

FEB 16

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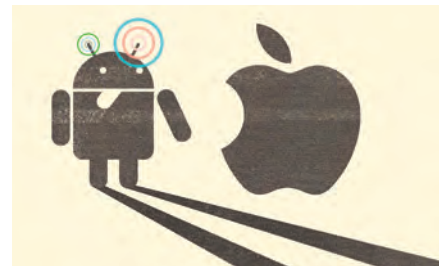
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FROM THE PRESIDENT

Putting Your Worries to Bed



Marta L. Tellado,
President and CEO

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"A RUFFLED MIND makes a restless pillow," the acclaimed Victorian novelist Charlotte Brontë once wrote, and, almost two centuries later, the observation still rings true. After all, it's a lot harder to sleep at night when you're worried about finding the safest car seat for your child, protecting your privacy in the face of emerging technologies, or even the health risks of sleeplessness itself. That's why we've gone to extraordinary lengths this month to help deliver you peace of mind so that you can rest easily knowing Consumer Reports has your back.

In malls and other public spaces across America, facial recognition software may soon be creeping into more widespread use, a development that could have serious privacy implications. Our report lets you know what all of that could mean for you and your family, and spells out the urgent need for consumer protections that must be incorporated as the trend progresses.

We're also helping to put you at ease this month thanks to our new child safety seat recommendations, which include testing

innovations developed by Consumer Reports experts to distinguish seats that provide higher levels of safety. Additionally, we're uncovering some of the health risks associated with a lack of sleep, including the aggressive advertising of sleeping pills and their widespread misuse by people who underestimate their risks. Naturally, sleeping better starts with a little exercise and a comfy bed, which is why we're also providing expert ratings on everything from cardio equipment and fitness trackers to mattresses and pillows—everything you need to sleep soundly knowing that the choices you make are informed by our latest testing.



About the Cover

Who's getting shut-eye in your bed, and who's *not*? More than 160 million Americans suffer from some sort of sleep disturbance. In our comprehensive package "I Can't Sleep," starting on page 22, we use our expert labs and in-house experts to rate and analyze what

works, what doesn't, and what's dangerous—from mattresses to sound machines, from supplements to sleeping pills. We commissioned Craig Cutler, an award-winning still life and portrait photographer, to set up shop in a studio with 20-foot ceilings and inspire models to pretend they were at home in their own beds. Also on set were a Ragdoll cat and a harlequin Great Dane, Chester (photo, above)—because let's face it, sometimes it's our pets who have the sweetest dreams. For more about healthy sleep habits, go to ConsumerReports.org/sleepbetter

Readers Weigh In on Our Gift Guide, Credit Cards, and Those Confusing Dates on Food Labels



Gift Guide Gripes and Gratitude

In our December issue, we assembled dozens of top-rated products tested in our labs over the recent months to serve up in “The Great Gift Guide.” We received a great variety of responses:

“The Great Gift Guide” seems to be aimed at households with incomes in the top 2 percent of Americans. Each page was dominated by gifts costing hundreds of dollars, followed by a discussion of giving a car as a gift. Sure nice to know what \$400 toaster I should give. One for each of my six married kids will only set me back \$2,400. That’s before I work on gifts for my nine grandkids!

—Dan Bucks, Milwaukee, WI

EDITOR’S NOTE It’s true that some of the products were pricey, but that’s in part because our gift picks were chosen largely from a year’s worth of testing products in our labs, and we ruled in only those that were safe and top performers.

Always enjoy the suggested gifts. I immediately ordered one of the items for myself: the small Vornado heater for under my desk. I have high

hopes for warm legs and feet this winter.

—Linda Colburn, Mt. Pleasant, MI

Your gift guide suggests a \$650 blender with a seven-year warranty. In early 1971, I purchased a Sunbeam blender using Consumer Reports’ guidance. It’s the only blender my wife and I have ever owned. We use it regularly, and in 45 years it has never had a failure; even the rubber lid is as good as new. It was probably less than \$20 (about \$120 in today’s dollars).

—Kenneth Morgen, Cockeysville, MD

f Cars are expensive and the value just goes down. I would be furious if my husband went out and spent that kind of money without my agreement. I’d much rather be surprised with a getaway trip.

—Sonya Draggoo Schaffer, via Facebook

I love the gift guide. I need my money to stretch as far as possible with so many people to buy for, and I would much rather buy quality products and make sure they last a while so it’s not a waste of money!

—Jessie Edmond, Brooklyn, NY

A lot of the gift recommendations, especially the kitchen gadgets, belong to a much bigger gift budget than mine. But the concept of an issue devoted largely to helping readers select gifts is a good idea, addressing a major stressor for this season. And the “Really, You Shouldn’t Have” article [about what to do when you get an unwanted gift] is a useful novelty.

—Hugh Blair-Smith, Dennis, MA

In “Batteries Built to Last” (December 2015), you missed an opportunity to rate rechargeable batteries. Instead, you barely mentioned them in your disposable battery article, except for a warning to never charge a regular battery in a battery charger. Why? Even if rechargeables didn’t perform as well as your top-rated batteries per use, they can be reused hundreds of times! I have been using AA and AAA rechargeables for years in headphones, electric shavers, bicycle headlights, etc. I encourage you to please focus more on environmental issues.


—Arthur Samuelson, San Francisco

EDITOR’S NOTE For our battery tests, we analyze market data to find out the types consumers use and then test the most popular ones,

alkaline and lithium AA batteries, says Maria Rerecich, director of the electronics testing team. But we hear you; expect to read about environmental topics in future issues.

Interesting gift ideas, including a few things I didn't know were available. One example: the \$100 Cuisinart Belgian waffle maker with removable grids that go in the dishwasher. Sounds convenient, but I might be skeptical that it would work well had CR not tested and recommended it.

—John Cuddeback, Winchester, VA

 I have referred to Consumer Reports since the 1960s or 70s, when we bought a car based on Ratings. I have just ordered a laptop, which I might not have considered if I hadn't seen your latest Ratings. Here's hoping it turns out as well as that car.


—Patricia Heater, via Facebook

The Case for Gift Baskets

Over the years, I have sent a variety of food boxes and baskets to friends and family for the holidays. But I have rarely had to spend more than \$50 to \$75 for a quality product from a variety of vendors, including those you mention. To recommend purchases beginning over \$125 is NUTS! I know of no one who has either sent or received a similar product over my very long gift-giving life.

—Richard Coyle, Deerfield, IL

EDITOR'S NOTE Gift baskets come at many prices, of course. For our project, we chose those that contained items people in our nationally representative survey told us they would like to receive. And we did find that our money went further when we created our own basket with items purchased at a local supermarket.

 I'm thinking you could make a kick-ass gift basket for about \$20 and then drop it off at the local food bank. Now there's an offering that really delivers!

—Terry Troha, via Facebook

Regifting Reality Check

I enjoyed your caveats on regifting in the December issue, "How to Avoid 'Regifting' Regrets." I received a wedding present—lovely towels wrapped in tissue paper inside a nice box with a bow. Underneath the tissue paper was a man's sport shirt. We decided not to embarrass the givers by thanking them for the shirt.

—Diana Kelley, Tampa, FL

Your article on regifting is troubling. Although it announces that the stigma of regifting is obsolete, it then devotes nearly all but the last paragraph to describing methods to avoid getting caught and making excuses that wouldn't be needed if regifting wasn't sleazy. The quoted etiquette expert has the right answer: Donate unwanted gifts to charity.

—Richard Broudy, San Luis Obispo, CA

Wrap It Up

In "That's a Wrap" (December 2015), I wish you had pointed out that smaller stores often offer free gift wrap year-round, even while larger chains do not. It's one of the reasons I shop at my locally owned stores.

—Barbara Mina, Oak Island, NC


Credit-Card Check

In "Play Your Cards Right" (December 2015), I didn't read anything about annual fees. Were those costs subtracted from your rewards totals? Each card has a different fee; some have one grace year before fees kick in.

—Susan Linkhart, Gaston, OR

EDITOR'S NOTE Yes, we did subtract any annual fees. As we pointed out in the article, some cards waive any fees for the first year, and others don't charge any fees. Our calculator took all of that into consideration. We evaluated the cards over a multiyear period so

that those that waived first-year fees wouldn't have an unfair advantage.


 *Been there, done that. Cash or debit card.*
—Carmen Rosales, via Facebook

When Food Isn't Safe to Eat

I appreciate the advice in "Is 'Expired' Food Safe to Eat?" (December 2015) that the dates given on food products have more to do with quality than safety. But you failed to include advice on other foods, such as fresh meat. My understanding is that consumers need to take those "use or freeze by" dates seriously. What is your advice for meat, eggs, and other unprocessed food?

—Jim Meek, Anderson, NC

EDITOR'S NOTE Even on meat, poultry, and egg packages, the dates have little to do with safety. The bacteria responsible for foodborne illnesses aren't the same ones that lead to spoilage. If illness-causing bacteria such as salmonella or campylobacter are in food, they'll be there even when it's fresh. And the food could make you sick if it's improperly handled or undercooked even before the date on the package passes. That said, meat will go bad, but you're likely to notice a rotting odor, mold, sliminess, and other signs of spoilage.

 *When in doubt, throw it out.*
—Amy Lillibut, via Facebook

WRITE

To share your comments for publication, go to [ConsumerReports.org/lettertoeditor](https://www.consumerreports.org/lettertoeditor). To reach us on social media, see page 8.

CORRECTION

"Choose the Best Bank for You" (January 2016) stated the number of bank and credit-union ratings provided by respondents to our banking survey was more than 74,000. The correct number was more than 70,000.

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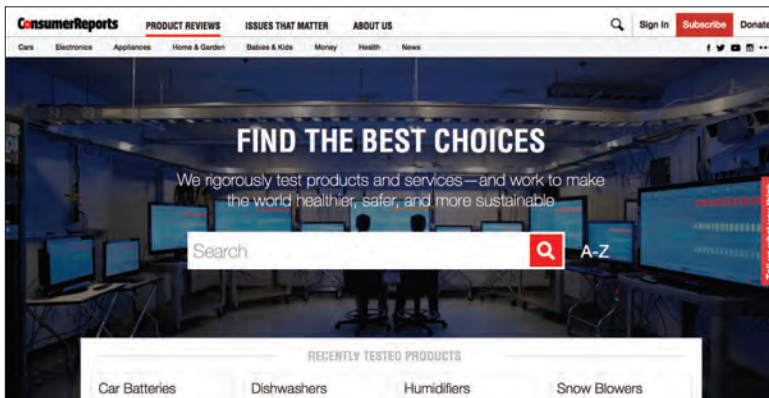
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At ConsumerReports.org

Check out the latest in our growing list of improvements at ConsumerReports.org. Our new site navigation makes it simpler to find key topics across 60,000 pages of product Ratings, advice, and articles. We also beefed up our About Us page, giving you more information about what we do—and how you help—to unleash the world-changing power of consumers. And don't forget that subscribers to our website have complete access to Ratings for about 7,600 products, which are updated regularly.



Want to get the lowdown on the TVs, SMARTWATCHES, and OTHER GADGETS you'll soon see in stores? Consumer Reports' experts will check out dozens of new products at the **2016 CONSUMER ELECTRONICS SHOW** in Las Vegas starting Jan. 6. The next week, our auto pros head to Detroit for the **NORTH AMERICAN INTERNATIONAL AUTO SHOW**, where they will dissect the latest technology, safety advances, and fuel-efficiency features. You'll find stories and video from both shows at ConsumerReports.org

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You can also use your smartphone to check our buying guides and Ratings of more than 7,600 products at ConsumerReports.org



RATINGS APP



CAR BUYING GUIDE APP

The UPDATE

DON'T GET BURNED

Guard against a gas fireplace's unseen risk

GAS FIREPLACES are popular because they eliminate the muss and fuss of wood-burning versions. But that convenience comes with a risk you may not be aware of: More than 80 percent of gas fireplaces sold last year have fixed glass panels that can become extremely hot—as hot as 1,328° F—because they don't allow heat to escape. And the glass can remain dangerously hot for up to an hour after the gas is turned off. Touching

the super-heated glass can instantly cause third-degree burns. Each year, those burns lead to about 17,000 medical visits, and up to 11 percent of the burns require surgery. Young children are especially at risk.

New gas fireplaces manufactured after Jan. 1, 2015, must come with mesh safety screens that fit over the glass, according to mandatory industry standards developed with the Consumer Product

Safety Commission. That's a protective step we've been pushing for along with the American Academy of Pediatrics and others.

But the rule isn't retroactive to the more than 10 million gas fireplaces in American homes, resorts, and other public places. If you have one in your home or business, it's up to you to add a safety barrier. Despite the industry's education efforts, some fireplace retailers may

not know about the new rule. Contact the manufacturer; it might provide a barrier at no charge. Or you'll have to buy one; they cost \$100 to \$900 or more depending on the size and style. Go to safefireplacetips.com for more information about what you need and where to get it. If you converted a wood-burning fireplace to gas and it has glass doors that you open when the gas is on, this warning doesn't apply.





Our president, Marta L. Tellado, speaking at Consumers International in Brazil.

OUR FIGHT FOR CHANGE

When Bigger Is Better—and When It's Not

A Global Partnership

One voice can be powerful, but a collection of strong voices will always prevail. That's why we're a member of Consumers International, a federation of more than 240 advocacy groups from

more than 100 countries, all fighting for consumer rights and empowerment.

In November, members gathered in Brazil for an annual meeting to discuss opportunities and challenges. Marta L.

Tellado, Consumer Reports' president and CEO (at left), delivered a keynote address, encouraging members to seek innovative ways to serve and connect with consumers.

"This is a critical, rich time for us to reach a new generation," Tellado said, "as we ourselves regenerate."

To learn more about the mission of this worldwide watchdog, go to consumersinternational.org.

Merger Mania

Is bigger better? In 2015, companies spent about \$3.5 trillion on mergers and acquisitions to take over competitors. Those transactions bring joy to boardrooms, but consumers can be left with fewer choices and higher prices. That's why Consumer Reports uses its muscle to help keep the marketplace fair, whether that means stepping between merging cable conglomerates, such as Comcast and Time Warner Cable, or giant pharmaceutical firms.

The latest example: the airline industry. The hectic holiday season always makes millions

of Americans aware of the pitfalls and problems created by merging airlines (price gouging, crowded cabins, etc.). In fact, the Department of Justice recently sued United and Delta for collaborating to cut out competing airlines from airports in the New York City area.

Specifically, United floated the idea of giving John F. Kennedy International Airport tarmac slots—or licenses that allow a plane to take off and land at a destination—to Delta. In return, Delta would fork over slots at Newark Airport, giving United even more control over that airport.

According to the DOJ, United already controls 73 percent of the slots at Newark and grounds many planes instead of flying them or allowing other carriers to fly.

But bigger isn't always better, and we are committed to making sure that there's a level playing field. Go to justice.gov/atr to learn more about the case, and share your complaints about ticket costs with us at ConsumersUnion.org/airlines

RECALLS



CANDLE LIDS THAT CAN CUT

About 720,000 glass-jar candles are being recalled by the maker, the MVP Group, because the lids can shatter when the jar is being opened. The candles were sold at Big Lots, Dollar General, and Family Dollar stores this year for about \$5. More than a dozen people have been injured; one of them required stitches.

What to do If you have an unopened candle, don't open it. Whether you've opened it or not, call MVP at 877-240-1707 or go to mvpgroupint.com for a refund.



SONATA BRAKE-PAD PROBLEM

Hyundai has issued a safety recall for certain 2011 and 2012 Sonata vehicles because of a problem with the brake pedal. Materials in the pedal's stopper pad can deteriorate, potentially causing a number of problems that can increase the risk of a crash.

What to do Take your vehicle to the dealer, who will replace the brake pad with a revised part. Owners will be reimbursed for any repair costs.



SHARK BLENDERS BITE

SharkNinja is recalling about 1.1 million Ninja BL660 series professional blenders because people can be cut if they remove the lid to pour while the blade is still inside. The blenders were sold at stores nationwide and online from March 2012 through September 2015 for about \$140.

What to do Keep the lid on and locked when you pour, or remove the lid and blade first. Get revised instructions at ninjarecall.com; click "Download New Manual." For more information, call SharkNinja at 877-593-5140.



LAWN-TOOL GAS LEAK

The manufacturer Stihl is recalling about 140,000 gas-powered outdoor tools because the gas tank vent was installed incorrectly and can pose a fire hazard. The tools were sold nationwide from November 2014 through September 2015 for \$200 to \$400. The company has had 319 reports of the vents coming loose and fuel leaking.

What to do To find out whether you own one of the recalled tools, call Stihl at 800-610-6677 or go to stihlusa.com. Dealers can provide a free inspection and repair.

SCAM TRACKER

Outsmart Tax Thieves This Filing Season

File early, and be alert for IRS impersonators and tax frauds



TAX SOFTWARE MAKERS AND service providers are offering new layers of security this tax season. You may find shorter shutdown times after inactivity, for example, and fewer chances to try again after a log-in error. Users of TaxSlayer, TurboTax, and other services will have the option to use a unique log-in code along with the usual ID and password. The updates reflect a coordinated effort by the Internal Revenue Service, states, and the tax-prep industry to prevent fraud involving pilfered Social Security numbers.

Thieves usually claim tax refunds by filing returns before their victims do. So another way to protect yourself is to file long before the tax deadline, which is Monday, April 18, this year (April 19 in Maine and Massachusetts).

What Victims Can Do

You may not know you've been a victim of tax-related ID theft until you get an IRS notice. It

may say that you collected wages from an employer you don't recognize, for example, or that your Social Security number has been used on more than one return.

Report incidents of ID theft to the Federal Trade Commission at ftc.gov. Then set up a fraud alert with one of the three big credit bureaus—Equifax (equifax.com/creditreportassistance, 888-766-0008); Experian (experian.com/fraudalert, 888-397-3742); or TransUnion (transunion.com/fraud, 800-680-7289). The bureau you choose will share your alert with the other two; all three will give you a free credit report. You can also request that the bureaus issue security freezes to prevent any new credit from being issued without your permission.

At irs.gov, fill out Form 14039, an Identity Theft Affidavit. The IRS will issue you an “identity protection personal identification number” (IP PIN) intended to prevent further fraud. (All residents of the District of Columbia, Florida, and Georgia—not just victims—can get IP PINs as part of an IRS pilot program. Find details at irs.gov/getanippin.)

Avoid Other Scams

Fraud involving IRS impersonators spikes during tax season. Remember:

- The IRS never asks for personal or financial information via email, text, or social media, and it will never contact you by phone to demand payment. Report suspicious email to <https://www.irs.gov/uac/Report-Phishing>.
- The agency will never ask for credit-card numbers over the phone, require payment without allowing you to question it or appeal, or threaten you with arrest for nonpayment.

Report fraud to the IRS at 800-366-4484 and at treasury.gov/tigta/contact_report_scam.shtml.



LEARN

Find out more about avoiding tax scams, get tax-prep and filing tips, and read about ways to save money on your federal and state returns at ConsumerReports.org/taxes

4 More Reasons to File Early

Fraud prevention is only one reason to send in your 1040 as soon as you get all of your forms and statements

GET YOUR REFUND SOONER

About two-thirds of Americans can expect federal refunds this year. Last year, refunds averaged more than \$2,700.

GET A JUMP ON COLLEGE AID

You can use information from your tax forms to complete the Free Application for Federal Student Aid, at fafsa.ed.gov. Early applicants get more financial aid, says Mark Kantrowitz, president of MK Consulting in Las Vegas and a financial-aid expert.

BUY YOURSELF SOME TIME

If you don't get money back but owe more, knowing the amount before the deadline gives you more time to plan how you'll pay. You can pay by credit card, but you'll get hit with a service fee of as much as 2.35 percent of your tax liability. For a list of accepted services that process tax payments by credit card, search for “pay taxes by credit card” at irs.gov.

FUND AN IRA

If you get money back, consider using it to fund an individual retirement account for 2015 before the April 18 deadline. The contribution limit is \$5,500 for those under 50 and \$6,500 for those older. (You'll need to estimate your 2015 contribution on your return. Assuming you meet income limits, the contribution will be deducted from your taxable income, increasing your tax savings.) Or use your refund toward your 2016 IRA; you've got through the next tax season to do so.

Baggage Claim Check

Many travel bags advertised as carry-ons really aren't

THE MOST sought-after real estate in the U.S. these days may not be facing a beach—it's most likely in the overhead bin on your next flight. That's why luggage that's billed as something you can carry on is such a hot ticket. Because space in overhead compartments is at a premium, airlines have strict limits on the size of bags allowed. If you're in the market for a new carry-on, here's a heads-up: Measure before you buy. Why? Because you can't always rely on manufacturers' published dimensions.

Size limits vary, but the rule for domestic travel on three of the biggest airlines—American, Delta, and United—is that carry-on bags can be no more than 22 inches high by 14 inches wide by 9 inches deep.

We spotted complaints on Amazon and Ebags about carry-ons people ordered that were larger than advertised, something they didn't find out until they were at an airport trying to wrestle them into "sizers" to see whether they met the size criteria. "BEWARE!" wrote a disgruntled consumer. "This bag is being presented as a carry-on, however it will not fit into the airline 'sizers.' There is a

good chance you will be told you have to check the bag (defeating the purpose of buying a carry-on bag)." Another reported: "I bought this as a carry-on, as advertised. It is 23½ inches long, not the advertised 22 inches. And so it didn't fit properly into the overhead."



SIZE MATTERS
This Lipault bag fits in many overhead bins, but some other bags are too big.

Luggage Lessons

We bought 11 bags, all marketed as carry-ons, from 11 brands. We took note of the dimensions the manufacturers provided. Then we took our own measurements in our labs, fitting each bag into a special box (to ensure steady, uniform positioning) with a laser

level to capture height, weight, and depth. To ensure that there were no bulges that might add depth, we flattened the bags using a 21x10.5-inch piece of plywood with a 10-pound weight on top. (Photos are at [ConsumerReports.org/carryons](https://www.consumerreports.org/carryons).) We found that nine of the 11 models were larger than claimed (see table).

We also discovered that manufacturers measure bags differently. Some measure the inside rather than the outside to capture packable space. A spokesman for Samsonite said the company didn't measure handles or wheels. But as far as airlines are concerned, whatever takes up space in an overhead bin counts.

To avoid spending money on a carry-on bag you can't carry on, follow these tips:

- Check airline websites to make sure you know what's allowed.
- When shopping in stores, use a measuring tape to check sizes.
- When shopping online, read user reviews to find out whether owners have had problems taking a carry-on onboard. Also check return policies so you know your options if you order a bag that doesn't measure up. (When we checked the policies for the bags included here, only Costco stated that it would take back its Kirkland luggage once used.)

How They Measure Up

Of the 11 bags, nine were larger than the makers' stated dimensions. Only one met its size claims exactly, and one was smaller. And only two bags were small enough to fit into many airlines' overhead bins.

BAG	Manufacturer's Stated Measurements (Height by Width by Depth, in Inches)	Consumer Reports' Measurements (Height by Width by Depth, in Inches)
American Tourister iLite Xtreme 21-Inch Spinner \$99.99	21x14.5x8	23.5x15.25x9
Briggs & Riley Domestic Carry-On Expandable Upright \$499	22x14x9	22.5x14.5x9.25
Eagle Creek Tarmac 22 \$290	22x14x9	22.25x15x8.5
Kirkland Signature Upright 21.5-Inch Black Carry-On \$99.99 (Costco) ¹	21.5x14x8.75	23x14x9
Lipault Paris Foldable 2-Wheeled 22-Inch Carry-On \$199 ²	22x14x8	21x14x8
Samsonite Silhouette Sphere 2 21-Inch Spinner \$229.99	21x15x8	22.5x16x10
SwissGear 7377 20-Inch Carry-On Spinner \$80 ²	20x14x7.5	21.75x14x8.5
Traveler's Choice Sienna 21-Inch Hybrid Rolling Carry-On Garment Bag \$229.99	21x14x9	22.5x14.5x8.5
TravelPro Maxlite 3 21-Inch Expandable Spinner \$280	21x14x9	22.5x14.75x9
Tumi Alpha 2 Frequent Traveler 2-Wheeled Carry-On \$645 (discontinued) ³	24x14.5x9.5	24x14.5x9.5
Victorinox Aovolve 22 \$249.99	22x13.75x10	22.5x14.75x10.5

¹Measurements are per tag and company website; total overall dimensions also listed on back of tag. ²Small enough to fit into some airlines' carry-on sizing bins. ³Smaller than what manufacturer claimed. ⁴Met manufacturer's claimed measurements.



ASK OUR EXPERTS

My smartphone and other gadgets often ask whether I want to back up documents to the 'cloud.' What exactly is the cloud, and do I really need it?

A. The cloud is a great way to store and share your documents, music, photos, and other content and be able to retrieve them using a variety of devices, explains Donna Tapellini, senior electronics editor.

Technically speaking, the “cloud” refers to groups of remote servers connected to the Internet and run by such companies as Apple, Google, Microsoft, and others. You’re usually provided a certain amount of space free to store and sync your files. If you go over that amount, you can buy more. The cloud gives you access to larger amounts of storage than

your devices may hold, though you’ll still want to use an external hard drive for backup if you have lots of files. Here’s a look at some of the biggest cloud services:

Apple’s iCloud works with your Apple devices. You start with 5GB free; 50GB costs 99 cents per month, and the fee goes up to 1TB for \$10 per month. As many as six family members can share content, including downloads from iTunes and iBooks, and apps.

Microsoft’s cloud offering is called OneDrive. You can download documents from any device, not just those that are Windows-based. You get 15GB free and can

buy more; pay \$100 per year for Office 365 and get 1TB of storage in addition to Excel, Word, and other Office programs.

Google starts you out with 15GB free. Its built-in Google Drive also includes a suite of office apps. With Google Docs, for example, you store your files on Google’s servers and use its word processor to edit, write, and so on. It’s also easy to share files and even to collaborate by working on an item at the same time.

Other cloud services include Amazon Cloud Drive, Dropbox, and SugarSync. If one doesn’t do everything you want it to, or if you quickly use up all of your free storage, you can mix and match—for example, using Dropbox to share files, Google for collaboration, and iCloud for your iPhone photos.

My front windshield is always icing over, and the defroster doesn’t clear it up. What helps?

A. It sounds like your defroster system needs repairing, says Jeff Bartlett, deputy cars editor. If it were working correctly, it would

help clear your windows on the coldest days, even if your car sits outside all day. He suggests starting your car and turning on the defroster with the fans on high speed to start to melt exterior ice before you start to remove it with a scraper. Don’t use windshield wipers while the glass is icy because that will wear out the blades. By the time you finish scraping, any fog on the inside should start to clear. If those steps don’t do the trick, have a mechanic check your vehicle for a leaky heater core or a faulty thermostat.



I hate hand-washing dishes. Can I put plasticware in the dishwasher?

A. Yes. Just avoid selecting dishwasher cycles such as “sanitize” that use higher washing or drying temperatures. Heat can cause plastic to degrade, says Urvasi Rangan, Ph.D., Consumer Reports’ director of safety and sustainability. And it can cause worrisome chemicals such as BPA (bisphenol A) to leach from some types of plastic containers. Although most food-storage containers are no longer made with BPA, older plasticware may contain it. BPA has been linked to health issues including cardiovascular disease and an increased risk of breast and prostate cancers. Containers may also have other chemicals such as plasticizers and phthalates that can leach. Most dishwasher manufacturers recommend placing plastics and other delicate items on the top rack. And here’s some good news: Using a dishwasher instead of hand-washing can significantly reduce your water and energy consumption.

LEARN

We have more than 140 in-house experts who research, test, and compare—so you don’t have to! Send your questions to: ConsumerReports.org/askourexperts ... and watch this space for the answers.



SURVIVAL OF THE FITTEST

Give yourself a technical edge this year by matching your fitness goals to the right gear. Our uncompromising experts put the latest of the big-machine offerings through the paces.



PROP STYLING: ANGELA CAMPOS

PHOTOGRAPH BY CLAIRE BENOIST

Americans spend more than \$65 billion per year on fitness—everything from gym memberships to infomercial weight-loss devices. But if our goal is to be more buff, we're not getting our money's worth. Obesity rates climbed to 38 percent for U.S. adults in 2014, up from 32 percent a decade earlier, according to the Centers for Disease Control and Prevention. In fact, the number of obese Americans exceeds those who are merely overweight.

When we regularly do work out, two-thirds of us do so at home, mainly for comfort and cost savings. A sleek new cardio machine can, by itself, inspire and motivate, but take home the wrong one and it will quickly become the world's priciest clothes hanger. Our latest tests of treadmills and ellipticals—and a new innovation that's a cross between the two—will help get you up and running, and keep you going through your favorite podcast or guilty pleasure on Netflix.

If you've been waiting to buy, your patience may have paid off. The latest machines are more connected than ever—to apps that track your results or hook you into a community of like-minded enthusiasts. Add a fitness tracker (see page 20) for dynamic feedback on your progress.

Of course, no technology can get you off the couch. But there's enough inspiration in the following pages to make 2016 your fittest in years.

TREADMILLS



THESE FAMILIAR machines are ideal for avid runners and walkers, especially those who live in regions where the climate isn't conducive to year-round outdoor exercise. You can spend as little as \$300 on a budget folding treadmill or 10 times as much on a higher-end nonfolding model. Serious runners who have the space should consider investing in a top-rated, nonfolding treadmill, because those machines tend to have a longer deck that's better suited to a runner's open stride. Work hard enough, and you could burn up to 350 calories in a 30-minute workout. That's roughly equivalent to a slice of cheese pizza, so you can enjoy the occasional guilt-free indulgence, provided you put in the miles.

RUNNER'S EDGE

With its powerful motor and sturdy deck, the Sole TT8 is just right for serious runners.

Ratings: 15 Top-Scoring Treadmills

Of the 35 treadmills we tested, the highest scored 84; the lowest, 44. Below are the highest-scoring models in order of performance in each category. Treadmills marked as CR Best Buys combine value and performance. Nonfolding treadmills tend to perform better overall, but folding models cost less and are a smart option where space is tight. For full Ratings, available to online subscribers, go to [ConsumerReports.org](https://www.consumerreports.org)

☒ CR Best Buy
☒ Recommended

● Excellent
 ● Very Good
 ○ Good
 ○ Fair
 ● Poor

Rec.	Rank	BRAND & MODEL	PRICE	SCORE	TEST RESULTS				
					Ergonomics	Construction	Ease of Use	Exercise Range	User Safety

A. NONFOLDING

<input checked="" type="checkbox"/>	1	Landice L7 Cardio Trainer	\$3,800	84	●	●	●	●	●
<input checked="" type="checkbox"/>	2	NordicTrack Elite 9700 Pro	\$2,200	84	●	●	●	●	●
<input checked="" type="checkbox"/>	3	Sole TT8	\$2,300	83	●	●	●	●	●
<input checked="" type="checkbox"/>	4	True PS300	\$3,000	81	●	●	●	●	●
<input checked="" type="checkbox"/>	5	AFG 7.1 AT	\$1,700	81	●	●	●	●	●
<input checked="" type="checkbox"/>	6	Precor TRM 243	\$3,800	81	●	●	●	●	●

B. FOLDING

<input checked="" type="checkbox"/>	1	ProForm Pro 2000	\$1,250	82	●	●	●	●	●
<input checked="" type="checkbox"/>	2	Spirit XT485	\$2,000	81	●	●	●	●	●
<input checked="" type="checkbox"/>	3	NordicTrack C1650	\$1,300	81	●	●	●	●	●
<input checked="" type="checkbox"/>	4	LifeSpan TR4000i	\$1,800	79	●	●	●	●	●
<input checked="" type="checkbox"/>	5	NordicTrack Commercial 1750	\$1,500	79	●	●	●	●	●
<input checked="" type="checkbox"/>	6	AFG 3.1 AT	\$1,200	78	●	●	●	●	●
<input checked="" type="checkbox"/>	7	NordicTrack C970 Pro	\$1,000	76	●	●	●	●	○
<input checked="" type="checkbox"/>	8	Xterra Trail Racer 6.6	\$1,000	76	●	●	●	●	●
<input checked="" type="checkbox"/>	9	ProForm Sport 7.0	\$800	73	●	●	●	●	○

PICK THE RIGHT ONE FOR YOU

BEST FOR RUNNERS

A3 Sole \$2,300
A5 AFG \$1,700 CR Best Buy
B3 NordicTrack \$1,300 CR Best Buy
A3 has a lengthy 60-inch running deck and an impressive 14 percent incline for high-intensity workouts. **A5** is even longer and steeper, though its motor isn't quite as powerful. **B3** offers peak running potential in a folding treadmill. Though not a pick, the \$630 Horizon T101 treadmill has enough deck length and durability for walkers.

B2 is a folding treadmill that features excellent ergonomics, including a convenient chest-strap heart-rate monitor. **B9** also folds, offers top value among compacts, and is compatible with iFit, which tracks your progress and replicates real-life runs with Google Maps.

COOLEST CONNECTIVITY

A2 NordicTrack \$2,200
A6 Precor \$3,800
B6 AFG \$1,200 CR Best Buy
A2 uses iFit technology. **A6** has Preva, a cloud-based service that lets you set weekly goals based on calorie burn. **B6's** Nike + iPod feature automatically saves workout data to your iPod.

FOR TIGHT SPACES

B2 Spirit \$2,000
B9 ProForm \$800

Guide to the Ratings. Score is based on ergonomics, construction, ease of use, exercise range, and safety. **Ergonomics** is how well the machine accommodates the needs of different users. **Construction** is our judgment of quality and the results of our durability tests. **Ease of Use** is how easy it is to adjust exercise intensity, read the display, and operate monitor functions. **Exercise Range** is how well each machine provides an effective workout for users of various fitness levels. **User Safety** is our assessment of safety and security, including stop-button size and location, safety-key operation, the possibility of striking the motor housing, and the security of the deck for folding models. **Price** is approximate retail.

FROM OUR EXPERTS

PETER ANZALONE, TEST ENGINEER



You can get more out of your workout, as well as your equipment, if you follow these expert insights.

1) Exercise equipment should feel comfortable and support your body's natural movement, so don't just admire it from afar. Go into a fitness store, sneakers on, and spend at least 15 minutes on the machines before buying. You need to work up a sweat before making this big purchase.

2) Cardio equipment has a lot of moving parts and electronics. To keep things moving smoothly, wipe down the machine after each use to remove any dirt, dust, and sweat. Listen for squeaks or other unusual sounds, which could indicate that a fastener needs tightening. Keep elliptical roller surfaces clean and lubricated, and treadmill belts aligned and lubed,

following the instructions in your owner's manual.

3) Home exercise equipment causes tens of thousands of injuries each year. Always use the safety key on treadmills, which will stop the belt if you fall. Because young children are often victims of injury, the best policy is to keep them away from your equipment at all times.

Peter Anzalone has been a tester for Consumer Reports for almost a decade. With degrees in mechanical engineering, dance, and advanced personal training, he's uniquely suited to testing today's high-tech exercise gear.

ELLIPTICALS



BUILT-IN MOTIVATION

The AFG 4.1AE lets you set weekly goals based on calorie burn, distance, and workout duration.

THESE MACHINES are best if you want a weight-bearing exercise that's lower-impact than running. Most ellipticals have moving handgrips that allow for a more full-body workout. Calorie output tops out around 270 for a vigorous 30-minute session.

Most of the machines we tested cost between \$800 and \$3,000. Many basic models provide sound ergonomics, solid construction, and a variety of exercise options, but you might have to pay more for connectivity. Several tested models feature iFit, which for a \$99 annual fee allows you to track your workout data, choose from professional exercise programs, and create simulated workouts with Google Maps. Other machines connect to free sites such as MapMyFitness and MyFitnessPal, which measure how workouts are affecting blood pressure, cholesterol, and more.

Ratings: 8 Great Ellipticals

Of the 31 ellipticals we tested, the highest scored 79; the lowest, 46. Ellipticals marked as CR Best Buys combine value and performance. Heart-rate programs automatically adjust resistance based on target heart rate. For full Ratings, available to online subscribers, go to [ConsumerReports.org](https://www.consumerreports.org)

☒ CR Best Buy
☒ Recommended ● Excellent ● Very Good ○ Good ● Fair ● Poor

Rec.	Rank	BRAND & MODEL	PRICE	SCORE	TEST RESULTS					
					Ergonomics	Exercise Range	Ease of Use	Construction	Heart-Rate Features	User Safety

A. HAS HEART-RATE PROGRAMS

<input checked="" type="checkbox"/>	1	Diamondback 1260 Ef	\$2,200	79	●	●	●	●	●	●
<input checked="" type="checkbox"/>	2	Precor EFX 225	\$3,000	74	●	○	●	●	●	●
<input checked="" type="checkbox"/>	3	AFG 18.1AXT	\$1,700	73	●	○	●	●	●	●
<input checked="" type="checkbox"/>	4	Schwinn 470	\$800	73	●	●	●	●	●	●
<input checked="" type="checkbox"/>	5	AFG 3.1AE	\$1,100	72	●	●	●	●	●	●
<input checked="" type="checkbox"/>	6	AFG 4.1AE	\$1,350	72	●	●	●	●	●	●

B. NO HEART-RATE PROGRAMS

<input checked="" type="checkbox"/>	1	Landice E7 Pro Sport	\$3,600	69	●	○	●	●	○	●
<input checked="" type="checkbox"/>	2	ProForm 19.0 RE	\$1,000	68	●	●	●	●	○	●

PICK THE RIGHT ONE FOR YOU

FOR WEIGHT LOSS

A1 Diamondback \$2,200

A2 Precor \$3,000

Both machines have unique electronic inclines for intense workouts and moving handgrips for a full-body workout.

A3 and **A6** automatically save your workout data to your iPod. **A4** can send your results to the MyFitnessPal website.

MOST COMPACT

A3 AFG \$1,700

B2 ProForm \$1,000 CR Best Buy
A3 has a footprint of 65 inches, shorter than most. **B2** is the only folding elliptical on our recommended list.

COOLEST CONNECTIVITY

A3 AFG \$1,700

A4 Schwinn \$800 CR Best Buy

A6 AFG \$1,350

Guide to the Ratings. **Ergonomics** assesses pedaling motion and how well machines accommodate people of various sizes. **Exercise Range** assesses aspects of exercise intensity. **Ease of Use** indicates how easy it is to read the display and use the program. **Construction** considers design choices and our perception of quality based on noise, feel, and ride. **Heart-Rate Features** evaluates sensors, programs, and how heart rate controls the elliptical operation. **User Safety** indicates aspects of safety, including pinch points, materials, and stability.

ALTERNATIVE MOTION MACHINES



WE TESTED A NEW type of cardio machine that borrows elements from treadmills and ellipticals. These newbies go by various names, including “hybrid ellipticals” and “anti-gravity treadmills,” though the industry seems to be settling on “alternative motion machines,” or “AMMs.” They allow you to control the length of your stride (as on a treadmill), and your feet are always in contact with the pedals (as on an elliptical), so there’s no pounding.

Peter Anzalone (above) oversaw testing of three models, using a panel of 18 Consumer Reports employees in a range of age, weight, and fitness levels. Reviews were mixed, but panelists agreed that the motion takes some getting used to. We didn’t rate AMMs, but the descriptions at right will help you choose.



WATCH

To view a video of Consumer Reports’ panelists trying out these new alternative motion machines in our fitness labs, go to [ConsumerReports.org/ammvideo](https://www.ConsumerReports.org/ammvideo)

MORE STRUGGLE, LESS FUN

NordicTrack FreeStride FS7i
\$2,000

The NordicTrack costs far less than the others, though it’s still not cheap. AMMs are often marketed to runners, but many panelists said that this one was more like an elliptical or cross-country skiing motion than running. Overall, it fared worst in our tests. Panelists found the striding motion difficult to control, and pedals tended to come into contact with the machine, making a loud banging sound.

FEATURES

Oversized cushioned pedals; 40 onboard programs; 24 resistance settings; touch-screen display; Internet capability, including iFit. Chest-strap heart-rate monitor.

PROS

- High-resolution touch-screen display.
- Training videos and running-track graphic, which shows progress around a simulated track.
- Controls on moving handgrips, which made it easy to adjust resistance and incline.

CONS

- Moving handgrips lacked cushioning and could force the wrist into an awkward position.
- The pedals periodically came into contact with the machine, causing a sound that was jarring and noisy.

ONLY FOR THE GRACEFUL

Octane Fitness Zero Runner ZR7
\$3,300

If you love to run but worry about the punishing pounding on your knees, this machine will appeal because it mimics a running feel without the impact. But there’s a pretty steep learning curve—not to mention the steep cost. Panelists who were less athletic or lacked coordination found it particularly challenging to establish and maintain a consistent motion. (One panelist: “It feels a little like trying to swim in Jell-O.”) The Octane doesn’t have a motor, so you have to set your own stride and rhythm with pure leg power. That’s a good thing, though, because leg strength helps with stability as you age and keeps your mind sharp, according to a study from King’s College London.

FEATURES

Programs including cross-circuit types that incorporate time for off-machine exercises; ability to pair with SmartLink app to access custom workouts. Chest-strap heart-rate monitor.

PROS

- Simple and easy-to-read display.
- Quiet operation.

CONS

- Limited selection of workout programs.
- Machine’s movement was difficult to master.
- Feeling of instability with the pedals, especially when stepping onto the machine or standing still, like during a water break.

A REAL CROWD PLEASER

Precor Adaptive Motion Trainer with Open Stride \$8,900

This is a commercial-grade machine intended for gyms, hence its steep price. But it had the widest appeal, with 50 percent of panelists saying they’d be “extremely excited” to use it again. Some even described it as fun. Although using this machine doesn’t feel much like running, it works well as a stepper and transitions smoothly into elliptical-like striding patterns. The variety of movements and the well-integrated moving handgrips kept panelists engaged.

FEATURES

Six onboard programs that automatically adjust the resistance; an illuminated stride-length indicator that swings back and forth to show the frontmost and rearmost extent of your stride.

PROS

- Easiest to master, with smooth operation.
- Moving handgrips that were well-designed and functional.
- Easy-to-use controls and a clear display.

CONS

- You have to pedal fast enough to activate the display, which some found a nuisance when making the initial selections for a workout.
- No included chest-strap heart-rate monitor, though it does have an onboard transceiver that will work with a monitor you supply.

ARE YOU KEEPING TRACK?

Take advantage of the motivational power—and data deep dive—that fitness trackers offer



ELITE ATHLETES have always been data fiends, recording their speed, heart rate, and other workout information, often with the help of a personal trainer. Wearable fitness trackers, particularly the newest, most sophisticated models, are making that kind of record-keeping available to ordinary people.

We recently put 17 devices through their paces in our labs. Many worked well, but our testing found that none of them are foolproof, especially

when you go beyond straightforward metrics such as heart rate. So if you want to track a hard-to-measure variable such as calories burned, it's best to use the readout as an estimate rather than an excuse for a second piece of pie.

The top-rated Fitbit Surge, \$250, is a good choice if you want lots of workout data combined with some smartwatch capabilities. In addition to counting steps and telling time, it comes equipped with a GPS mode, a highly accurate heart-rate monitor, and a

large, easy-to-read display. It can also notify you when you receive a call or text on your smartphone.

For those willing to do without GPS data and phone notifications, the \$100 Fitbit One is a bargain. The device, which clips to your clothing, capably counts steps and notes changes in elevation, useful if climbing stairs is part of your routine.

The least expensive tracker we tested, the Jawbone UP Move, \$50, got dinged in our Ratings in part because it doesn't have a display; to review all of your

data, you have to download a free app to your mobile device. But it works well as a no-frills step counter, providing accurate info and syncing easily with a smartphone.

In addition to having their own apps, most trackers can coordinate with health apps such as MapMyRun. Some also work with companion products. The Withings Activité Pop, for example, has a bathroom-scale sibling, the Smart Body Analyzer; both feed data to a Withings health app to provide a fuller view of your fitness.

BEYOND STEP COUNTING

All fitness trackers count steps, but many do more. Here are additional features you should look for.



GPS

High-end fitness trackers use a GPS mode to provide a more accurate picture of how far you've run, information also needed to calculate your pace.

CR'S TAKE: It's handy, but you can get the same benefit by carrying your smartphone, which has a GPS function, and activating a free app such as *RunKeeper*.



Heart-Rate Monitor

Several trackers are good at measuring heart rate at the wrist, limiting the need for the chest straps that serious athletes have used during workouts. Some trackers also record resting heart rate throughout the day.

CR'S TAKE: This feature is useful for data-oriented runners who want to stay in a certain heart-rate zone.



Stair Tracking

Devices with altimeters can detect stair or hill climbing by measuring minor changes in elevation. (About 10 feet equal one flight of stairs.)

CR'S TAKE: It's useful because hill climbing is a great way to boost a workout's intensity.

Ratings: 17 Wearable Trackers

The Fitbit Surge sits atop our Ratings, with 84 out of 100 possible points. Scores are based mainly on ease of use, the accuracy of the step counter and heart-rate monitor, and the number of useful features.

☑ CR Best Buy ☐ Recommended

● Excellent ● Very Good ○ Good ● Fair ● Poor

Recommendation	Rank	BRAND & MODEL	PRICE	SCORE	TYPE	TEST RESULTS				FEATURES				
						Ease of Use	Heart-Rate Monitor Accuracy	Step-Count Accuracy	Battery Life (Days)	Floors Climbed	GPS Tracking	Sleep Tracking*	Food Tracking	Notifications
☑	1	Fitbit Surge	\$250	84	Watch	●	●	●	7	●	●	●	●	●
☑	2	Basis Peak	\$200	79	Watch	●	●	●	4			●		●
☑	3	Fitbit ChargeHR	\$150	79	Band	●	●	●	5	●		●	●	●
☑	4	Samsung Gear Fit	\$150	76	Band	●	●	●	3.5			●		●
☑	5	Fitbit One	\$100	76	Clip-On	●	NA	●	14	●		●	●	
☑	6	Microsoft Band	\$130	74	Band	●	●	●	1.5		●	●		●
	7	Withings Activité Pop	\$150	70	Watch	●	NA	●	240			●		
	8	Polar Loop 2	\$120	69	Band	●	NA	●	8			●		●
	9	Polar A300	\$140	69	Watch	●	NA	●	28			●		
	10	Garmin Vivosmart	\$150	64	Band	●	NA	●	7			●		●
	11	Jawbone UP Move	\$50	63	Clip-On	●	NA	●	180			●	●	
	12	Garmin Vivoactive	\$250	61	Watch	○	NA	●	21		●	●		●
	13	LifeTrak Zone C410	\$100	60	Watch	○	●	●	365			●		
	14	Misfit Shine	\$70	56	Clip-On	○	NA	●	180			●	●	
	15	Jawbone UP3	\$180	53	Band	○	NA	●	7			●	●	
	16	Garmin Vivofit 2	\$100	49	Band	○	NA	○	365			●		
	17	Fitbit Flex	\$100	45	Band	●	NA	●	5			●	●	

* For more info on sleep tracking, see "Gimmicks or Great Gadgets?" on page 32.

Guide to the Ratings: Ease of Use is an evaluation of ergonomics, ease of interaction, syncing, and pairing, and the display's readability in bright and low light. Battery Life is based on manufacturer claims.

3 TIPS TO GET MORE ACTION

USE THE SOCIAL FUNCTIONS

Much like a jogging partner or friends at the gym, the social features built into fitness-tracker apps can motivate you to get off the couch and out the door. You can use them to share workout results, receive notifications when one of your pals goes for a run, and set up group challenges, such as trying to reach a certain number of steps over the weekend.

FIND THIRD-PARTY APPS

Most fitness trackers have companion apps that make it easy to review your workouts and monitor your progress. But there are other options for you to explore. MyFitnessPal, for instance, can use data from your fitness tracker to evaluate your exercise and food intake, which is particularly helpful if your goal is to lose weight.

PRESERVE YOUR BATTERY

A tracker may work for a few days or even two weeks between charges. To extend battery life, you can remove alarms, turn off Bluetooth connectivity until it's time to sync the device with your phone, and shut off the display when you're inactive. Note: Most trackers use a proprietary cable for charging, so try not to lose it—unless you view shopping as exercise.

PRIVACY ALERT

Like websites and mobile apps, fitness trackers might share personal data with manufacturers and software providers.

To find out what information is collected and how it might be used, you should read the permissions section in the app's description and the privacy policy on the manufacturer's website.



Americans everywhere are desperate for shut-eye, turning to drugs, supplements, and high-tech gadgets. Here's what works, what doesn't, and what's dangerous.



SLEEPLESSNESS HAS A LONG AND TORTURED HISTORY. A 15th-century Italian lawyer named Hippolytus de Marsiliis is said to have first documented sleep deprivation as a way to punish prisoners. (If you're unconvinced by his cred, note that he is the same fellow credited with confirming the effectiveness of slow-drip water torture.) And he was only making formal what humans had known for centuries: Not getting enough sleep is painful.

Today, the problem of too little sleep, and the quest for more of it, is as acute as ever: 27 percent of people in a new Consumer Reports survey of 4,023 U.S. adults said they had trouble falling asleep or staying asleep most nights, and 68 percent—or an estimated 164 million Americans—struggled with sleep at least once a week.

A good night's sleep can require everything from the practical (a cool, comfortable pillow) to the ethereal (a deep sense of calm and peace of mind). The modern marketplace has exploded with proffered solutions, from mattresses to white-noise machines, sleeping pills to sleep coaches.

Americans spent an estimated \$41 billion on sleep aids and remedies in 2015, and that's expected to grow to \$52 billion by 2020, according to Natana Raj, an analyst with BCC Research in Wellesley, Mass. The rub is that certain solutions don't work as well as claimed—if they work at all.

Sleep drugs are arguably the most significant concern. About one-third of the people we surveyed had tried either a sleep drug (such as Ambien, which requires a prescription, or Sominex, which does not) or a dietary supplement (especially melatonin) at least once in the previous year. Forty-one percent of people who use over-the-counter sleep aids reported taking them for a year or longer, and 48 percent use the drugs several times per week. Most concerning:

The way people misuse sleep drugs can be dangerous, our survey found.

Why Sleep Eludes so Many

Sleep experts today aren't as prescriptive as they once were about how much shut-eye humans require each night.

"You need as much sleep as it takes for you to stay awake and alert the next day, without caffeine," says Nathaniel Watson, M.D., co-director of the University of Washington Sleep Center in Seattle and president of the American Academy of Sleep Medicine, which last summer issued new sleep guidelines. It's also okay if you wake up in the middle of the night, as long as you fall back asleep, Watson says.

Still, most people don't function well with less than 7 hours of sleep, Watson says, and regularly getting less than that amount can, over time, harm your health. Continued sleep shortages contribute to depression, heart disease, lowered immunity, obesity, and type 2 diabetes, among other ills, he says.

Why are so many of us sleeping so little? One reason is simple math: Americans are working longer—an average of

44 hours per week, according to an August 2015 Gallup Poll. That's the longest workweek in the history of Gallup's annual work survey. And a record 17 percent of U.S. adults now log 60 or more hours per week in the office, leaving less time for sleep.

Working longer hours, plus having longer commutes, leaves less time for domestic chores—paying bills, doing repairs, dealing with paperwork for taxes or kids' college—which get stuffed into twilight hours.

In today's global economy, working late into the night or first thing in the morning is often a necessity. That kind of shift work—once mainly confined to nurses, emergency room doctors, factory workers, and police officers—can wreak havoc on the body's sleep-wake cycle.

And then there are modern habits: Many people are staying up late to entertain themselves on electronic devices—even as research suggests that blue light from those devices may interfere with the body's production of melatonin, the sleep hormone.

What Works, What Doesn't

The Consumer Reports Best Buy Drugs team, which evaluates the safety and effectiveness of medications, reviewed the research on sleep drugs and found them to be limited in their effectiveness and prone to potentially dangerous misuse.

Our medical experts looked at the research on melatonin as well as the lifestyle changes that improve sleep. We also have Ratings from our labs on 45 mattresses, as well as advice on how to find a pillow that matches your sleep style.

Overall, our review of the products, drugs, and services from the sleep industry found a whole lot of marketing spin and misinformation but also some positive news about therapies and products that can do some good in the age-old quest for better sleep. ■



THE PARADOX OF SLEEPING PILLS

The benefits might be smaller than you hoped for, and the risks may be greater

SLEEPLESSNESS is complicated—but that hasn't stopped millions from craving a simple, chemical solution. Potions used to ease the misery of insufficient sleep can be traced back to the ancient Egyptians, who employed an extract of the opium poppy to bring on sleep. And the Greek god Hypnos was often depicted holding a poppy.

In our survey, 37 percent of people who complained of sleep problems at least once per week said they had used an over-the-counter or prescription sleep drug in the previous year. And why wouldn't they? The Food and Drug Administration has approved the drugs to treat sleep problems, which means the agency has determined that their benefits outweigh the risks.

"But those benefits aren't as great as many people assume, and the drugs have important harms," says Lisa Schwartz, M.D., a drug-safety expert at Dartmouth's Geisel School of Medicine in Hanover, N.H., who has worked with Consumer Reports Best Buy Drugs on investigating sleeping-pill effectiveness and safety.

What's more, our survey found that about half of people who take sleep aids use the drugs in potentially harmful ways—by, for example, taking them more often or longer than recommended, or combining them with other medications or supplements (see "The Risky Business of Rx Sleep Drugs," on page 28).

Limited Benefits

Best Buy Drugs commissioned Schwartz—who in 2013 served on an FDA advisory committee that looked at the new insomnia drug suvorexant (Belsomra)—and her colleague, Steven Woloshin, M.D., to review the evidence the FDA used to approve the drug.

They concluded that people who took a 15- or 20-milligram dose of Belsomra

every night for three months fell asleep just 6 minutes faster on average than those who took a placebo. And those on Belsomra slept on average only 16 minutes longer than people given a placebo.

Such small improvements didn't translate to people feeling more awake the next day, either. Instead, more people who took Belsomra reported that they felt drowsy the next day than those who took a placebo.

Merck, the drug's manufacturer, said in a statement, "We believe our clinical data and FDA-approved prescribing information clearly demonstrates the value of Belsomra."

A previous Best Buy Drugs analysis of other prescription sleep drugs—so-called Z drugs such as eszopiclone (Lunesta), zaleplon (Sonata), and zolpidem (Ambien)—found that they, too, provided modest benefits. It found that people fell asleep, generally, between 8 and 20 minutes faster when taking those drugs than when compared with a placebo.

Older prescription sleep drugs known as benzodiazepines (including Dalmane and

Restoril), as well as over-the-counter sleep drugs such as Advil PM, Nytol, Sominex, Tylenol PM, and ZzzQuil, generally aren't any better than newer drugs at helping people fall asleep or stay asleep. (For more on sleep drugs, see the facing page.)

The 'Morning After' Effect

Even when taken as directed, sleeping pills pose risks, including next-day drowsiness.

"People take sleeping pills hoping that they will function better the next day," Schwartz says. "But some people actually end up functioning worse—so drowsy, in fact, that driving can be dangerous—because the effects of the drug can linger."

A study published online in June 2015 by the American Journal of Public Health found that people prescribed sleeping pills were around twice as likely to be in car crashes as other people. The researchers estimated that people taking sleep drugs were as likely to have a car crash as those driving with a blood alcohol level above the legal limit.

Several sleeping-pill instructions caution users to take the medications only if they can stay in bed for at least 7 to 8 hours. And to address the dangers of next-day drowsiness, the FDA has cut in half the recommended doses for Ambien and Lunesta. The labels for Ambien CR and Belsomra 20 milligrams, in fact, caution against driving at all the day after taking the pill. Yet our survey found that about a quarter of sleep-aid users drove with less than 7 hours of sleep at least once in the previous year.

The Dark Side

Sleeping pills can pose other dangers, too, including dizziness, falls, and fractures.

"These drugs are known to have a hangover effect that impairs coordination and balance into the next day, especially

**SOME PEOPLE
ACTUALLY FUNCTION
WORSE THE
DAY AFTER TAKING A
SLEEPING PILL
BECAUSE THE
EFFECTS OF THE DRUG
CAN LINGER.**

WHAT'S IN YOUR MEDICINE CABINET?

Many drugs that people take as sleep aids were first used to treat anxiety, depression, and allergies. Only when doctors realized that the drugs also acted as sedatives were they recommended for insomnia, too. Here are some commonly used sleep drugs.



'BENZOS'

These drugs swam into public awareness around the 1960s when diazepam (Valium)—part of a class of drugs known as benzodiazepines—was prescribed for restless housewives. Other benzodiazepines—estazolam, flurazepam (Dalmane), and temazepam (Restoril)—are approved as sleep aids, but they can still breed dependence and trigger side effects such as confusion and grogginess.

TRAZODONE

This medication is commonly prescribed for sleep—even though it's approved by the FDA only for depression. Our experts say not to take the drug for sleep unless you also suffer from depression.



BELSOMRA

This is the first in a new class of sleep drugs to target orexin, a brain chemical linked to wakefulness and appetite. But it doesn't seem to work better than older drugs, and it can trigger worrisome side effects, such as "sleep paralysis," in which you are awake but unable to move.

'Z' DRUGS

Doctors hoped these meds—eszopiclone (Lunesta), zaleplon (Sonata), and zolpidem (Ambien)—wouldn't cause troublesome next-day drowsiness. But the FDA says they are prone to that, too, and linked to rare, though frightening, behaviors such as sleep driving and sleep eating.



OVER-THE-COUNTER

Sleep drugs you can buy without a prescription aren't much safer than Rx drugs. In fact, it's easy to take dangerously high doses of them because their active ingredients—the antihistamines diphenhydramine and doxylamine—aren't only in OTC sleep products such as Sominex and ZzzQuil. They're also in nighttime pain relievers such as Advil PM and Tylenol PM, as well as allergy meds such as Benadryl, and numerous cough and cold medications.



in older adults,” says Ariel Green, M.D., a geriatrician at the Johns Hopkins University School of Medicine in Baltimore.

Even over-the-counter sleep aids—such as Advil PM, Sominex, and ZzzQuil—pose risks, including daytime drowsiness, confusion, constipation, dry mouth, and problems urinating.

Safer Use of Sleeping Pills

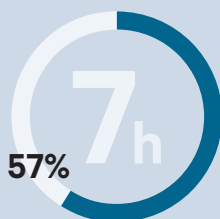
Because of the limited benefits and substantial risks of sleeping pills, Consumer Reports’ medical experts advise that sleep drugs should be used with great caution. The American Academy of Sleep Medicine no longer recommends sleeping drugs as a first-choice treatment for chronic insomnia, opting instead for cognitive behavioral therapy for insomnia (see “Get More ZZZs, Naturally,” on page 30).

In general, sleeping pills should be reserved for short-term insomnia—such as that caused by jet lag, anxiety after the death of a family member, or job loss—says Watson at the AASM. For those limited situations, CR experts recommend following these precautions, which apply to prescription and over-the-counter sleep drugs:

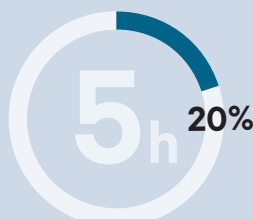
- Tell your doctor about all of the medications you take, including supplements. Many common drugs, such as certain antibiotics and antidepressants, can interact dangerously with sleep drugs.
- Take the drugs only if you have time for at least 7 or 8 hours of sleep. Even if you’ve had that much sleep, don’t drive if you feel drowsy.
- Do not take an extra dose if you wake up in the middle of the night.
- Never mix sleeping pills with alcohol, recreational drugs, or other sleep drugs or supplements, including over-the-counter nighttime pain relievers and antihistamines, such as Benadryl Allergy, that contain the sedative diphenhydramine.
- Start with the lowest recommended dose, especially until you know how the drug affects you.
- Be cautious about frequent use. Taking sleep drugs regularly can breed dependence and raise the risk of adverse effects. ■

THE RISKY BUSINESS OF RX SLEEP DRUGS

The need for slumber drives people to use sleep drugs in potentially dangerous ways, according to a nationally representative survey of 4,023 U.S. adults conducted by Consumer Reports in June 2015. Survey respondents who used over-the-counter or prescription sleep aids told us that at least once in the previous year they:



Took sleep drugs without allowing for at least 7 hours of sleep.



Took sleep drugs without allowing for at least 5 hours of sleep.



Took more than the recommended dose.



Mixed Rx, over-the-counter, or supplemental sleep aids such as melatonin.



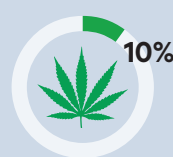
Reported drowsiness the day after taking sleep drugs.



Drove within 7 hours of taking sleep drugs.



Dozed off while driving the next day.



Mixed sleeping aids with alcohol or recreational drugs such as marijuana.

In addition, the survey found that among people taking Rx sleep drugs

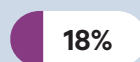


Took them every day.

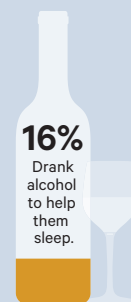
Among people taking over-the-counter sleep drugs



Didn't talk with a health professional about their use of the drugs.



Took them every day.



Drank alcohol to help them sleep.



Merck spent \$36 million on TV ads for its new drug Belsomra from Aug. 1 to Nov. 24, 2015, making it the second most advertised Rx drug in that time frame, according to iSpot.tv. The ads note that Belsomra is the first drug to target orexin, a chemical that plays a role in keeping people awake. But Belsomra doesn't work much, or any, better than other sleep drugs. And because it's new, little is known about its long-term safety.

An Over-the-Counter ‘Cure’?

ABOUT 34 MILLION AMERICANS reach for the sleep remedy melatonin each year, spending a reported \$378 million in 2014—lured by its reputation as an effective and natural sleep aid. But melatonin may not be as simple and safe a cure as many people hope.

Melatonin is in fact a hormone secreted by the brain's pineal gland. It sets the body's circadian rhythm, the 24-hour “clock” that helps control when you fall asleep and wake up. Traces can be found in barley, olives, rice, tomatoes, and walnuts, which



is why the Food and Drug Administration allows a synthetic version to be sold over the counter. (In the U.K. you can get melatonin only through a doctor.)

Melatonin can ease sleep problems caused by shift work or jet lag. But overall, people taking the drugs fall asleep only 7 minutes faster and sleep 8 minutes longer on average,

according to a 2013 analysis in the journal *PLoS One*.

The supplements pose some risks, too. About 20 percent of users in our survey reported next-day grogginess. And the Council for Responsible Nutrition, a supplement trade group, says to use caution before driving the next day.

Melatonin can also can undermine

blood pressure and diabetes medications. What's more, “supplements aren't regulated carefully, so what's on the label may not be what's in the pill,” says Marvin M. Lipman, M.D., Consumer Reports' chief medical adviser.

If you want to try it, look for products with the “USP Verified” mark, which have been vetted by the nonprofit U.S. Pharmacopeia. And stick with low doses, too. Research suggests that 1 to 3 milligrams is enough for most people, and as little as 0.1 to 0.3 milligrams may be effective for some.

The Dangers of Driving While Drugged

ON MAY 22, 2012, after working the evening shift at a coal mine in Galatia, Ill., Michael Jeter, then 34, took the sleep drug zolpidem (Ambien) even though he had to drive to a doctor's appointment early the next morning. At some point he also took diphenhydramine, an antihistamine found in OTC allergy drugs and sleep aids, as well as an anti-anxiety drug that can cause drowsiness.

Around 9:30 the next morning, after his doctor's appointment, Jeter

drove into a group of highway workers, killing one and injuring three. “The widow sent my son a family picture,” says Jeter's father, the Rev. Michael Jeter. “Michael put it on the refrigerator to remind him what he had done.”

Brian Moore, 43, who was hit by Jeter, is sympathetic. “I believe he didn't realize that combining those pills was like putting a chemical bomb in his stomach.”

Jeter was arrested for aggravated DUI

and sentenced to nine years in prison. But if you're driving erratically because you've taken medication, you can get arrested even if you don't harm anyone, says Duane Kokesch of the National District Attorneys Association.

If, after checking for dilated pupils, poor coordination, and other signs, a police officer suspects you're impaired because of a drug you've taken, he can charge you with DUI and arrange for a blood test.

VOICES OF THE SLEEP-DEPRIVED

We asked Facebook users about their sleeping-pill experiences. Within 48 hours, we received 181 responses (many, tellingly, in the wee hours!). Here's a sampling:



VICTORIA DUDA, 42
KENOSHA, WIS.

I took Ambien a few years back and it was crazy! I'd wake up the next morning with various empty food containers—once even 3 pounds of potato salad!—next to my bed.



KATHY RIDGEWAY, 62
CHICAGO

I go on and off Ambien, rotating it with Benadryl, Valium, and melatonin. On weeks when my schedule is light, I try to get by with nothing. But by the third night, I'm crying for sleep, and relapse into pills.



GREGORY THOMAS, 52
POLLOCK PINES, CALIF.

My doctor refused to give me a prescription so I take an over-the-counter sleep aid every night along with melatonin. Sometimes I wake up groggy but it's better than living in a continuous state of exhaustion.



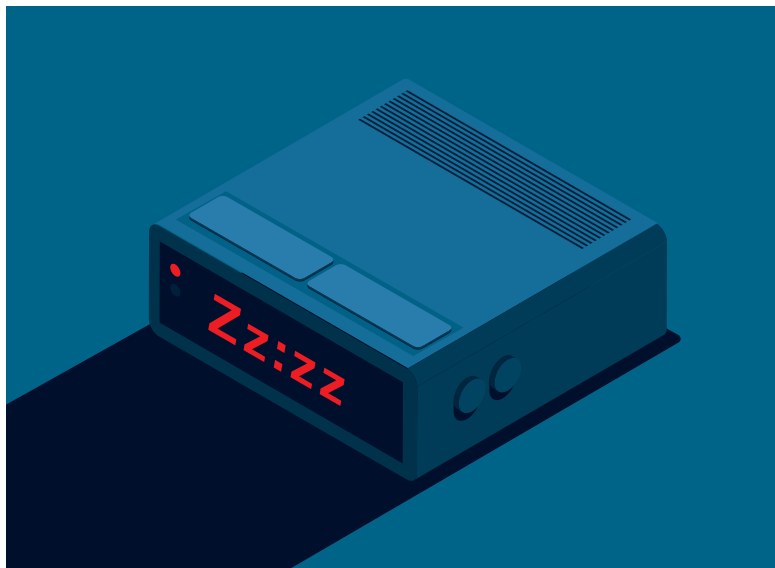
JULIE A. WOODS, 64
DEXTER, MICH.

I took Ambien for three days. I was found a mile away from my home by police officers after neighbors spotted me. I was sleepwalking! Extremely scary!



KEN SUSO, 57
DALLAS

I had very bad short-term memory loss after taking Ambien. I couldn't remember what I had for lunch the day before. I would drive to work and not remember how I got there.



GET MORE ZZZs, NATURALLY

Changing your sleep habits is a powerful fix, free of side effects

THE HEALTHIEST STEP you can take to sleep better is to make an appointment with your doctor. She should review all of the prescription and over-the-counter medications you take, a number of which—including blood pressure meds and a variety of antidepressants—can impair sleep.

Next, she will assess whether you have any medical conditions such as arthritis, heartburn, menopause, and prostate

enlargement, all of which are notorious for interrupting sleep. But they're often overlooked as contributing causes, says Marvin M. Lipman, M.D., Consumer Reports' chief medical adviser.

Your doctor may also want to establish whether you suffer from sleep apnea (periodic pauses in breathing while you sleep, lasting from a few seconds to a few minutes) or restless legs syndrome (involuntary urges to move your legs). To do so, she

will probably refer you to a sleep specialist who might track your patterns overnight, either at an inpatient sleep clinic or at home with a portable sleep monitor.

If your doctor rules out medical problems as a cause of your poor sleep, consider cognitive behavioral therapy for insomnia (CBT-I), a form of behavioral treatment that focuses on changing habits that disrupt sleep. The American Academy of Sleep Medicine now recommends CBT-I over sleep drugs as the treatment of first resort for chronic insomnia.

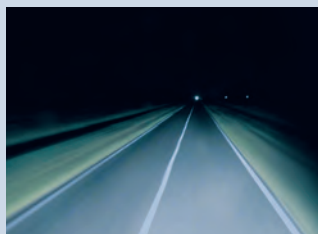
A 2015 review in the journal *Annals of Internal Medicine* concluded that CBT-I helped people sleep about 26 more minutes per night. Those improvements lasted even after the therapy stopped—and didn't pose any of the risks that drugs do.

If you're already taking sleeping pills, CBT-I has also been shown to help wean you from these drugs, says Lisa Medalie, Psy.D., an insomnia specialist at the University of Chicago. The treatment, which requires roughly two months of weekly sessions, is usually covered by insurance.

Here's how it works: You'll be asked to keep a sleep diary to record when you fall asleep and wake up, how long it takes to fall asleep (and if you wake up, how long it takes to fall back asleep), and how you feel the next day. Then the therapist will suggest strategies to help change your nagging thoughts and bad habits. At each session, you'll get "homework," such as stashing your smartphone under your bed at night so that you don't obsessively check the time or your emails.

Personalized CBT-I is the most effective way to go, but you can start now by trying out some of the techniques a therapist might recommend. ■

ILLUSTRATION: THOMAS POROSTOCKY



A Silent Killer

ASLEEP AT THE WHEEL

NODDING OFF at the wheel isn't just frightening—it can be fatal. Consider that at 55 mph you cover the length of a football field in 5 seconds. In fact, about one-fifth of fatal car crashes involve a drowsy driver, according to a 2014 study from the AAA Foundation for Traffic Safety, in

which specially trained investigators analyzed 14,268 car crashes between 2009 and 2013.

To combat that problem, the National Highway Traffic Safety Administration recently initiated a campaign against drowsy driving, and certain states are pursuing legal options. Arkansas and

PRACTICE MAKES PERFECT

Healthy sleep habits should happen all day long, experts say

7 A.M.

GET UP AT THE SAME TIME, EVEN ON WEEKENDS

A top goal is to keep your body's wake-sleep cycle predictable. Sleeping in some days feels good in the short term but creates long-term havoc.

7:30 A.M.

SOAK UP MORNING SUN

Get your body into daylight early in the day if you can. That helps set a proper 24-hour clock.

8 A.M.

GET A MOVE ON

Regular exercise encourages sleep, possibly because it tires you out and eases stress. Avoid working out within an hour or two of bedtime because that may increase alertness and make it more difficult to fall asleep.

10 A.M.

TIME YOUR CAFFEINE CAREFULLY

A cup of coffee at breakfast or midmorning is okay, but if you have chronic trouble sleeping, avoid caffeine for at least 6 hours before bed.

NOON

SOAK UP MIDDAY SUN

Midday exposure to natural light helps strengthen your body's 24-hour sleep-wake cycle.

3 P.M.

NIX THE NAPS

Fight the urge for an afternoon snooze even if you didn't sleep much the night before, for the same reason that you shouldn't sleep in: When bedtime comes, you're ready for sleep.

6 P.M.

HAVE AN EARLY, LIGHT DINNER

Big meals close to bedtime are a no-no, especially if you suffer from heartburn, which tends to worsen when you lie down. Alcohol is okay, as long as you will be up for several more hours. A drink before bed might help you conk out, but it can increase the likelihood of waking up in the middle of the night.

9 P.M.

POWER DOWN YOUR GADGETS

The blue light from laptops and smartphones can slow production of the sleep hormone melatonin. So shut them down 2 hours before you intend to go to sleep. Can't unplug? At least dim the device and hold it a foot or so from your eyes. Or consider special glasses designed to block out blue light (see page 32 for our reviews of three pairs).

10 P.M.

POWER DOWN YOUR BRAIN

An hour or so before bed, dim the lights in your bedroom and do something relaxing: Read a physical book (not a lit screen), listen to quiet music, meditate, or have a glass of a warm, non-caffeinated drink. (Note that there might not be anything magical about milk, but any soothing drink before bed may help you unwind.)

10:55 P.M.

TRY SENSORY DEPRIVATION

Close your curtains, try eyeshades, use earplugs, or turn on a fan or a white-noise machine (see page 32 for our reviews of white-noise apps for your phone).

11 P.M.

GO TIMELESS

Watching the minutes tick by can become a self-defeating obsession. So put your alarm clock or smartphone someplace where you can't easily see or reach it, such as under your bed.

3 A.M.

IF YOU WAKE UP ...

... and can't get back to sleep within 20 minutes, go to another room and do something relaxing. When you start feeling sleepy, head back to bed.

DO YOU NEED A 'COACH'?

THERE ARE COACHES for everything these days—life, relationships, business, and now sleep.

"Sleep coaches" often visit your home, offering suggestions about your bedroom environment (such as using dark curtains) and giving advice on your sleep habits (such as banning electronic devices in the bedroom before bedtime), says Mar Oscategui, founder of the Association of Professional Sleep Consultants.

Though that's advice many people could follow on their own, hiring a coach might motivate some to be more serious about making changes, Oscategui says. Coaches usually charge from \$75 to \$150 per hour—and their services aren't covered by insurance.

But Shalini Paruthi, M.D., director of the Pediatric Sleep and Research Center at St. Louis University and a spokeswoman for the American Academy of Sleep Medicine, says, "There's little evidence that people who hire these coaches actually sleep better." A recent review in the *Journal of Pediatrics* found that less than half of self-proclaimed sleep coaches had prior experience in health care or education. The study also pointed out that the coaches are not required to be licensed or to have any specific certification.

Paruthi recommends instead consulting with your doctor, who can determine whether you should be referred to a therapist trained in cognitive behavioral therapy for insomnia.

New Jersey allow police to arrest people driving erratically if they admit they've been awake for at least 24 hours.

Entrepreneurs have introduced stay-awake gadgets, including an ear device that sounds off if your head nods forward and smartphone apps

that randomly blast an alarm. But such devices may only be providing a false sense of security.

Certain cars can now detect driving patterns that suggest drowsiness, such as lane drifting. But what do the high-tech cars do if they think you're getting sleepy? Mercedes CLA-Class

cars turn on a coffee-cup icon and sound an alert. And the navigation system in the Volvo XC90 can direct you to a rest area.

In fact, the best solution is pretty simple, says Nathaniel Watson, M.D., president of the American Academy of Sleep Medicine. Don't get behind the

wheel if you're tired, and if you find yourself at the wheel struggling to stay awake, change drivers. If you're alone, pull over somewhere safe and take a nap or get a cup of coffee; note that it can take between 15 minutes and an hour for the caffeine to take full effect.

GIMMICKS OR GREAT GADGETS?

The market has exploded with options meant to help you sleep. Our experts examined some of the latest in our labs.

WHITE-NOISE APPS

Sounds on your smartphone aim to send you into slumber

More than half of people in our new sleep survey who report that they have tried white-noise machines—which both block out distractions and provide soothing sounds such as ocean tides, soft rain, and purring cats—say the devices help them sleep. The machines can be pricey, though, and are not especially portable. But you can enjoy the white-noise benefit with a free smartphone app. We tested whether those high-tech versions work as well.

We compared two apps with two white-noise machines that were favorites among our panelists in a previous test—the **Brookstone Tranquil Moments Advanced Sleep Sounds**, \$170, and **Marpac Dohm DS**, \$50. In our tests, neither the **myNoise** app (available for Apple iOS devices) nor the **White Noise Free Sleep Sounds** app (Android and iOS devices) precisely matched the sounds produced by the machines, but they sounded very similar. The

apps, however, have many more sounds to choose from (some sounds are sold separately), and you have the option of recording your own personalized sounds. Plus the apps are as portable as your smartphone is, which makes them a good choice for travelers. If you like your sounds to be at high volume, the apps have the advantage because you can hook your smartphone directly to external speakers. The apps offer a sleep timer and an alarm clock, just like many machines do.

SLEEP TRACKERS

Fitness bands and in-bed sensors cater to the data-driven who hope that the gear will reveal sleep patterns

Certain devices are claimed to track how much and how well you sleep by measuring your bedtime tossing and turning. That includes fitness trackers, such as the **Fitbit Surge**, \$250, and standalone devices such as the **Beddit Sleep Monitor**, \$140, a thin sensor that you put directly on top of your mattress. Both types sync to your smartphone or computer to create charts of how long it took you to fall asleep, how many minutes you were restless, and

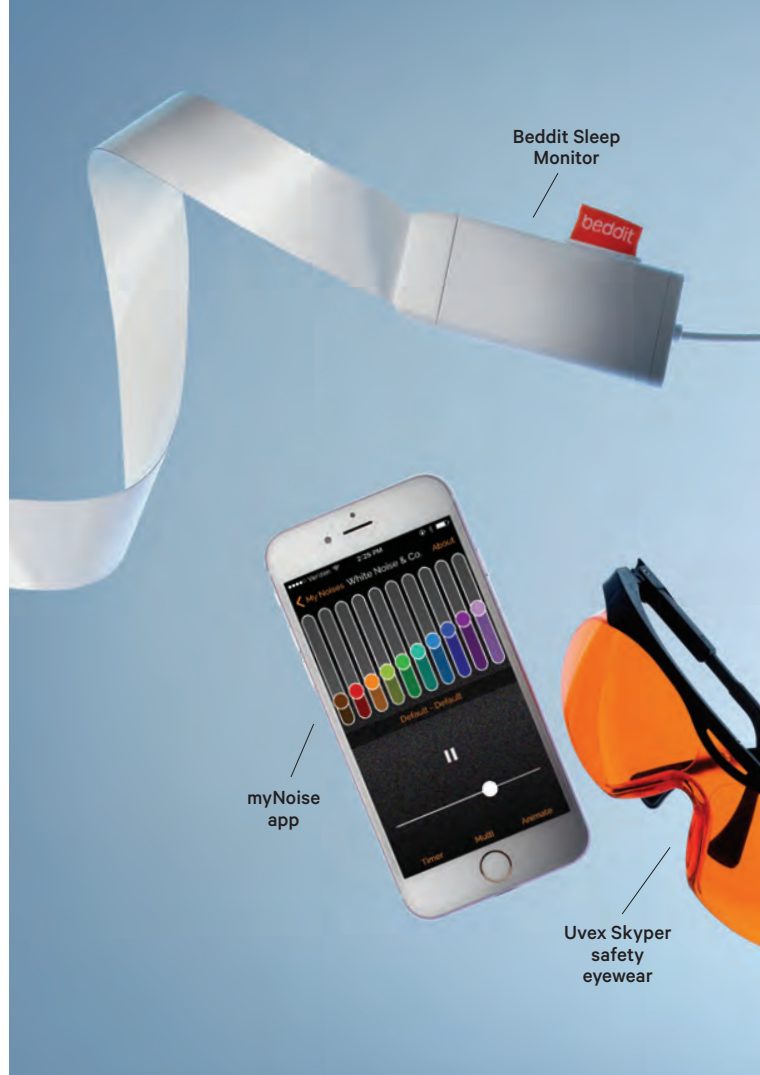
how long you slept.

But trackers that you wear on your wrist, such as the Fitbit, may overestimate sleep duration by as much as an hour, says Nathaniel Watson, M.D., president of the American Academy of Sleep Medicine, who helped review new sleep technologies in the December 2015 *Journal of Clinical Sleep Medicine*. That could be because the devices are attached to your arm, so if you're awake but motionless, it'll incorrectly record you as sleeping, he says.

The Beddit estimates sleep time using overall body movement as well as heart-rate and breathing patterns. Our tester, who used the Beddit and Fitbit Surge at home on different nights, found that even when he remained awake but motionless, the Beddit knew that he was

awake; the Fitbit recorded him as sleeping at such times. But the Beddit app sounded its alarm early when it sensed that our tester was in a light sleep stage. (Beddit's manufacturer claims that its optional "smart alarm" helps you wake up feeling more rested.)

Even if the devices aren't completely accurate, they may alert some users to underlying health problems. For example, if they detect breathing disturbances, you may want to check into whether you suffer from sleep apnea, a condition—common in heavy snorers—that increases the risk of heart attack. But for most people, the daily logs of time spent sleeping will simply make them more aware of their nighttime habits, Watson says. (Be aware that the apps may share your data with the manufacturer.)





BLUE-LIGHT EYEGLASSES

These specs are intended to guard against sleep-disrupting light from smart gadgets

The full spectrum of visible light is often described using the colors of the rainbow: red, orange, yellow, green, blue, indigo, and violet. The LED screens of TVs, computers, smartphones, and video games produce lots of blue light. Exposure to high levels of that light close to bedtime can suppress the production of the sleep-promoting hormone melatonin by the brain's pineal gland, says Charles Czeisler, M.D., chief of the Division of

Sleep and Circadian Disorders at Brigham and Women's Hospital in Boston.

That's why he and other experts advise that it's best to avoid those devices 2 or 3 hours before you hit the pillow.

For those who can't—or won't—unplug in the evening, several companies offer blue-light blocking glasses that filter out the wavelengths in the blue part of the spectrum. Czeisler cautions that for those glasses to offer substantial benefit, they need to block almost all blue light. In addition, he says more research needs to be done to prove that people who wear the glasses actually fall asleep faster.

We tested three pairs of glasses in our labs for their ability to block blue light, measuring light intensity at all wavelengths to find out how

much each lens absorbed. Of the three, only one—the **Uvex Skyper** safety eyewear (orange tinted), \$8—cut out almost all blue light. The **Gunnar Intercept** gaming glasses (medium yellow), \$53, cut blue light by about half, and the **Spektrum Pro Blue Light Blocking Glasses** (light yellow), \$40, cut it by only about a third.

SLEEP HAT

The maker of this biofeedback beanie claims that it whispers sleep signals into your ears

The maker of the **Sleep Shepherd**, an ear-hugging hat with built-in speakers, says it monitors your brain waves and “optimizes your time asleep” while “drowning

out distractions like a snoring partner.” The product literature claims that the hat uses the natural patterns of your brain waves to generate sounds that simulate the soothing sensation of side-to-side swaying—similar to being in a hammock. The company points to small studies in Europe, one of 20 adults and another of 15 teens, to support its claims that the Sleep Shepherd sounds can influence brain wave signals and promote sleep. “Biofeedback is a fairly legitimate way to train your body and alter your behavior,” says the AASM's Watson. “But these kinds of devices need to prove their worth more than they have up to this point.” Our tester found that the hat was comfortable, though warm, and functioned well as a white-noise machine—though, at \$149, an expensive one.

Serta

Charles
P. Rogers

Ikea

Sealy
Posturepedic

Stearns
& Foster



MAKE YOUR OWN BED ... AND LIE IN IT

Ignore the ads. Here's how to get the right mattress at the price you want to pay.

WHEN YOU BUY A NEW MATTRESS, a bad decision can literally keep you up nights. And the industry doesn't make it easy to sort the good models from the so-so from the downright awful. With their flowery and pseudo-scientific language, manufacturers' marketing messages are crafted to persuade you that the bridge between you and a great night's sleep is only a few thousand bucks. For instance, Serta's \$1,100 (queen size) Fitzpatrick Pillow Top is claimed to deliver "excellent body-hugging conformability to each sleep partner." Ads for Tempur-Pedic's Tempur-Flex, \$2,600, proclaim that it's "a bed that transforms your sleep" with a "dynamic support layer that moves with you."

And the two Duxianas we tested, starting at \$4,800, are claimed to align your spine "through dynamic contouring support." But in our tests, all of those were just average at best for back support.

To help you shop wisely, our labs evaluate every mattress in our Ratings—currently 45 models—not only on how it supports the spine but also on how it endures years of use, absorbs vibration, allows easy movement, and more.

Before you go shopping, arm yourself

with our expert reviews and these tips:

Start in the back of the store. Stores usually keep the priciest models in front. So head to the back, and if you don't find anything you like, work your way toward the front of the store, and up in cost.

Be hip to bait and switch. When you ask for a particular mattress, such as one featured in one of those alluring ads, you'll often be told it was replaced by another the store just happens to have that's "exactly the same." Don't believe it; the ad was meant to get you into the store. Also, many model names you see at major retailers such as Macy's, Sears, and Sleepy's are exclusive to them—so you won't be able to comparison shop.

Expect the hard sell. Sales reps can get incentives for pushing certain models. Extras such as mattress protectors may also add to commissions, so you might hear claims that using one is a condition of the warranty. It's not.

Take your time. Comfort is an individual decision. So make sure you lie on the mattress for 10 to 15 minutes, spending time on each side, on your back, and on your stomach if that's how you sleep. (Consider bringing your own pillow.) In



WHAT 'ORGANIC' LABELS MEAN

CONCERNED ABOUT off-gassing and harmful chemicals in your mattress? Manufacturers of organic mattresses suggest that their products are safer, and this product category—though still niche—is growing. But labels can be confusing. And some certifications matter more than others. The term 'natural' on a mattress, for instance, is meaningless, with no standards behind it and no required verification.

If you're in the market for a mattress made without potentially harmful chemicals, look for the label claims below. And look for a more in-depth report on organic bedding from us soon.

BEST GOTS and GOLS

A mattress bearing a GOTS (Global Organic Textile Standard) or GOLS (Global Organic Latex Standard) certification is truly organic, meaning that it has at least 95 percent organic materials and doesn't use potentially harmful chemicals in processing.

GOOD Oeko-Tex Standard 100

The Oeko-Tex Standard 100 doesn't ensure that a mattress's fiber is organic, but it sets limits for the emission of potentially harmful chemicals such as formaldehyde and other volatile organic compounds (VOCs). It also forbids the use of certain flame retardants and dyes.

SOME VALUE CertiPUR, Greenguard, Greenguard Gold, Organic, Organic Content Standard 100

These certifications are somewhat meaningful, but their requirements are narrower in scope than those above.

a survey of subscribers, about 80 percent of those who took the time to do that told us they were satisfied with their purchase. But you usually can't do that in warehouse clubs or with online retailers, so make sure the return policy lets you send it back if it doesn't satisfy.

Consider keeping your box spring. If you're switching from an innerspring to a foam or air bed, you might need a new foundation with no springs. Otherwise, if the box spring you have isn't sagging or damaged, it should suffice—and save you money. (Though mattresses and box springs are usually sold in pairs, you can opt to buy them singly; box springs alone usually cost \$150 to \$300.)

Haggle. Some businesses, such as warehouse clubs, won't budge on price. But when shopping at specialty chains and other stores, be sure to negotiate. Mark-ups are huge—that's why retailers can lower prices by 50 percent or more during their frequent sales. So even if there's no sale, insist on a "sale" price. No deal? Start to walk out. Chances are, you won't get far before the sales rep gives in.

Check the terms. Most companies will let you sleep on a mattress for anywhere from two weeks to 120 days before deciding to return or exchange it, but be sure to get the policy in writing. If you do return a mattress, you may pay a 15 to 25 percent restocking fee. ■

Can You Believe 'My Pillow' Promises?

IF YOU'VE BEEN UP late channel surfing—maybe because you're having trouble sleeping—chances are you've come across the 1- to 2-minute infomercial for My Pillow, \$60. It's running "constantly somewhere in the U.S." every day across multiple networks, and on the Fox network alone 10 times per day, according to My Pillow inventor and manufacturer Mike Lindell.

The company makes some bold claims for what it calls the "most comfortable pillow you'll ever own," including an "exact custom fit." Explains Lindell, "You can adjust the My Pillow to make it fit you. The foam pieces interlock and hold that position without going flat, so you get support where you need it." That results in "deeper, longer REM sleep," according to the pillow's packaging.

We bought three My Pillows to test in our labs. Though we weren't able



UNBOXED My Pillow sans marketing claims.

to test that REM sleep claim, we did examine them inside and out. My Pillow describes itself as having "3-piece interlocking fill," but it actually has thousands of torn polyurethane foam pieces in three sizes. We were able to shift the foam pieces around to different positions, and they did seem to stay put under pressure. The case is 100 percent cotton, and it didn't have any noticeable off-smells like some new pillows can.

How does it feel? Our tester described it as "kind of lumpy, but comfortable." We also polled staffers who

bought My Pillow on their own. Most said they bought it to help alleviate a sleep problem such as insomnia, neck pain, or snoring. Half of the 18 staffers said it helped a lot, 17 percent said it helped a little, and 33 percent said it didn't help at all. Only one-third of the group said they would buy My Pillow again.

The 60-day money-back guarantee means that you can return it, though you'll have to pay for shipping and handling on both the original purchase and the return. Exchanges are free, however, including shipping.

OUR TESTS OVER TIME

We first tested mattresses in 1938. Though our equipment has changed, our goals have not: to see how much support a mattress provides and how well it will hold up over time.



1. SIDE SHOW

Today we measure spinal support by hooking up our testers to sensors that send readings to a computer.

2. BOUNCE TEST

We used to pound this "buttocks simulator" against each mattress 125,000 times.

Today we measure durability with a giant 308-pound roller.

3. SPRING-LOADED

We cut open mattresses to see whether what's inside is what manufacturers claim. We still count springs, as this tester did in 1958.

THE PATH TO A PERFECT PILLOW

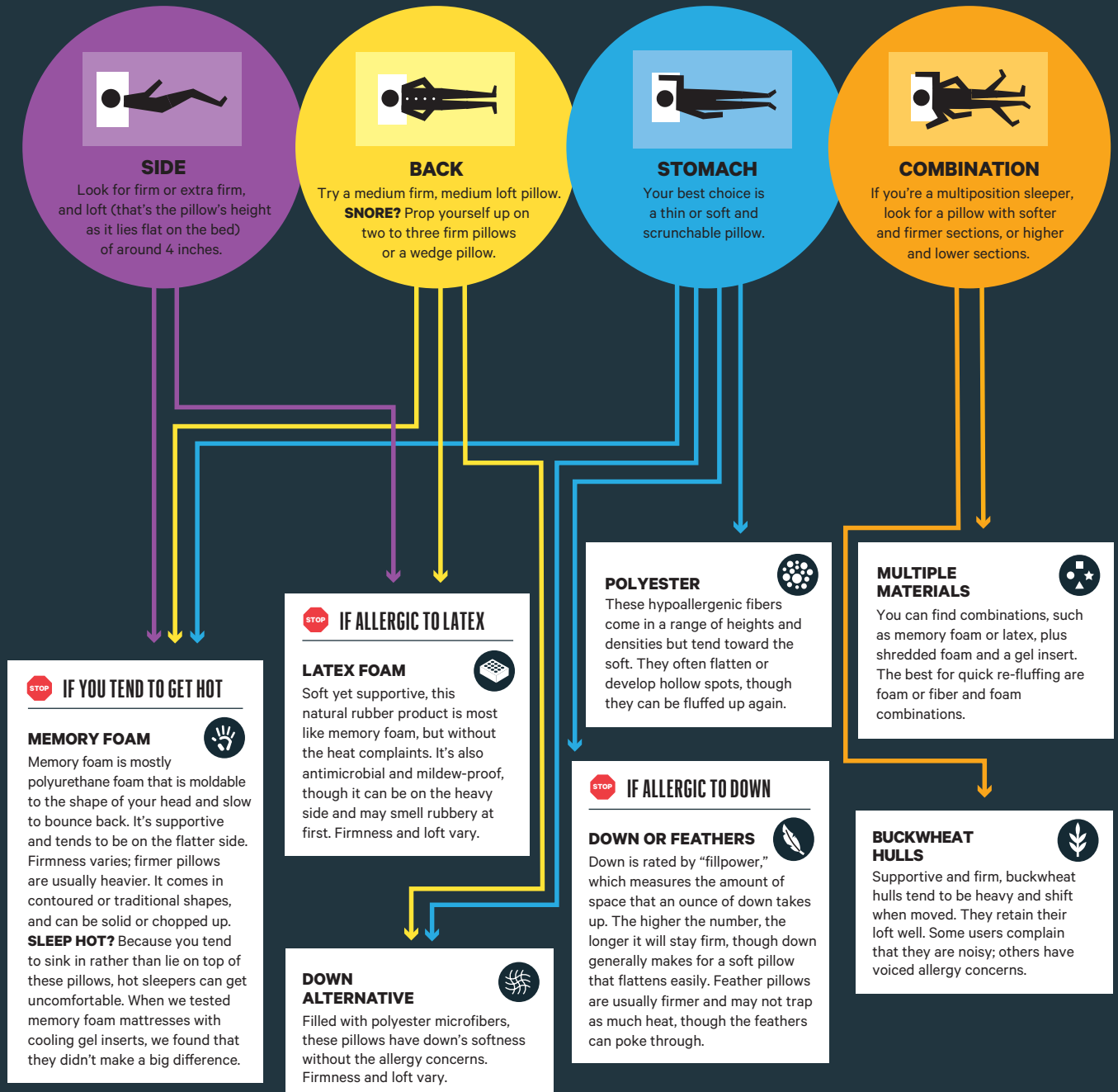
ANYONE WHO has ever had a bad's night sleep knows how easy it is to develop a love-hate relationship with your pillow. Too soft, too hard, too flat, too hot ... it's a nighttime version of Goldilocks, except that the perfect pillow never seems to come along. And packaging

labels don't necessarily help because there's no uniform definition of terms. Price isn't always an indicator of quality. An in-store squeeze of a pillow is not going to tell you what it's like to sleep on it all night.

We believe the best way to shop is to start with your

dominant sleep position: that's the position you settle into and is likely to be your favorite, says Rebecca Robbins, Ph.D., fellow at the New York University School of Medicine and co-author of "Sleep for Success!" (AuthorHouse, 2010). The right pillow keeps your head and neck

aligned without losing your neck's natural curve. Many pillows are now labeled that way. Use our flowchart below to find the best style and fill material for you. And just to be safe, check the retailer's return policy so that you don't get stuck with a closet full of rejects.



PICK THE RIGHT MATTRESS

BEST FOR \$800 OR LESS

A4 Denver Mattress \$500 CR Best Buy

B1 Novaform \$800 CR Best Buy

C2 Sleep Number \$800 CR Best Buy

All were impressive overall, especially given their lower prices. Choose **A4** if you want a soft innerspring mattress without extras such as a latex-foam layer or infused gel. The foam **B1** offers top-notch back and side support plus easy movement. **C2** scored almost as well as its pricier brandmate, **C1**, but has a much thinner foam layer on top.

BEST FOR HOTTIES

A1 Sealy Posturepedic \$1,275 CR Best Buy

A2 Charles P. Rogers \$1,500

B1 Novaform \$800 CR Best Buy

B4 Spring Air \$1,200

C2 Sleep Number \$800 CR Best Buy

These five didn't retain heat in our tests, and we judged them all impressive for back or side support, or both.

BEST FOR COUPLES

A1 Sealy Posturepedic \$1,275 CR Best Buy

A3 Charles P. Rogers \$1,100 CR Best Buy

B2 Serta \$1,575

C2 Sleep Number \$800 CR Best Buy

If you share your bed, you want a mattress that mutes vibrations from one side of the bed to the other, such as these. **C2**, with its dual adjustable air bladders, lets you adjust firmness on half of the bed at a time to suit individual preferences.

BEST FOR BACK SUPPORT

A2 Charles P. Rogers \$1,500

A5 Sealy Posturepedic \$775

C1 Sleep Number \$3,000

C2 Sleep Number \$800 CR Best Buy

Paying more for the adjustable air **C1** buys the softest of the four mattresses, though it tends to retain heat.

BEST FOR SIDE SUPPORT

A1 Sealy Posturepedic \$1,275 CR Best Buy

A4 Denver Mattress \$500 CR Best Buy

B1 Novaform \$800 CR Best Buy

B6 Casper \$850

C1 Sleep Number \$3,000

C2 Sleep Number \$800 CR Best Buy

If you mostly sleep on your side, these are good bets. They also resisted bounce and allowed easy turning.

Ratings: The Mattress of Your Dreams

Scores in context: Of the 45 queen-size mattresses we tested, the highest scored 74; the lowest, 32. All models are listed in order of performance, within types. Recommended models scored especially well; of these, CR Best Buys represent the best values.

☒ CR Best Buy ☒ Recommended

● Excellent ● Very Good ○ Good ● Fair ● Poor

Rec.	Rank	BRAND & MODEL	PRICE	SCORE	TEST RESULTS					FEATURES			
					Side Sleeping	Back Sleeping	Durability	Stabilization	Claimed Firmness	Measured Firmness	Resists Bounciness	Eases Movement	Retains Warmth

A. INNERSPRING

<input checked="" type="checkbox"/>	1	Sealy Posturepedic Hybrid Trust Cushion ¹	\$1,275	71	●	○	●	●	Firm	Soft	●	●	
<input checked="" type="checkbox"/>	2	Charles P. Rogers Powercore Estate 5000 ²	\$1,500	71	○	●	●	●	Firm	Medium	●	●	
<input checked="" type="checkbox"/>	3	Charles P. Rogers St. Regis Pillowtop	\$1,100	68	○	●	●	●	NA	Medium	●	●	●
<input checked="" type="checkbox"/>	4	Denver Mattress Doctor's Choice	\$500	67	●	●	●	○	Plush	Soft	●	●	
<input checked="" type="checkbox"/>	5	Sealy Posturepedic Grant Park Cushion Firm Euro Pillow Top	\$775	67	○	●	●	●	Firm	Medium	●	●	
<input checked="" type="checkbox"/>	6	Stearns & Foster Estate Scarborough Luxury Firm ¹	\$1,575	66	○	●	●	●	Firm	Soft	●	●	
	7	Duxiana Dux 515 ²	\$7,595	64	●	○	●	○	Firm	Soft	●	●	
	8	Serta Fitzpatrick Pillow Top ¹	\$1,100	64	●	●	●	●	Firm	Soft	●	●	
	9	Night Therapy 12" Euro Box Top Spring	\$250	64	○	●	●	●	Firm	Soft	●	●	
	10	The Original Mattress Factory Orthopedic Luxury Firm	\$540	63	●	○	○	○	Firm	Soft	●	●	
	11	Spring Air Isabella	\$1,600	62	○	○	●	○	Plush	Medium	●	●	
	12	Duxiana Dux 101 ²	\$4,800	61	●	○	●	●	NA	Soft		●	●
	13	Beautyrest Black Whitten Luxury Firm Pillowtop	\$2,600	61	●	●	●	●	Firm	Soft	●	●	
	14	Beautyrest Recharge Shakespeare Collection Luxury Pillowtop	\$830	61	○	○	●	●	Medium Firm	Soft	●	●	
	15	Serta iSeries Vantage ¹	\$1,075	60	○	○	●	●	Firm	Medium	●	●	●
	16	Tempur-Pedic Tempur-Flex Flex Supreme	\$2,600	60	○	●	●	●	Medium Firm	Soft	●	●	
	17	Stearns & Foster Estate Walnut Grove Luxury Firm ¹	\$1,575	60	○	○	●	●	Firm	Soft	●	●	
	18	Saatva Luxury Firm Euro Pillowtop	\$900	60	○	○	●	●	Firm	Soft		●	
	19	Ikea Sultan Holmsta ²	\$550	58	○	●	●	●	Firm	Soft	●	●	●
	20	MacyBed Grand Plush Super Pillowtop 15" (Macy's)	\$910	57	○	●	●	○	Plush	Soft	●	●	●
	21	Shifman Anniversary Collection (Bloomingdale's)	\$3,025	52	○	○	○	●	Firm	Medium		●	●
	22	Ashley Sleep Destin Beach	\$850	44	●	●	●	○	Firm	Soft	●	●	●
	23	Beautyrest Recharge Messala ¹	\$1,600	43	○	●	●	●	Plush	Soft	●	●	



A1 Sealy
Posturepedic

A3 Charles
P. Rogers

B1 Novaform

B2 Serta

✓ CR Best Buy ✓ Recommended

● Excellent ● Very Good ○ Good ○ Fair ● Poor

Rec. Rank	Brand & Model	Price	Score	Test Results						Features	
				Side Sleeping	Back Sleeping	Durability	Stabilization	Claimed Firmness	Measured Firmness	Resists Bounciness	Eases Movement

B. FOAM

✓	1	Novaform 14" Serafina Pearl Gel (Costco) ¹	\$800	70	●	●	●	●	Medium Firm	Medium	●	●
✓	2	Serta iComfort Savant EverFeel ¹	\$1,575	67	○	●	●	●	Plush	Soft	●	●
✓	3	Leesa Leesa Medium Firm ³	\$890	65	○	○	●	●	Medium Firm	Medium	●	●
✓	4	Spring Air Back Supporter Natalie (Costco) ²	\$1,200	64	○	●	○	○	Ultra-firm	Medium	●	●
✓	5	Tuft & Needle Ten ³	\$500	64	○	○	●	●	Firm	Medium	●	●
✓	6	Casper The Casper ²	\$850	64	●	●	●	●	Firm	Medium	●	●
✓	7	Ikea Morgongava ² ³	\$1,000	63	○	●	●	●	Firm	Medium	●	●
✓	8	Sleep Innovations 12 inch Gel Swirl ¹	\$470	62	○	○	●	○	Medium/Firm	Medium	●	●
	9	Novaform Altabella (Costco) ¹	\$1,300	61	●	●	●	○	Plush	Medium	●	●
	10	The Original Mattress Factory Serenity Latex ² ³	\$1,540	61	○	○	●	○	Firm	Soft	●	●
	11	Ikea Myrbacka ² ⁴	\$550	61	○	○	●	●	Firm	Medium	●	●
	12	Night Therapy 14" Deluxe Grand Firm (Sam's Club)	\$515	58	○	○	●	○	Firm	Medium	●	●
	13	Serta iComfort Sleep System Genius ¹	\$1,375	58	○	●	●	●	Firm	Medium	●	●
	14	Serta iComfort Directions Acumen ¹	\$2,220	58	○	●	●	○	Firm	Soft	●	●
	15	Spa Sensations 10" Memory Foam SPA-1000Q	\$360	57	○	●	○	●	Firm	Medium	●	●
	16	Ikea Matrand ² ⁴	\$400	57	○	○	●	●	Firm	Medium	●	●
	17	Sealy Posturepedic Optimum Inspiration ¹	\$1,775	52	○	●	●	●	Plush	Soft	●	●
	18	Ara 13" 100% Visco Memory Foam (Costco)	\$1,100	48	○	●	●	○	Plush	Soft	●	●
	19	Optimum by Sealy Posturepedic Gel Memory Foam Series Radiance Gold ¹	\$1,475	48	○	●	●	●	Medium Firm	Soft	●	●
	20	Tempur-Pedic Cloud Supreme	\$2,400	32	○	●	●	○	Plush	Soft	●	●

C. ADJUSTABLE AIR

✓	1	Sleep Number i8 bed ³	\$3,000	74	●	●	●	●	NA	Soft	●	●
✓	2	Sleep Number c2 bed	\$800	72	●	●	●	●	Plush	Firm	●	●

¹ Includes a layer of gel-infused foam. ² Includes a latex-foam layer. ³ Made of foam but not memory foam. ⁴ Firm models are memory foam; medium-firm models have latex foam.

HOW WE TEST MATTRESSES

We calculate the overall score primarily by evaluating a mattress's side and back support, durability, and stability. For adjustable-air mattresses, we use an average of firmness levels. **Side Sleeping** is the ability to keep a side sleeper's spine relatively horizontal. **Back Sleeping** is the ability to maintain the natural curve of a back sleeper's spine.

Durability gauges a mattress's ability to keep its original shape, height, firmness, and support after a simulated eight to 10 years of use, including our passing a 308-pound roller over each mattress 30,000 times. A high score for **Stabilization** indicates little or no bouncing transferred for innersprings, and ease of movement and changing position for foam. **Firmness** compares manufacturer claims with our measurements. ("NA" indicates no claim.) **Price** is approximate retail for queen size without a box spring.

WE SPEND THOUSANDS SO THAT YOU DON'T HAVE TO

Because Consumer Reports buys everything we test at retail, the same way you do. So for all of the mattresses now in our Ratings, that's a grand total of \$65,200. Add in shipping and salaries for shopping, testing, reporting, and shooting photos and video, and that hikes the price to \$321,280.



WATCH

To see our full mattress Ratings and to watch a video of how we test mattresses, go to [ConsumerReports.org/cro/MattressGuide](https://www.ConsumerReports.org/cro/MattressGuide)



NEW TECHNOLOGY

can read your face in public for gender, age, and race—and use that data to target you with ads.

M30-40/W

M45-55/W

M25-35/W

F25-35/W

M55-

F55-65/W

F35-45/B

D-40/W

M25-35/W

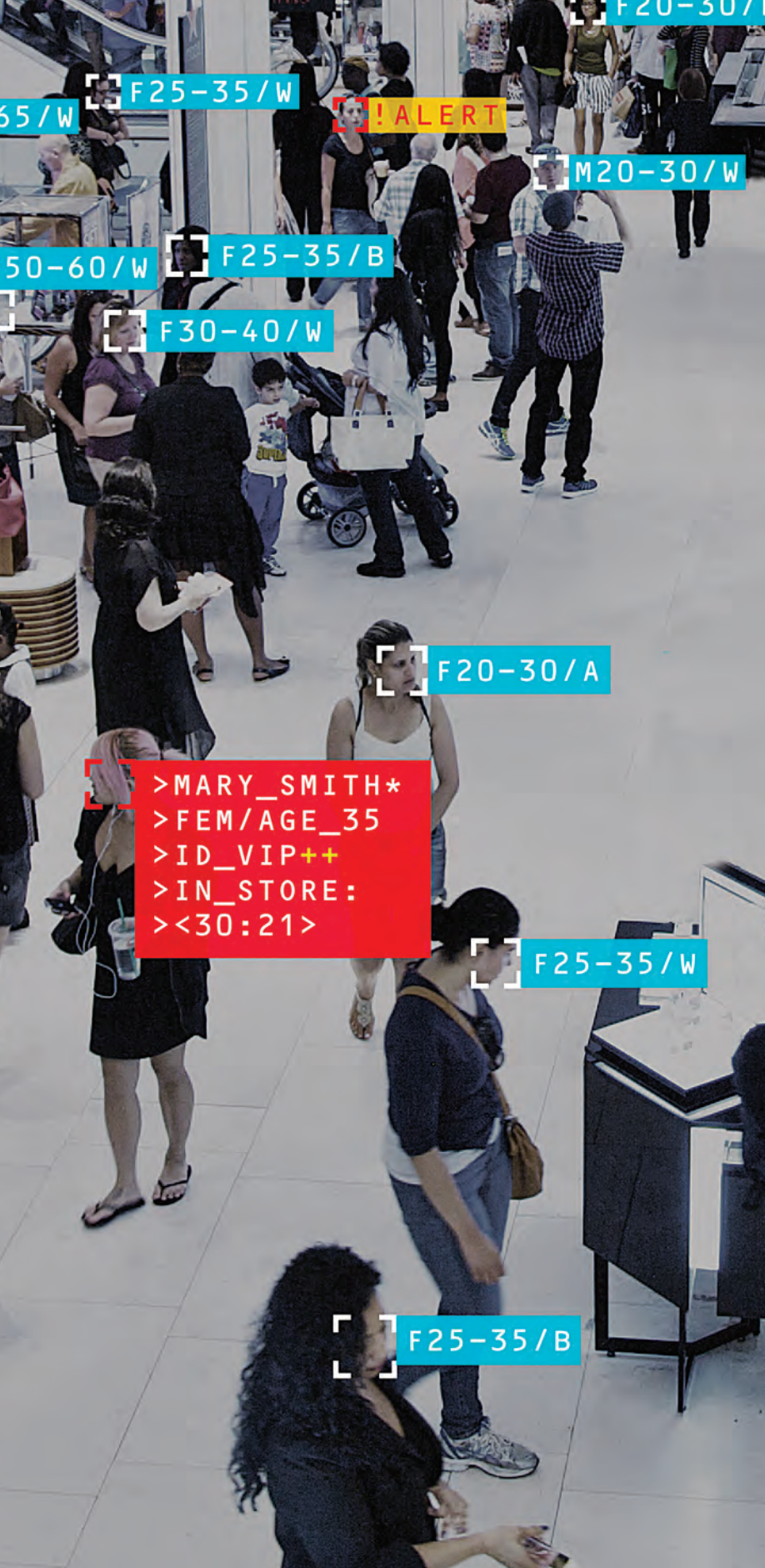
F25-35/B

F45-55/W

>JOHN_SMITH*
>MALE/AGE_41
>ID_VIP++
>IN_STORE:
><30:21>

F25-35/B

F25-35/A



**PRIVACY
ALERT**

WHO'S TRACKING YOU IN PUBLIC?

*Facial recognition
technology is moving into the
world of department
stores, casinos, and cruise ships—
and even churches.
How freaked out should you be?*

THE MALL IS CROWDED, including the department store that keeps your family supplied with everything from handbags to business suits. Moments after you enter, a saleswoman walks up holding a tablet. She smiles and greets you by name. Are you shopping for yourself or your spouse today? We've moved things around since you were here in December—let me help you find your way, she says.

This is how customer service works in

a few high-end stores in Europe, and vendors are now marketing the underlying technology to retailers in the U.S. The experience relies on facial recognition—whether it sounds appealing or intrusive depends on your perspective.

Here's how facial recognition works. As shoppers enter the store, security cameras feed video to computers that pick out every face in the crowd and rapidly take many measurements of each one's features, using algorithms to encode the data in strings of numbers. These are called faceprints or templates. The faceprints are compared with a database, and when there's a match, the system alerts salespeople—or security guards if anyone previously caught shoplifting in the store is spotted walking the aisles.

A company called Herta Security, based in Barcelona, Spain, is one vendor of the technology. Its system is being used in casinos and expensive shops in Europe, and the company is preparing to open offices in Los Angeles and Washington, D.C. Retailers that use the Herta system receive alerts through a mobile app when a member of a VIP loyalty program enters the store—the customers have previously agreed to have their photos entered into the retailer's database. The screen displays the shopper's name, a photo just taken from the video feed, shopping preferences, and other details.

For now, security is a bigger business than customer service, however. Herta's software was used at the 2014 Golden Globe Awards at the Beverly Hills Hilton to scan for known celebrity stalkers. The company's technology may soon help bar known criminals in soccer stadiums in Europe and Latin America. Police forces and national security agencies in the U.S., the United Kingdom, Singapore, South Korea, and elsewhere are experimenting with facial recognition to combat violent crime and tighten border security.

Beyond Photo Tagging

Facial recognition is more firmly established online than in the physical world. Facebook has used it to help users tag photos since 2010. Last spring Google

**Your faceprint may
become a Web cookie
for the real world.
It might let companies
track you in public—
and it could never
be deleted.**

launched a photos app that helps users organize their pictures by automatically identifying family members and friends. (Google suffered a public relations humiliation when the system labeled a photo of two black people as gorillas. The search giant rushed to apologize—and fix its algorithms.) Looking ahead, MasterCard is experimenting with a system that lets users validate purchases by snapping a selfie. Like fingerprint scanners and other biometric technologies, facial recognition has the potential to offer alternatives to passwords and PINs.

Those applications can make photo-sharing faster and more fun, and they can add security and convenience to real-world venues. However, the technology has been evolving fast, with little public debate or regulation.

In that regard, facial recognition today is reminiscent of the World Wide Web of the mid-1990s. Back then, few people anticipated the day when the details of everything we read, watch, and buy online would become commodities traded and used by big business—and frequently stolen by hackers. Two decades on, many of us have become numb to the privacy intrusions of the Web. But at least we know we've gone online and can control whether or not we have social media accounts and what we share through them.

Facial recognition has the potential to move Web-style tracking into the real world, and can erode that sense of

control. That's what alarms privacy experts such as Alvaro Bedoya, the executive director of Georgetown Law's Center on Privacy & Technology, and the former chief counsel to the Senate's subcommittee on privacy, technology, and the law.

"People would be outraged if they knew how facial recognition" is being developed and promoted, Bedoya says. "Not only because they weren't told about it, but because there's nothing they can do about it. When you're online, everyone has the idea that they're being tracked. And they also know that there are steps they can take to counter that, like clearing their cookies or installing an ad blocker. But with facial recognition, the tracker is your face. There's no way to easily block the technology."

No Talk, No Action

Facial recognition is largely unregulated. Companies aren't barred from using the technology to track individuals the moment we set foot outside. No laws prevent marketers from using faceprints to target consumers with ads. And no regulations require faceprint data to be encrypted to prevent hackers from selling it to stalkers or other criminals. You may enjoy Facebook's photo-tagging suggestions, but would you be comfortable if every mall worker was jacked into a system that used security-cam footage to access your family's shopping habits, favorite ice cream flavors, and most admired superheroes?

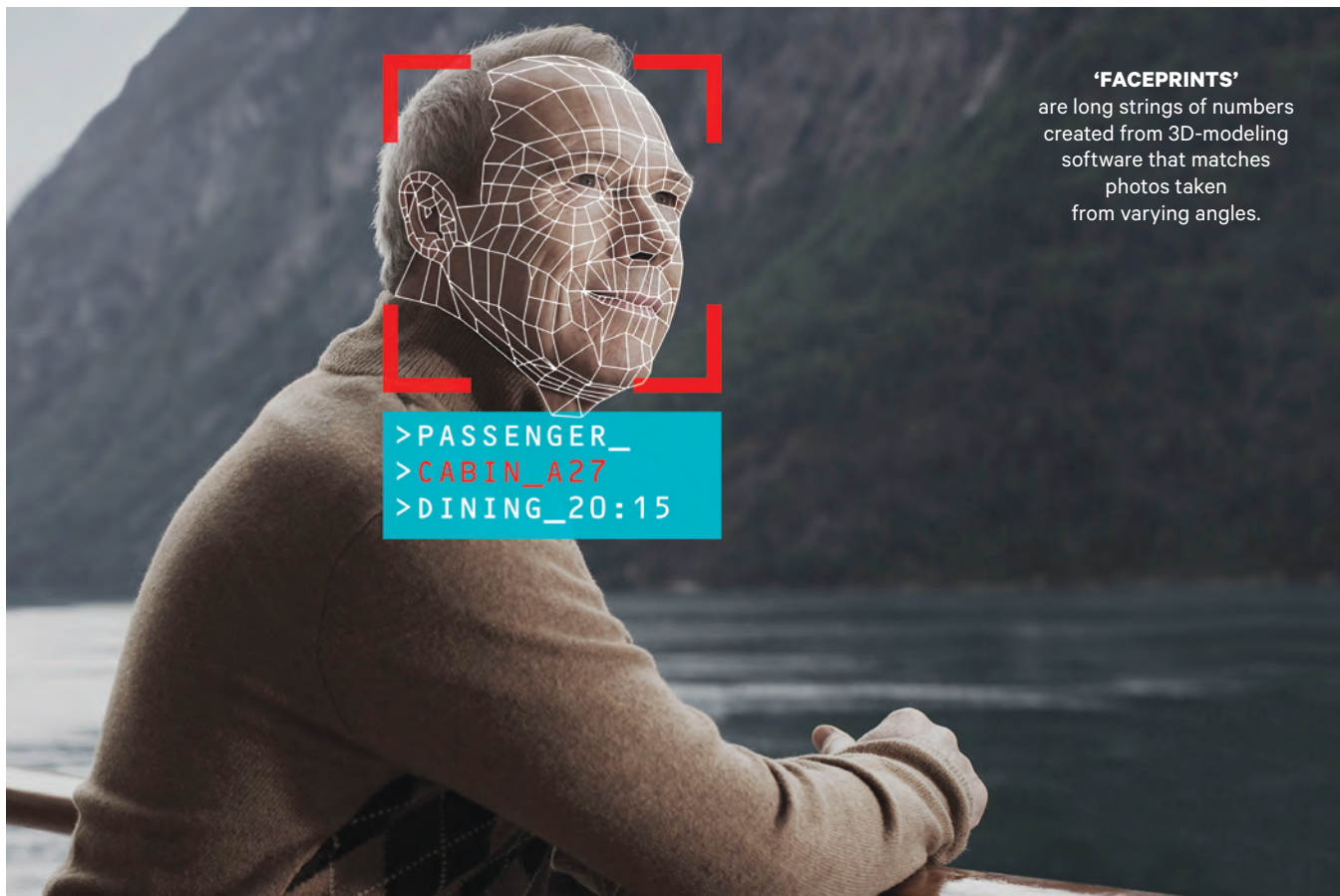
Like it or not, that could be the future of retail, according to Kelly Gates, associate professor in communication and science studies at the University of California, San Diego and author of "Our Biometric Future: Facial Recognition Technology and the Culture of Surveillance" (New York University Press, 2011).

"Regardless of whether you want to be recognized, you can be sure that you have no right of refusal in public, nor in the myriad private spaces that you enter on a daily basis that are owned by someone other than yourself," Gates says. "You give consent by entering the establishment."

In 2014 the Commerce Department's National Telecommunications and

THE GHOST IN THE CAMERA

How facial recognition technology mines your face for information



'FACEPRINTS'

are long strings of numbers created from 3D-modeling software that matches photos taken from varying angles.

>PASSENGER_
>CABIN_A27
>DINING_20:15

FACIAL RECOGNITION is not a single technology. Instead, it's a broad field in which researchers use 3D modeling, analysis of patterns of light and dark in photographs, and other techniques to first pick out faces from a video stream or still photo, then identify either characteristics of the subject (male or female, age range, race) or a specific identity.

The most widely used technique relies on taking hundreds of measurements between established facial features. One leading vendor of the technology is Cognitec Systems, which in the past several years has expanded from its home offices

in Dresden, Germany, into the U.S., Australia, and other countries. Elke Oberg is the company's marketing manager.

"Essentially what is being looked at is a landscape of the face," Oberg says. "Facial recognition software takes various measurements of each face and turns these into a string of numbers. Then it's just a matter of comparing one string of numbers with another. The higher the similarity score, the more likely it is that you're looking at the same person." The resulting file is called a faceprint or face template—it can consist of thousands of digits, depending on what algorithm is used. It can

be compared with databases to recognize shoplifters, verify identities to open electronically controlled gates, or simply count how many people are standing in a particular line or crowding around a popular store display.

A facial recognition research project called DeepFace that was conducted by Facebook and described in a paper in summer 2014 used a computing architecture called a deep neural network. The project was an example of "machine learning." Researchers didn't tell the computer to take a predetermined set of measurements of each photo. Instead, they built a system that automatically analyzed

millions of images, turned them into 3D models, and then figured out on its own how to pick out which photographs matched.

The system was 97.35 percent accurate when applied to a publicly available dataset of more than 13,000 photographs collected from online news stories with uneven lighting, shot from a variety of angles.

That kind of work has the potential to make facial recognition systems faster, more accurate, and easier to scale up to handle huge numbers of images. The computer would know which individuals appeared in almost any photo, taken almost anywhere—and do it almost instantly.

Information Administration started to address those issues by organizing talks between trade groups, individual companies, and privacy advocates. The goal was to come up with voluntary standards to allow facial recognition to expand while protecting consumer privacy. But the talks stumbled badly last June.

Bedoya had been participating in the meetings since they began in 2014. He says that privacy advocates had started worrying at a previous meeting, when trade groups refused to commit to encrypting facial recognition data. "It's such a basic safeguard that we thought it would sail through," he says.

Then, at the June meeting, Bedoya says that privacy advocates asked a hypothetical question about user consent: Let's say a citizen is walking down a public street. And then a company he's never heard of wants to snap his photo and check a database to identify him by name. In that case, the company would clearly have to ask first, right?

"That was an edge case, the most extreme example," Bedoya says. "But not a single company in the room would agree to it." Stakeholders were meeting in a conference room about two blocks west of the White House, in Washington, D.C. In the afternoon the group took a break, and the privacy advocates didn't come back. A few days later they announced that they would no longer participate in the talks. "We said, 'We're not going to play this game. We're withdrawing from negotiations, and we're going to tell the world what's happening.'" The NTIA meetings have continued—but to date no code of conduct has been adopted.

Of Staterooms and Church Pews

Though facial recognition is still used largely for security, other applications are spreading, particularly in the hospitality industry. On Disney's four cruise ships, photographers roam the decks and dining

rooms taking pictures of passengers. The images are sorted using facial recognition software so that photos of people registered to the same set of staterooms are grouped together. Passengers can later swipe their Disney ID at an onboard kiosk to easily call up every shot taken of their families throughout the trip.

Kelly Shanahan-Carson, who co-founded a Disney-travel blog called The Main

tool, early on the hotel experimented with using the system to identify VIP guests who could be greeted by name by hotel staff, according to 3VR. The hotel wouldn't comment on whether that program is still active. But facial recognition companies are actively marketing their systems to hotels.

A surprising use of facial recognition was revealed in the summer of 2015

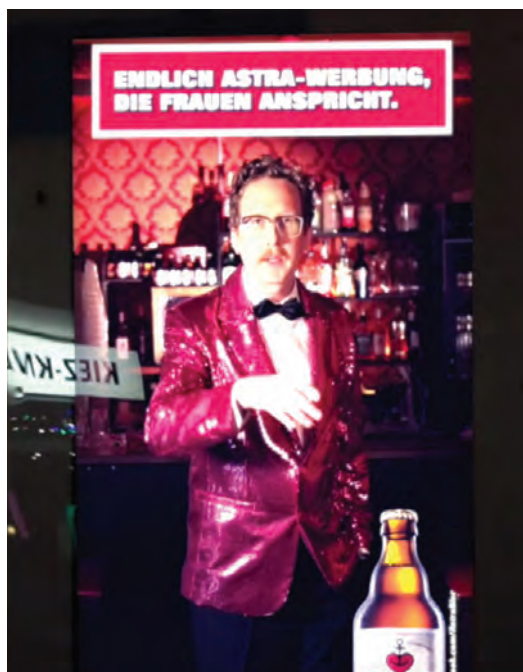
when a company called Churchix said it had installed a facial recognition system in dozens of churches around the world to track which congregants were attending services. Company founder Moshe Greenshpan declined to put Consumer Reports in touch with any clients, saying that the technology received a "wave of bad publicity, and our clients got a little scared." However, he defended his product. "Tracking members means that churches know who is a regular attendee, and might be open to giving a donation, for example," he says. "It also means they can know whether a regular attendee suddenly stops coming. The church can call to make sure everything is okay."

Surveillance in the pews may seem particularly off-putting, but there's evidence that facial recognition tends to make people uncomfortable wherever it appears.

In a recent study of 1,085 U.S. consumers by research firm First Insight, 75 percent of respondents said they would not shop in a store that used the technology for marketing purposes. Notably, the number dropped to 55 percent if it was used to offer good discounts.

The aversion people feel to facial recognition may decline as it becomes more familiar, especially if retailers offer enough incentives. Meanwhile, not every intelligent camera system is looking to identify you as an individual. Facial recognition can also help marketers determine the age, sex, and race of shoppers.

In Germany, the Astra beer brand



YES, I'M TALKING TO YOU

Digital beer ads on the streets in Germany can detect the age and gender of a passerby, then react with tailored messaging.

Street Moms, is a fan of the technology. "In the past, they'd print every single shot and place them in racks lining the wall in Shuttles, the photo store onboard. You'd have to look through hundreds of photos to find yours. By the last day, it would be nuts." Disney's system is built by a company called The Image Group, which also partners with Royal Caribbean, Celebrity Cruises, and other companies.

Starting in 2010, the 1,200-room Hilton Americas-Houston in Texas employed a facial recognition system created by a company called 3VR. Though the system is designed mainly as a security

recently created an automated billboard that noted when women walked past. The billboard approximated the women's age, then played one of several prerecorded ads to match.

Retailers can use facial recognition systems to see how long people of a particular race or gender remain in the shop, and adjust displays and the store layout to try to enhance sales. Using related technology, some high-end retailers in the U.S. have experimented with "memory mirrors" that perform tricks such as storing images of what shoppers tried on so that they can be revisited, or emailed directly to friends for feedback.

A Database of Billions

If a company wants to tap into a list of thousands of consumers who like stout beers and sports cars, it can do that through a big data broker. But, according to facial recognition vendors and customers, privacy experts, and lawyers we interviewed, marketers that want to combine faceprints with personal data are amassing the information themselves, one customer at a time.

That's a slow process, and the customer databases are relatively small. The scale is entirely different online. In 2014 Facebook published a paper on a research project it calls DeepFace (see "The Ghost in the Camera," on page 43), a system said to be 97.35 percent accurate in comparing two photos and deciding whether they depicted the same person—even in varied lighting conditions and from different camera angles. In fact, the company's algorithms are now almost as adept as a human being at recognizing people based just on their silhouette and stance. How did Facebook get so good? Partly by harnessing the photos uploaded and manually tagged by many of its 1.5 billion users. And some privacy experts consider that a misuse of personal data.

"Entities like Facebook hold vast collections of facial images," says Gates, the UC, San Diego professor. "People have voluntarily uploaded millions of images, but for their own personal photo-sharing activities, not for Facebook to

develop its facial recognition algorithms on a mass scale."

Last spring Carlo Licata, a resident of Illinois, sued Facebook, claiming that the company broke a state law, the Biometric Information Privacy Act, by failing to get his consent to storing, using, and sharing the data. Two other men later joined the suit, which is still progressing through the legal system.

It's not apparent what effect such lawsuits might someday have on Facebook and other companies that use facial recognition. What is clear, though, is that just a couple of states have been ahead of the rest of the country in grappling with the implications of the technology. "Illinois is on the forefront," Licata's lawyer, Jay Edelson, says. "Texas has a similar statute, although it doesn't allow consumers the right to bring lawsuits if their rights are violated. Unless there is a new law that's enacted, people in other states don't really have many rights protecting the collection and use of their faceprints."

And there's no way to determine what deals online companies may someday forge with walk-in businesses. Could Facebook or another Web-based company use its vast database of faceprints to power real-world facial recognition? Hypothetically, a tech giant wouldn't need to share the faceprints themselves. It could simply ingest video feeds

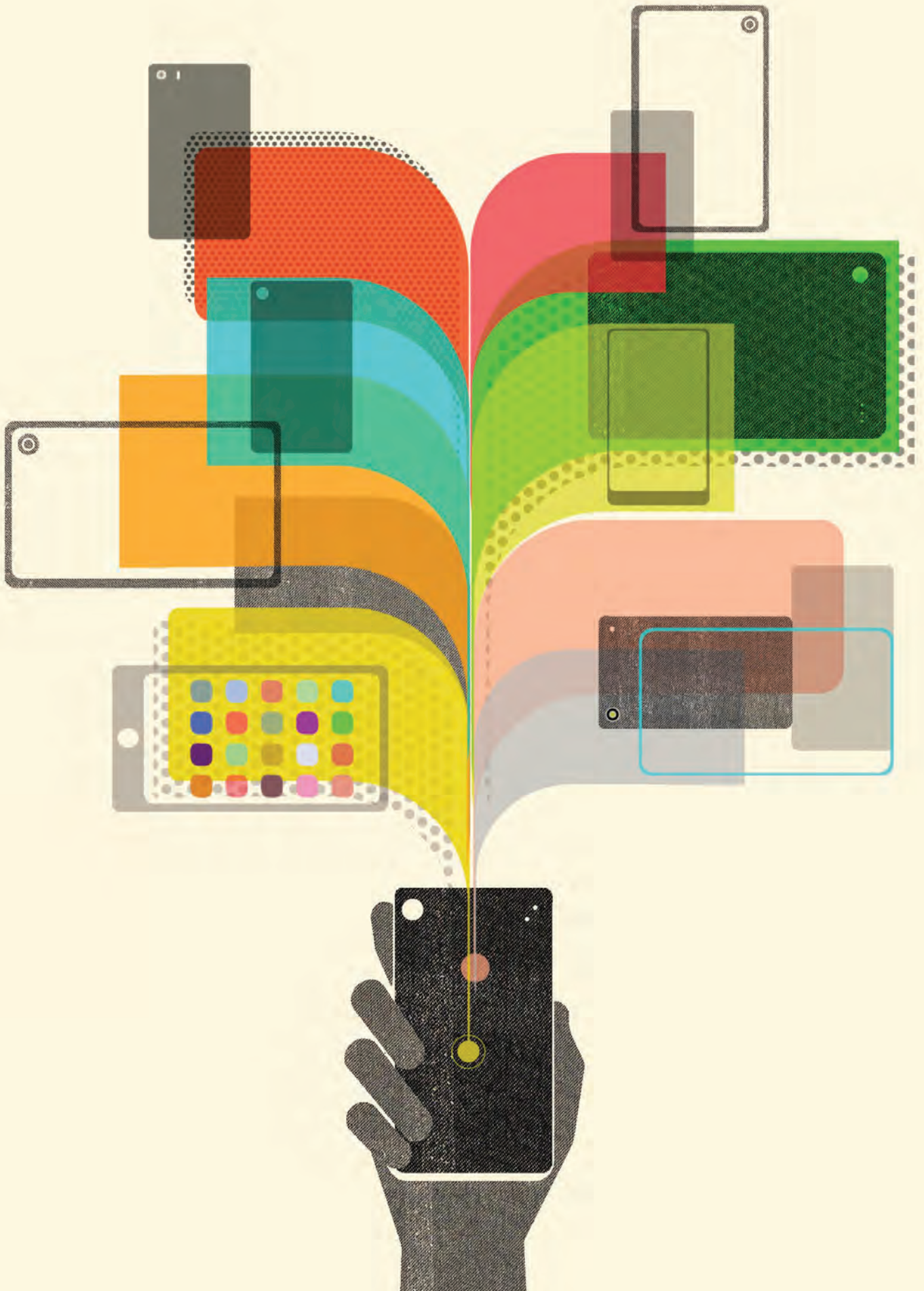
**'You can be sure that
you have no right of
refusal in public, nor in
the myriad private
spaces that you enter
on a daily basis that are
owned by someone
other than yourself.'**

from a store and let salespeople know when any well-heeled consumer walked through the door.

The Surveillance Economy

Nearly all technologies that come with privacy risks are developed for legitimate and even beneficial purposes. Facial recognition is no exception, but it deserves attention and debate. Simple facial detection could surround you in a bubble of billboards and electronic store displays shown only to people of your race, sex, and age. More importantly, facial recognition has the potential to erode the anonymity of the crowd, the specific type of privacy you experience when you stride through a public space, near home or on vacation, and refreshingly, no one knows your name. Marketers already can see every article we read online; do we need to let them record every shop window we gaze through?

According to privacy advocates, this is the time to consider policy changes, while facial recognition is still ramping up. One step advanced by stakeholders at the NTIA meetings would be to require an opt-in before people are entered into a facial recognition database, with reasonable exceptions for safety and security applications. That idea has already been implemented by some leading technology companies. For instance, users of Microsoft's Xbox gaming system can access their profiles using facial recognition, but only if they choose to turn on that feature. Second, regulations could require companies to encrypt faceprints or institute other strong data protections—after all, a compromised PIN can be replaced, but there's no ready solution if someone steals your biometric files. Special rules could prevent children under the age of 13 from being targeted by facial recognition systems in stores. And consumers should have the right to know who has a copy of his or her faceprint, how it is being used, and who it is being shared with. Those are just a few of the proposals that can be debated, and should be. Because right now, there are virtually no consumer protections at all. ■



THE ULTIMATE GUIDE TO SHOPPING FOR YOUR NEXT SMARTPHONE

*A step-by-step
strategy for
choosing the best
provider, the
best phone, and
the best data
plan for you*

IF YOU HAVEN'T SHOPPED for a new cell-phone plan in a while, the odds are good that you're paying a price for your loyalty—or your inertia. In a recent survey of almost 90,000 Consumer Reports subscribers, almost half of those who switched providers in the past year saw a big drop in their monthly bill. We're talking \$20 or more. After making the shift, some respondents said they got more reliable coverage, faster data service, and better customer service, too.

Because of the heightened competition among providers, the draconian two-year contract is near extinction and consumers have new ways to finance phones.

Have your eye on that top-of-the-line Galaxy S6 Edge+? Now you can lease it like a car, pay it off in interest-free installments, or buy it outright and enjoy a lower monthly bill.

So it's time you explored your options. Keep reading as we show you how to get a better deal from any provider and, while you're at it, buy that smartphone you've been coveting, whether it's the latest tech wonder or a bargain-priced workhorse.



CELL-PHONE CARRIER

SHOULD I STAY OR SHOULD I GO?



THAT'S THE BIG QUESTION. To answer it, take a quick look at your current plan. If it costs close to \$100 per month to feed, it's time to make some changes, even if you're inclined to stick with your service provider. As a general rule, you shouldn't spend more than \$25 to \$50 each month per phone line above the cost of the phone itself.

But comparing phone plans is a special challenge. Because the fee structures vary so much from one provider to the next, you need a calculator or a pencil with a fresh eraser to evaluate them (unless you're a whiz at Excel spreadsheets). Here are four tips to help you cut through the confusion:

▷ **ROUND UP YOUR BEST PROVIDER OPTIONS.** For help, consult our carrier Ratings and analysis on page 51. Generally speaking, prepaid service from the smaller carriers benefits people with modest data needs (Web browsing, email, Facebook) and little lust for the hot phone of the moment. Heavy data users, especially those who want three or more phone lines, will most likely be happier with one of the Big Four carriers (AT&T, Sprint, T-Mobile, or Verizon Wireless).

▷ **CONFIRM THE COVERAGE.** The promise of coverage is a key reason for switching plans, according to our survey participants, and that gives large carriers such as AT&T and Verizon a distinct advantage. They have the country well-covered with high-speed 4G Internet service. And let's face it: There's no point finding a great deal if the new plan doesn't let you receive phone calls in your home or office.

Almost all providers supply maps on their websites with ZIP code, address, or local landmark prompts to help you confirm coverage. But don't rely on those alone; they don't account for small dead zones created by natural and constructed obstacles. You should also make sure you

can cancel service and return the phone if a coverage problem like that crops up. For some carriers, including Sprint and Verizon, the grace period is a brief 14 days. They'll charge you a \$35 restocking fee as well.

And last, before settling on a provider, ask friends who have various services to break out their phones so you can assess how good each provider's signal is in your home, office, and favorite haunts.

▷ **COUNT YOUR PHONE LINES.** That's easy: You + spouse + dependents.

▷ **DO THE MATH.** For smartphone users, the biggest charge is usually related to data use. Most people can live with 500 megabytes to 1 gigabyte per phone each month, especially if they confine their cellular-data activities to browsing the Web, using news and e-book apps, and sending and receiving email without photos, videos, and other large attachments. It's always

good to save tasks like those, plus video calls and media streaming, for when you have access to Wi-Fi. But maybe you stream a fair amount of music and video when you commute. If that's so, you'll probably need 2GB to 3GB per month. And if your eyes are permanently glued to YouTube away from home, consider 4GB or more. You should also note that T-Mobile lets its customers enjoy content from popular video streaming services such as HBO Go and Netflix without dipping into their data allowances.

The Big Four carriers offer unlimited texts and voice minutes with their plans. For providers that don't, factor in about 200 to 300 minutes and several hundred texts per phone. That should add \$15 to \$25 per line to your costs.

Once you have all of those figures in hand, add them up to determine the costs. Now review the gotchas in "Beware of Pricing Pitfalls," on the next page.



THE PHONE

SHOULD I UPGRADE?



TAKE A CLEAR-EYED look at whether your phone is past its prime. Here are three cases when it might be wise to replace it:

▷ **YOUR CURRENT PHONE IS GIVING YOU TROUBLE.** Unlike toasters, which can work for many years with minimal care, smartphones are always in a race against time. Within a year or two, the battery may start to give out on you before the day is through. Months later, the phone feels less responsive, almost sluggish. It may even crash or restart unexpectedly. And then your favorite apps go belly-up because of an operating system update. You can replace a cracked display or an anemic battery (by yourself on many Android phones), but when system improvements from Apple or Google reduce the performance of your phone, it's probably time to replace it.

▷ YOU'RE MOVING TO ANOTHER PROVIDER.

The North American cellular landscape is a morass of incompatible networks. For a long time, providers locked the phones they sold into their services. Once you met the terms of your agreement, you might persuade the company to set yours free, but chances are it lacked the technology to function properly on a rival network. But that's changing. Apple, for instance, sells unlocked phones with the technology to operate in multiple networks. And as a sign-up incentive, many providers will let you trade in your old phone for money toward a new one, or even replace a model from your old provider with one that's the same or similar at no additional cost.

▷ **YOU CAN'T RESIST A NEW GADGET.** These days, year-to-year improvements in handset technology are less significant, so there's less incentive to upgrade. For instance, the iPhone 6s is quite similar to the 2014 iPhone 6, except for a moderately faster processor, a 3D Touch display that simplifies multitasking, and a higher-resolution camera that takes still pictures that move. But we realize those are good reasons for gadget aficionados to rush out and buy one.

THE FINANCING

HOW SHOULD I PAY?



WITH THE DEMISE of the two-year contract, the cost of your phone is now clearly separated from the cost of your service. That leaves you with three solid options:

▷ **PAY IT OFF UP FRONT AND ENJOY A LOWER MONTHLY BILL.** Not a bad choice if you're eyeing an affordably priced model such as the \$180 LG Escape2 recommended in our Ratings. It also makes sense if credit issues (even because of ID theft) prevent you from buying a phone in installments.

▷ **PAY FOR IT OVER TIME.** That's a great way to purchase a phone, especially if you have expensive tastes. The full retail price is usually divided into 24 monthly installments. After two years, you can scratch that fee from your phone bill, reducing it by \$30 to \$50 per month. Though AT&T's Next and Verizon's Edge are marketed as early-upgrade plans, you can choose to pay off your current phone instead and treat yourself to the savings.

If you're an Apple fan, consider buying a new iPhone 6s or 6s Plus through Apple's own iPhone Upgrade program. You pay about \$30 to \$45 per month (depending on the model), which includes AppleCare+, one of the few extended-warranty programs that may be worthwhile for certain consumers—all spread out over 24 interest-free installments. After a year, you can trade it in and opt for a brand-new phone or keep the one

Beware of Pricing Pitfalls

PLAN PRICING among the Big Four carriers is so bizarre and counterintuitive that customers, particularly those with multiple phone lines, may actually spend more money when trying to be frugal. Though the plans offer unlimited voice minutes and texts, the providers often charge a fee for every phone that accesses the service. And those fees can be higher when you buy less data. Adding to the confusion, T-Mobile insists on a specific data allowance for each phone; AT&T, Sprint, and Verizon dispense it in sharable buckets. More confounding still, the data bundle options vary in size among carriers. But with a calculator and these tips, you can slice through the subterfuge.

TIP 1

Consider purchasing more data than you think you need.

Sprint charges a \$20 access fee per phone for data

buckets of 4GB or less. (The 4GB of data, all shareable, cost \$50.) But if you choose the company's 8GB plan, that fee falls to \$15 per phone. (8GB of data cost \$70.) Do the math and you'll find that if you have four phones, the total cost for either option is precisely \$130.

TIP 2

Stay away from the two-year contracts still available at AT&T, Sprint, and Verizon.

In addition to hefty early-termination fees, you may have to contend with a whopping monthly \$40-per-phone access fee.

TIP 3

Consider the extras.

T-Mobile allows subscribers to stream content from a number of popular video services without using a data allowance. Those services include ESPN, HBO, Hulu, Netflix, Showtime, and Starz. That means binge-watchers can indulge their passion on a minuscule data plan.

you have and bank the savings 12 months later. Not bad. Even better: Because you're dealing directly with Apple, you have your choice of providers.

▷ **LEASE IT.** Depending on the terms, that could be a good deal for anyone who likes to trade up to a new phone every year or two. The monthly cost to lease from Sprint, one of the first major carriers to offer leasing, varies by device and how much you put down. At the end of 24 months, you can turn the phone in for a new model, keep paying on a month-to-month basis, or pay Sprint the remaining amount due on the phone to own it outright. In Sprint's iPhone Forever plan, a leasing program exclusively for the iPhone 6s and 6s Plus, a 16GB phone will cost you \$22 to \$27 per month until the next upgrade opportunity. If you trade in a working smartphone, the fee dips to \$15 per month.

THE OLD PHONE

SHOULD I
STASH IT OR
TRADE IT IN?



YOU MAY WANT to hold onto it as a backup in case the new one is lost or stolen. Phone insurance and extended warranties, except perhaps AppleCare+, are often a poor investment because of high premiums (often \$10 and up), high deductibles (more than \$100), unclear language about what to expect as a replacement, and the relatively low risk of losing your phone to damage or theft.

But a used cell phone is like a used car in many ways. You can sell it for cash or trade it in for a discount on the next one.

Before you unload it, though, here's what you should do:

▷ **WIPE IT.** A factory data reset should remove photos, email, app accounts, and other personal information you don't want to fall into other hands. On Android phones, the Reset option is usually under Backup in the Settings menu. On an iPhone, it can often be found at the bottom of the General page, under Settings. Most iPhones (iOS 7 or later) have an antitheft feature called Activation Lock that prevents others from using them. To release your iPhone from Activation Lock so another person can use it, log in to your iCloud account, select All Devices, which opens a list of devices linked to your account, then choose the one to be removed. Follow the necessary prompts to remove your device.

Information isn't actually erased when you wipe a phone. The data remains,

Six Ways to Boost Your Phone's Performance

1 | HD VOICE

People have long complained about cell-phone voice quality. But this feature offers the promise that you can converse with the clarity of a face-to-face meeting. Too bad it works only between compatible phones within the same carrier network.

2 | TRACKING BLOCKERS

A smartphone GPS mode is great when you need directions, not when you're roaming the aisles at the mall. You can protect your privacy by deciding which advertisers and apps can see your location and when. iPhone users can go to Location Services in the Privacy section

of Settings to change restrictions. Android 6.0 Marshmallow users can go to the Permissions section in each app in the Apps section of Settings.

3 | EASY-TO-READ TYPE

Apple and Android phones have an Accessibility menu in Settings where you can adjust screen brightness and make text larger and bolder. Apple's Button Shapes switch makes navigation controls more prominent. The easy modes on many LG and Samsung phones automatically boost the size of app icons and fonts on the phone, and make it more senior-friendly by paring the features down to the essentials. You can also experiment with the settings for users with hearing and visual impairments.

4 | DATA SAVERS

Because transferring data via cell service is expensive, you should try to use Wi-Fi whenever possible to back up or share large files (photos, streaming videos, etc.). You can also adjust apps settings to prevent them from downloading news or updates until you're in a Wi-Fi network—ideally one you trust (think home or office).

5 | BATTERY SAVERS

Make sure the screen brightness is set to Auto (on most iPhones, go to Settings, then Display & Brightness), so the

device can adjust to indoor and outdoor conditions, but lower the baseline brightness (usually a sliding switch in the Display menu). Set the screen to sleep after 15 or 30 seconds of inactivity. If you're in an area with no signal, turn on airplane mode. If possible, reduce the update frequency of email, social-network feeds, and other apps to once every hour or so.

6 | BLUETOOTH SHARING

When a friend is at your side, you can share photos, videos, or text files without fumbling around on email. As long as you both have Apple's AirDrop or Android Beam activated, you just zap it directly, phone-to-phone, but only Apple to Apple, Android to Android.

Carrier Ratings: Why It Pays to Think Small

Scores in context: Of the cell-phone providers covered in our survey, the highest scored 89; the lowest, 66. They're listed in order of overall customer satisfaction.

● Better ← → Worse ●

	PROVIDER	READER SCORE	SURVEY RESULTS								
			Value	Voice	Text	Web Problems	Data	Support: Phone	Support: Staff Knowledge	Support: Staff Courtesy	

A. TRADITIONAL SERVICE: BILLED AT MONTH'S END, OFTEN UNDER A CONTRACT

1	Consumer Cellular	89	●	●	○	●	●	●	●	●
2	Ting	88	●	●	○	●	●	●	●	●
3	GreatCall/Jitterbug	79	○	●	—	—	—	●	●	●
4	Credo Mobile	78	○	○	○	○	●	●	●	●
5	Virgin Mobile	76	○	○	○	○	○	●	●	●
6	U.S. Cellular	73	●	○	○	○	○	●	●	●
7	T-Mobile	73	○	●	●	●	○	○	●	●
8	Verizon Wireless	70	●	○	○	○	○	●	●	●
9	AT&T	68	●	○	○	○	○	●	○	○
10	Sprint	67	●	●	○	●	●	●	○	○

B. PREPAID SERVICE: BILLED IN ADVANCE, WITHOUT A CONTRACT

1	Republic Wireless	87	●	○	●	●	●	—	—	—
2	Cricket	85	●	○	○	●	●	—	○	○
3	Page Plus Cellular	84	●	●	○	●	○	—	○	○
4	Straight Talk	80	●	○	○	○	○	●	●	●
5	TracFone	79	●	○	○	○	●	●	●	●
6	MetroPCS	78	●	○	○	○	○	—	—	—
7	Virgin Mobile	76	○	○	○	○	○	●	○	○
8	Net10	76	○	○	○	○	●	●	●	●
9	Boost Mobile	75	●	○	○	●	○	—	—	—
10	T-Mobile	74	○	○	●	○	○	●	○	●
11	Verizon Wireless	70	●	○	○	○	○	●	○	●
12	AT&T	70	●	○	○	○	○	●	○	○
13	Sprint	66	●	●	○	●	●	—	○	○

Guide to the Ratings. Ratings are based on 89,829 Consumer Reports subscribers who completed the 2015 Annual Summer Survey in July/August and had traditional or prepaid cell-phone service. Traditional customers said they received a bill after each month of service; prepaid customers said they paid for service as needed. Some providers may offer one or both types of service, but only providers for which we had sufficient data of the specified type are included in the table. **Reader Score** refers to how respondents rated their overall satisfaction with their cell-phone service and isn't limited to the factors listed under survey results. A score of 100 means all respondents were completely satisfied; 80 would mean very satisfied, on average; 60, fairly well-satisfied. Differences in reader scores of less than 5 points aren't meaningful. The following ratings are based on the average frequency of problems in the past week, are adjusted for frequency of use, and are relative (reflecting differences from the average of all providers in all areas): **voice** (no service, static), **text** (difficulty sending/receiving messages, delays), and **Web** (slow, interrupted, or unavailable). The following blobs reflect mean scores on a scale of "Very Poor" to "Excellent": **value** for money, experience with **data** service, ease and speed of reaching support staff through the **phone system**, and **support staff knowledge** and **courtesy**. Findings reflect experiences of our readers, not necessarily those of the general U.S. population. '—' indicates insufficient data.

THE RIGHT SERVICE FOR YOUR NEEDS

BEST VALUE: SMALL PROVIDERS

A1 Consumer Cellular

A2 Ting

What pushes people to seek a new plan? Better coverage and a good deal. These small providers delivered big on both. Top-ranked Consumer Cellular actually earned higher marks for service than AT&T, which is interesting because it uses AT&T's network. Ting, which bills customers based on their actual usage, relies on the cellular networks of Sprint and T-Mobile. That means customers with phones that support both networks—think iPhone 6s and 6s Plus, the Samsung Galaxy S 6+ and Note5, and the Motorola Moto X Pure—are likely to get the best coverage from that provider.

BEST VALUE: MAJOR CARRIERS

A7 T-Mobile

The Big Four carriers corral consumers—about 80 percent of the readers in our survey—with their retail outreach and promises of broad network coverage and a wide selection of phones. Yet they often struggle with customer satisfaction (not to mention price). This year, T-Mobile slightly outscored Verizon, AT&T, and Sprint for perceived value.

BEST COVERAGE: MAJOR CARRIERS

A8 Verizon Wireless

A9 AT&T

They didn't match T-Mobile for perceived value, but Verizon and AT&T left customers fairly well-satisfied with the availability and quality of their network service.

BEST VALUE: PREPAID SERVICE

B1 Republic Wireless

B2 Cricket

B3 Page Plus Cellular

People in search of savings often turn to carriers that let them pay for the service they use on an as-needed basis. Among these three well-rated options, Cricket was a standout for Web service and Page Plus for network performance, particularly for voice. Republic Wireless, which relies heavily on Wi-Fi networks for phone use in its lowest-cost plans, has a limited selection of phones.

but there's no longer a file name pointing to it, and the space occupied by the data is now free to be used by the next email or text message to come along in search of a home. iPhones, by default, further protect your data by encrypting it. On Android phones, encryption protection is available but it's far more complicated and less uniform from model to model. To find out how to protect your device, read "Why Android's 'Factory Reset' Isn't Really Secure," at ConsumerReports.org.

▷ **LEVERAGE IT.** Providers often use credit or full phone replacements to lure customers away from one another. As of press time, for example, AT&T was offering up to \$300 toward a new phone and the monthly bill. Sprint was promising to shave \$7 off the \$22-per-month iPhone Forever leasing program fee. But the small print noted that to qualify for the full amount, your old phone had to be in decent shape and in working order, so that the carrier could resell it.

▷ **SELL IT.** Lots of retailers and websites will give you cash or in-store credit for

your old phone. But don't expect a big payday. A lot depends on the desirability of your model, its storage capacity, age, carrier, condition, and status (locked or unlocked). And prices vary from business to business. For instance, we were quoted \$70 for a Verizon 32GB LG G3 smartphone with normal wear from Gazelle.com; BestBuy.com's Trade In program offered a \$95 gift card.

In the end, it costs nothing to price a phone, and it's certainly educational. Other retailers with trade-in programs include Amazon, Apple, and Costco. ecoATM accepts phones at kiosks in locations around the country that will scan the device and pay you on the spot what they estimate it's worth. Of course, you can also try your luck on eBay and Craigslist. ■



To get more expert advice from our test labs, watch the video in our Smartphone Buying Guide at ConsumerReports.org

How to Make Your New Phone Old Again

BACK IN THE Pleistocene epoch (or thereabouts), when phones were bulky as bricks and screens were smaller than business cards, people relied on real keyboards and styluses to peck out their missives. Believe it or not, those devices are making a comeback.

It's not just Luddite longings. Physical keyboards allow you to type without looking down at the screen. And a stylus (with a special tip for today's capacitive screens) comes in handy when you have fat fingertips, long fingernails, or fingers sheathed in gloves.

Owners of Samsung Galaxy S6 Edge+ devices pining for the sure-touch feedback of a BlackBerry-style keyboard can get their wish with an optional protective cover for \$60 featuring a pop-on keyboard that engages the virtual keys beneath it. When you're done typing, the keyboard clips to the back of the phone.

Have an iPhone 6? Try the **Kootion Wireless Keyboard, \$20**, which attaches to the back of your iPhone and slides out. The device, which syncs with your phone via Bluetooth, has backlit keys for typing in

the dark. But it needs to be charged separately.

The **Top Shock Proof PU Leather Case, \$30**, puts your LG G3 in a protective clamshell-like environment. When you open it up, a full keyboard appears opposite the phone. It, too, syncs with the phone via Bluetooth and needs to be charged separately.

And if you want to experience the smudge-free accuracy of a stylus, Bluroo and Fenix sell them in packets of three for \$6 to \$8. They come with lanyards that plug into your phone's 3.5mm jack to prevent you from misplacing them.

PHOTOS YOU'LL BE PROUD TO POST

These smartphones were culled from our Ratings because their cameras are simply the best. Count on higher-resolution sensors (12 megapixels or more) to produce sharper cropped or enlarged prints, optical image stabilizers to help minimize blurriness, and video cameras that can capture spur-of-the-moment action with high-definition clarity.

STUNNING STILLS

The **Nexus 6** aced our tests for still-image quality (resolution, dynamic range, color accuracy, and visual noise), even without the higher-resolution sensors of some rivals. But don't write the others off. In fact, the **LG G4** and **Apple iPhone 6s Plus** excelled at low-light shots.

VIDEO STARS

All of these phones took videos good enough to upload to YouTube. They can also record at a resolution (2160x3840) high enough to feed an Ultra HD TV. But the **Samsungs** took slightly better HD video (1080p), the most common form, in daylight, indoor, and low-light conditions. The **Motorola Moto X Pure** and **iPhone 6s** models had trouble focusing on subjects in low light.

SELFIE SHTICKS

The **LG G4's** 8-megapixel camera may capture every freckle. The **Samsungs**, **Motorola**, and **Apples** have wide-angle selfie cameras (handy for squeezing people into your shots). The Samsungs and LG let you operate the rear camera with gestures and/or voice commands. And the **Motorola Pure's** front camera has its own LED flash. The Apples and LG use display lighting to simulate a flash.

PROP STYLING: ANGELA CAMPOS



Ratings: Best Smartphone Cameras

● Excellent ● Very Good ○ Good ◐ Fair ● Poor

Rank	BRAND & MODEL	TEST RESULTS		FEATURES			
		Camera: Image Quality	Camera: Video Quality	Rear-Facing/Main Camera Resolution (Megapixels)	Optical Image Stabilizer	Front-Facing Camera Resolution (Megapixels)	Memory-Card Slot
1	Samsung Galaxy Note Edge	●	●	15.9	●	3.7	●
2	Nexus 6	●	○	13.0	●	2.1	
3	Motorola Moto X Pure Edition	●	○	21.4		5.0	●
4	Samsung Galaxy Note 4	●	●	15.9	●	3.7	●
5	LG G4	●	○	15.9	●	8.0	●
6	Apple iPhone 6s Plus	●	○	12.2	●	5.0	
7	Apple iPhone 6s*	●	○	12.2		5.0	

* The iPhone 6s isn't pictured.

Ratings: The Phones to Own

Scores in context: Of the 40 phones tested, the highest scored 79; the lowest, 65. For devices available from multiple carriers, test results were averaged. Models are listed in order of performance.

☑ CR Best Buy ☑ Recommended

● Excellent ● Very Good ○ Good ○ Fair ● Poor

Recommended	Rank	Brand & Model	Price	Score	Test Results										Display Size (in.)	Operating system*
					Ease of Use	Messaging	Web Browsing	Display Quality	Voice Quality	Phoning	Battery Life	Camera: Image Quality	Camera: Video Quality	Portability		
☑	1	Samsung Galaxy S 5	\$480	79	●	●	●	●	○	●	●	●	●	●	5.1	A
☑	2	LG G4	\$480	78	●	●	●	●	○	●	●	●	○	●	5.5	A
☑	3	Samsung Galaxy S6 active	\$595	78	●	●	●	●	○	●	●	○	●	●	5.1	A
☑	4	LG G3	\$430	78	●	●	●	●	○	●	●	●	○	●	5.5	A
☑	5	Apple iPhone 6s	\$650	77	●	●	●	●	○	●	○	●	○	●	4.7	i
☑	6	Apple iPhone 6	\$550	77	●	●	●	●	○	●	●	●	●	●	4.7	i
☑	7	Samsung Galaxy S6	\$575	77	●	●	●	●	○	●	●	○	●	●	5.1	A
☑	8	Samsung Galaxy S6 Edge	\$670	77	●	●	●	●	○	●	●	○	●	●	5.1	A
☑	9	HTC One M9	\$650	76	●	●	●	●	○	●	●	●	○	●	5.0	A
☑	10	HTC One M8	\$550	75	●	●	●	●	○	●	●	○	○	●	5.0	A
☑	11	Samsung Galaxy Note 4	\$550	75	●	●	●	●	○	○	●	●	●	●	5.7	A
☑	12	Samsung Galaxy Note5	\$700	75	●	●	●	●	○	●	●	○	○	○	5.7	A
☑	13	Samsung Galaxy Note Edge	\$800	75	●	●	●	●	○	○	●	●	●	●	5.6	A
☑	14	Samsung Galaxy S6 edge +	\$770	75	●	●	●	●	○	●	●	○	○	○	5.7	A
☑	15	LG G Flex 2	\$500	74	●	●	●	●	○	●	●	●	○	●	5.5	A
☑	16	Motorola Moto X Pure Edition	\$400	74	●	●	●	●	○	●	●	○	○	○	5.7	A
☑	17	Motorola Droid Turbo (BN)	\$480	74	●	●	●	●	●	●	●	●	○	○	5.2	A
☑	18	Apple iPhone 6s Plus	\$750	73	●	●	●	●	○	○	●	○	○	●	5.5	i
☑	19	Apple iPhone 6 Plus	\$650	73	●	●	●	●	○	○	●	○	○	●	5.5	i
☑	20	Nexus 6	\$650	73	●	●	●	●	○	○	●	○	○	●	6.0	A
☑	21	Motorola Moto X (2nd gen)	\$450	72	●	●	●	●	○	●	●	○	○	○	5.2	A
☑	22	LG G3 Vigor	\$285	72	●	●	●	●	○	●	●	○	○	○	5.0	A
☑	23	HTC One M8 (Windows)	\$480	72	●	●	●	●	●	●	●	○	○	○	5.0	W
☑	24	LG Escape2	\$180	71	●	●	●	●	○	●	●	○	○	○	4.7	A
	25	Acer Liquid Jade Z	\$250	70	●	●	●	●	○	●	○	○	○	○	5.0	A
	26	Asus ZenFone 2	\$200	69	●	●	●	●	○	●	●	○	○	○	5.5	A
	27	LG G Stylo	\$290	69	●	●	●	●	●	○	●	○	○	●	5.7	A
	28	LG G Vista	\$240	69	●	●	●	●	○	○	●	○	○	●	5.7	A
	29	Huawei P8 Lite	\$250	69	●	●	●	●	○	●	●	○	○	○	5.0	A
	30	Sharp Aquos Crystal	\$240	69	●	●	●	●	●	●	●	○	○	○	5.0	A
	31	Samsung Galaxy Grand Prime	\$230	68	●	●	●	●	○	●	●	○	○	○	5.0	A
	32	BlackBerry Classic	\$370	67	●	●	●	●	○	●	●	○	○	○	3.5	B
	33	BlackBerry Passport	\$500	67	●	●	●	●	○	○	●	○	○	●	4.5	B
	34	Microsoft Lumia 735	\$190	67	●	●	●	●	○	●	●	●	○	○	4.7	W
	35	LG Leon LTE	\$140	66	●	●	●	●	○	●	○	○	●	○	4.5	A
	36	Kyocera Brigadier	\$400	66	●	●	●	●	●	●	●	○	●	○	4.5	A
	37	Microsoft Lumia 640 XL	\$250	65	●	●	●	●	○	○	●	○	○	●	5.7	W
	38	LG Optimus F3Q	\$325	65	●	●	●	○	○	●	●	●	○	○	4.0	A
	39	Samsung Galaxy Core Prime	\$140	65	●	●	●	●	○	●	●	●	○	○	4.5	A
	40	LG Lancet	\$120	65	●	●	●	○	○	●	○	○	●	○	4.5	W

* A=Android, B=BlackBerry, i=iOS, W=Windows Phone.

BEFORE YOU MAKE THE CALL ...

The 24 phones recommended in our Ratings are very good performers with great displays and decent battery life. (Listed is the lowest full retail price for the smallest capacity available.)

WELL-ROUNDED PERFORMERS

2 LG G4 \$480

5 Apple iPhone 6s \$650

These models cram crisp displays, great performance, and long battery life into a form that most hands will find comfortable. They also have great keyboards and text-editing tools.

JUMBO SCREENS

11 Samsung Galaxy Note 4, \$550

16 Motorola Moto X

Pure Edition, \$400

18 Apple iPhone 6s Plus, \$750

The Samsung's extra-sharp 5.7-inch display isn't only easy to read in bright sunlight but is also sensitive enough to take commands when you're wearing gloves. In addition to quick charging, the powerful, customizable Motorola offers an impressive array of voice and gesture controls. And the Apple shares many of the advantages of the iPhone 6s, though its display is significantly larger (5.5 inches), making it a much better device for viewing multimedia and document details.

TRIED-AND-TRUE BARGAINS

1 Samsung Galaxy S 5, \$480

6 Apple iPhone 6, \$550

Is that a 2014 Samsung atop our Ratings? Why yes, that old-school model has a lot of clear advantages over its successor. It's designed to survive a 30-minute dunk in about 3 feet of water, its memory can be cheaply upgraded via a microSD card slot, and its long-life battery can be replaced with ease. The model also has advanced productivity and gesture features lacking in many new phones. And if you prefer Apple and can live without 3D Touch controls, the 2014 iPhone 6 is very similar to the 2015 6s. The two areas where they differ? The old stalwart has better battery life and can capture better video.

Road REPORT



ABOUT FACE
Children should
ride rear-facing
until their
second birthday.

ROADWORTHY

Our tough new tests reveal the safest car seats for big and little kids

LAST YEAR WE BEGAN USING a rigorous new testing protocol that held child seats to a higher standard. We updated our methodology because the federal standard is 30 years old and we wanted to better evaluate seats as they would perform in a modern vehicle interior.

We debuted the results of that new testing in our September 2015 issue with a

look at infant seats. Now we've added to those insights with testing of convertible seats—the seat a child will use from the moment he outgrows a rear-facing infant seat until he is ready for a booster seat.

Based on our crash tests, we have some important new advice: It's wise to switch to a rear-facing convertible seat no later than a baby's first birthday, rather than waiting until he or she outgrows an infant seat.

Why? Although many infant or rear-facing-only seats have weight limits of 35 pounds or more, your child is likely to grow out of those seats, height-wise, before reaching those weight limits.

More importantly, the convenience of continuing to use an infant seat as your child approaches its height limit may be outweighed by the risk of a head injury. Research shows that when a child suffers

ROAD REPORT

serious harm in a crash, it is often to the head—from striking the front seatback or some other part of the vehicle’s interior.

For our tests, we use child-sized dummies, a vehicle seat that is mounted onto a sled on rails, and a simulated front seatback positioned to mimic a vehicle’s interior. We install each child seat onto that sled; its motion is designed to produce forces similar to those of a crash.

For our infant-seat tests we used a dummy representing a 12-month-old child. The dummy’s head hit the simulated seatback in 16 of the 30 seats we tested. But with rear-facing convertible seats, the same dummy avoided contact in 22 of the 23 models.

For maximum safety we, along with the American Academy of Pediatrics, recommend that children remain rear-facing until age 2. New laws reflecting that recommendation will take effect in California, New Jersey, and Oklahoma in the coming years. We encourage other states to follow their lead, because statistics show that people are more likely to comply with child-seat best practices when there are laws on the books.



LEARN

For more on how we test child seats, as well as full Ratings of all child seats, go to [ConsumerReports.org/cro/car-seats](https://www.ConsumerReports.org/cro/car-seats)

Child-Seat Timeline

OUR EXPERTS RECOMMEND using a minimum of three safety seats over your child’s lifetime: an infant seat, a convertible seat, and a booster seat. Use this chart to help determine when to switch from one type to the next. And remember that ages are only a guideline; height and weight are key for maximum protection for your child.

REAR-FACING INFANT SEATS

\$55 to \$300
(for children 4 to 40 pounds)

An infant seat’s detachable carrier is a great convenience because it can be used to carry your baby, plus it snaps into a compatible stroller. Our tests show that infant seats provide the best fit for the smallest babies, so don’t be tempted to skip to a convertible seat. Though infant seats are designed to hold children weighing as much as 40 pounds, most will outgrow them height-wise first. And based on our new findings, you’ll want to move your child to a convertible seat by his first birthday.

CONVERTIBLE SEATS

\$40 to \$450
(for children 5 to 45 pounds rear-facing and 20 to 70 pounds forward-facing)

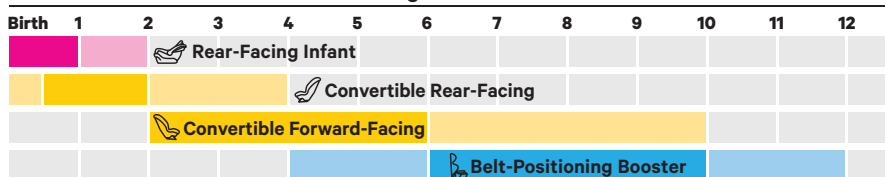
When your baby turns 1, it’s time for a rear-facing convertible seat. They are designed to be installed either rear- or forward-facing. Our tests have shown that rear-facing convertibles offer better head protection for children that age. Switch the seat to forward-facing once he turns 2 or when he reaches the seat’s rear-facing height and/or weight limits. Many convertible seats have a maximum weight limit of 65 pounds, or sometimes more, so they should serve until he is ready for a booster seat.

BELT-POSITIONING BOOSTER SEATS

\$14 to \$300
(for children 30 to 120 pounds)

When your child outgrows a convertible seat with its safety harness, he is probably too small for the vehicle’s seat belt to fit him properly. A child isn’t tall enough to use seat belts alone until he reaches 57 inches tall and is between 8 and 12 years old. Boosters are designed to raise the child high enough so that the vehicle’s seat belt sits correctly on his frame. High-backed boosters are the best choice because they include some side bolstering, as well as a guide that can better position the shoulder belt.

Age (Years)



■ Darker areas indicate recommended use periods.
■ Lighter areas indicate transition periods.

FROM OUR EXPERTS

EMILY MATHEWS,
AUTO SAFETY ENGINEER



We use child-sized dolls to demonstrate proper child-seat fit.

- 1) When determining which seat to buy, it’s important to know your child’s weight and height. Staying within the seat’s limits will reduce your child’s risk of injury. It’s best not to guess.
- 2) Don’t rush to move your child from a rear- to forward-facing seat, or to a booster seat, because you think he or she is physically “big enough.” Depending on age, your child’s musculoskeletal system may not be developed enough to handle the increased burden of crash forces.
- 3) Parents may think that keeping children rear-facing until age 2 is uncomfortable. But it’s not, because kids are more flexible than adults.
- 4) To check whether the seat is properly installed (4 in 5 are not, according to the National Highway Traffic Safety Administration), go to [safekids.org](https://www.safekids.org) to find a nearby child-seat checkup.

Emily Mathews, Ph.D., is a specialist in pediatric injury biomechanics. She is also a certified Child Passenger Safety Technician. She works out of our 327-acre test track headquarters in Colchester, Conn.

Ratings: Best Seats for Babies and Bigger Kids

These seats are the best performers in their categories. Our Ratings are based on crash protection, ease of use, and fit-to-vehicle using both LATCH and seat-belt installation (how simple it is to install). Boosters are rated for potential to provide a proper belt fit. Rear-facing infant and convertible models were tested to our new protocol; boosters underwent our traditional tests. CR Best Buys are notable values.

Similar seats—with similar features and designs as the tested model—are included where applicable and are separated with a slash (/).

*Note: For information on the Recaro Performance Ride's crash performance, go to [ConsumerReports.org/recaro](https://www.consumerreports.org/recaro)

☑ CR Best Buy ☑ Recommended

● Excellent ● Very Good ○ Good ● Fair ● Poor

Rear-Facing Infant Seats (New Test Protocol)

Rec. Rank	BRAND & MODEL	PRICE	SCORE	Crash Protection	TEST RESULTS		
					Ease of Use	Fit-to-Vehicle	
						LATCH	Belt

A. 22-LB. CAPACITY

☑	1	Chicco KeyFit	\$180	77	Best	●	●
☑	2	Maxi-Cosi Mico	\$200	64	Best	●	○
	3	Mia Moda Certo	\$120	58	Better	○	○

B. GREATER THAN 22-LB. CAPACITY

☑	1	Chicco KeyFit 30	\$190	76	Best	●	●
☑	2	Combi Shuttle	\$180	69	Better	●	●
☑	3	Cyber Aton 2	\$300	67	Best	●	●
☑	4	Safety 1st onBoard 35 Air	\$150	65	Best	○	○
☑	5	UPPAbaby Mesa	\$280	64	Better	●	○
☑	6	Britax B-Safe	\$150	64	Best	○	○
☑	7	Safety 1st onBoard 35	\$110	63	Better	●	○
☑	8	Graco Snuggly 30 (Classic Connect)	\$100	62	Best	○	○

Convertible Seats (New Test Protocol)

Rec. Rank	BRAND & MODEL	PRICE	SCORE	Crash Protection	TEST RESULTS			
					Ease of Use	Fit-to-Vehicle		
						Rear LATCH	Rear Belt	Forward LATCH
								Forward Belt

A. CONVERTIBLE

☑	1	Chicco NextFit	\$300	82	Best	●	●	●
☑	2	Britax Marathon ClickTight	\$265	81	Better	●	●	●
☑	3	Evenflo SureRide/Titan 65	\$100	74	Best	●	●	●
☑	4	Cosco Scenera Next	\$45	73	Better	●	○	●
☑	5	Graco Contender 65	\$140	72	Better	●	●	●
☑	6	Graco Size4Me 65/Headwise 65	\$180	71	Best	●	●	○
☑	7	Graco My Ride 65	\$110	70	Better	○	●	●
	8	Safety 1st Guide 65/Guide 65 Sport/Eddie Bauer XRS 65	\$95	64	Better	●	○	●
	9	Britax Boulevard (G4)/Marathon (G4)	\$265	64	Basic	●	○	●
	10	Safety 1st Chart Air 65	\$130	64	Best	●	○	●
	11	Safety 1st Complete Air 65	\$160	63	Best	●	●	●
	12	Maxi-Cosi Pria 70/Pria 85	\$200	63	Better	○	●	●
	13	Evenflo Triumph 65	\$130	62	Best	●	●	○

Convertible Seats (continued)

Rec. Rank	BRAND & MODEL	PRICE	SCORE	Crash Protection	Ease of Use	TEST RESULTS			
						Rear LATCH	Rear Belt	Forward LATCH	Forward Belt
14	Britax Roundabout (G4)	\$145	62	Basic	●	○	○	●	●
15	Peg Perego Primo Viaggio SIP 5-65 Convertible	\$350	57	Better	●	●	●	●	●
16	Cosco Scenera/ Safety 1st onSide Air	\$40	55	Basic	○	○	○	●	●
17	Graco Classic Ride 50/Ready Ride	\$100	54	Better	○	●	●	●	●
18	Safety 1st Advance SE 65 Air+	\$170	54	Basic	●	○	○	●	●
19	Combi Coccoco	\$240	52	Better	○	●	●	●	●
20	Clek Filo	\$380	51	Better	○	●	●	●	●
21	Evenflo Tribute	\$50	50	Better	○	●	●	●	●
22	Clek Foonf	\$450	44	Better	○	●	●	●	●
23	Recaro Performance Ride*	\$270		NA	●	○	●	●	●

Belt-Positioning Booster Seats

Rec. Rank	BRAND & MODEL	PRICE	SCORE	TEST RESULTS		
				Crash Protection/ Belt Fit Highback	Crash Protection/ Belt Fit Backless	Ease of Use

A. HIGHBACK

☑	1	Cyber Solution X-Fix Plus	\$170	65	●	NA	●
	2	Kiddy Cruiserfix Pro	\$230	63	●	NA	○
	3	Peg Perego Viaggio Hbb 120	\$200	61	○	NA	●
	4	Harmony Folding Travel Booster	\$100	41	●	NA	●

B. HIGHBACK-TO-BACKLESS

☑	1	Evenflo Big Kid Amp Highback	\$40	72	●	●	●
☑	2	Evenflo Big Kid Sport	\$30	72	●	●	●
☑	3	Evenflo Big Kid DLX	\$60	69	●	○	●
☑	4	Evenflo Big Kid LX	\$60	69	●	○	●
	5	Graco Afix Big Kid LX	\$80	63	●	○	○
	6	Safety 1st Boost Aur Big Kid LX	\$60	62	●	○	○

C. BACKLESS

☑	1	Harmony Youth Booster Seat	\$13	68	NA	●	●
	2	Evenflo Big Kid Amp	\$25	64	NA	○	●
	3	BubbleBum Booster Seat	\$30	56	NA	○	○
	4	Cosco Ambassador	\$15	55	NA	○	●
	5	Clek Olli	\$100	51	NA	○	●
	6	Cosco Top Side	\$17	39	NA	●	●

iM Just Okay

When Toyota created its Scion brand 15 years ago as a way to reach out to millennials, it sold two urban-minded small hatchbacks. Both vehicles played off the brand's value of reliable but basic transportation, wrapped in minimalist exteriors that could be personalized to the buyer's whim. But fun to drive, they were not. After almost a decade without updating its core hatchbacks, Scion is trying a different recipe. For those who crave Euro-styled economy-car practicality with a whiff of nimble handling, the iM is calling you.



Scion iM

64 **THIS YOUTH-TARGETED** hatchback looks cool, swallows a fair amount of bulky cargo, and is zippy on corners. But this derivative of the utilitarian Toyota Corolla is also saddled with an underwhelming four-cylinder engine that delivers lackluster acceleration. Its 0-to-60-mph time of 10 seconds is 1.5 ticks slower than the Mazda3's. It left us wishing for the 20 or 30 more horsepower offered by competitors.

The driving experience isn't helped by a continuously variable transmission—which uses belts and pulleys rather than gears—that attempts to mimic a regular automatic with artificial “shift” points. When asking for more power, you get more engine noise than forward thrust. One would expect great fuel economy as a trade-off. However, its 31 mpg overall is merely respectable and hardly a standout in this class.

But don't write off the iM just yet.

Handling is a strong point. Though the American-market Corolla has a solid-axle rear suspension—it won't win any slalom contests—the iM boasts an independent double-wishbone setup normally seen in race cars. When done right, that more elegant system can provide a crisp response to steering inputs and can result in a settled ride, especially over bumpy curves.

In the iM's case, the car turns in with alacrity and stays unflappable. But ride comfort isn't stellar, with road jolts that intrude noticeably. The car is unsettled on uneven pavement.

And though hatchback versatility gives you the ability to haul bulky stuff through a wide opening and a folding rear seat, the

suspension's architecture and mounting points intrude on the cargo area. And because the iM's wheelbase is 4 inches shorter than the Corolla's, don't expect as much rear-seat room for passengers as in the Toyota.

The iM's cabin exhibits a youthful ambience, with patterned black-and-white seat fabric and stitches in visible spots. But the rest of the décor is rather basic. Bolstered front seats lack a lumbar-support adjustment. Getting in and out of the low-slung seats can be an effort for some. The steering wheel has limited telescoping range, which compromises an ideal driving position.

For its relatively affordable price, the iM comes nicely equipped with standard automatic climate control, connectivity features such as Bluetooth and voice commands, and a rearview camera. But options are limited. For instance, a sunroof is not available, nor are any advanced electronic safety features such as blind-spot warning or rear cross-traffic alert.

As for infotainment, the touch-screen interface lacks a tuning knob for audio, and it suffers from small buttons. Certain phones had Bluetooth connection difficulties, and streaming audio often error-coded back to the phone's first song. That's great if you like Aaliyah, but you can get sick of resetting the system.

Ultimately, the iM makes for a stylish and versatile first car or urban runabout. Being a Toyota, it's likely to be reliable and keep owners headache-free. Though it might be a fun corner-carver, don't expect straight-line thrills when you step on the gas.



TESTED VEHICLE

HIGHS	Agility, fuel economy, hatchback versatility, well-equipped for price
LOWS	Acceleration, engine noise, rear seat, rear visibility, lacks common options
POWERTRAIN	137-hp, 1.8-liter 4-cylinder engine; continuously variable transmission; front-wheel drive
FUEL	31 mpg
PRICE	\$19,255-\$19,995



DESPITE A SPORTY-LOOKING SHIFTER, the CVT dulls the driving experience.



THE HATCHBACK'S gaping maw allows room for bulky cargo.

Mitsubishi Outdated

If it were 1996, this would be a great SUV. But today, it's just plain behind the times.



59

MITSUBISHI IS TRYING to push its way onto your shopping list by virtue of the Outlander's standard third-row seat (rare among small SUVs), its temptingly low \$23,845 base price, and some big discounts on the showroom floor. That might make the Outlander seem like a lot of car for the money, but don't be fooled. This is not a competitive model.

Despite a few updates for 2016, the Outlander feels old enough to have been cast in a "Friends" episode. Compared with the best in this class, the Outlander is almost the bottom feeder. (The lowly Jeep Cherokee gets that honor.)

The Outlander now has a slightly improved ride, it's quieter than it used to be, and it ekes out slightly zippier acceleration and better



THE OUTLANDER comes with a tiny third-row seat, limited to occupants 5'3" or shorter.

fuel economy—a competitive 24 mpg.

But the Outlander is reluctant to corner, requiring excessive steering-wheel twirling. And with lots of body lean, it's one of the clumsiest vehicles we've recently tested. The soft suspension's ride feels initially absorbent, but it can get unsettled to the point of occupants experiencing motion sickness. And the continuously variable transmission amplifies the engine's nasty howl to that of a Soundgarden reunion.

The touted third-row seat is okay in a pinch, but it's so tiny that you shouldn't count on it for everyday use. It's also odd that a vehicle with a third-row seat lacks A/C vents for rear passengers. The second-row bench is rather roomy, but the front seats didn't earn raves and don't offer lumbar adjustments. Like most other small SUVs, getting in and out is a breeze.

The interior is dated, plasticky, and crude—with the exception of the modern-feeling infotainment system.

The Outlander's crash tests earned it a Top Safety Pick designation from the Insurance Institute for Highway Safety. Forward-collision warning with automatic braking, adaptive cruise control, and lane-departure warning are optional.

These cars sell in so few numbers that we don't have sufficient data to predict their reliability; Mitsubishi's generally hold up well.

But even factoring in the expected big discounts, we'd rather have a good used SUV. And if you need a third-row seat in the small-SUV class, you'd be better off with a Nissan Rogue.



TESTED VEHICLE

HIGHS	Standard third-row seat, access, visibility, crash-test results
LOWS	Agility, acceleration, unsettled ride, engine noise, no A/C vents for rear passengers
POWERTRAIN	166-hp, 2.4-liter 4-cyl.; continuously variable transmission; all-wheel drive
FUEL	24 mpg
PRICE	\$23,845-\$31,845



Volkswagen Jetta 1.4T

A new gas engine could make the diesel argument moot

79

HIDDEN WITHIN THE CLOUD of its emissions scandal, Volkswagen has a new fuel-efficient powertrain that is a compelling alternative for diesel buyers.

Since its 2011 redesign, the Jetta sedan has offered more engines than Spinal Tap had drummers. Just introduced is a 1.4-liter, 150-hp turbocharged four-cylinder gasoline engine, which might be the most satisfying of all of the small turbos on the market.

Despite its small displacement, the 1.4T delivers healthy midrange torque. Occasionally the turbo can be caught off-boost, and the transmission may remain in too high a gear, but that is rare.

More important, for those looking for a high-miles-per-gallon diesel alternative, the Jetta 1.4T got a decent 32 mpg overall, compared with 36 mpg for the Jetta diesel.

More impressive is its 47 mpg on the highway—just a shade below the TDI, and without the diesel's hesitation on takeoff and noisy low-speed clatter. And the 1.4T stickers for \$2,850 less than the comparable diesel that was being sold before the scandal broke.

As such, the Jetta 1.4T provides an enticing combination of zip, frugality, and refinement, especially when considering the 1.4T's automatic transmission vs. the jerky dual-clutch setup that afflicts the diesel.

Volkswagen limits the 1.4T to relatively basic trim levels, and our SE lacked some common features, such as lumbar adjustment in the cloth-only seats. But the infotainment system now works with Android Auto and Apple CarPlay.

Overall, this small turbo gasoline engine considerably weakens the case for diesels on more than one level. If VW needs a comeback player, this could be it.

TESTED VEHICLE

POWERTRAIN	150-hp, 1.4-liter 4-cyl. turbo; 6-speed automatic; front-wheel drive
FUEL	32 mpg
PRICE	\$21,235

ROAD REPORT

Ratings: Small SUVs and Small Hatchbacks

Scores in context: Recommended models did well in the overall road-test score and had average or better predicted reliability. They also performed adequately in government or insurance-industry crash tests, if tested. For full Ratings, available to online subscribers, go to [ConsumerReports.org](https://www.consumerreports.org)

☒ Recommended

● Better ← → Worse ●

Rec.	Rank	MAKE & MODEL	PRICE As Tested	SCORE Road Test	RELIABILITY Predicted	TEST RESULTS									
						Overall MPG	Acceleration, 0-60 MPH, Sec.	Dry Braking, 60-0 MPH, Ft.	Avoidance Maneuver Max. Speed, MPH	Routine Handling	Ride/Noise	Driving Position	Seat Comfort, Front/Rear	Controls	Cargo Volume, Cu. Ft.

SMALL SUVs

<input checked="" type="checkbox"/>	1	Subaru Forester 2.5i Premium	\$26,814	85	●	26	8.7	127	52.0	●	○/○	●	●/●	●	35.5
	2	Hyundai Tucson SE (2.0L)	\$25,920	76	New	24	11.0	129	54.0	●	●/●	●	●/●	●	29.5
<input checked="" type="checkbox"/>	3	Toyota RAV4 XLE	\$26,802	75	●	24	9.0	135	51.5	●	○/○	●	●/●	●	37.0
	4	Ford Escape SE (1.6T)	\$28,040	75	●	22	9.9	133	52.5	●	●/●	●	○/●	●	35.0
<input checked="" type="checkbox"/>	5	Nissan Rogue SV	\$29,920	74	○	24	9.5	134	54.0	○	●/○	○	○/●	●	31.5
<input checked="" type="checkbox"/>	6	Mazda CX-5 Touring (2.5L)	\$28,090	74	●	25	8.0	133	52.5	●	○/○	●	●/●	●	33.0
<input checked="" type="checkbox"/>	7	Honda CR-V EX	\$27,500	73	○	24	9.0	134	51.5	●	○/○	●	●/●	○	36.0
	8	Kia Sportage LX (2.4L)	\$24,400	70	●	22	10.3	137	53.5	●	○/○	●	●/●	●	28.0
	9	Mitsubishi Outlander SEL (4-cyl.)	\$28,405	59	NA	24	10.0	132	50.5	●	○/○	●	○/●	●	32.5
	10	Jeep Cherokee Latitude (4-cyl.)	\$27,490	58	●	22	10.9	138	51.5	○	○/●	○	○/●	●	31.0

Why certain models are not recommended. The Hyundai Tucson is too new for us to have reliability data. The Ford Escape and Jeep Cherokee have below-average reliability. The Ford Escape and Kia Sportage scored a Poor in the IIHS small-overlap crash test. The Mitsubishi Outlander scored too low in our tests to recommend.



Subaru Forester



Toyota RAV4



Nissan Rogue

Rec.	Rank	MAKE & MODEL	PRICE As Tested	SCORE Road Test	RELIABILITY Predicted	TEST RESULTS									
						Overall MPG	Acceleration, 0-60 MPH, Sec.	Dry Braking, 60-0 MPH, Ft.	Avoidance Maneuver Max. Speed, MPH	Routine Handling	Ride/Noise	Driving Position	Seat Comfort, Front/Rear	Controls	Luggage, Suitcases+Duffels

SMALL HATCHBACKS

	1	Volkswagen Golf SE (1.8T)	\$25,315	82	●	28	8.7	130	54.0	●	●/●	●	●/●	●	2+1
<input checked="" type="checkbox"/>	2	Subaru Impreza Sport Premium	\$22,345	76	●	26	9.4	127	52.5	●	●/○	●	●/●	●	2+2
<input checked="" type="checkbox"/>	3	Kia Soul Plus	\$24,115	74	●	26	8.8	127	53.5	●	○/○	●	●/●	●	1+1
<input checked="" type="checkbox"/>	4	Mazda3 i Grand Touring (2.0L, MT)	\$24,040	73	●	32	8.2	133	54.0	●	○/○	●	●/○	○	2+2
	5	Ford Focus SE	\$22,185	71	●	28	9.3	137	52.5	●	●/●	●	●/○	○	2+1
<input checked="" type="checkbox"/>	6	Honda Fit EX	\$19,025	67	○	33	10.0	132	55.0	●	●/●	○	●/●	●	2+2
	7	Scion iM	\$19,995	64	New	31	10.0	133	52.5	●	○/○	○	●/○	●	1+3
<input checked="" type="checkbox"/>	8	Nissan Versa Note SV	\$17,495	61	●	31	10.9	135	54.5	●	○/○	○	○/●	●	1+2

Why certain models are not recommended. The Volkswagen Golf and Ford Focus have much-below-average reliability. The Scion iM is too new for us to have reliability data.



Subaru Impreza



Kia Soul



Mazda3

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Love Hurts

Whatever you're celebrating this month, try not to get it twisted

Be My Valentine—Some Other Time
When it's true love, what's the rush?
(Submitted by Elizabeth Sumter, Perkasie, Pa.)



Not valid on Valentine's Day weekend Feb. 13-15.

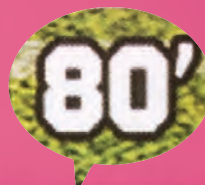
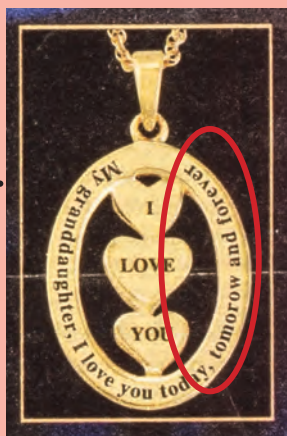
Women's Fashion Daywear

Women's Fashion Daywear
Sizes S-3X, 34B-42D.
Reg. \$9-\$30,
now 6.75-22.50.



Not Exactly Office Casual
A reader says, "Daywear—really!" Maybe it depends on where you work, but our office is a bit more buttoned-up.
(Submitted by a reader in Cincinnati.)

Sometimes Love Does Mean Having to Say You're Sorry
Nothing says "Be mine forever" like a \$99 pendant with a typo.
(Submitted by Norman Marshall, Grand Rapids, Mich.)



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Supersized Super Bowl
To hang a TV that big, winners might need a larger house, a reader writes.
(Submitted by Richard Sun, Sacramento, Calif.)

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IN THIS SPECIAL SECTION

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Contact Info**CR Best Buy** Products with this icon offer the best combination of performance and price. All are recommended.**Recommended** Models with this designation perform well and stand out for reasons we note.

How to Use the Canada Extra Section

Every month, Canada Extra provides Canadian pricing and availability information about products tested for that issue. The Ratings in this section are based on this month's reports, but they narrow your choices to the products that are sold in Canada.

You can use this section in either of two ways: Start with the main report, read about the products that interest you, and turn to this section to find whether they're sold—and for what price—in Canada. Or start here, find products sold in Canada whose price and overall score appear promising, and read more about them in the main report and full Ratings chart; page numbers appear with each Canadian report. (For some products, the Canadian model designation differs slightly from the one used in the U.S.)

In most cases, the prices we list here are

the approximate retail in Canadian dollars; manufacturers' list prices are indicated by an asterisk (*). Check marks identify CR Best Buys or recommended products in the U.S. Ratings. "NA" in a chart means that information wasn't available from the manufacturer. We include, in the Contact Info list on page 32d, the manufacturer's phone number and Web address in Canada so that you can call or go online to get information on a model you can't find in the stores. (Many products that aren't available in Canadian stores can be bought online.)

We appreciate your support, but we don't take it for granted. Please write to CanadaExtra@cu.consumer.org and tell us what you think. We can't reply to every email message or implement every suggestion, but with your help we'll try to keep growing to serve your needs.

Smartphones

Here are the rated smartphones that are available, listed alphabetically by their Canadian carrier.

Prices vary by carrier. **Report and Ratings, pages 46-54**

Bell Mobility

- ☒ Apple iPhone 6
- ☒ Apple iPhone 6 Plus
- ☒ Apple iPhone 6s
- ☒ Apple iPhone 6s Plus
- ☒ BlackBerry Classic
- ☒ HTC One M9
- ☒ LG G4
- ☒ Nexus 6
- ☒ Samsung Galaxy Grand Prime
- ☒ Samsung Galaxy Note 4
- ☒ Samsung Galaxy Note 5
- ☒ Samsung Galaxy S6
- ☒ Samsung Galaxy S6 edge
- ☒ Samsung Galaxy S6 edge +

Rogers Wireless

- ☒ Apple iPhone 6
- ☒ Apple iPhone 6 Plus
- ☒ Apple iPhone 6s
- ☒ Apple iPhone 6s Plus
- ☒ BlackBerry Classic
- ☒ BlackBerry Passport
- ☒ LG G3
- ☒ LG G4
- ☒ Samsung Galaxy Grand Prime
- ☒ Samsung Galaxy Note 4
- ☒ Samsung Galaxy Note 5
- ☒ Samsung Galaxy Note Edge
- ☒ Samsung Galaxy S6
- ☒ Samsung Galaxy S6 edge
- ☒ Samsung Galaxy S6 edge +

Telus Mobility

- ☒ Apple iPhone 6
- ☒ Apple iPhone 6 Plus
- ☒ Apple iPhone 6s
- ☒ Apple iPhone 6s Plus
- ☒ BlackBerry Classic
- ☒ BlackBerry Passport
- ☒ LG G3
- ☒ LG G4
- ☒ Motorola Moto X (2nd gen.)
- ☒ Samsung Galaxy Grand Prime
- ☒ Samsung Galaxy Note 4
- ☒ Samsung Galaxy Note 5
- ☒ Samsung Galaxy S6
- ☒ Samsung Galaxy S6 edge
- ☒ Samsung Galaxy S6 edge +

Treadmills

Seven of the highest-scoring tested treadmills are available. **Report and Ratings, pages 14-19**

		BRAND & MODEL	PRICE	SCORE
Rec.	Rank			

A. NONFOLDING

<input checked="" type="checkbox"/>	1	Landice L7 Cardio Trainer	\$5,000	84
<input checked="" type="checkbox"/>	3	Sole TT8 (Costco)	\$2,800	83
<input checked="" type="checkbox"/>	4	True PS300	\$3,500	81
<input checked="" type="checkbox"/>	6	Precor TRM 243	NA	81

B. FOLDING

<input checked="" type="checkbox"/>	2	Spirit XT485	\$2,500	81
<input checked="" type="checkbox"/>	4	LifeSpan TR4000i	\$2,500	79
<input checked="" type="checkbox"/>	5	NordicTrack Commercial 1750	\$1,900	79

Ellipticals

Five of the highest-scoring tested ellipticals are available. **Report and Ratings, pages 14-19**

		BRAND & MODEL	PRICE	SCORE
Rec.	Rank			

A. HAS HEART-RATE PROGRAMS

<input checked="" type="checkbox"/>	1	Diamondback 1260 Ef	\$2,400	79
<input checked="" type="checkbox"/>	2	Precor EFX 225	\$4,000	74
<input checked="" type="checkbox"/>	3	AFG 18.1AXT	\$1,800	73
<input checked="" type="checkbox"/>	4	Schwinn 470	NA	73

B. NO HEART-RATE PROGRAMS

<input checked="" type="checkbox"/>	1	Landice E7 Pro Sport	\$3,800	69
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Recalls

2006-2011 Toyota/Scion models

On certain vehicles, inconsistent application of grease during the manufacturing process could cause the driver's-side power window master switch to stick or become inoperative, allowing debris to accumulate between the contact points. That could result in an electrical short circuit; the switch assembly may overheat, produce smoke, melt, and/or catch fire.

Models 315,000 2007 and 2009 Toyota Camry and Camry HV; 2006-2007 and 2009-2011 Rav4; 2006-2011 Yaris; 2009-2011 Corolla, Highlander, Highlander HV, Matrix, Sequoia, and Tundra; and 2011 Scion XB and XD vehicles.

What to Do Have the dealer inspect the driver's power window master switch and apply a specialized grease that inhibits heat buildup, or replace the power window master switch circuit board, as necessary. Note: This is an expansion of recall 2012-338.

2008-2010 Mercedes-Benz models

On certain vehicles, a defect in the supplemental restraint system (SRS) controller could cause SRS components (such as airbags and seat belt pretensioners) to inadvertently deploy or fail to deploy appropriately. Unintended seat belt pretensioner, airbag, or other deployment in a non-warranted (nonimpact) situation could result in minor injuries or a vehicle crash; failure to deploy in a crash increases the risk of injury.

Models 10,888 C Class and GLK Class vehicles.

What to Do Have the dealer replace the SRS control unit. Note: The condition would cause the illumination of the SRS warning light.

2009-2010 Ford/Lincoln models

On certain vehicles operated in areas where road salt is used on the roadways during winter months for extended time periods (New Brunswick, Newfoundland-Labrador, Nova Scotia, Ontario, Prince Edward Island, and Quebec), corrosion may occur underneath the fuel tank. That could result in a small hole in the fuel tank allowing a fuel vapor leak or fuel leak that, in the presence of an ignition source, could result in a fire. A malfunction indicator lamp (MIL) may illuminate, and/or a fuel odor or liquid fuel may be observed.

Models 18,187 Ford Edge and Lincoln MKX vehicles.

What to Do Have the dealer inspect and, if necessary, repair or replace the fuel tank. Note: This recall is an expansion of recall 2014-482.

2015-2016 Honda Fit models

On certain vehicles, the rear grab rail brackets may not have been manufactured to design specifications. In the event of a collision, they could interfere with side curtain airbag deployment.

Models 8,081 vehicles.

What to Do Have the dealer replace the rear grab rail bracket with one that has felt applied to prevent a puncture of the side curtain airbag.

2015-2016 Hyundai Sonata models

If an ABS malfunction occurs during vehicle operation, the ABS warning lamp may fail to illuminate, contrary to the requirements of Canada Motor Vehicle Safety Standard 135—Brake Systems. That can allow an ABS malfunction to go undetected by the driver, increasing the risk of a crash.

Models 3,378 vehicles.

What to Do Have the dealer update the ABS control software.

2015-2016 Porsche models

On certain vehicles, a defect in the fuel low pressure line could result in a fuel smell and/or fuel leak that, in the presence of an ignition source, could result in a fire.

Models 3,490 Macan S and Macan Turbo vehicles.

What to Do Have the dealer install an improved fuel low pressure fuel line.

2015-2016 Volkswagen models

On certain vehicles, the camshaft lobe may fail, potentially increasing stopping distances and also resulting in a reduction in available engine power. Those problems could increase the risk of a crash.

Note: The failure would result in the Engine Malfunction Indicator Light illuminating.

Models 17,200 2015-2016 Golf, GTI, and Jetta, and 2015 Beetle and Passat vehicles.

What to Do To be determined.

Autos

All of the tested vehicles are available in Canada. Listed within category. **Report and Ratings, pages 58-60**

MAKE & MODEL	PRICE RANGE	ACCELERATION (SEC.)				FUEL ECONOMY (LITERS PER 100 KM)		
		0-50 KM/H	0-100 KM/H	80-100 KM/H	500 METERS	CITY DRIVING	HIGHWAY DRIVING	OVERALL
SMALL HATCHBACK								
Scion iM	\$21,165–\$21,990	4.1	10.6	4.1	20.3	10.8	5.5	7.5
SMALL SUV								
Mitsubishi Outlander	\$25,998–\$36,498	4.0	10.6	4.1	20.3	13.5	7.7	9.9
COMPACT SEDAN								
Volkswagen Jetta	\$15,995–\$36,895	3.5	9.6	4.2	19.4	11.2	5.0	7.4

Contact Info

How to reach manufacturers in Canada.

AFG

877-348-8736
afgfitness.com

Apple

800-263-3394
apple.com/ca

BlackBerry

ca.blackberry.com

Costco

costco.ca

Diamondback

800-776-7642
diamondbackfitness.com

HTC

866-449-8358
htc.com/ca

Landice

973-927-9010
landice.com

LG

888-542-2623
lg.com/ca

LifeSpan

877-654-3837
lifespanfitness.com

Motorola

800-461-4575
motorola.ca

Nexus

google.com

NordicTrack

888-308-9616
nordictrack.ca

Precor

800-347-4404
precor.com

Samsung

888-899-7605
samsung.ca

Schwinn

800-605-3369
schwinnfitness.com

Sole

855-258-3555
soletreadmills.com

Spirit

870-935-1107
spiritfitness.com

True

800-883-8783
truefitness.com