or two to think about what the interviewer is really asking you. In this case, the interviewer is really asking, "Let me see how you would think through developing an estimate for the number of automobile tires sold each year in the U.S. by telling me about the process and assumptions you'd use to arrive at your estimate."*

TIP

Take a moment to think about what is really being asked before plunging into an answer.

Candidate: Well, it's just four times the number of cars sold in the U.S., plus maybe a few more.

» *Although this offers a small amount of insight into the basic assumptions and thinking that the candidate would use to structure her response, it is not nearly deep or well-thought-out enough to satisfy an interviewer—*

there isn't enough specificity to her answer. While you don't need to arrive at an exact number in your final answer, you do need to provide a decent estimate based on information you have at hand or can deduce from other information you know.

Candidate: All right, this one's easy! My brother is an industry analyst for cars at Goldman and he told me there are 15 million cars sold each year, so my answer is 60 million. Next question.

» *Never say that a question you've been asked is easy. If it were easy, it wouldn't be asked of you in a case interview. This answer also implies that the candidate believes one data point or piece of information is all that's required to answer a related—but not perfectly correlated—question. You don't ever want to give the impression that you respond rashly or without measured consideration to a query; this implies immaturity and thoughtlessness, both of which would be very off-putting to an interviewer seeking humble, intelligent, and thoughtful candidates for a role that will often demand maturity and nuanced problem solving.*

Good Answer

Candidate: That's an interesting question, considering the various sales channels and the different sources of demand for auto tires in the U.S. Let me start by applying a "bottom up" approach towards estimating the total demand for tires.

» *Good start. The candidate has demonstrated interest in the question and communicated a road map for how he will begin to think out loud about the components of information required to develop a response. Furthermore, the candidate has shown an understanding of both business operations (buzzwords are generally ill advised, but in this case referring to "sales channels" gives the interviewer a sense that the candidate has a basic understanding of operations) and economics (by choosing the demand side of the total*

market to pursue the market-size estimate, rather than the supply side, which is likely to be more challenging in making good assumptions given the relatively arcane nature of tire manufacturing).

Candidate: To begin, I will draw some parameters around the definition of the automobile-tire market so that I can then define the sources of demand for tires. In this instance, I'll assume that our market concerns rubber tires for passenger cars and light trucks only. Therefore, I will exclude commercial vehicles, tractors, trailers, and things like RVs for the purposes of my estimate. Is that acceptable, or would you like me to define the market more broadly?

» *Well done in defining the nature and parameters of the problem before diving in. This demonstrates patience and a desire for precision in defining ambiguous problems before thinking about potential solutions. These are valued skills for consultants and general management strategists, who are hired as much for their maturity in managing complex problems as they are for their ability in solving them. Furthermore, the candidate demonstrates comfort, ease, and most important, respect for his interviewer by asking a question that engages the interviewer and lets him help the candidate define the problem more specifically.*

Interviewer: Yes, that's fine. For the purposes of your estimate, just focus on cars and trucks like pickups and SUVs.

Candidate: OK, sounds good. To start, I believe that one source of demand for automobile tires centers on new cars and trucks themselves. Although I don't know offhand what the total number of passenger cars sold each year is, I'll develop a rough estimate that I can use to estimate the tire demand for this channel and then move on. I know that there are about 300 million people in the U.S. and that about three-quarters of them are above the driving age; this amounts to about

225 million people. I will further assume that about three-quarters of those who are of legal driving age actually own a car; this is based on personal experience with friends and family members in both rural and urban settings. That leaves about 160 million people in the U.S. who own cars today. Now I'll assume that people replace their cars on average of once every 10 years—just to keep it simple without knowing the exact numbers. That would give an annual estimated number of about 16 million new cars sold, resulting in 64 million new tires sold for those new cars and trucks alone.

» *The candidate has used a combination of personal knowledge about cars and some round-number estimates using population and demographics to whittle down the new cars element of this market-sizing problem to a manageable and reasonable number. Although there may be some inaccurate assumptions in the logic chain the candidate presents here, by speaking his way through the chain with the interviewer, the candidate shows his ability to extrapolate in a reasonable manner using known information to arrive at an estimate when little information was initially available. Using personal experience, like that involving how many friends and family own cars, is OK so long as the candidate doesn't take it too far—which he hasn't. Furthermore, the candidate has driven to a reasonable component of the estimate without taking forever to do so—enough time to think about the logic chain rationally and completely, but not too much time to be burdensome and unnecessary for this estimation exercise.*

Candidate: Now that I've estimated the number of tires demanded for new cars and trucks, I'll move on to estimating the number demanded for used cars and trucks currently on the road. I just came up with an estimate of 160 million people who own cars. For the sake of consistency, I'll use this same figure for the estimated number of used cars on the road.

> TIP

Keeping track of your assumptions is crucial. You may need to return to them later.

» *Good job. Realizing that another component of the estimate relies on a piece of information that had previously been estimated, the candidate acknowledges that he has thought this out and takes a consistent number for the next demand estimate. In doing so, the candidate is being clear on his progress toward an answer and has demonstrated the ability to return to prior thinking to reassess and reuse relevant data when appropriate.*

Candidate: Now I need to estimate the average number of years it takes for a driver to wear the tires out on his or her car. I believe I remember from commercials that tires are rated with an average of 60,000-to-80,000-mile warranties. If we assume that an average driver covers about 15,000 miles per year that means each car needs its tires replaced about once every four years. This means about 40 million cars require new tires to replace old worn-out ones each year—approximately 160 million additional new tires for used cars.

> TIP

Communication skills are as much a part of the market-sizing interview as the assumptions and answers you deliver.

» *The candidate is doing well with one of the rules of market-sizing questions: using nice round numbers that are easy to divide and multiply into other round numbers. This not only will ease and speed up his estimation efforts, it will let him focus on the assumptions he is making—and communicating those assumptions as he works his way through the answer—rather than on the actual mathematics. You are not being hired for your ability to do cube roots*

and multiply seven-digit numbers in your head. You are being hired to think creatively and logically with uncertain information at hand. Therefore, using round numbers will help you focus on what's important in a market-sizing interview: your thinking, not your math. That said, there is no shame in pulling out a pencil and paper if your case question starts to involve so many numbers or assumptions for a particular estimate that you need to write a few down to keep your thinking straight. Interviewers do not deduct points for candidates who assist their thinking by writing—unless of course all you do is write and you fail to share your progress and thinking at every step with your interviewer. Communication skills are as much a part of the market-sizing interview as are the assumptions and answers you deliver.

Candidate: So, we have what I believe are the two major sources of demand for new auto tires estimated. These add up to 224 million new tires per year.

Interviewer: Have you thought of any other potential sources of demand for new tires? I can think of a few myself. Can you come up with a few more?

» *The interviewer is trying to put the candidate on the ropes. Her question suggests that the interviewer has a particular answer or idea that she wants the candidate to figure out. Don't get flustered if the interviewer takes this tactic at the midpoint in a case interview you believe has been going well. Sometimes it's simply a way to assess how a candidate will react under stress. Take a moment, then calmly proceed to develop a more detailed and refined answer. Your interviewer will let you know when you are approaching a sufficient estimate, just as she will let you know that a longer and more detailed estimate is expected.*

Candidate: One additional source of demand I haven't addressed yet is flat tires and damaged single tires, both of which need to be replaced on a one-off basis. Would

it be helpful to develop an estimate for these tire sales to add to the estimate I've developed so far?

» *Good job. The candidate demonstrates here that he is able to think about special circumstances, which would add to the market sizing. Although these lesser-order sources of demand or supply in market-sizing questions sometimes do not add materially to the estimated number, it's useful to acknowledge that you consider them and ask the interviewer if she'd like you to augment your estimate with deeper thinking.*

Interviewer: That's all right. I believe that you've covered the two largest sources of demand for new auto tires each year, so I think we can settle on 224 million as your estimated annual sales number. I trust you could get a more refined estimate by adding more, smaller sources of new tire demand if we kept pursuing it. We're close enough with what you've given me thus far, so let's move on. Well done.

» *By simply acknowledging the candidate's ability to go deeper, without actually asking him to do the additional estimating and thinking required, the interviewer demonstrates that she was indeed simply trying to gauge what the candidate's reaction would be to a little pressure or stress in the midst of problem solving.*

While a little unsettling to a candidate whose confidence may be growing as he moves smoothly through a case, this is by no means out of the ordinary. The candidate did a great job addressing the challenge—and the interviewer acknowledged this by concluding the case in order to use the remaining time in the interview for other problems and discussions. This is a sign that the candidate has done well and has satisfied the interviewer's desire to witness and understand the candidate's logical thinking skills. Well done.

CASE 14

How many sheets of paper would it take to completely encircle the earth at the equator?

» *This isn't a brainteaser. It's actually a market-sizing question that is perhaps deceptively simple—be forewarned that some wrinkles may emerge. This question would be appropriate for undergrads and advanced-degree candidates.*

Bad Answers

Candidate: That's a stupid question. Why are these case interviews always so random? I'm trying to get a consulting job. I didn't go to a top school to do silly estimates about the size of the earth.

» *It's never smart to insult the interviewer or the process. The case interview process is what it is and you're not going to change it. Plus, though no system is perfect, the case interview has proven to be a good predictor of consulting success. In fact, if you don't enjoy the mental gymnastics of doing these problems, you probably won't enjoy consulting.*

Candidate: I have no idea. I don't know anything about the size of the earth. I was an English major. I thought these would be business cases.

» *While not as bad as opening by insulting the process, giving up or "punting" is clearly not the way to go either. You almost certainly will get a question whose topic is unfamiliar to you. That's part of the game. Buck up, use any related knowledge you do have, create a structure, and start making some clear assumptions.*

Good Answer

Candidate: Well, that's certainly an interesting question. I must admit, I don't know much at all about the size of the earth. Nevertheless, I'll give it my best shot and try to use what I do know, and I'll talk you through my thinking.

> TIP

Show enthusiasm for answering any case question put before you. Demonstrate that you have the high energy essential to succeed once you're hired.

» *Good start. The candidate admits to a hole in his knowledge, so the interviewer might be willing to cut him some slack initially. But the candidate also indicates his willingness to attack the problem and bring to bear what he does know. This is an important trait that interviewers are looking for. Plus, the candidate is most likely a bit nervous since he's not comfortable with the topic. A bit of initial reflection (remember to speak slowly and clearly) can calm you down as well as give you time to think!*

Candidate: Well, let's start with the paper, since I do know a thing or two about that. You know, it strikes me that the easiest way to tackle the situation would be to consider the paper lengthwise. It's common knowledge that a standard sheet of paper is 8.5 inches by 11 inches. Since 11 inches is pretty close to one foot, I'll just consider a sheet of paper to be 1 foot long.

Interviewer: That's clever. I must admit that I was originally thinking you'd consider the thickness of the sheet of paper, since that's obviously more complicated. But I like your style. You made a solid assumption and chose a path of less resistance. However, I reserve the right to ask you for a different version later in the interview.

» *Score one for the candidate. He's made a great assumption. Remember: round numbers, straightforward assumptions. Don't make things harder than they have to be.*

Candidate: OK, now for the hard part—the stuff I don't know as well. Let's see. I'll start with something I do know. I've taken a bunch of trips from New York to Los Angeles, and I'm pretty sure that the distance

between them is roughly 3,000 miles. I'm going to assume this is right if that's OK with you.

» *Solid start. Anchor in something you know and go from there. Your interviewer will tell you if she has a problem with your assumption. Otherwise, forge ahead.*

Candidate: I'd say there are a few ways to come at this. If I know that the U.S. is about 3,000 miles across and I then picture the handful of globes I've seen in libraries and such, it seems to me that you could fit about ten USA's around the center of the earth. That would imply 30,000 miles. I'll just assume a mile is around 5,000 feet and therefore that implies 150 million feet. Given my one-foot assumption for the length of the paper, this equates to 150 million sheets of paper. I know there's some rounding there, but I've at least rounded up on the paper size and down on the mile size.

» *Excellent round one. Nice round numbers, solid assumptions, awareness of the assumptions, and a decent first answer. This would almost be good enough, but the candidate is a star, so he isn't done.*

Candidate: But I want to double check this estimation if that's OK? The 30,000-mile figure feels about right, but let's look at it another way. I'm pretty comfortable with the 3,000 miles being the distance spanning the U.S. And I know that it takes about five hours to fly from New York to Los Angeles. That feels about right, because I seem to recall reading that 747s fly at about 600 miles per hour. So let me use those numbers to gut check my figures. I think it's about eight hours from Los Angeles to Tokyo, so let's call that 5,000 miles. So now I'm at 8,000 miles from New York to Tokyo.

» *This is a good approach: The candidate is using what he knows. When you've got a lot of data floating around, you've really got to make an effort to keep it all straight. Don't be afraid to write things down.*

Candidate: Next I'll go from Tokyo across Russia. I have no idea what that flying time is, but I know it's long. I know Russia is huge—the world's biggest country. I think it has something like ten time zones. So I bet it's about three times bigger than the U.S. Therefore, I'm going to say its 9,000 miles across. Now I'm at 17,000 miles from New York to the Ural Mountains.

I've never flown across Europe, but folks are always saying the European Union is similar in size and population to the U.S., so why don't I say it's the same 3,000 miles across? I think that's high, but it's close enough. That puts me at 20,000 miles so far. I've flown from London to New York and it takes about five hours. So, let's say that distance is 3,000 miles, the same as it is for New York to Los Angeles. That puts me at 23,000 miles total.

Of course, I've been flying up in the northern hemisphere for the most part—the distance is greater at the equator. I'll tack on another couple thousand miles and call it an even 25,000. That's within shouting distance of my original 30,000, so I'm feeling more comfortable. In this case, I'd multiply 25,000 by 5,000 to get 125 million pages of paper. Therefore, if I wanted to take a final step, I could average the two estimates and come out with somewhere between 130 million and 140 million sheets of paper.

Interviewer: That's pretty impressive for someone who didn't know anything about the size of the earth. Just be glad I didn't ask you about the distance to the sun (it's 93 million miles, by the way). I warned you at the beginning, though, that I might ask for a different version, so now you'll have to humor me: Let's quickly suppose you have to consider the thickness of the paper, not the length or the width.

Candidate: OK, that should be straightforward enough. Paper's pretty thin—too thin for me to think about it in terms of individual pieces. But I do have some experience loading laser printers (don't we all!). I know one of those packs of paper has 500

sheets, and I'd say it's about 3 inches thick. So that tells me there are 2,000 sheets of paper in a foot if you consider the thickness of the paper. Therefore, if we take my rough 130-million feet estimate and multiply that by 2,000, we get 260 billion sheets of paper at the equator. Let me check my zeros...Yep, that's my estimate.

» *Well done! The candidate has demonstrated a facility with numbers, a stick-to-itiveness, enthusiasm, creativity, and an ability to apply past learning to current problems. The candidate has responded to interviewer prompts and come up with reasonable answers that he's tested. It's certainly likely that somebody with no idea of the circumference of the earth would also have little knowledge of the distances from various cities. No matter. The point is that there are many ways to skin a cat. One quick point: Even in round-number examples like this one, it's easy to get lost in the commas and zeros. Don't be afraid to use pen and paper to keep things straight.*

CASE 15

How many pay phones are there in Manhattan?

» *This is a straightforward market-sizing question, which would be appropriate for undergraduates and advanced-degree candidates.*

Bad Answers

Candidate: No one uses phone booths anymore. Everyone has a cell. I was watching *Superman* with my nephew last month—oh, he is so cute—and he wanted to know what that weird little box was that the people stood in while using the phone.

» *Not a smart angle. Despite showing knowledge of pop culture, your interviewer will not be amused.*

Candidate: I saw that annoying Verizon guy in *The New York Times* yesterday. The article he was in stated

that there are 6,360 payphones in Manhattan. I have a photographic memory, so there's your answer.

» *Even if you know the answer, the more important thing is still the process. You may want to admit that you know the answer in case the interviewer wants to change the question. Either way, you still need to give a solid case interview answer to this question.*

Candidate: How am I supposed to know anything about Manhattan? I've never been there. I'm from Paris/San Francisco/Des Moines....

» *This might be a fair point. It's tough when you get a question that pertains to a topic about which you know nothing. And to be fair, if your interviewer knows that you have no experience with Manhattan, he likely won't ask you this question. But then again, maybe he will. So be ready. If you are indeed from Paris, jump in and say something like, "Well, I'm sorry, I know next to nothing about Manhattan. But I know it's a big city and I come from Paris, another big city. So I'll just use what I know about Paris and try to extrapolate from there...." Your interviewer should be fine with this tactic. If he's not, he'll probably provide some additional information to help get you started.*

Good Answer

Candidate: There are a couple of ways to go about answering this question, so I'll try to break it down into parts. I figure I'm going to have to come up with some notion of the size of Manhattan and also the likely locations of pay phones. I'll start with the size of Manhattan.

» *Good start. The candidate has successfully laid out two key pieces of data needed and has created a logical structure to use in walking the interviewer toward the answer.*

Candidate: Although I don't know Manhattan intimately, I do know there's a grid system in much of

the city, which should help us immeasurably. I know it doesn't cover the entire city and I know there are some non-numbered avenues in there like Park and Broadway, but I'll try to make some round assumptions.

I know the streets go at least as high as 125th Street in Harlem. And I think they go even higher, at least to 175th Street if I correctly recall the time I drove down into Manhattan. Plus, I know the southern tip of the island, the older part, doesn't have the grid. For example, down by Wall Street, it's kind of haphazard, like downtown Boston. So when I put all that together, I'm going to say there are 200 streets running east to west in Manhattan.

In terms of those running north to south, I know that there are somewhat more than ten avenues, plus the named, non-numbered streets. I will therefore say there are 15 streets running north to south. That leaves me with $200 \times 15 = 3,000$ intersections.

I'm going to think in terms of intersections and blocks, since I think that's easiest. Here, I've been scratching this down in a rough map; this is how I'm looking at it. I know there are some exceptions to the rules I've laid out, but my assumptions seem solid and the variations will likely balance each other out. Does this seem OK with you?

TIP

It's okay to factor a bit of intuition into your answers—that will come in handy in the business world, too.

» *Good job. The candidate is developing the structure and has quickly pulled together a number of solid assumptions. There were other bases for these assumptions, including land area or population, but the grid appears to be the easiest way to come up with them. The candidate has done well in making round-number assumptions. The interviewer is fine with his approach, so the candidate should keep on moving.*

Candidate: Now let me think about locations of pay phones. To keep it simple we can think about pay phones that are outside and pay phones that are inside. Outside areas will include things like street corners and the sides of buildings. Inside would be lobbies of buildings and such. I think there will be very few pay phones in residential buildings, so we are mostly talking office buildings, restaurants, and hotels.

» *Another good, quick summary that still has the candidate moving ahead confidently.*

Candidate: I'll start with the outdoor phones. I know I have the aforementioned 3,000 intersections. And there are four corners to every intersection. Now, I know some corners have no phones and others have a bank of phones. And that's not even covering the banks of phones that sometimes appear midblock on the sides of buildings. There are a lot of angles to consider, so I'll make the assumption that every other corner of every intersection has one phone, meaning two per intersection, meaning 6,000 outside phones in Manhattan. This number seems a little high to me, so why don't I make it 5,000.

» *This is a good piece of thinking. Clear, methodical assumptions with solid math. Stating your gut feel is OK, too. Those reactions can be valuable and often right. In a real-world situation, a gut feel might cause you to re-evaluate a position or try another angle. But for now, the interviewer is satisfied and so the candidate can move on.*

Candidate: Next, I have to come up with the number of pay phones inside buildings. This could be complicated, with restaurants, office buildings, hotels, and so on. Would you like me to be very granular here or shall I make some broader assumptions?

» *This is a reasonable question. The candidate is not trying to get off easy, but rather stating the facts. If there's*

enough time, the interviewer may allow the candidate to slog through a bunch of specific assumptions about types of establishments. In this case, he tells the candidate to make some broader assumptions.

Candidate: OK, I'll try to keep it broad. If I think about an intersection, there's probably an average of one restaurant, one office building, and a quarter of a hotel. This is assuming that on average each block is mostly residential. Let's just say there is one pay phone in the lobby of each type of building. I realize that some will have many more, but some might have none. So if I use my 3,000 intersections, that means $3,000 \times 2.25$. Well, that's going to be more than 6,000, which added to the 5,000 equates to 11,000 pay phones. That number seems too high. I'm going to revise my estimate and say there's one inside pay phone per intersection, which means 3,000 inside pay phones, which means 8,000 total. Hmmm. That still feels a bit high to me, but the assumptions seemed reasonable along the way. What do you think? Should I start over?

Interviewer: That's fine. I actually don't know the exact answer anyway. What I wanted was your thought process and it's been good so far. Let's look at your little map sketch, though, and think through briefly what wrinkles or other assumptions you'd test if you had more time. Just run through them for me.

» *In some cases, your interviewer will not know the exact answer. Once again, that's because the exact answer doesn't matter. The process does, however, along with your performance and attitude. In this case, the candidate's gut reaction was effective and relevant and has led to this final chance to shine.*

Candidate: There are a number of things I'd look at. First of all, you've got Central Park sitting in the middle of Manhattan. And it's big. So that would be a big hole in my grid assumptions. You'd have to knock out a lot of intersections. Next, you have the issue of the streets

and the avenues on the edge of the island only having one or two accessible corners, not always four. Finally, when looking at the number of buildings in a block, I'd probably be better off thinking in square blocks, since buildings are large. Finally, because my gut tells me the results aren't quite right, I'd want to triangulate with some more methods. Probably a course of assumptions using phones per population would be reasonable.

» *A fine effort. This question was deceptively simple, but the candidate has done a good job. The lesson as always: You don't have to be right, but you do have to do the case right. Make good assumptions, nail the math, listen to your gut reactions, summarize, talk out loud, lay out a plan, and follow it. All these things are what count. This is a case in which jotting down thoughts, or the map in this case, will help you a great deal.*

>> The WetFeet Story

WetFeet was founded in 1994 by Stanford MBAs Gary Alpert and Steve Pollock. While exploring their next career moves, they needed products like the *WetFeet Insider Guides* to guide them through their research and interviews. But these resources didn't exist yet—so they started writing! Since then, millions of job seekers have used the *WetFeet Insider Guides* and WetFeet.com to research their next career move.

In 2007 WetFeet became part of Universum Communications, the global leader in employer branding. Thanks to the integration of WetFeet into the Universum group, WetFeet products are now used by job seekers all over the world. In addition to our *Insider Guides* and WetFeet.com, we produce *WetFeet* magazine, which features career advice tailored to undergraduate students.

>> The WetFeet Name

The inspiration for our name comes from a popular business school case study about L.L. Bean, the successful mail-order company. Leon Leonwood Bean got his start because he literally got his feet wet: Every time he went hunting in the Maine woods, his shoes leaked. One day he set out to make a better hunting shoe, doing such a good job that his friends lined up to buy pairs of the boots. And so L.L. Bean was born.

The lesson we took from the Bean case? Well, it shows that getting your feet wet is the first step toward achieving success. And that's what WetFeet is here for: To help you get your feet wet and take the right steps toward ever-greater career goals, whatever they may be.



»» All consulting candidates will face some form of the market-sizing case. Designed to test your facility with logic and numbers, a market-sizing question may stand on its own or be part of a larger case. Either way, you'll need to juggle your skills in quantitative analysis and employ common sense. Fortunately, by studying up on the case process and honing your case interview skills through practice, you'll be crunching numbers with ease and impressing interviewers with your explanations in no time.



Illustration by mokibillo

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