

# Context of Quant Problems in Case Interviews

## Overview

This lesson discusses the context of quantitative problems in Case Interviews, the flow of a typical Case Interview (**Case Flow**), and why Management Consulting firms assess the quantitative skills of candidates. Much of the material in this lesson is covered in articles linked to from the *FastMath Ace the Case* Course Page. I'm including the content here in case you didn't read it previously and because this information is very relevant to preparing for Case Interviews and so I want this information to be part of the course materials as well.

## What is a Case Interview?

A "**Case Interview**" is a specific type and format of interview originally given to candidates applying to Consulting positions at Management Consulting firms like McKinsey, Bain, and BCG. These firms are some of the most prestigious companies in the world, and many future business leaders have worked as Consultants at these and other Management Consulting firms. Anybody interviewing for a Consulting position at a Management Consulting firm will likely receive Case Interviews with a quantitative component in their interview process. Many former Management Consultants have subsequently taken jobs at other companies in Strategy, Marketing, Finance, Product Management and Business Development, and use the Management Consulting-style Case Interview when they interview candidates. Case Interviews have therefore started to be used to evaluate candidates applying for jobs outside of Management Consulting. In this series of articles the term "Case Interview" refers to the Management Consulting style of Case Interview, regardless of whether a Management Consulting firm gives them, or another firm using the same style of interview.

Case Interviews require the interview candidate to discuss, analyze, diagnose, and ideally solve a business problem encountered by a company. These "Cases" are usually based on real Consulting work that the Management Consulting firm has done for a client. Case Interviews frequently have a quantitative component that requires candidates to perform quantitative analysis without calculators, spreadsheets, or other electronic aids. A candidate's performance in the quantitative component of the Case Interview often plays a significant factor in their overall evaluation and decision of whether or not to extend an offer.

## Strong Quantitative Skills are Needed as a Management Consultant

Strong math and quantitative (quant) skills are essential skills for Management Consultants. Clients will often hire Management Consulting firms to develop recommendations that will maximize profitability or valuation for the client. To develop their recommendations, Management Consultants perform comprehensive quantitative analysis and model the financial results of a range of options the client could pursue. Therefore, the ability to perform quantitative analysis on data and develop insights and recommendations based on that quantitative analysis is a critical skill for Management Consultants.

In addition to being able to perform quantitative analysis, effective Management Consultants need several additional quantitative skills. They need the ability to determine what kinds of quantitative analysis are relevant to accomplishing the client's specific goals. Furthermore, Management Consultants need to be able to identify what specific data and information are relevant to the client's specific problem, and are required to perform the necessary analysis. Having these skills allows Management Consultants to collect only the data relevant to the problem, and to determine what additional data is needed beyond what is currently available.



Management Consultants are primarily hired for their analytical ability, and **not** for “creative” or “communications” work, such as developing advertising campaigns or for PR/communications. Companies will usually work with a specialized firm like an advertising agency, PR or communications firm for these needs. Management Consultants have historically not been very involved in the creative aspects of Product Design, although that is changing as McKinsey has acquired several Product Design consulting firms (Lunar and Veryday). Therefore, if you are primarily a creative or communications person, being a Management Consultant is probably not the best role for you. Clients primarily hire Management Consultants for fact-based analytical research and quantitative analysis. Sometimes the quantitative and analytical work that Management Consultants do will influence Product Design by showing that certain consumers’ needs are unmet—hence the recent McKinsey acquisitions of several Product Design consulting firms.

## Why Consulting Firms Evaluate Quantitative Skills

As discussed previously, quantitative skills are required to be an effective Management Consultant, and therefore the Management Consulting firms assess these skills in their interviews. Management Consulting firms also have a surplus of qualified candidates, which would be magnified if the consulting firms did not eliminate people for having sub-par quant skills or did not include quant skills in their overall assessment of a candidate. For these reasons Management Consulting firms use a candidate’s quantitative skill level as an important factor in selecting candidates.

In short, Management Consulting firms evaluate a candidate’s quant skills because quant skills are important—and because they can; top Management Consulting firms can still find enough qualified candidates if they include quantitative skills in their evaluation criteria. Consider it from the Consulting firm’s perspective: given two strong candidates who are otherwise equal—except that one has strong quant skills and the other has poor quant skills and could potentially damage the firm’s credibility with clients—which candidate would you hire?

## Math Problems within the Context of Case Interviews

Management Consulting firms have historically evaluated a candidates’ quantitative skills by including quantitative components within Case Interviews. However, giving Case Interviews is very time and resource intensive for the Management Consulting firms, because Consultants, who could otherwise be doing work for clients, are needed to give the Case Interviews. In order to reduce the resources required to assess candidates’ quantitative and analytical skills, several Management Consulting firms are experimenting with requiring some candidates to take a written test that includes quantitative problems. For example, McKinsey gives the Problem Solving Test (**PST**) to non-MBA Advanced Degree candidates and BCG has experiment with a similar test. In the future, additional Management Consulting firms may require even more candidates to take a written test before being invited to Case Interviews. After passing a written test (if required), successful candidates usually go through a minimum of five Case Interviews. Not all Case Interviews have a quantitative component — but most do, and in course of five Case Interviews you will almost certainly encounter several quant problems.

The quantitative problems themselves are embedded within the context of the Case Interview, and are usually part of the analysis needed to solve the business problem and develop recommendations. Some problems or questions frequently encountered in **Case Interviews** are: how a client can increase profits, increase revenue, or increase revenue growth rates; how a client can cut costs; whether the client should buy another company; or what the client’s international expansion strategy should be. Candidates will frequently need to quantitatively evaluate different potential actions to determine which one will have the most value to the client, which is often measured by the resulting increase in profit or valuation for a for-profit company, and other metrics for non-profit or government clients.

As an example, the overall Case could focus on identifying how a large multinational manufacturing firm could increase profits after having seen several years of declining profits (or increasing losses). As a candidate, you should begin by providing a **Structure** for the areas you would like to investigate further,

and then ask more detailed **Questions** about each of these areas to specify what information you would like to gather. This phase of the Case Interview is meant to mimic the actual research you would conduct as a Consultant if you faced this scenario. For example, in your **Structure**, you might say that you would look at the different Products the manufacturing firm sells, the Competitors, overall Market Dynamics, and Cost information. For your more detailed questions, you might find it useful to know the Revenue and Profit for each Product the firm offers. You might also want to know Revenue and Market share for the Competitors. You would ask relevant and more specific questions for each topic in your **Structure**. If you identify the “Right” areas to investigate and ask the “Right” **Questions**, then the interviewer will usually provide additional quantitative **Data** and ask you to **Analyze** it.

The specific type of quantitative analysis required of candidates in Case Interviews varies substantially from interview to interview. You could be given numerical data and be asked to calculate metrics, where the specific mathematical operations you need to perform are relatively clear. An example of this type of calculation would be if you are given the Price and Quantity (number of units sold) for a series of Products and asked to calculate the Revenue for each Product, which would be the Price multiplied by the Quantity for each Product.

You could also be asked to perform more complex analysis where you need to identify the approach, and the specific calculations required **may not** be clear. For example, you may be asked how the client should prioritize their limited production capacity among several different products. You would then need to determine the criteria you would use to prioritize the products and perform the required analysis. You might be given data or shown graphs and asked what conclusions or insights you can draw from that data. Or, you may not be given any data until you ask specifically for data relevant to the Case. Once you ask the “proper questions” the interviewer will usually provide some guidance on the analysis they would like you to perform. Candidates are also frequently given charts, graphs or data tables and asked to interpret them.

After performing your analysis, you will usually be asked to provide **Recommendations** for the client, and you may be asked to **Brain-storm** creative ways to solve the problem. Finally, you will usually be asked to **Summarize** the overall problem, your research, and your “findings.”

## Case Flow

The diagram below shows overall flow of a typical Case Interview:



As a candidate, you will be expected to do the following in the quantitative portion of case interviews:

- Understand the quant question
- Determine what information or data is relevant
- Identify if additional data (beyond what has currently been given to you) is required and ask for that data
- Identify how to calculate the answer
- Perform the calculation
- Interpret the result and develop recommendations based on the result within the context of the business case

The **Data** and **Analysis** stages of the Case interview are certainly the most quantitatively intensive. However, having a quant-oriented approach and mindset will also influence the way you **Structure** your research, the **Questions** you ask and your **Recommendations**. Any quantitative findings should also be included in the Summary. Therefore, quantitative skills are relevant and important to **most** of the Case Interview.

## Weight of Quant Skills in Interviews

Quant skills are only one of the skills assessed in Case Interviews. As a candidate, you are evaluated on your overall combination of skills and your perceived potential. Generally, a candidate's quantitative assessment consists of **20–25 %** of the **overall** interview evaluation weight. The goal of Management Consulting firms is to find the set of candidates with what they perceive are the best set of skills overall.

Most firms have a “minimum bar” for quant skills for their candidates, which means you are unlikely to receive an offer if you do not exceed this bar—unless you are otherwise a **highly exceptional** candidate (such as being a Rhodes Scholar). At some firms, dramatically exceeding this “bar” does **not** strengthen your candidacy—that is, the quantitative evaluation is binary: you either pass the quant assessment or you don't. At other firms, such as McKinsey, if you can demonstrate very strong quantitative skills it will differentiate you from other candidates. The quant problems from these firms can be more complex, which allows candidates with strong quant skills to fully demonstrate their ability. The corollary is that, for some very complex quant problems, you **don't** need to correctly solve all the components to receive an offer.

The relative importance of quantitative skills in the Case Interview varies by firm, office and the individual interviewer. As an example, if you are interviewing with a Consulting firm partner who has a PhD in a very quantitative field like Applied Mathematics or Physics, they may ask more challenging quant questions and place a greater emphasis on quant skills in their interviews. McKinsey, in particular, places more emphasis on quant skills than other firms, and, as mentioned previously, demonstrating exceptional quant skills can greatly strengthen your candidacy at McKinsey.

Given the large weighting of 20–25% that quant skills have in Consulting interviews—and the quant “minimum bar” at most Consulting firms—you can certainly sink your chances of receiving an offer if you perform poorly in the quant portion of the interview.

## No Calculators Allowed in Case Interviews

Be aware that, in Case Interviews, you cannot use calculators or spreadsheets. All your calculations must be done with pen and paper, or mentally.



There are a number of reasons calculations must be done without calculators or spreadsheets. First, the Management Consulting firms want their Consultants to be comfortable with numbers and don't want employees to rely on calculators for simple calculations. Furthermore, clients pay a significant amount of money to hire Management Consultants, and the Consulting firms would lose credibility if their consultants make mistakes when doing mental or pen-and-paper calculations in meetings.

## Summary

Quant skills are needed to be an effective Management Consultant; hence, they are assessed in Management Consulting Case Interviews. Quant skills are one several skills Management Consulting



firms assess in their interviews. At most firms, if you do not exceed a “minimum bar” for quant skills, it is unlikely you will receive an offer. You cannot use calculators or spreadsheets in Management Consulting interviews, and the assessment of your quant skills usually contributes about 20–25% of the overall interview evaluation weight.