How to Ace a Google Interview

Brain teasers like the ones used for hiring by the Internet giant are spreading to other picky employers.

By WILLIAM POUNDSTONE

Imagine a man named Jim. He's applying for a job at Google. Jim knows that the odds are stacked against him. Google receives a million job applications a year. It's estimated that only about 1 in 130 applications results in a job. By comparison, about 1 in 14 high-school students applying to Harvard gets accepted.

Jim's first interviewer is late and sweaty: He's biked to work. He starts with some polite questions about Jim's work history. Jim eagerly explains his short career. The interviewer doesn't look at him. He's tapping away at his laptop, taking notes. "The next question I'm going to ask," he says, "is a little unusual."

You are shrunk to the height of a nickel and thrown into a blender. Your mass is reduced so that your density is the same as usual. The blades start moving in 60 seconds. What do you do?
Google receives a million job applications a year.

The interviewer looks up from his laptop, grinning like a maniac with a new toy.

"I would take the change in my pocket and throw it into the blender motor to jam it," Jim says.

The interviewer's tapping resumes. "The inside of a blender is sealed," he counters, with the air of someone who's heard it all before. "If you could throw pocket change into the mechanism, then your smoothie would leak into it."

"Right... um... I would take off my belt and shirt, then. I'd tear the shirt into strips to make a rope, with the belt, too, maybe. Then I'd tie my shoes to the end of the rope and use it like a lasso."

Furious key clicks.

"I don't mean a lasso," Jim plows on. "What are those things Argentinian cowboys throw? It's like a weight at the end of a rope."

No answer. Jim now realizes that his idea is lame, but he feels compelled to complete it. "I'd throw the weights over the top of the blender jar. Then I'd climb out."

"The 'weights' are just your shoes," the interviewer says. "How would they support your body's weight? You weigh more than your shoes do."

Jim doesn't know. That's the end of it. The interviewer begins ticking off quibbles one by one. He isn't sure whether Jim's shirt—shrunken with the rest of him—could be made into a rope that would be long enough. Once Jim got to the top of the jar—if he got there—how would he get down again? Could he realistically make a rope in 60 seconds?
Jim doesn't see where a word like "realistic" comes into play—unless Google has a shrinking ray.

"It was nice meeting you," the interviewer says, extending a still-damp hand.

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Jim isn't quite imaginary. He's a composite. For the last eight years I've collected interview questions. The blender question is real. Several Google interviewees recounted to me what happened when they came up against it. And though Google doesn't comment on the specifics of its hiring process—it likes to maintain an air of mystery, which has led to a cottage industry of samizdat Google questions passed among hopeful future employees and curious outsiders—former and current Google HR specialists have shared rather freely with me what it is that motivates the way they interview job candidates.

“You are shrunk to the height of a nickel and thrown into a blender. Your mass is reduced so that your density is the same as usual. The blades start moving in 60 seconds. What do you do?”

We'll get to the longer answer, but the short answer is that Google isn't looking for the smartest, or even the most technically capable, candidates. Google is looking for the candidates who will best fit Google.
That's tougher than it sounds. And the dilemma Google faces is emblematic of our depressed knowledge economy. We live in an age of desperation. But in our current economic climate, employee screening has become more, not less, important. In a boom, companies could afford to be cavalier about hiring. If a worker didn't fit, he or she would soon move on. Today, employees cling to jobs like limpets to wet rocks. The only way to get rid of someone is to fire him (an increasingly fraught maneuver in our litigious society). Thus, the flood of job applicants has to be strained more finely than ever before, as even unsexy firms find themselves with multiple well-qualified applicants for each position.

How are companies coping with this new environment? In September 2009, the Labor Department reported that job seekers outnumbered job openings by 6 to 1. These unemployment numbers have spread riddles, loaded questions and multiple-interview marathons across the corporate food chain, into mature and less cutting-edge industries. Each year Glassdoor.com compiles a list of "oddball" interview questions (puzzles, riddles and the like) reported by members. In the most recent list, only about a quarter of such questions came from tech firms. The rest were from mainstream corporations, from Aflac to Volkswagen.

"If you could be any superhero, who would it be?"

"What color best represents your personality?"

"What animal are you?"

These questions, posted by job candidates on Glassdoor.com, aren't from some wacky Silicon Valley start-up—they're asked of applicants at AT&T, Johnson & Johnson and Bank of America, respectively.

Goldman Sachs interviewers ask candidates the firm's stock price. Morgan Stanley asks interviewees to name a recent story they've read in the Financial Times—apparently, a lot can't. J.P. Morgan Chase asks the value of pi. (It's thought to be instructive to see how many digits the candidate can recite.)

Since being a math or tech whiz is irrelevant to running most businesses, some companies have redoubled their efforts to find the perfect match of candidate and corporate personality. Whole Foods interviewers have candidates describe their perfect "last meal." It's a quick way of gauging the applicant's knowledge of food and passion for it. Expedia does the same thing with travel, asking questions like "If you could go camping anywhere, where would you put your tent?"

The online retailer Zappos has a trickier question: "On a scale of 1 to 10, how weird are you?" The preferred answer is somewhere in the middle, CEO Tony Hsieh explained in a speech to the Asia Society in 2010. A 1 "might be a little bit too straitlaced for the Zappos culture," and a 10 "might be a little too psychotic."

Does any of this work? Weird interview questions have become a meme, like a joke or a viral video. It's catchiness, rather than proof of their effectiveness, that keeps them in circulation at
many companies. But folks who believe they need to shake up the traditional method of hiring—
the standard job interview—are certainly on to something.

The deep, dark secret of human resources is that traditional job interviews don't work very well.
In fact, there's been quite a bit of research on the topic. One example is a famous experiment that
interviews. People who saw 10-second clips of an interview had roughly the same opinion of the
interview subject as did the actual interviewer—making a strong case that job interviewers go by
first appearances and are fooling themselves into believing they've gleaned additional
information from everything that comes after.

Unfortunately, the human-resources profession has yet to identify a widely accepted alternative.
But it's hardly been from lack of trying. Some companies have used "biodata" (a mash-up of the
words biography and data). In World War II, it was found that promising pilots could be
identified with a simple question: "Did you ever build a model airplane that flew?" In the 1950s,
the emerging computer industry latched onto logic puzzles as an attempt, however makeshift, to
to identify those capable of thinking in new ways.

Does the puzzle approach popularized by the tech industry work? A controlled experiment is
difficult—you would have to ask a lot of applicants the same question, record the results and
then hire them all.

“The best answers to many of the questions begin with, 'It depends.'”

But these types of questions do reflect the general findings of employment psychology. There is
significant evidence that "work sampling," the use of tests similar to the work being performed,
is a better predictor of future performance than the usual job-interview chit-chat. Google does a
lot of work sampling, such as requiring coders to write code in the interview. The rationale for
the creative-thinking questions is that they test the type of mental processes used in inventing a
new product or developing a new business plan.

So how do you measure a talent for invention? The blender riddle encapsulates the process of
inventing a new product. You begin by brainstorming. There are many possible answers, and you
shouldn't be in a hurry to settle for the first idea that seems "good enough."

The two most popular serious answers to the blender riddle seem to be (1) lie down, below the
blades and (2) stand to the side of the blades. There ought to be at least a nickel's width of
clearance between the whirling blades and the bottom or sides of the blender jar. Another
common reply is (3) climb atop the blades and position your center of gravity over the axis. Hold
tight.

None of the above answers scores you many points at Google. Former and current Google
interviewers have told me that the best answer they've heard is: Jump out of the jar.

Huh?
The question supplies an important clue: the word "density." "Being shrunk to the size of a nickel" is not a realistic predicament. For starters, it might mean eliminating 99.99% of the neurons in your brain. To deal with a question like this, you have to decide where to suspend disbelief.

The fact that the interviewer mentions a detail like density is a nudge. It says that things like mass and volume matter in this question and that a successful answer can use simple physics.

In short, if were you shrunk to 1/10 your present height, your muscles would be only 1/100 as powerful—but you'd weigh a mere 1/1,000 as much. All else being equal, small creatures are "stronger" in lifting their bodies against gravity. Were you shrunk to nickel size, you'd be strong enough to leap like Superman, right out of the blender. Think of the feats performed by fleas in a flea circus.

That is the kernel of a good answer to the question. But Google's interviewers are not just looking for someone who has the basic idea. The best answers to many of the questions begin with, "It depends."

What's the most efficient way to sort a million 32-bit integers?

It depends on the makeup of the list of integers and the constraints of time and memory. The applicant is expected to ask about these things. In general, Google is not trying to fill a particular job. The way the company morphs and grows, they want to find people who can join in one role and end up doing something completely different.

Google has tried biodata. "Did you ever make a computer from a kit?" was one question that the company found could isolate candidates with a lifelong passion for computers. But such methods have been de-emphasized in favor of its sometimes quirky interviewing process.

Design an evacuation plan for San Francisco.

Use a programming language to describe a chicken.

What is the most beautiful equation you have ever seen? Explain.

By design, none of these questions has a right answer. This has led to intense speculation and even paranoia among Google job candidates. It's also led to other companies adopting Google-esque questions without having any idea what constitutes a good answer.

Fifteen million Americans are now out of work, and many of them can expect to come into contact with this new and alien culture of intense interviewing practices. The blender question is a metaphor. The growth of a company, or of anything we humans care about, is all about change of scale. Solutions that work when something is small do not necessarily work as its scope expands.
Google's quirky interviewing works for Google. But other companies need to understand why it works at the tech giant—and how it might intelligently be adapted to other contexts. And job candidates need to understand what kind of thinking and skills are being sought by firms that are hiring. Often, all it takes to succeed is one good mental leap. But it's important not to jump out of the blender and into the fire.

5 Google Interview Questions

1. What's the next number in this sequence: 10, 9, 60, 90, 70, 66 … ?
   
   *Asked at Google*

2. You're in a car with a helium balloon on a string that is tied to the floor. The windows are closed. When you step on the gas pedal, what happens to the balloon—does it move forward, move backward, or stay put?
   
   *Asked at Microsoft*

3. Using only a four-minute hourglass and a seven-minute hourglass, measure exactly nine minutes—without the process taking longer than nine minutes.
   
   *Asked at Google*

4. A book has N pages, numbered the usual way, from 1 to N. The total number of digits in the page numbers is 1,095. How many pages does the book have?

   *Asked at Google*

5. A man pushed his car to a hotel and lost his fortune. What happened?
   
   *Asked at Google*


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Answers to Google Interview Questions

1. What's the next number in this sequence: 10, 9, 60, 90, 70, 66 … ?

   A. Spell the numbers out:

   Ten

   Nine

   Sixty
Ninety
Seventy
Sixty-six

They are in ascending order, based on the number of letters in the spelled-out numbers. A correct response will have nine letters: 96, for instance. A cleverer answer is "one googol." That's the huge number that can be written as a "1" with a hundred zeros after it. Google, the company's name, was originally a misspelling of "googol."

2. You're in a car with a helium balloon on a string that is tied to the floor. The windows are closed. When you step on the gas pedal, what happens to the balloon—does it move forward, move backward, or stay put?

A. The near-universal intuition is that the balloon leans backward as you accelerate. Well, the intuition is wrong. Your job is to deduce how the balloon does move and to explain it to the interviewer.

When you step on the gas pedal, what happens to the balloon?

One good response is to draw an analogy to a spirit level. For the not so handy, a spirit level is the little gizmo carpenters use to make sure a surface is horizontal. It contains a narrow glass tube of colored liquid with a bubble in it. Whenever the spirit level rests on a perfectly horizontal surface, the bubble hovers in the middle of the tube. When the surface isn't so level, the bubble
migrates to the higher end of the tube. The takeaway here is that the bubble is simply a "hole" in the liquid. When the surface isn't level, gravity pulls the liquid toward the lower end. This pushes the bubble wherever the liquid isn't—toward the opposite end.

Untie the helium balloon and let it hit the moonroof. It becomes a spirit level. The balloon is a "bubble" of lower-density helium in higher-density air, all sealed in a container (the car).

Gravity pulls the heavy air downward, forcing the light balloon against the moonroof.

When the car accelerates, the air is pushed backward, just as your body is. This sends a lighter-than-air balloon forward. When the car brakes suddenly, the air piles up in front of the windshield. This sends the balloon backward. Centrifugal force pushes the air away from the turn and sends the balloon toward the center of the turn. Of course, the same applies when the balloon is tied to something; it's just less free to move. The short answer to this question is that the balloon nods in the direction of any acceleration.

3. Using only a four-minute hourglass and a seven-minute hourglass, measure exactly nine minutes—without the process taking longer than nine minutes.

![Diagram of hourglasses](image)

Jason Lee

Using only a four-minute hourglass and a seven-minute hourglass, measure exactly nine minutes.

A. Start both hourglasses at 0 minutes. Flip over the four-minute glass when it runs out (at 4:00); ditto for the seven-minute glass (at 7:00). When the four-minute glass runs out the second time (at 8:00), the seven-minute glass will then have one minute of sand in its lower bulb. Flip the
seven-minute glass over again and let the minute of sand run back. When the last grain falls, that will be nine minutes.

4. A book has N pages, numbered the usual way, from 1 to N. The total number of digits in the page numbers is 1,095. How many pages does the book have?

How many pages does the book have?

A. Every page number has a digit in the units column. With N pages, that's N digits right there. All but the first 9 pages have a digit in the tens column. That's N - 9 more digits.

All but the first 99 pages have a digit in the hundreds column (accounting for N - 99 more digits).

I could go on, but not many books have more than 999 pages. A book with 1,095 digits in its page numbers won't, anyway.

This means that 1,095 must equal:

\[ N + (N - 9) + (N - 99). \]

This can be simplified to:

\[ 1,095 = 3N - 108. \]
That means that $3N = 1,203$, or $N = 401$. That's the answer, 401 pages.

5. A man pushed his car to a hotel and lost his fortune. What happened?

A. He was playing Monopoly.