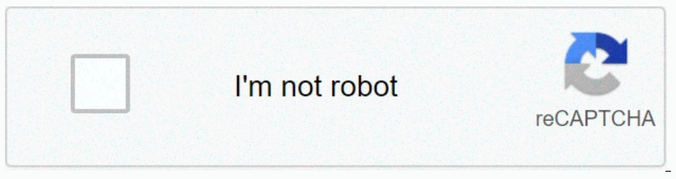

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Number bases pdf

Math boils down to pattern recognition. We identify patterns in the world around us and use them to navigate its challenges. To do all this, however, we need figures - or at least the information that our figures represent. What are numbers? As we will explore more later, it is a deceptively deep question, but you already know the simple answer. A number is a word and symbol that represents a count. Let's say you go outside your home and see two angry dogs. Even if you don't know the word two or know what the corresponding number looks like, your brain would have a good understanding of how a two-dog encounter compares to a three-, one- or zero-dog situation. We owe that innate understanding to our brain (specifically, inferior parietal lobe), which naturally extracts numbers from the surrounding environment in much the same way it identifies colors [source: Dehaene]. We call this number sense, and our brains come fully equipped with it from birth. Studies show that while infants have no understanding of human numeracy systems, they can still identify changes in volume. Neuroimaging research has even discovered that infants possess the ability to engage in logarithmic counting, or count based on integrated increases in physical volume. While a baby won't see the difference between five teddy bears and six teddy bears in a lineup, he or she will notice a difference between five and 10 [source: Miller]. Talsans play a crucial role in the way animals navigate their surroundings – environments where objects are many and often mobile. But an animal's numerical sense is becoming more imprecise with increasing numbers. Humans, for example, are systematically slower to calculate 4+ 5 than 2 + 3 [source: Dehaene]. At some point in our ancient past, prehistoric humans began to develop a means of increasing their sense of meaning. They started counting on their fingers and toes. That's why so many numerical systems rely on groups of five, 10, or 20. Base-10 or decimal systems originate from the use of both hands, while base-20 or vigesimal systems are based on the use of fingers and toes. So old people learned to externalize their number of minds, and thus, they arguably created humanity's most important scientific achievement: mathematics. I came across this ING Your number marketing trick the other day and thought it was perfect for a bright Friday post :) Although the trick probably isn't the best term to use here, more like marketing genius! Create a fun financial game for us geeks, and then have every blog about it! Haha... It's a good thing we love you ING. But yes, after giving it a spin myself, it looks like my number (Retirement Number, that is) is $2 million $652,000+. That's a lot! But then again, my ultimate goal is probably one more extreme than the average American out there (who (as see below). Here are the questions they ask you, along with the answers I gave. Feel free to fudge those you don't know and just do your best. Some of them were harder than you might expect! What is your pension number? How old are you? 30 Are you married? Yes What is your current household income? $100,000. This swings on Madam page projects @ grad school, along with all my side hustles. At what age do you plan to retire? 40 :) Although the better question to ask is, At what age would you like to retire, even if you will continue to work on things you love anyway? I personally want to be as close to financially free at 40 as possible. Which means you don't have to worry about money, and lots and lots of meaningful work! Or travel, or whatever my old heart wants. How much annual income will you need during retirement? Yes, no idea. I put down $60,000, but it's really a shot in the dark. I'd have to run the numbers and really think about this one a bit, but it's sure not happening right now. I'm way to relax this Friday to find out ;) Provide income through what age? Again, no idea! And really it's kinda freaky if you ask me, haha... I had 80 down there but then realized it would mean I would die at 81, so I changed it to 99 :) I feel like I'd be happy to go right before the big 100, wouldn't you? And then wha-bang! Out comes your ING number. Obviously it's not a perfect science (esp with the last 2 zingers), but it gives you an idea of the things to think about when you plan ahead that way. The age at which you retire and the length you live is very very important! Same with your lifestyle at the time and a billion other things, especially like your health. But it's supposed to be quick & fun, so I'm sure a lot of them were left out on purpose. The message at the top summed up all this perfectly: The earlier you start thinking about your future, the easier it will be to reach your number and enjoy retirement. Yes!! And now it's your turn :) Spend minute and a half filling the answers out yourself, and then come back and drop your number in the comments. No signing up for this or 000 or anything, just use 'em and lose 'em and then get back to great poppa ;) ——— PS: My Money Blog's number is $2,048,822.00 PPS: Consumerism Comment is somewhere around $3,000,000 PPPS: And I think I have some ING Referrals left if anyone wants one. You get either $10 or $20 for free just to open an account, I can't remember the exact details, but just email me if you're interested and we'll make it happen. j (that) budgets are sexy (dot) com. Jay loves to talk about money, collect coins, crack hip-hop, and hang out with his three beautiful boys. You can all his online projects on jmoney.biz. Thanks for Blog! There is a calculus for knitting. An untamed batch of wool is twisted and fed into a rotating wheel, a wooden contraption about as high-tech as an abacus that ties the fibers into a single string of yarn. This yarn, on the other hand, is woven into geometric design consisting of equations: A certain number of rows combined with certain stitches provide something functional and beautiful. In the right hands, knitting produces a precise but almost magical alchemy-chaos in order. You can see why it would appeal to Brenda Dietrich.Dietrich, 47, runs the mathematics science department at IBM's famed Thomas J. Watson Research Center-the chief math manager at arguably the largest and most important mathematics department in corporate America. She loves maths beauty and complexity. Still, she often uses conference calls and encounters spinning yarn on the steering wheel next to her ThinkPad. And she knits incessantly-a scarf, coat, shawl, and hat going at the same time. The exquisite blue and purple cashmere shawl in her office? It was last year's strategy meeting for research software, she said. I sat on the back row knitting for three days. Dietrich, who has coauthored 13 patents and has twice been named one of IBM's top inventors, likes to do things-tangible things, not just theorems. As a mathematician, she has a rare ability to travel between two very different worlds, says Paul Horn, head of IBM research. She can listen to a customer describe the messy details of a business, and then translate these specs into mathematical problems for her team to solve. And she believes mathematicians should live in the real world, a world of customers. When she took over the mathematics department in 2001, she encouraged researchers to venture outside Watson, which she calls the lovely stone building on the hill, and work with IBM consultants in the field. These days, her team is, in fact, venturing out from years of behind-the-scenes, mostly theoretical research to tackle an impressive array of real-world issues at IBM and beyond. How to assemble a project team from consultants scattered all over the world. How to fight large forest fires more effectively. To identify the best leads in the pipeline. OnTarget, the sales-prediction software that grew out of math research, generated $100 million in new revenue as a pilot program in Canada. Last year, it delivered about $500 million in use worldwide, an amount that makes Dietrich giggle as if she can't quite believe it. Dietrich's 160 researchers are increasingly among the most valuable problem solvers at IBM. Historically, the stars here have been the physicists who made the technology that went into chips and systems, and then it was computer scientists and engineers, horn says. Now we see the emergence of mathematicians. They're embedded everywhere. This is due to IBM's IBM's from hardware to software and services. And part of it, surely, is a function of Dietrich's marketing and political savvy: A geek but far from the personality-challenged stereotype, she knows how to win attention and resources in an organization of 330,000 people. More than that, her department's growing impact reflects a larger real-world shift. A generation ago, companies at best urged mathematicians to optimise production lines and perhaps to support price decisions. What more can they contribute to the bottom line? Today, companies measure almost every aspect of what they do, and computers are fast enough to crunch the numbers in time for execs to act on the analysis. In the hands of talented mathematicians, data creates an invaluable advantage. Elaborate algorithms reveal a company's inefficiencies and options-unseen bottlenecks in the supply chain or customers' hidden purchasing patterns. Whole companies-think Google is being built almost entirely around math. And others, like IBM, integrate mathematics into operation and decision-making in ways never before seen. This must have been the industrial age for mechanical engineers. It's a great time, Dietrich says, to be a computational mathematician. A numbering class at the University of North Carolina at Chapel Hill changed Dietrich's mind about becoming a doctor. Mathematics was a revelation, like hearing music for the first time. There is structure and symmetry and the most beautiful theory, she says. It made me believe in an underlying order in the world. Dietrich, whose husband is an IBM software architect, joined the company in 1984 after earning his PhD. in operation research and industrial engineering at Cornell, and she applied that gorgeous theory to design more efficient chip-manufacturing lines. It was exciting to see how useful mathematics could be. In the mid-1990s, she got bored between projects – a dangerous situation, she laughs – and pursued a new set of problems, where she spent six months in the field with IBM consultants and clients. They couldn't tell you the dependent and independent variables, she says. But she could, and that ability to translate the practicality into the theoretical (and back) was powerful. In some ways, her experience was the basis for how her research department now works. If you're not a mathematician, the deep math that Dietrich and her team perform sounds utterly foreign-combinatory auctions, integer programming, conditional logic, and so on. Their whiteboard scribbles on Watson look incomprehensible, like Farsi or Greek (so again, many of the symbols are Greek). But these mysterious equations represent the real world and how it works. When mathematicians model a problem, they are creating a numerical snapshot of a dynamic and its variables. Take the forest fire project Dietrich and the researchers are working on. Extinguishing quickly spreading flames over tens of thousands of acres is an expensive and complicated business. In 2000, a particularly devastating year, the federal government spent more than $1 billion and still lost more than 8 million acres. Its fire planners want to reduce costs and damage through better coordination between the five agencies involved. Armed with seven years of data, IBM's mathematicians are creating a huge model that shows how the resources of every firefighter, truck, airplane, etc.-have been used in the past, how much each effort cost and how many acres burned. The algorithms describe the likely costs and results of a number of strategies to fight a given brand. How many bulldozers and buckets do you have in Yellowstone Park? Dietrich asks. And if you need to move them elsewhere, how much will it cost and how long will it take? She speaks quickly and describes the unruly variables that mathematics makes sense from. It's a nice project. Complicated, huh? Uh, yes. For years, mathematicians were so focused on basic research that they wouldn't go near projects like this, and they weren't asked to, either. It was like working at a university without even the strain of teaching, says longtime researcher Baruch Schieber. Once you've decided what to work on, the first consideration wasn't how will this affect the company? If the researchers wanted to, they could close their office door and focus on the most esoteric research, uninterrupted and isolated. Initially, Horn says, putting maths specialists in front of customers made everyone nervous, not least of all customers. The scientists are undeniably brilliant, he says, chuckling, but you wonder how some of them come home at night. Watson, located an hour north of New York, has a relaxed, collegiate feel; sneakers and jeans, along with the occasional bushy beard and ponytail, are the norm. Stubborn, professorial types fit right in. Dietrich may seem brilliant and charmingly quirky, but when she keeps up on the intricacies of math, she can be daunting. She doesn't suffer fools and enjoys a good debate. But Dietrich has learned to soften his approach to avoid undermining consultants' relationships with clients. She helped create a class for researchers explaining the consulting process and culture. A mathematician perfectionism has to give way to deadlines. The smartest-person-in-the-room vibe is considered off-putting, rather than an invitation to match sense. Instead of forcing an argument about logic that we're trained to do, it's a bit adversarial-you have to keep your mouth shut and listen, she says. And you have to stay out of the technical filth. Some longtime mathematicians originally for, at at would suffer from Dietrich. Instead, they live a double life. In fact, says researcher Robin Lougee-Heimer, projects like the one she's working on now, a nationwide distribution puzzle for a brand-name customer, uncover fertile research topics. I get exposed to big problems, she says, with ugly details and complexity. It used to be that Schieber, a senior manager in optimization, would consult about a project within IBM and occasionally reach out to consultants. They rarely reciprocated his calls. Now he says, I'm the one is selective. When we first started asking what resources consultants spend on projects, they said that each project was different. It just drove me crazy. Word is out: The math team can help. Dietrich fields a few dozen requests a month, half of which she declines because the problem has already been resolved or isn't challenging enough. We want to push the boundaries of what is resolved, she says. Otherwise, what's the point? In a sense, Dietrich is doing what she enjoyed as a young math whiz-solving word problems. Here's a doozy: After IBM's sales team signs a consulting contract, the company often has to assemble the project team at the deadline-say 50 Java developers in Chicago by the following Monday. It can choose from 190,000 consultants around the world with different skills, personalities and availability. It should do this for thousands of projects a year for customers of all sizes in every industry imaginable. In the meantime, the mix of projects and available consultants is constantly changing. When we first started asking what resources consultants spend on projects, they said that all projects were different, dietrich says. It just drove me crazy. By poring over two years of project data, mathematicians identified which skills were most commonly used in certain types of tasks. You may not know exactly what the customer wants, but now you have an idea of who you need a $5 million project compared to a $50 million project, says Dan Connors, optimization manager for the Workforce Management program. This staff analysis tool helped managers anticipate demand and plan accordingly, increasing consultant productivity by 7% and reducing travel costs and the use of external contractors. The savings exceeded $500 million. So do the math: Add in sales from the OnTarget forecasting tool, and that's a $1 billion contribution from Dietrich's math whizzes. Brainiacs address another problem whose solution could be just as valuable: how to choose the best teams. Project managers tend to choose the most talented developers and engineers available, or those they already know. It may work well for the project at hand, but in the long run, it is not for the benefit of IBM as a whole; better to spread talent around. Researchers are also a social-networking analysis that would assess the paths of email, instant messaging, and phone calls to identify which teams act as flat organizations and which are hierarchical-who work well together and who don't. But the problem that is truly grabbing Dietrich involves predicting the labor force in the future. By analyzing population trends, employee demographics and skills, and the demand for certain technologies, her researchers hope to identify labor shortages in different functions and occupations before they happen. This work, almost unimaginably complex and far-reaching, is far from complete. Each answer generates new questions, and that's fine. That's a good thing. Even mathematicians don't have all the answers. Dietrich will not get bored and she will prove some lovely knitting. Eventually, she will have numbers that help us think differently about the world and where it is moving and IBM and its customers will hire or train employees accordingly. It may well turn out, of course, that what they need is more mathematicians. Mathematicians.

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