



CONSUMER DECISION MAKING

2023-2024 Guide

TEXAS A&M
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EXTENSION





Consumer Decision Making

Study Guide Additional Resources

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Professional Dress and Grocery Meats (retail cuts) will be added soon!!! Due to unexpected delays, we wanted to go ahead and release these 10 classes until we have the additional two finalized. We realize some Districts have contest in late October.



ATHLETIC SHOES

With the many types of athletic shoes that are available, it can be hard to choose the right shoes for you. There are differences in design and variations in material and weight. The American Academy of Orthopedic Surgeons says that these differences have been developed to protect the areas of the feet that encounter the most stress in a particular athletic activity. Let's review some of the different types of sports shoes available.

Athletic shoes

- Are grouped into the following categories: running, training, and walking; they include shoes for hiking, jogging, and exercise walking. These shoes should have a comfortable soft upper, good shock absorption, smooth tread, and a rocker sole design that encourages the natural roll of the foot during the walking motion. Features of a good jogging shoe should include cushioning, flexibility, control, and stability in the heel counter area, lightness, and good traction. Whereas, cross-training shoes combine several characteristics of other types of shoes so that you can participate in more than one sport and wear the same shoe. A good cross trainer should have flexibility in the forefoot that you need for running, in addition to stability on the inside and outside of the shoe for the control needed for aerobics and tennis. Walking shoes should flex easily at the ball of the foot, which help feet to push forward.

Court sport shoes

- Include shoes for tennis, basketball, and volleyball. Most court sports require the body to move forward, backward, and side-to-side. As a result, most athletic shoes used for court sports are subjected to heavy abuse. The key to finding a good court shoe is the sole. Ask a coach or shoes salesperson to help you select the best type of sole for your sport.

Field sport shoes

- Include shoes for soccer, football, and baseball. These shoes are cleated, studded, or spiked. The spike and stud formations vary from sport to sport, but they generally are replaceable or detachable cleats, spikes, or studs affixed into nylon soles.

Track and field sport shoes

- Are very specific to the sport. The needs of the individual are most important when picking the shoe. For example, foot types, gait patterns, and training styles should always be considered. It is always best to ask a coach about the type of shoe that should be selected for the event in which you are participating. Proper-fitting sports shoes can enhance performance and prevent injuries. Follow these specially designed fitting facts when purchasing a new pair of athletic shoes:

- Try on athletic shoes after a workout or run and at the end of the day. Your feet will be at their largest.
- Wear the same type of sock that you will wear for that sport.
- When the shoe is on your foot, you should be able to freely wiggle all of your toes. There should be a thumb's width from the tip of the toe to the end of the shoe.
- The shoes should be comfortable as soon as you try them on. There is no break-in period. If they're not comfortable in the store, they won't be comfortable when you're exercising.
- Walk or run a few steps in the shoes. They should be comfortable. The heel of the shoe should not slip off the foot as you walk or run.
- Always re-lace the shoes you are trying on. You should lace through each top eyelet as you crisscross the lacing pattern to ensure a more snug fit and decrease slippage. Don't tie the laces too tight as this may cause injury to the nerves or tendons on the top of the foot and ankle.
- There should be a firm grip of the shoe to your heel. Your heel should not slip as you walk or run.



Now that you know what type of shoe to buy and tips to picking out a properly fitting shoe, you need to consider:

- its construction—how well it was made. Understanding the basics of shoe construction can help you choose intelligently from among the thousands of available styles.
- Stitching should be secure, even, and straight. There should be no rough spots, wrinkles, bulky seams, or gummy adhesives.
- Rubber around the base of the shoe should be one continuous strip, tightly attaching the sole to the upper.
- The toe box should be square for adequate toe room.
- The shoe should have side and tongue padding for extra comfort. Cushioning on the cuff around the ankle and at the Achilles tendon helps to reduce friction and irritation.
- The inner sole should be soft and resilient, with adequate arch cushions.
- The reflector should be as big as possible, especially if you will be outside at dusk or dawn.
- The insole should be removable for cleaning and, when it loses springiness, replacement.

In addition to being overwhelmed by all the choices in athletic shoes, you may be surprised at how much they cost.

Slick ads and television commercials tout technological features, the latest gimmicks, and shoes named after sports celebrities. Paying more than \$100 does not necessarily get you a better shoe. Good quality shoes may be pricey, but don't overlook the less expensive shoes because they can outperform their costlier brandmates. Be sure that whatever price you decide to pay for the shoes, it's because the shoe has the features that meet your needs—not because it is a certain brand or has a sports celebrity's name on it.

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ACTIVEWEAR

Sales of activewear are at an all-time high. According to the market research from NDP Group, activewear sales generated \$35 billion in 2014 and made up nearly 17% of the entire American clothing market. Activewear is clothing worn for sport or physical exercise and uses the latest in performance fabrics and technology to ensure that apparel can stand up to the intense demands of sporting disciplines like running, cycling, swimming and gym-work. Activewear includes tops, shorts, tights, socks, jackets, sport bras and so much more. The right activewear can enhance your training and performance. Fabric and fit are probably the most important factors when choosing activewear.

Fabric

Fabrics are designed for different purposes. Some fabric pull sweat away from your skin and others absorb it. When it comes to workout clothes, some choices are better than others depending on your workout.

- **Wicking**

Wicking fabrics are breathable synthetic fabrics that provide moisture control for an athlete's skin during a mid to high intensity workout. In essence, the fabric "wicks" the sweat away from your skin which help it evaporate quickly and keep your body cool. Wicking fabrics tend to be soft, lightweight and stretchy, making them an excellent choice for activewear. This broad category of fabrics is used to make garments like T-shirts, sports bras, running and cycling jerseys, socks, and polo-styles shirts for any physical where the goal is to keep your skin as cool and dry as possible. Moisture-wicking fabrics are used to make apparel for outdoor activities such as hiking, fishing, mountain biking, snow skiing, and mountain climbing. There are a number of products marketed for their wicking. Many of these products are used as a blend with each other or with cotton. Additionally, these products may be branded under a variety of names such as Dri-Fit, Coolmax, Vapor, and Climalite.

- **Polyester** - is the workhorse of the workout fabrics and is the one you see on labels most often. Basically plastic cloth, it's durable, wrinkle-resistant, lightweight, breathable, and non-absorbent.
- **Spandex** - Also known as elastane and by the brand name Lycra, spandex puts the stretch in workout wear. The synthetic fabric can expand to nearly 600 percent of its size, offers an unrestricted range of motion, and then snaps back in place. Spandex is an anagram for expands.
- **Emerging Performance Fabrics** - The next big thing in activewear is products that provide even more benefits. Benefits include improved wicking, temperature control, UV protection and anti-odor properties. Bamboo is an example of a new, emerging performance fabric. These products may also be more expensive.

Cotton

Cotton can also be a good choice when choosing activewear. Cotton can also be a good choice when choosing activewear. Cotton is a breathable, soft, comfortable and natural fiber that works well for lighter workouts. Cotton also tends to be less expensive than synthetic activewear. However, cotton is very absorbent and is slow to dry. When wet, cotton hold the moisture next to your body.



Fit

Choose activewear that fits your body and your workout. For example, if you are running or biking, avoid wide leg or loose pants/leggings. Likewise, for activities such as yoga or Pilates, choose stretchy, fitting fabrics. Additionally, avoid fabrics that could chafe or irritate your skin during repetitive movement.

Pay closer attention to fit more than size because some workout clothes tend to run smaller and more form fitting than regular clothes.

COST

There are many factors to consider when shopping for activewear. You may be surprised at how much activewear costs. Paying the top dollar does not necessarily mean that you will get the best activewear for you. Be sure that whatever price you choose to pay for activewear that it is the right activewear for you and that it meets the needs you desire. <https://makersrow.com/blog/2014/08/powerful-tips-for-manufacturing-an-activewear-line/>



HEADPHONES/EARBUDS

Whether you are watching videos or listening to music or podcasts, headphones and earbuds have become ever important accessory. Phones, for example, come with a set when you purchase them. They add that much value as an accessory that phone companies just include them in the box. The need for headphones (collectively all styles and models) are important whether you are at home, school, work, at play, or on the go. There are so many different applications for which consumers want and need sound delivered. Selecting the best pair of headphones is a very personal decision, but there are plenty of styles, models, and features that require the consumer to really do their homework before purchasing a set. Some can be very small and slip into a coin purse or shirt pocket while others can blow you away with amazing sound. Some come with wires and some without. Some consumers may even purchase multiple types/sets to suit different needs. Explore some of the styles and features and evaluate how they address specific needs and wants among retail consumers.



Figure 1: Headphones & Earbuds (Source: The Wire Realm)

Over-Ear

These styles are the largest within the spectrum of headphone models. This is in part because as an over-the-ear design, the cups cover the entire ear where the pads typically press up against the head. Another benefit in completely covering the ear is blocking outside sound and preventing delivered sound from leaking out. All of these have some important implications for the user and even others.

These headphones come in two styles that affect sound in a couple of ways:

- Closed-back headphones have a solid cover over the back of each earcup which helps keep sound in and helps block ambient noise. While that can be a great feature, blocking outside noises can prevent the listener from hearing things like “take out the trash” or “dinner is ready.”
- Open-back headphones have openings on the back of the earcup which are intended to give the listener a clearer and more natural sound. However, that design allows sound to bleed out which might disturb the person sitting in the airplane or library next to you. A benefit is that it allows the listener to hear ambient sounds that may be important to hear.

By design, the over-ear models are the largest, covering the entire ear. The quality of sound is likely better in these models than others, but they may come at some expense literally and figuratively. They tend to be more costly. They also can cause the ears to get warm/hot if used for extended periods of time.

These headphones come with adjustable headbands that connect the two earcups. They can come in a wide range of designs to include slim/sleek bands to wider, padded bands and everything in between. Depending on how they are worn, they can really mess up your hairstyle. Again, those become personal choices.



On-Ear

This style of headphone generally is smaller and lighter than its over-ear sibling. These models press directly over the outer ear instead of the head. Many consumers find them more comfortable than the over-ear models. Similarly, these headphones come in closed-back and open-back styles in order to create the same effects. However, since they only go directly over the ear and do not press against the head, they are much more likely to bleed sound out and let ambient noise in as compared to the over-ear headphones. This is primarily because by nature of them sitting on the ear, they do not create a seal against the head. Depending on the size/shape of the user’s ears, these headphones can vary greatly in this regard.



Figure 2: Over-ear (L) & On-ear (R) Models (Source: Crutchfield Corporation)

The headbands on these models are much like those of the over-ear, however, there are many styles that come foldable making it convenient for storage and protects them from damage when not in use.

In-Ear & Earbuds

By far the smallest models come in a couple of styles, the in-ear and earbud headphones. While very similar in appearance, there are some subtle differences that even have experts arguing how different they really are. Albeit small, it is still important to know the difference.

In-ear style headphones rest in the “bowl” of the ear, just outside of the ear canal. However, most styles include silicone canal tips. These enter the ear canal and create a seal with the ear canal to prevent sound from bleeding out and ambient noise from getting in. When comparing this style with its on-ear and over-ear siblings, the relative difference in effectively sealing in sound and blocking out noise can be very different. For ultimate comfort, some manufacturers even offer custom molded earpieces that fit perfectly in the bowl of your ear if you are willing to pay the extra price. That’s one way to create a sound seal and a way to keep others from borrowing your headphones.

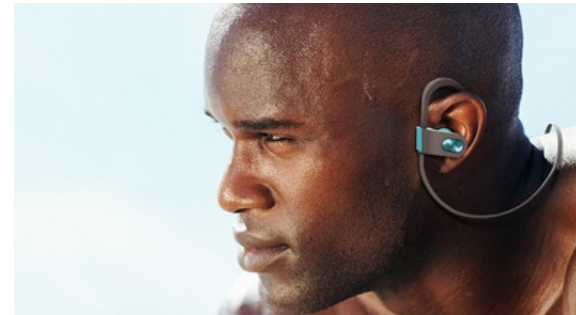
Earbuds also rest in the “bowl” of the ear, just outside the ear canal. However, this style does not include the canal tips like the in-ear styles do. Manufacturers will include soft foam slip on covers to add comfort, but they do not provide a seal with the ear canal like the in-ear styles do. As one might expect, while some sound might bleed out, ambient noise or sounds can easily be heard when using earbuds. As was mentioned earlier, there are some advantages to hearing outside sounds. The most common way people acquire a set of earbuds are the white ones that come with the purchase of an iPhone®. Don’t believe that there is not a retail market for earbuds. They tend to be the most economical option and many quality products provide suitable listening pleasure.



Figure 3: Earbuds vs. In-Ear (Source: HiFi Headphones)

Some listeners may find these types of headphones uncomfortable if used for long periods of time. Consider the comfort level and time they will be used before making your purchase.

Many of these models also come with a wide range of designs to hold the earbud in place. For many, simply putting them in the ear as shows in Figure 3 is enough for them to stay in place. However, depending on the level of activity, “ear hooks” may be needed to keep them in place. There are a wide range of products available for the active listener that wants to listen while they work out, play sports, or do anything that may need to provide some support and keep them in place.



Sound Quality *Figure 4: Ear-Hook Design*

Like speakers, headphones and earbuds can emphasize different parts of the audio spectrum and is very much a subjective quality measure. While there are some “accuracy” measures that can be evaluated with sophisticated instruments, consumers generally must rely more on enjoyability which is completely subjective. When it comes to headphones and earbuds, and specifically music, many people like strong, deep bass sound but hi-fi enthusiasts lean more towards accurate, natural sound. Which one are you?

Consumers should try them before they buy them. This requires driving to a retail outlet and listening to them and comparing them first-hand. It is also a good idea to take any music or audio with you for which you typically would use the headset. However, purchasing online without the ability to listen to them poses a bit of a dilemma. The best recourse in this situation is to evaluate the seller’s return policy so that you can return them if you are not happy with them.

Over-ear and On-ear models, given their size, allow manufacturers to focus on the quality of sound rather than portability. Even so, you can still find relatively good quality sound ranging from \$20 to \$800.

Many models have on-board controllers that allow the listener to raise the volume, lower the volume, mute, pause, or advance music or sound on the headphones. These can add versatility to the device.

Size & Portability

The decision between In-Ear, On-Ear, and Over-Ear models must be evaluated against their intended purpose, holding other features constant. When portability is the most important feature, then the In-Ear/Earbud models will be a smarter choice. However, if the quality of sound takes priority, the larger Over-Ear or On-Ear models will likely be a better choice. It is important to consider that there are some high quality In-Ear/Earbud models that will provide better quality sound than the Over-Ear or On-Ear models. Look at your choices carefully before you make any rash decisions that will leave you feeling like you didn’t get what you paid for.

Over-Ear models typically do not come foldable, making them bulky and difficult to stow compared to the earbuds.



However, many of the on-ear models come in foldable styles with a semi-hard case or bag. In terms of storage, will the consumer put them in a cabinet, drawer, backpack, purse, or pocket?

Within the in-ear/earbud models exist some that include a rigid or soft collar that lays around the neck with wired earbud/in-ear headphones. These styles can be foldable and may be easier to store than their larger over-the-head siblings.



Figure 5: Rigid and Soft Collar-Style In-Ear Headphones

Wired

The array of headphones and models that keep you tethered to a device will likely provide you with the best listening experience. While you get that at the expense of not being able to move further than the cord will allow, you virtually eliminate the instance of interruption of disconnecting from your listening experience. Consider the length of the cord provided with the device and the interface with the sound source. You can find them with 1/8" connector for some phones and computers. Some come with a 1/4" jack for sound systems and other professional uses. You can also find some with USB connectors for use with computers and other computer-based USB ports. Depending on the application, you will need to select the appropriate wired connection. While there are adapters between 1/8" and 1/4" connectors, it will be more difficult to find an adapter to convert those to/from a USB connection as the source or the headphones.

Don't assume that every corded headphone keeps you tethered to your home or office. You must remember that the cord can simply be between the phone in your backpack and your ears. Do not let the wired headphones keep you static. You can always get great sound on the move. The only thing keeping you tethered is the source of the sound, so your headphones can be as portable as your source.

Wireless

Wireless headphones provide the most freedom of movement with proximity to the sound source. The most common form of connection is with Bluetooth® technology. The standard range of Bluetooth is about 30 feet in an open space. Wires and cords can get in the way of active movement. The wireless options provide considerable freedom in that respect. However, if your activities separate you from your sound source beyond its range, you will experience interruption or disconnection from the sound. Even people or objects between your source and device can reduce the effective range of the connection.

An inherent part of any wireless headphone is the use of batteries to power the device. The best measure of battery performance is actual playtime. Unlike a wired device, wireless headphones must be powered to make the wireless connection. Larger over-ear or on-ear devices may be less efficient with battery usage while smaller in-ear models may boast up to 20 hours of playtime. Whichever model you choose, be aware of playtime, the amount of time it will take to recharge, and the interface with the charging device (USB, Firewire, AC adapter, etc.). In terms of size, larger models may have larger battery capacity compared to smaller ones. The key is to compare active playtime.

Reference to "true wireless" models continue to expand. Like the in-ear collar style models, there remains a wire connecting the two earpieces. True wireless headphones are especially portable but often have shorter playtime.



One final note about wireless headphones is that there are models that are BOTH wireless and wired. Keep a vigilant eye on device specs as this provides some great versatility for the consumer.

Noise-Cancelling

Noise-Cancelling (NC) technology is available in many models and provides some very important benefits. There is passive and active NC technology. Passive NC technology is based on the construction of the headphones including materials that help block ambient sound. Active NC technology are embedded circuitry that work off battery power to erase low-frequency sound waves including much of the outside ambient noise. Working in a noisy environment, like a train station lobby, can make it difficult to concentrate on your work. NC headphones are designed to cancel out that noise. NC-featured devices will likely come at a premium but may be worth the expense depending on the application and user.

Active NC headphones require power, and as described in the Wireless section, the key is to determine and compare active playtimes. Keep in mind that if you are using the headphones for short periods of time, playtime may be less of a factor in deciding between models and styles. In some cases, the NC technology can be switched off to conserve battery playtime.

The biggest challenge regarding NC headphones is to distinguish good NC technology from not-so-good NC technology, especially by reading the product packaging or specs. The best determination is to do a hands-on evaluation. Try them out.

Microphones

The integration of microphones in headphones can dramatically affect the versatility of any headset. For example, answering a call on your phone using your headphones might be a valuable benefit. Many professionals working at home may use headphones with mics to conference with colleagues across the internet. Gamers are especially attracted to earphones with mics. It changes the way they interact with other online gamers and gives them the ability to listen and speak clearly. There are a wide range of options regarding headphones with microphones. Some microphones may include their own NC technology to increase the quality of sound going through the mic.

In terms of design, some microphones are rigid and affixed to the earcups in the over-ear or on-ear models. The in-ear models generally house the integrated mic in one of the earpieces or on the cord connecting to the device. In the collar-style headphones, it may be integrated into the collar or the wires connecting the earpieces.

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TABLETS

A tablet computer, more commonly referred to as a “tablet” is a mobile computer system that has distinguishing characteristics that make it unique from laptop computers, desktop models, and even smartphones. More specifically, a tablet includes a full operating system with a touchscreen interface. The device includes rechargeable batteries and comes in a thin, flat platform and can have screen sizes that range from approximately 7 to 10 inches (measured diagonally). These devices are designed to be smaller than the laptop with similar function. However, they are also intended to be larger than smartphones to add productivity while remaining highly mobile, light, and agile.

Types of Tablets

- **Slate** – This type of tablet is typically in the smaller range of tablets. Their screen sizes can be as small as 5 to 6 inches, a bit below the standard 7 to 10-inch range for tablets. However, some slate tablets can be as large as 10 inches. The primary feature, or lack thereof, is that slate tablets do not come with a keyboard. Although you can typically add a keyboard as an accessory, the slate tablets are small, sleek, and are designed primarily for touchscreen interface (including on-screen keyboards) for accessing entertainment apps, watching videos or playing games that use the touchscreen interface. The touchscreen can be used using the finger(s) or even a stylus (likely not included at the time of purchase).



Figure 1: [Slate] Apple iPad 1st Generation (Released January 10, 2010)

- **Mini tablet** – This type of tablet generally weighs less than slate tablets and are typically have a smaller screen size as well. It is designed to be more portable than its larger version, but specifications can be different. Functionally, it is like the larger tablet and typically includes a touchscreen interface. Due to its smaller size, this type of tablet may be a bit more affordable than its larger version. Screen sizes are typically around 7 inches.



Figure 2: Apple iPad (mini) 6 (Released September 2021)

- **Phablet** – This type of tablet gets its name from “smartphone” and “tablet” as a crossover between the smaller smartphone and the functional attributes of tablets. This type is also known as a hybrid. With screens in the 5-inch range, the typical phablet is around 5.5 inches. These tablets are designed for screen-intensive interaction with many having or including a stylus typically stored within the frame of the device for notetaking or sketching. These devices are typically used for mobile web browsing and multimedia viewing and like smartphones include a touchscreen interface. As the size of smartphones increases to even larger models than the phablet, what differentiates a phablet from a large smartphone is the 16:9 aspect ratio unique to the phablet. Some smartphones may be “longer” than the phablet and do not hold to the 16:9 aspect ratio.



Figure 3: [Phablet] Samsung Galaxy S23 (Released February 2023)



- **Laplet (2-in-1)** – This type of tablet is uniquely identified as being equipped with a keyboard as part of its original design. This tablet typically includes on-screen keyboards that can also be used to interface with the device. These models run full-featured desktop operating systems like Windows® and Apple iOS® that allow them to run software (or apps) like those found on laptops/desktops. In addition, many models can be found to have I/O ports like USB or DisplayPorts (VGA, DVI, etc.). However, the laplet’s most prominent feature is the keyboard. Within this type of tablet, the laplet can be categorized as either a 2-in-1 Convertible or a 2-in-1 Detachable.
- **Convertibles** – This form of laplet has a keyboard that folds or flips back and is hidden or concealed by the screen frame when not in use
- **Detachables** – This form of laplet has a keyboard that can be detached from the actual laplet and stored separately. While other forms of tablets can include a keyboard as an accessory, the detachable laplet includes an integrated keyboard as part of its original design.



Figure 4: [Laplet] Convertible & Detachable Models

- **Others** – As the evolution of tablets continued to find unique consumer demands, other forms of tablets were developed. While less common now, there still exist other forms of tablets that target gamers. Gaming tablets may include peripheral devices that interface a much more functional gamepad or thumbstick to provide a better gaming experience for the user. Other designs included the booklet or clamshell designs that include an integrated gamepad or thumbstick. These are designed specifically for gaming experiences and are less functional when it comes to web browsing, multimedia viewing, apps or other diverse uses.



Figure 5: [Gaming] Nintendo Switch (Released March 2017)



Specifications and Features of Tablets

When evaluating tablets, there is a wide range of general features that may be included in each's standard design or variations in brand models that provide consumers a wealth of options to meet their needs. Here are some featured categories that consumers can find as part of tablet specifications and marketing pieces packaged with the tablet.

- **Screen Size & Shape** - The standard tablet screen size is about 7 inches, however, variations including the phablet and mini tablets might be as small as 5.5 inches. The measure of a screen, like televisions, is determined by the diagonal length of the visible screen and does not include the actual size of the device or its frame or chassis. When held in landscape mode, most modern tablets have the short, wide shape of a wide-screen television (16:9 aspect ratio). It is important to note that not every model has the standard size screen. Screen sizes that are squarer in design may provide a smaller viewing screen when watching HD video that is formatted for the 16:9 aspect ratio.
- **Wireless Connectivity** - Most models offer WiFi connectivity as a standard feature. This allows the device to connect wirelessly to a local area network (router). The connectivity allows for downloading livestreaming, and updating the operating system or applications. Although connecting with WiFi is most common, that does not work for all when connectivity is required but there is no available WiFi. Many models include cellular network connections. These models tend to be more costly and may add charges to your cellular network bill. However, it remains a valuable feature for those where WiFi is not enough. Keep in mind that some cellular plans allow the user to share smartphone internet service with their tablet.
- **Display** - The tablet display specifications are characterized in different ways.
 - One important factor in evaluating tablet displays is resolution. Higher resolutions make images and text appear sharper. Resolutions at the 800x600 level will present lower quality viewing than HD resolutions or even 3180x2160 UHD screens. However, UHD resolutions on a 7-inch screen may not be visibly better than lower resolution screens.
 - Some displays have an anti-glare coating that makes it easier for viewing in bright light. Shiny, uncoated screens can require higher screen brightness settings to view clearly which uses more battery power than lower screen brightness settings. Be aware that some anti-glare coating may require special cleaning products that the shiny glass uncoated screens require.
 - Viewing angles are another important display feature. Wider viewing angles allow the device to be held in different positions for viewing. This may also affect multiple viewers' ability to see the screen clearly from different angles. This may be a benefit or not, depending on the circumstances. Users may not want the person in the seat next to them to be able to see their screen.
 - Tablets can include ambient light sensors that adjust brightness and contrast automatically. This helps viewing ability and also can prolong battery life.
- **Operating System** - All tablets come with an operating system like those installed on laptops. They are scaled down versions that conserve battery life due to the smaller processors required to run apps. Google's Android, Apple iOS, Chrome OS, and Windows operating systems dominate the tablet market and is in large part the feature that affects the tablet's capabilities the most. The ability to update the operating system is critical to allowing the tablet to use the newest apps while improving the security of the device. There are other operating systems depending on the tablet. There is a direct correlation between operating system and available apps that a device can use.
- **Hardware** - All computing devices have a processor. The processors (measured in gigahertz) affect the speed at which processing occurs over the device. The larger the gigahertz (GHz) the faster and better performance. Performance and processing speed can also be affected by the amount of memory on the device, both hard drive and random-access-memory (RAM). As with the processor, the larger the better. Hard drive space can as



little as 16GB and increase from there to as high as 64GB or 128GB. Of course, I/O ports can extend hard drive space. As it relates to RAM, tablets can range from 512MB to at or above 2GB.

- **Ports (I/O)** - Input and Output (I/O) ports can be important feature in a tablet depending on its use by expanding its capabilities. The most common ports found include USB, Thunderbolt, and DisplayPorts. There are other ports available. A port can be used to expand a device's memory or connect an accessory as with gaming tablets. Some tablets include a slot for microSD cards which also serve to expand memory. There a multitude of adapters and accessories that can be used with tablets to expand their capabilities using an existing port.
- **Printing** - A tablet's ability to print via WiFi adds a valuable function to the device. Those using Apple iOS and Android operating systems include the capacity for printing.
- **App Market** - One of the key features of most apps is that they are proprietary to the operating system. Depending on which OS is being used, the availability of apps is limited to those offered within that platform. Many developers create apps that are available on the largest platforms, Apple iOS and Android. Some apps come pre-installed on the tablet's operating system; all others must be downloaded. Hard drive space and operating systems can affect the availability and use of apps on any tablet.
- **Camera** - Now standard in most portable devices, tablets can feature forward and rear facing cameras. The key to cameras is the quality of images. Two-camera devices may include cameras with different quality image capture. Also, the ability to record video/audio is a key function of many tablets. The higher the pixel value, the better the picture and video quality. For video, some models support and record 720 HD or Full HD quality.
- **Battery Life** - Depending on the frequency and time a tablet is in active use, batter life can be a considerable factor. By design, tablets are smaller, lighter, and more efficient than laptops. Tablets can range form 7 to 10 hours of batter life. That time can vary even within the device's expected range. It all depends on active use, brightness of screen, use of WiFi and processing demand among a few variables.
- **Multiple Users** - The ability for a single device to be used by multiple users varies considerably. Some Android models can allow the user to login with their own credentials. This is especially valuable for parents who want to limit and monitor apps used by children. Apple iOS models do allow different users to login to their Apple account differently but not in the same way as the Android.
- **Accessories** - As with most consumer products, there generally more accessories available than devices. They include Bluetooth I/O devices, covers, skins, stands, screen covers, and more. Some of them add to the functionality of your tablet, while others prolong their life. Some just make the device more functionable. Regardless of the accessory, consider how the accessories add or detract form the value of your tablet.

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WIRELESS PORTABLE SPEAKERS

Anytime people get together, especially to celebrate an important occasion, music is invariably part of the celebration. Weddings, funerals, graduations, sporting events, prayer, romance, rocking a baby to sleep, or even studying can all have some music that plays a part of the activity. It is an important part of human life and culture. The portability of speakers and their wireless connection add convenience. Wireless and Bluetooth speakers bring top-quality sound whether you are at home, work, or on the go. The challenge can be in finding the right model for the occasion.

Wireless and Bluetooth speakers can range from as little as \$2 up to \$800 and are a convenient alternative to larger portable P/A systems. Their sizes can also range considerably along with other features available across all variations and models.

There are two main groups of wireless speakers available on the market today. While there are other technologies out there, the market share is split between Bluetooth® and WiFi. These two technological communication standards serve as the foundation of most wireless speakers and will be the focus of the information provided below.

Bluetooth® is a short-range wireless communication technology that allows devices such as mobile phones, computers, and peripherals to transmit data or voice (sound) wirelessly over a short distance. The typical range for Bluetooth technology is about 30 feet.



Bluetooth



WiFi™ is a wireless communication technology that uses radio waves to provide wireless high-speed internet and network connections that references IEEE 802.11x which is a standard for defining communication over a wireless local area network, or WLAN. The typical range for WiFi routers (2.4GHz) can reach up to 150 feet indoors and 300 feet outdoors.

Bluetooth and WiFi, like many other wireless devices in your home or office, use the same band of radio wave frequency clustered around 2.4GHz. If you see a sticker on your baby monitor, cordless phone, or wireless microphone on your karaoke machine it has nothing to do with speed. It simply refers to the radio band frequency being used to communicate or transmit data or sound. Although the effective range of Bluetooth and WiFi vary dramatically, both can be affected by interference from other wireless devices as well as structures like walls, furniture, and even people.



Figure 1: L-R, Bluetooth, WiFi, and Bluetooth/WiFi Capable Models (Source: Consumer Reports, 2019)

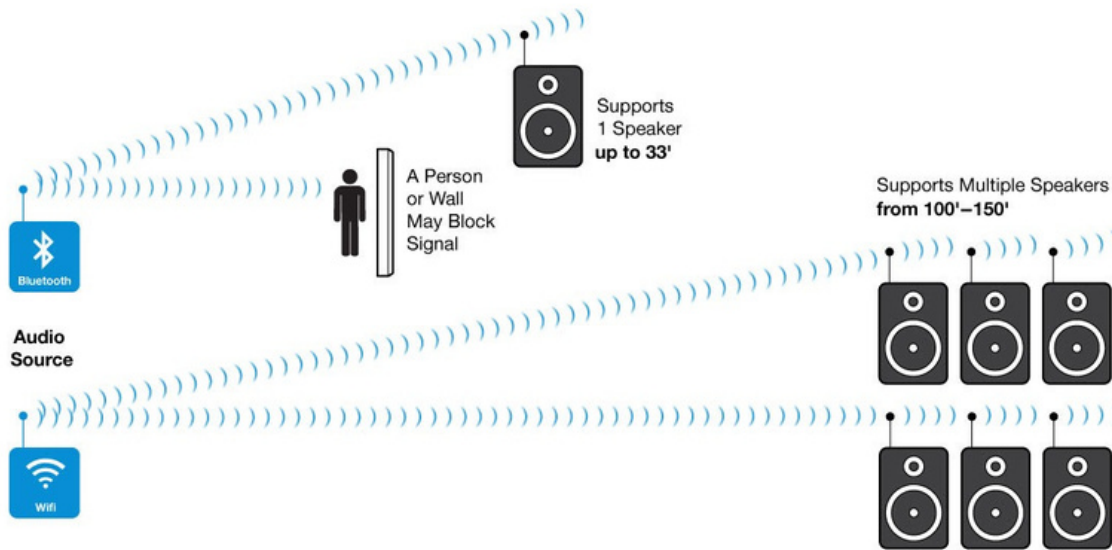


Figure 2: Bluetooth & WiFi Range (Source: Consumer Reports, 2019)

Some important features that you might find in this wide range of models developed for an even wider range of applications can be explored through these general descriptions.

Design

One of the most important design features of a portable speaker is that of size. Keep in mind that the smallest models (minis) and the largest models (sometimes called “tailgater” or “block rocker”) can both be considered portable wireless speakers.



Figure 3: [Mini] 0.7 oz & 1.5" x 1.5" x 1.0"



Figure 4: [Tailgater] 29 lbs & 12" x 15" x 20"

Without question, between these two examples, there would be a considerable weight difference. Depending on its use and application, weight can be a significant factor in determining the best model for the consumer. The smallest models could weigh only a few ounces, while the larger models could weigh up to or over 20 pounds.

In addition to weight, unit construction and design vary. The lightweight models are made of plastic materials or other lightweight composites. Large models may be made of more substantial materials. Choices of material provide function, durability, and style but don't let the looks fool you. Two different models of similar size and weight can both fit neatly in a backpack, however, one is going to the beach and other is going to study session. Construction of some models may include waterproof designs like those developed to go in the shower while others



may need to be more rugged than waterproof. Durability should extend not only to the model shell but include internal components as well. That includes interactive buttons, ports, and speakers. Some designs include rubberized or silicone edges as shock absorbing features in case they fall onto a hard surface. Finally, style can play a major role in deciding what type of speaker to purchase. Wireless speakers can provide a wide range of aesthetic designs from the sleek, modern, sophisticated looks to the more rugged outdoor design. The key to design, construction, size, style and durability falls on the intended use.

Portability

As referenced earlier, portability is a relative term and can include the Mini models, the Tailgate models, and everything in between. So, what are some important factors to consider in relation to these wireless speakers that make them portable? Of course, you can't put a 29-pound speaker in your backpack or beach bag. Nor can you experience any great level of success taking a WiFi speaker on a camping trip. Like design, the key is to determine how the speaker will be used and **where** it will be used. Moving a speaker around the kitchen can be portable as can carrying it in a canoe down the river.

Many "portable" speakers that connect via Bluetooth or WiFi must be plugged into a power source. Some have rechargeable batteries while other models require a battery pack accessory to power the speaker with a wired power source. Any of these configurations may be considered portable if they are moved easily from place to place for different needs and uses. Unless you are using disposable batteries, most devices must be plugged into a power source at some point. Don't discount a speaker that must be plugged in as not being portable.

Some facets that are covered in other parts of this resource include design, size, weight, battery life, charging, and even setup. Many of these also have relevance in a speaker's portability. You will need to evaluate some of those facets and their impact on portability given its intended use and purpose.

Sound

Sound quality can be a major factor in deciding which model is good for you. Like other features, where you plan to use it needs to be at the forefront of your decision. Large outdoor areas may require higher wattage or "bigger" sound than a small dorm room. However, loudness is not the only measure of quality. In fact, all wireless speakers require the transmission of data or sound to the speaker and the data compression has a dramatic impact on sound quality. In general, WiFi speakers are better than Bluetooth speakers due to how the data is compressed and transmitted. WiFi can transmit higher quality sound to the speaker than Bluetooth. Some of the simpler wireless models only have a single speaker and can only play in Mono as opposed to Stereo sound delivery. Higher end models may include 2.1 channel system that includes 2 channels of sound (left and right speaker) plus a separate subwoofer. The quality of sound between a Mono and 2.1 channel system is clearly distinguishable to any listener. A wireless speaker's sound can also be affected by its arrangement of speakers. A single speaker can only send sound in a single general direction. There are other speakers that can send sound in multiple directions. Only a speaker with multiple speakers arranged appropriately can set in the middle of the room and send sound in all directions. These omnidirectional models will likely be more expensive than the single-speaker unidirectional speakers. Keep in mind that there are some shell designs that give the impression of multiple speakers or surround sound, so read the manufacturers information closely. The model in Figure 5 can be placed in the middle of a room and broadcast sound in all directions. The smaller model in Figure 6 plays sound in only 1 direction. If laid flat, the speaker will push sound upward. Speaker arrangement can add effective reach if that is the intent.



Figure 5: Omnidirectional Wireless Model



Figure 6: Unidirectional Wireless Model



Figure 7: Speakers arranged in a circular design

Wattage (W) is a feature that many speakers use within their marketing strategy. However, wattage is a power unit of measure. The true measure of speaker power is a combination of speaker rating (wattage), power of the amplifier, and efficiency between the two. Two models boasting 40W of sound may not necessarily be equally loud. Since you can't know the specs of the internal amplifier nor the speaker's efficiency, that would be like buying two jelly-filled donuts without knowing what filling was used. They just will not be the same. Also know that reference to wattage may not be specific to the speaker. You may see a 40W speaker, a 40W amp, or 40W of sound as a marketed feature.



Voice Control

These speakers are sometimes referred to as “smart” speakers and are voice command devices with an integrated virtual assistant that offers interactive actions and hands-free activation with the help of a wake phrase like “Alexa,...” or “Hey Google!...” or “Hey Cortana!...”

Some of these devices may be accessed via Bluetooth, WiFi, or both and may extend functionality of the speaker beyond playing sound (music) by accessing/controlling automated functions with integrated controllers.



Figure 8: Smart Speaker with Voice Control

Power Supply & Batteries

Portability of any device can certainly be extended by its ability to function under DC power. Wireless speakers may have integrated rechargeable batteries with a charging port, or they may require AC power supply to function. Some of the AC-powered devices can be powered by a battery-pack purchased separately as an accessory. AC-powered devices that can easily be unplugged, moved and plugged into another outlet can certainly be considered portable with the scope of its size and the availability of a power source.

For those that operate in some capacity with DC power (internal or external), their portability excluding size and function, is much greater than being tethered to a power supply with a power cord. Not all batteries are the same. There are differences in the amount of power they will store, how fast the device consumes the power, how long it takes to recharge, and what power source can be used to recharge to name a few. In addition, battery life can increase or decrease the life of your device especially if it is internal and cannot be removed/replaced.

Most DC models on the market have internal rechargeable batteries. Lithium-ion and Lithium polymer batteries provide great power density, are lightweight, small and safer than other designs in recent years. There are 3 factors related to understanding batteries: 1) Capacity – refers to the battery that will charge to 100% when new and only 70% over time; 2) Longevity – refers to the number of times a battery can be charged (charging cycles) before it will no longer charge; and 3) Performance – refers to the runtime of a battery on a full charge. However, most devices disclose two details, the battery type and either #-hours of runtime or “milliamp Hours” noted as **mAh**. The playtime/runtime is likely the closest comparable detail. Using mAh can be similar to the example above with speaker wattage.

Example: Consider two devices, one boasting 1,400 mAh and the other 4,400 mAh. The assumption that the 4,400 mAh battery will outplay the 1,400 mAh battery may be false if the 1,400 mAh device is considerably more efficient with its power than the other. They may have equal playtime.

Generally, Bluetooth devices will use less power than a WiFi device. Without knowing what quantity of mAh each has, their expected playtime is the closest comparable measure.

Setup

Establishing a connection between the broadcasting device (source of the data) and the wireless speaker is an important consideration. Bluetooth can be easily connected, whereas WiFi models require an app or more detailed



connection requirements. However, Bluetooth connections may be interrupted by device use (phone/alarm/notifications). WiFi devices, on the other hand, get their audio directly from the internet stream, avoiding interruption by the device.

Connection Range

Bluetooth can range from 30-33 feet but that can easily be affected (shortened/interrupted) by any large objects that may get between the connecting device and the speaker. This could include a wall, large structure, or even a person. WiFi ranges can extend from 100-150 feet. Obstructions are generally limited to walls and large structures. In an outside setting, WiFi could range up to 300 feet.

Pairing multiple devices

Some Bluetooth and WiFi models have the capability to pair multiple devices simultaneously. However, the pairing process, range, and other factors vary greatly between and among both types.

Pairing two devices via Bluetooth may be challenging in public areas with many devices. You need to know which one is yours (as it appears on your list of broadcasting devices) and it may be coded without the name making it difficult to recognize. Pairing Bluetooth can also pose issue if the signals are blocked or interrupted by moving objects (e.g. people at a party). WiFi devices may not be any easier to connect, but once connected they can be much more reliable if there is a WiFi signal. Also, pairing WiFi devices usually takes place using an app on a mobile device, tablet or computer.

Multiroom pairing is much more common among WiFi devices simply due to the signal strength, range and reliability of the WiFi signal. Pairing speakers in multiple rooms at home or at work may have many applications that add to the versatility of some wireless speakers.

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OUTDOOR EQUIPMENT

Tents, Sleeping Bags, and Camp Stoves

In 2011, an estimated 42 million Americans went camping. Those campers spent a staggering \$534.9 million days camping! There are many different types of camping experiences, each varying in time, terrain, season, and purpose. Properly preparing for a camping trip is probably once of the most important aspects of making the experience enjoyable. With this many people and time spent in the outdoors, it is important for each person to equip themselves with the best and most appropriate equipment available.

Three essential camping equipment items presented in this study guide are tents, sleeping bags, and camp stoves. With advances in technology over the last century, each item has improved in construction and purpose and is no longer a "one size fits all" product. To ensure a fun camping experience, consumers should become familiar with the many differences in the equipment before making purchases.

Tents

A tent is a portable shelter constructed of a fabric and supported by poles, with lines securing the structure to the ground. Today's tents are build in/for a variety of shapes, seasons, sizes, weights, features, and purposes.

- **Seasons**

- Three-seasons Tents are designed for spring, summer, and fall. These have a variety of ventilation options and are typically made of thinner, less durable material than four-season. It is best used in mild to hot climates.
- Four-Season Tents are built to provide better protection from snowfall and wind. Venting is minimal and the material is tougher than three-season. The season type is a bit misleading in that these tents are really designed for one season, winter. This type of tent may not be suitable for hot climates due to its limited ventilation.

- **Size and Weight**

- One of the biggest factors in selecting a tent is its size. Size is usually quantified by how many people can sleep on the floor. This is typically depicted by a "person" rating. As an example, a tent may be described as capable of sleeping 4 people. Keep in mind, this rating does not take into consideration any gear that may also need to be stored in the tent. An alternative means of determining the best tent is to estimate the amount of floor space needed by the camper(s) and match that to the floor space (noted by dimensions or square footage on the packaging) of the tent being purchased.
- With size also comes weight. Factors that affect weight are the size of the tent itself, the type and amount of material used, and the tent's features. Weight is an extremely important factor to consider when camping in more remote locations (i.e., backpacking or wilderness camping) and the camper is hauling the gear on foot to the campsite. Weight is less of a factor if the camper is "car camping" (parked close to the campsite) or using a horse or ATV to haul the gear.

- **Features** - Today's tents come with a variety of available features that help make your living space more enjoyable and comfortable.

- Rain fly: A removable, water-resistant outer wall made of cloth that helps protect the tent from rain. Rain fly's come in two categories: full-length and partial. Full-length extends almost completely to the floor and provides the most protection. Partial covers the mesh panels at the top of the tent and offers more ventilation than the full-length.
- Vestibule: A floorless "porch" usually created by an extension of the rain fly. Its purpose is to provide a semi-protected transition area between the tent and the outdoors. It is often used as an area to remove wet or muddy shoes.



- **Door:** A cloth door panel that is often secured by a zipper. Some tents have multiple doors to allow easier movement in and out of the tent.
- **Poles:** A rod made of aluminum, fiberglass, or carbon fiber that helps provide shape and structure to a tent. Fiberglass poles are found on inexpensive, light-duty tents (cheaper, heavier, and less durable than the other two). Aluminum poles are strong, light, and inexpensive. Carbon fiber poles are found on high-end tents. These are very light and strong, but are the most expensive to replace.
- **Panels/Walls:** The inner cloth canopy that is made up of a solid and/or screened (mesh) material. A solid, waterproof wall can provide protection from rain, but provides less ventilation inside the tent. A screened wall allows for better airflow in and out of the tent, but does not prevent rain from entering the tent. A hybrid design that uses a mixture of solid and screened material helps reduce condensation inside the tent. Tent fabric usually have better airflow in and out of tent, but does not prevent rain from entering the tent. A hybrid design that uses a mixture of solid and screened material helps reduce condensation inside the tent. Tent fabrics usually have a waterproof rating associated with its polyurethane-coated fabric. Higher values are associated with better waterproofing capabilities. For example, a rain fly with a rating of 2,500mm is more waterproof than 1,000mm. Keep in mind, the higher the rating (more coating), the heavier the tent will be also.
- **Windows:** Typically made of screened (mesh) material; it allows air to flow in and out of the tent while also minimizing entry of insects or other critters.
- **Floor:** A fabric component of the tent that is made of more durable material than the walls. The floor must hold up against the weight of its occupants and contact with the ground.
- **Footprint:** A durable material (also called a ground cloth) that is placed under the tent to provide extra protection from abrasion and moisture. A footprint will also help extend the life of the tent.
- **Sleeping Bags**
 - Camping is all about enjoying the great outdoors, but while you're fast asleep in your tent, comfort is probably the number one priority. Having the right sleeping bag can make all the difference in getting a restful sleep. Below are three of the most important factors to consider when purchasing a sleeping bag.
 - **Temperature Rating:** The temperature rating indicates the lowest ambient temperature that the average user would still remain comfortable at inside the sleeping bag. For example, a rating of +35 degrees Fahrenheit that the average person would remain comfortable inside the sleeping bag at +35 degrees Fahrenheit or higher. In selecting the ideal bag, select one that is rated for the coldest temperature expected.
 - **Insulation Type:** Most sleeping bags are insulated with either a synthetic polyester fill or goose down.
 - **Advantages: Synthetic Insulation**
 - Dry Fairly fast
 - Easy to clean
 - Less Expensive
 - Non-allergenic
 - **Advantages: Down Insulation**
 - Lightweight
 - Performs well in cold, dry weather
 - Highly compressible
 - Durable
 - **Shape and Size:** The most common shapes (in order of largest capacity to smallest) are rectangle, semi-rectangular, and mummy. Of the three, mummy shapes are smaller and typically lighter weight, ideal for backpacking. To compare sizes when purchasing, check the shoulder and hip girth specifications. Lengths come in "regular" or "long". Long is recommended for individual 6'6" or taller.



CAMP STOVES

- *Size and weight:* camp stoves come in a variety of arrangements, fuel types, and accessories. Stoves can range in weight from a few ounces to several pounds. Select a stove that minimizes weight and volume when backpacking. Be sure to factor in the weight of the stove's fuel. If car-camping, size and weight are less of a factor.
- *Burners:* Stoves are designed with single or multiple burners. Single burners are best for simple meal preparations such as boiling water, or a single can/pot of food. Multiple burners are ideal when preparing large meals that require more than one burner going at a time. Single burners weight less, and are the burner of choice for most backpacks.
- *Fuel Type - Cartridge vs. Liquid Fuel*
 - **Cartridge stoves** use compressed gasses such as propane, butane, or iso-butane that come in their own container.
 - These are typically lighter in weight, require less maintenance, and burn cleaner. Butane does not perform at temperatures below freezing (32 degrees Fahrenheit). Stoves are sold as a burner that attaches to the top of the cartridge, and the cartridge serves as the stove's base. Canister cannot be refilled.
 - **Liquid Gas stoves** have a refillable fuel tank that is typically filled with white gas or kerosene. These stoves work better in cold and windy conditions than cartridge stoves; however, they are more difficult to use and require more maintenance. Liquid fuels are heavier than the compressed gas fuels.

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OUTDOOR BACKPACKS

The following is a general guide for which pack sizes (measured in liters) typically work well for backpackers during warm-weather hikes of varying lengths. Colder-weather trips usually require a larger pack, while ultralight backpackers may choose to go smaller than the recommendations here. (For more information, see our Expert Advice article on Ultralight Backpacking.)

Length of trip Pack capacity (liters)

Weekend (1–3 nights) 35–50

Multiday (3–5 nights) 50–80

Extended (5+ nights) 70+

Weekend (1–3 nights; 35–50 liters)

Efficient packers using newer, less-bulky gear can really keep things light on 1- to 3-night trips by using a pack in this range. Be aware that packing light requires self-discipline and careful planning. If you can pull it off, though, the light-on-your-feet rewards are fantastic.



Multiday (3–5 nights; 50–80 liters)

- These are the most popular backpacking packs sold at REI, and they’re an excellent choice for warm- weather trips lasting 3 or more days.
- 50–80 liter packs are also used for backcountry skiing, for day trips, overnights and sometimes 2-night trips.



Extended-trip (5+ nights; 70 liters or larger)

Extended trips of 5 days or more usually call for packs of 70 liters or larger. These are also usually the preferred choice for:

- Winter treks lasting more than 1 night. Larger packs can more comfortably accommodate extra clothing, a warmer sleeping bag and a 4-season tent (which typically includes extra poles).
- Adults taking young children backpacking. Mom and Dad wind up carrying a lot of kids’ gear to make the experience enjoyable for their young ones.



Climbing Packs

REI also carries packs designed primarily as climbing packs. Most have modest capacities that are appropriate only for day trips or overnights. Common features include:

- The ability to strip down the pack to its minimal weight (removing the lid, framesheet and possibly the hipbelt) for use during a summit push.
- A narrower, sleeker, sometimes higher profile than a usual packbag, permitting unencumbered arm movement.
- Several lash-on points for external tool attachment.
- A daisy chain—a length of webbing stitched to the outside of a pack—to provide multiple gear loops for attaching a helmet or tools.
- A reinforced crampon patch (to prevent crampon points from gouging holes in the packbag).
- Gear loops on the hipbelt or low on the pack body, useful as clip-on points for gear or possibly as attachment points for skis.
- Shop REI’s selection of backpacks.





Once you've chosen the type of backpack you want, the next step is to work with an REI sales specialist to expertly fit you to your pack.

The right fit is one that offers:

- A size appropriate for your torso length (not your overall height).
- A comfortably snug grip on your hips.

If you're unable to work with a fit specialist in a store, you can enlist a friend and follow the directions provided in the REI Expert Advice article on Finding Your Torso and Hip Size.

Torso Length

Some packs are available in multiple sizes, from extra small to large, which fit a range of torso lengths. These ranges vary by manufacturer and by gender. Check the product specs tab for size details of a specific pack.

Other packs may feature an adjustable suspension, which can be modified to fit your torso, especially if you're in between sizes. The drawback: An adjustable harness adds a little weight to a pack.

Waist Size

The majority of a backpack's weight, 80% or more, should be supported by your hips.

Backpack hipbelts usually accommodate a wide range of hip sizes, from the mid-20 inches to the mid-40 inches.

People with narrow waists sometimes find they cannot make a standard hipbelt tight enough and need a smaller size. Some packs offer interchangeable hipbelts, making it possible to swap out one size for another.

Women-Specific Backpacks

These are engineered specifically to conform to the female frame. Torso dimensions are generally shorter and narrower than men's packs. And hipbelts and shoulder straps are contoured with the female form in mind.

Youth-Specific Backpacks

These typically offer smaller capacities and include an adjustable suspension to accommodate a child's growth. Women's backpacks, with their smaller frame sizes, often work well for young backpackers of either gender. So do small versions of some men's packs.

Additional Backpack Fit Adjustments

Load lifter straps

Are stitched into the top of the shoulder straps, and they connect to the top of the pack frame. Ideally, they will form a 45° angle between your shoulder straps and the pack. Kept snug (but not too tight), they prevent the upper portion of a pack from pulling away from your body, which would cause the pack to sag on your lumbar region.

Sternum strap

This mid-chest strap allows you to connect your shoulder straps, which can boost your stability. It can be useful to do so when traveling on uneven cross-country terrain where an awkward move could cause your pack to shift abruptly and throw you off-balance.

For tips on pack loading, see the REI Expert Advice article on How to Load a Backpack.





Backpack Frame Type

Internal-frame backpacks

The majority of packs sold at REI today are body-hugging internal frame packs that are designed to keep a hiker stable on uneven, off-trail terrain. They may incorporate a variety of load-support technologies that all function to transfer the load to the hips.

External-frame backpacks

An external-frame pack may be an appropriate choice if you're carrying a heavy, irregular load. Toting an inflatable kayak to the lake or heading out to the backcountry with surveying tools? An external frame pack will serve you best. External frame packs also offer good ventilation and lots of gear organization options.

Frameless backpacks

Ultralight devotees who like to hike fast and light might choose a frameless pack or a climbing pack where the frame is removable for weight savings.

Backpack Features

Main compartment access:

- Top-loading openings are pretty standard. Items not needed until the end of the day go deep inside.
- Some packs also offer a zippered front panel that folds open exposing the full interior of the pack, or a side zipper, which also makes it easier to reach items deeper in your pack.

Sleeping bag compartment

- This is a zippered stash spot near the bottom of a pack. It's a useful feature if you don't want to use a stuff sack for your sleeping bag. Alternately, this space can hold other gear that you'd like to reach easily.
- Top lid: Many packs offer a zippered top lid where most backpackers store quick-access items: sunscreen, insect repellent, camera, snacks, map. Some lids detach from the main pack and convert into a hipbelt pack for day trips.

Pockets

Typical offerings:

- Elasticized side pockets: They lie flat when empty, but stretch out to hold a water bottle, tent poles or other loose objects.
- Hipbelt pockets: These accommodate small items you want to reach quickly—a smartphone, snacks, packets of energy gel, etc.
- Shovel pockets: These are basically flaps stitched onto the front of a packbag with a buckle closure at the top. Originally intended to hold a snow shovel, they now pop up on many 3-season packs, serving as stash spots for a map, jacket or other loose, lightweight items.
- Front pocket(s): Sometimes added to the exterior of a shovel pocket, these can hold smaller, less bulky items.

Ventilation

This can be a drawback of internal-frame designs. Much of the pack rides on your back, cutting airflow and accelerating sweaty-back syndrome. Designers have addressed this in a variety of ways—ventilation “chimneys” built into back panels, for example.

A few packs have engineered a suspended mesh back panel, sometimes called “tension-mesh suspension.” This is a trampoline-like design where the frame-supported packbag rides along a few inches away from your back, which instead rests against the highly breathable mesh.

Padding

If you're using a lightweight pack with a fairly minimalistic hipbelt and lumbar pad, you can encounter sore spots on your



hips and lower back. If this is the case for you, consider using a cushier hipbelt.

Attachment points

If you frequently travel with an ice axe or trekking poles, look for tool loops that allow you to attach them to the exterior of the pack. Rare is the pack that does not offer at least a pair of tool loops.

Backpack Accessories

Raincover

Pack fabric interiors are usually treated with a waterproof coating. Yet packs have seams and zippers where water can seep through, and the fabric's exterior absorbs some water weight during a downpour.

The solution is a raincover, which could be a plastic garbage bag (cheap but clumsy) to a more customized packcover. If you expect rain on your trip, this is a good item to carry. An alternative: bundling gear internally in waterproof "dry" stuff sacks. Lightweight dry sacks can be a better option in windy conditions; strong gusts have the potential to abruptly peel a cover right off a pack.

Hydration reservoir

Nearly all packs offer an internal sleeve into which you can slip a hydration reservoir (almost always sold separately) plus 1 or 2 "hose portals" through which you can slip the sip tube.

REFERENCE

REI, <http://www.rei.com/learn/expert-advice/backpack.html>



Dental Products

With so many dental care products on the market, it can be a real challenge deciding which to use. Exploring some general product categories for oral health will provide some insight across the range of dental care products. According to the Center for Disease Control (CDC), “oral health affects our ability to eat, speak, smile, and show emotions. Oral health also affects a person’s self-esteem, school performance, and attendance at work or school. Oral diseases—which range from cavities and gum disease to oral cancer—cause pain and disability for millions of Americans.”¹

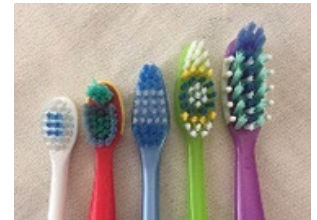
Home oral care recommendation from the American Dental Association (ADA) are based on data from clinic studies and systemic reviews. Oral care can help lessen the need to extensive dental intervention in the future.² The ADA recommends you brush daily with fluoride toothpaste. They also recommend that you clean between your teeth regularly. Of course, eating a healthy diet and seeing your dentist regularly are a key to dental care. To explore dental care products more effectively, the following categories of products will be reviewed:

- Toothbrushes
- Toothpastes
- Dental Floss

Toothbrushes

The ADA recommends brushing your teeth at least twice a day. However, how do you select the appropriate toothbrush? There are so many different brands and styles of toothbrushes. To complicate things even more, there are even manual and powered toothbrushes. The toothbrush is one of many tools to clean teeth, gums, and even your tongue. When choosing a toothbrush, consider the following:

- **Head Size** – Smaller head size make the toothbrush easier to maneuver into tight areas that are trickier to access. The compact head is smaller and more maneuverable than a full-size head. They can also be straight or angled. Angled brush heads help reach the insides of your teeth which are more susceptible to tartar buildup. Dentists suggest that a round headed toothbrush will provide a more versatile design.
- **Bristle Design** – Equally important, heads with varying sized bristles are more popular among manufacturers which help to get into deeper gaps between teeth and hard-to-reach areas. The shape of the bristle patterns can also vary. Diagonal patterns are good for cleaning the sides of the teeth and long the gum line. A cup-shaped design will be better for cleaning around teeth. A block design has all bristles the same size and type while polishing bristles are made of rubber-like material arranged in circles to help clean surface stains without damaging the enamel. Other variations include wavy, crisscross, and tapered. These designs are more about comfort and preference.





- **Bristle Firmness** – Many consumers feel that the firmer the bristles the better, but that is not accurate. While no oral hygiene can be harmful, so can the wrong oral hygiene. Firm bristles can damage teeth and gums. Soft bristles will do as an effective job as the firmer variety without irritating your gums which may contribute to a receding gum line. Toothbrushes are marketed as Extra Soft, Soft, Medium, and Hard. In general, go soft unless there is some valid reason to go with a firmer or softer bristle. Packaging may also express bristle firmness in millimeters. A “soft” bristle brush may show 0.15 mm while a “hard” bristle brush may show 0.23 mm reflecting the thickness of the bristles.
- **Handle Design** – While less important than head size and bristles, a handle that is comfortable and secure should be your priority. There are lots of varieties so picking one that fits well is important. Handles can be straight, contra-angle, non-slip grip, and flexible. The handle should allow you to comfortably reach every tooth surface including the very back of your mouth.



Each of the design features referenced above are important for any toothbrush, regardless of the type of toothbrush in question. The traditional “manual” toothbrush is the foundation for more contemporary version including the increasingly popular powered/electric toothbrush. Here are some key features about both types of brushes and considerations when purchasing one or the other.

- **Manual** – These are the most inexpensive types of toothbrushes and are as effective in keeping teeth healthy as any other. While the toothbrush heads are of utmost importance, manual toothbrush handle designs are extensive. However, the same selection principles referenced above apply. Furthermore, there is greater variability in head design among manual toothbrushes than its electronic counterparts. It is estimated that manual brushing results in about 300 brush strokes per minute.
- **Electric** – An electric toothbrush performs rotations or oscillations of its bristles making it a bit easier to remove tartar in hard-to-reach places where manual motion may prove to be more difficult. These brushes have removable heads, and they tend to be considerably more expensing to replace than the manual ones. Most are either battery operated or rechargeable. Some have timers to signal the user when to shift to other areas or stop altogether. Compared to manual brushes, these might be better at reducing the incidence of gingivitis and plaque given they increase the amount of brush strokes per minute. The ADA recommends electric toothbrushes for people with arthritis or other issues that prevent manual brushing from being effective. These brushes can also be divided into three sub-types:
 - **Standard power** – this is a generic term to differentiate any powered toothbrush from the other two types of speed or movement. A standard electric toothbrush ranges from about 2,500 to 7,000 brush strokes per minute.
 - **Sonic power** – this type moves the head fast enough to produce a hum in the audible frequency. Some models can produce up to 30,000 brush strokes per minute compared to a standard electric toothbrush. The benefit of this model is that it has large sweeping motion to remove food particles and bacteria from the teeth and gum lines.
 - **Ultrasonic power** – is faster than a sonic powered brush reaching up to 2.4 million strokes per minute. The benefit of such a high speed is that it breaks up the bacteria chains found in the mouth, whereas cleaning occurs simply by placing the brush on the tooth without any manual motion. Some models have adjustable frequency to allow for more sweeping motion.





TOOTHPASTES

The ADA recommends that people use only toothpaste that contains fluoride. Toothpastes containing fluoride have been shown to prevent cavities. Also, any toothpaste packaging should be reviewed to make certain that the ADA's Seal of Acceptance is present. This means that the product has met ADA criteria for safety and effectiveness. Products that do not have the seal does not mean they are not safe or effective, only that they have not been studied or endorsed by the ADA. Toothpastes are also developed and marketed with specific problems in mind. For example, if tartar buildup is a problem there are formulations that are designed to help with that. Toothpastes can contain ingredients that prevent enamel erosion; or that cosmetically affect the mouth such as whitening or improving bad breath. They can come in the form of gels, pastes, or even powders.

- Types - They can come in the form of gels, pastes, or even powders.
 - Gel – made from silica, these are less abrasive and create less foam and splatter. Compared to a paste, tooth gel has a less minty aftertaste.
 - Paste – foamier texture when brushing, thicker stronger flavors, tends to be more abrasive than gels.
 - Powder – contain dry ingredients like salt, baking soda, activated charcoal powder, and flavorings. Requires adding water. Good for removing stains and plaque. Does not fight cavities as effectively and may be too abrasive. No ADA seal.

Ingredients – They contain both active and inactive ingredients. However, to be endorsed by the ADA, a toothpaste must be fluorinated. Those are primarily for fighting cavities. Desensitizing agents are used for people who experience sensitivity due to tough, temperature and air current. There are some formulations designed to remove surface stains often referred to as “whitening toothpastes.” Formulations are also available to fight gum disease by destroying bacteria responsible for plaque and tartar buildup. Finally, there are some formulations that are fluoride-free. Those products will not have the ADA seal. Due to small children’s propensity to swallow small amounts of toothpaste, the ADA recommends that children 6 and under use very small amounts of toothpaste to avoid fluorosis.

ADA Seal of Acceptance is a very important part of selecting any type of toothpaste. However, there may be some circumstances where the seal is not present. Always consult your dentist before using any products that do not have the ADA seal.



DENTAL FLOSS

Flossing is a very important part of every oral hygiene regimen. Flossing once a day before bedtime decreases the likelihood of cavities and gum disease caused by food particles not removed from brushing alone. The benefits of flossing include removing bad breath-causing bacteria and plaque from below the gumline. It can reduce the likelihood of soreness, puffiness, and redness of the gums, and it helps prevent gingivitis. The most common types of dental floss are waxed and un-waxed thread, both made from nylon. There is no distinct advantage of either when it comes to improving your oral hygiene regimen except as noted below.





- Waxed – This type of floss contains a thin layer of wax on its surface making it a little thicker, but easier to glide between the teeth. Waxed floss is more likely to be flavored than unwaxed floss, and it is generally stronger. People with tightly spaced teeth may find it difficult to use waxed floss.
- Un-waxed – This floss is generally thinner than waxed and a bit more comfortable to move in and out of your teeth. They usually do not come in flavors which for some people may be an advantage. It is more likely to break during flossing compared to the waxed variety, but easier to get between tight fitting teeth.

Resources

1 Basics of Oral Health. (2022, October 17). Centers for Disease Control and Prevention. <https://www.cdc.gov/oralhealth/basics/index.html>

2 Home Oral Care. (2022, October 23). American Dental Association. <https://www.ada.org/resources/research/science-and-research-institute/oral-health-topics/home-care>



Fitness Equipment

Your personal health can be positively impacted by including physical activity into your regular routine. It can improve not only your physical health, but other facets of living a healthy life. “Regular physical activity can improve your brain health, help manage weight, reduce the risk of disease, strengthen bones and muscles, and improve your ability to do everyday activities,” according to the Centers for Disease Control (CDC).

According to the National Institute of Health, there are four basic types of exercise that can improve both health and physical activity². Each of them has different benefits and use of multiple types can magnify the benefits regardless of age. Types include:

- **Endurance** – The purpose of this activity is to increase your breathing and heart rate. It is often referred to as “aerobic” or “cardiovascular (cardio)”. Walking, cycling, swimming, climbing, dancing, and running, all of which can be used as endurance-building activities. There are a range of fitness equipment products that can be used for endurance.
- **Strength** – Muscle strength can help you become a better athlete, increase work productivity, and make strenuous daily activities easier. It can also help you with you balance. Equipment and products to help build strong muscles may include both “strength training” equipment and “resistance training” equipment. The CDC recommends two days of strength training per week
- **Balance** – This is an important part of physical fitness and focuses on the ability to maintain proper posture over the body’s base of support. Improved balance can prevent falls among the elderly, can increase the ability to generate power in a vertical jump for an athlete, and can serve as a method to increase the force or resistance placed upon the body to increase strength. There are a range of products on the market to help improve balance for all ages and purposes.
- **Flexibility** – Exercises that stretch muscles can greatly impact your body’s ability to stay flexible. Muscle flexibility allows for greater freedom of movement for other exercises as well as for everyday activities. It may also help you avoid discomfort when combined to small spaces for extended periods of time like a meeting, classroom, plane flight, or even a car/bus ride³. Equipment/products used to improve flexibility can be quite simple and inexpensive compared to other types of fitness equipment. However, the impact on your physical fitness can be quite dramatic over time.

There is a wide range of products available in this product category and there is an even wider range of uses for them. In addition, one should consider their physical fitness goals. Fitness equipment can provide benefits, although different, depending on the age and current physical ability of the user. However, most of the equipment referenced in this guide can be used across ages and abilities, depending on the type of equipment and the person’s ability to use the equipment towards their fitness goals effectively. This product category includes the following types of fitness equipment but may include others not listed or referenced here.

- Dumbbell Set
- Treadmill
- Stationary Bicycle
- Barbell Set
- Rowing Machine
- Elliptical Trainer
- Balance Trainer



DUMBBELL SETS (✗Endurance ✓Strength ✓Balance ✓Flexibility)

Dumbbells are small bars that fit in your hand and have equal weights on either side. They weigh as little as 2 pounds and go up to over 100 pounds. They can range from simple small sets to very large extensive sets depending on their range of uses and anticipated benefits from using them. Some are more appropriate as single person use for your home, while others may be more appropriate for multiple people to use at the same time as studio sets in a gym setting.

- **Materials** – Dumbbells can be made from a variety of materials including rubber, neoprene, urethane, steel, and cast iron. In addition, there may be some that include a combination of both like the rubber-coated cast iron products. There are advantages and disadvantages of each based on the type of use, space, and storage. The types of materials used can also be reflected in the cost. For example, the rubber coated hexagonal weights may be more expensive than the non-coated equivalent due to the extra materials used. In addition, rubber may be less likely to scuff or scar a delicate floor.
- **Types** – Dumbbells come in three general types to include fixed, adjustable, or plate loadable. Fixed dumbbells have a single grip which is permanently fixed between to billets and cannot be altered. Adjustable dumbbells consist of a series of weight plates mounted in a base with a mechanical handle or dial that can be adjusted for a specific plate which in turn adjusts the amount of weight. The plate loadable is also a varied type of dumbbell that includes a handle which can be loaded with varied weight plates and secured with a barbell collar. Depending on their intended purpose and use, one type may be more advantageous than another. For example, smaller sets of 2, 3 & 5-pound weights may not be expandable within the set unlike the larger studio sets that may range from 5 to 50 pounds each.
- **Shapes** – Dumbbells can be round/circular, hexagonal, square, or globe. Depending on how and where they will be used, the shape can impact which is preferential. For example, the hexagon-shaped dumbbells are less likely to roll away if they are set down on the floor, flat surface, or when storing. Circular dumbbells distribute their weight more uniformly compared to other shapes, and their ability to roll can be both an advantage and disadvantage.
- **Handles** – The handle is a very important feature of any dumbbell. Variations in grip thickness, shape, texture, and finish can make a big difference when selecting the best one for you. There are also some with revolving grips which allows the grip to spin separately from the dumbbell to avoid torque in the wrists when changing hand positions.





TREADMILLS (✓ Endurance ✓ Strength ✓ Balance ✓ Flexibility)

The treadmill is a stationary exercise machine that features a walking or running belt designed primarily for cardio exercise. However, they can be used for all types of exercise depending on the type and features of the individual model. Treadmills can offer a variety of speed and incline settings which is ideal for varied cardio fitness levels. Some models even offer Bluetooth connectivity for audio/visual and programming. Some have LCD touchscreens for interactive controls including streaming training programs. Treadmills can provide some unique advantages for their users to include:

- Offering cushioned running/walking surfaces for shock absorption, reducing high impact for runners which can lead to back, knee, and ankle problems over time.
- Helps build a stronger heart and bones through low impact cardio, as well as reducing blood pressure and even helping with weight loss.
- Building leg muscles and improving core strength.
- Improves mental health through endorphins released through aerobic exercise.

Treadmills can be grouped into 4 different types. Each may share similar features and benefits as well as have some features unique to each type. Since treadmills can be a very versatile piece of fitness equipment, evaluating the scope of its use is important when selecting the best one for your own use.

- **Manual** – These products are generally lighter and the least expensive of all treadmill types. They generally offer fewer features than the others as they are not powered by an electric motor. The primary features include handrails and the treadmill belt. They are powered exclusively by the person walking or running. As a result, when you stop walking/running the treadmill stops as well. This is a much safer option at home if there are small children around. They are usually foldable making them much easier to store, and generally smaller and lighter than their motored counterparts.
- **Motorized** – These products require a main power source for the electric motor and other powered features like LCD displays, speakers, streaming capabilities. Motorized treadmills are generally heavier than the manual versions but may be equipped with rollers to make moving them easier. The motorized belt and deck may have adjustable speeds and inclines for extended capabilities. Commercial versions may include vitals sensors to monitor heart rate. Their more rugged construction may be more appropriate for extended or heavy use and will likely be more expensive than the home-type models. However, they also work well at home despite the cost.
- **Hybrid** – These products are generally more expensive, and durable compared to other models. Their hybrid designs can include “tread climbers” that combine traditional designs with elliptical machines.





- **Medical** – These are very specialized machines but also have their place depending on its intended use. Sometimes referred to as “zero gravity” or “anti-gravity” treadmills, allow the user to walk or run at a lower percent of their own body weight. This is especially valuable for preventative rehabilitation or therapy and function primarily like a standard treadmill except as noted above.



Treadmill safety is very important especially for any version which will be at home and may be accessible to small children. Great care should be taken when selecting a treadmill. Ensure that it has important safety features such including emergency stop systems like a panic button, a tether with a shut-off clip, or both.

STATIONARY BICYCLES (✓Endurance ✓Strength ✓Balance ✓Flexibility)

Stationary bicycles or “exercise bikes”, like treadmills, are a type of stationary fitness equipment that provides some of the same fitness benefits as cycling with some important benefits over being out on an open road. Aside from the cardiovascular benefits of this type of activity, stationary bicycles also help with weight loss, burn fat, strengthens leg and lower body muscles, and provides a low-impact workout. This equipment allows for interval training and is much safer than road cycling for obvious reasons.

A stationary bicycle’s most common and basic design includes a metal frame, single wheel, a seat, and some type of handlebar. From this point the variations begin and have great impact on it’s use and versatility. The addition of other features can include things like vitals monitoring sensors, LCD screens, audio input ports, Bluetooth, and streaming program capabilities.

There are five general types of stationary bicycles: indoor cycling bikes, recumbent bikes, upright bikes, air bikes, and folding bikes. Each have their own unique characteristics and fitness benefits. Depending on your fitness goals, you should select the type and model that fits your needs best.

- **Indoor Bike** – This is likely the most common type of stationary bicycle. It includes the basic design with the handlebars positioned forward of the cycle (above the front wheel) to allow the rider to lean forward like being out on the open road. What makes this type unique is the exposed flywheel that uses friction or magnetic resistance to create different levels of intensity. The control is either a manual control (knob) or electronic control (digital). These models are great for high-intensity workouts and have a smaller footprint than some of the other types. You can even stand up on the pedals and ride in that position. One fault is that they generally provide no upper-body workout.



- **Recumbent Bike** – This type is unique in that it places the rider lower to the ground and repositions the pedals in front of the rider as opposed to directly below. As a result, this type is considered the lowest-impact type of bike. Unlike the Indoor Bike’s narrow seat, this one provides for not only a wider seat but includes a backrest as well putting the rider into an almost reclined position. People who might experience pain on a bike might be more comfortable with this type of bike. It may also be beneficial to someone recovering from injury, someone with balance problems, older people, or even someone with a disability. This bike gives up intensity for comfort and stability. There is no upper body movement or hand movement with these models making it less versatile.





- **Upright Bike** – This model is like the Indoor Bike with one major difference. The handles are closer to the rider with the intent of keeping the rider from leaning forward at any point during the ride. For some, this position might be a bit uncomfortable for long rides. This also creates a more compact footprint than other types. In addition, the seat tends to be smaller than on the recumbent bike. This model does provide for a more robust and intense workout than the recumbent bike, but there are fewer choices in this type of bike on the market.
- **Air Bike** – While the Indoor Bike uses a flywheel, an air bike uses a fan to generate resistance while pedaling. The faster you pedal, the faster the fan turns and the more resistance you create. These models tend to be noisier than other models so if you noise is an issue, this may not be the best choice. The pedals are located directly below the rider like the Indoor Bike and the seat size varies depending on the model chosen. One of the unique features of most Air Bikes are the moveable handles that add to an upper body workout. It works much like an elliptical where your upper body movement can in fact assist you with your lower body workout.
- **Folding Bike** – These models are designed with space as a priority. These are not your sturdiest designs but are functional and are great for small spaces. They are designed to be folded up and stored away easily. These models have the handlebars in front of you and the pedals below. Your ability to get an intense workout from these models is very unlikely, but they do provide a descent cardio workout. Many do have low maximum weight capacities and generally do not come with any “extras.” This makes them very affordable.



BARBELL SETS (✓ Endurance ✓ Strength ✓ Balance ✓ Flexibility)

- A barbell set is a piece of fitness equipment that is generally purchased as a set, although individual pieces can be purchased, and is primarily used for weight training to build strength. While it can be used to address other fitness benefits, relative to alternatives, this option is generally more expensive. A set includes a barbell, which is a long bar (4' to 8') designed to accept weight plates on either end to increase or decrease the total weight. Collars are used to prevent the plates from moving outward unevenly. By far it is one of the simplest pieces of fitness equipment in most gyms. However, it is much more complicated to learn how to use correctly and effectively. In exchanged, a barbell set for weight training requires using multiple muscle groups at once. This can make complete workouts more efficient. In some cases, you can work your entire body with a single move and are great for budding athletes. The two basic components of barbell sets include the weight and the barbells (with collars).



- **Weights** – The plates of any barbell set are the most important consideration. Most sets are available with cast-iron or bumper plate styles. Your choice will influence how you set up your gym, how many can be stacked onto a barbell and other factors. Cast-iron plates are the most traditional options for a set. They can be thinner than coated plated which allows for stacking more on any given barbell. However, cast-iron can rust if exposed to moisture or damp basements/garages. They are also a bit noisier as they clank together during your workouts. Bumper plates are generally made from a rubber base and as a result can be thicker than cast-iron plates reducing the number that can be stacked on a barbell. These also tend to be a bit pricier than the cast-iron plates. As far as sets, they can range from as little as 65 pounds and as high as 600 pounds. Unless you expect to be lifting that much, a mid-range set at 300-350 pounds is a good place to start.



- **Barbells** – Most sets include a Standard or an Olympic barbell that is about 7’ to 8’ in length and weighs approximately 45 pounds. They have a “sleeve” on either end that holds the plates of weight secured by a collar. Each different type of barbell has different qualities and a special design that serve its specific purpose. In addition to varying in shape and size, they may also feature different amounts of knurling (grippy lining on the metal), amount of whip (the way the weight changes as the bar moves), and sleeves.
 - Standard Bar: 35-55 lbs, versatile lifts, static sleeves
 - Olympic Bar: 33-44 lbs, versatile lifts, spinning sleeves
 - Trap (Hex) Bar: 30-70 lbs, great for deadlifts, not very versatile
 - Swiss Bar: 35 lbs, good for those with limited shoulder mobility, holds less weight
 - Safety Squat Bar: 50 lbs, good for beginners, not very common
 - Curl Bar: 25-35 lbs, good for arm lifts, varied hand positions, limited to arm lifts
 - Cambered Bar: 85 lbs, good for lower body lifts, hard to find
 - Log Bar: 135 lbs, specialized lifting, good for very heavy weight, hard to find
 - Deadlift Bar: 45 lbs, flexes for deadlifts, deeper knurling, relatively expensive
 - Powerlift Bar: 45 lbs, stronger steel, great for heavy weights, not for beginners



- **Collars** – There is a range of different collars that fit on barbell sleeves to secure the weight plates. They include spring collars, spinlock (threaded) collars, lockjaw collars, and muscle clamp collars to name a few. When it comes to securing the weight plates, make sure your collar is designed for the sleeves on your bar to prevent the weight plates from moving.



As anyone could imagine, barbell sets take up much more space than other forms of fitness equipment. In addition, their size and total weight make storing them after each use would be impractical. Depending on the size of the set, it might include racks for the bar(s) and weight plates. That is a big consideration when choosing to add this to your home gym. Plenty of space is a must.



ROWING MACHINES (✓ Endurance ✓ Strength ✓ Balance ✓ Flexibility)

- You do not have to be a rower to use and benefit from a rowing machine. Rowing machines provide a total-body workout. It is beneficial of all fitness levels. It's low-impact design is great for building up the heart and lungs as wells power and endurance. By using a total body approach, it is an efficient fitness product and is a great alternative to the treadmill or elliptical. The rhythmic motion can also be meditative. These products all have different features that are important in selecting the best one to suit your gym and fitness needs. Rowing machines can feature LCD displays, streaming workout capabilities, vitals monitoring, different resistance systems, and a variety of ergonomic designs. Some machines have a large footprint and can be much more challenging to store away after each use than others. Keep those things in mind when making your selections. They can also be on the pricier side of fitness equipment.

There are some general types of rowing machines on the market that may influence your decision to purchase one. The primary difference between these types is the system used to create the resistance that makes the workout different.

- **Hydraulic Rowers** – These rowers use a piston attached to the frame and the seat/bars. While these tend to be the smaller, more affordable of rowers, they provide less of a full-body workout due to the rigid rowing action of the piston. The resistance on these models does not change.
- **Air Rowers** – The resistance system on these models uses a flywheel that sucks air in the faster/harder you row which creates the resistance needed for a great workout. Some models include a “damper” to adjust the amount of air to increase/decrease the tension of each stroke. These are most popular models because the have virtually unlimited resistance for any amount of strength. They have a smooth natural feel but can be quite loud, and the harder/faster you pull the greater the resistance.
- **Magnetic Rowers** – Like the Air Rowers, these models use a flywheel for resistance. However, instead of air they use a magnetic break. The resistance is constant, so if you want to change the level of resistance, you must stop, adjust, the resume rowing which may not be ideal if you plan on a session with varied levels of resistance without interruption. These models tend to be a little smaller and are quieter than others.
- **Water Rowers** – These rowers give the most realistic feel to rowing as they use water to create resistance. The faster you row, the more resistance you get. However, to increase the overall resistance, you must add more water to the tank. These are more expensive that other models and are generally larger. In addition, the water must be changed periodically.



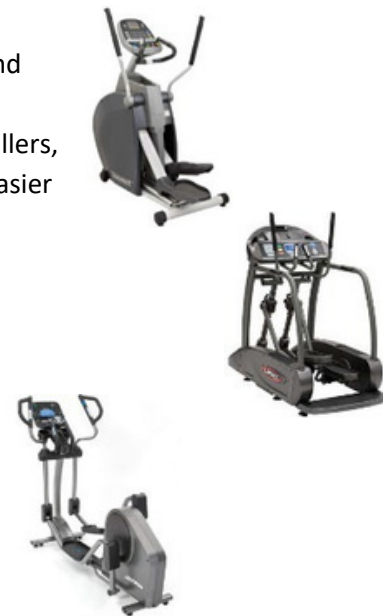
Size, storage, noise, and usability are all important things to consider when purchasing a rowing machine. Knowing the different types of resistance and the advantages and limitations of each choice are crucial to making the best purchase of rowing machines to suit your needs.



ELLIPTICAL TRAINERS (✓ Endurance ✗Strength ✓ Balance ✓ Flexibility)

Elliptical fitness machines are stationary units that provide a great low-impact workout without the same movements as running on a treadmill, pedaling and exercise bike, walking, and climbing stairs. Also referred to as “cross trainers,” these machines are primarily used to improve cardiovascular capacity and to strengthen muscles with low risk of injury. Machines put the user in an upright standing position on pedals who can then hold on to a static bar for support or can hold moving bars for greater versatility in your workout. Elliptical trainers can be great total-body workout machines. These too come with a variety of resistance systems, and features to add to your workout through LCD screens, digital displays, programs, streaming programming capabilities, and other features. Like a stationary bike, ellipticals are smaller and easier to store than other larger forms of fitness equipment. When selecting the best model for your use, consider value, size, ergonomics, exercise intensity, connectivity, and programs. Like all other forms of fitness equipment, you should also consider any safety features. Consumer Reports differentiates between those with and without heart monitoring programs, and groups ellipticals into three different types based on its configuration.⁴

- **Front-Drive Ellipticals** – The location of the flywheel is in the front of the machine and can provide greater vertical range of motion, like a stair climber. These usually have pedals supported on wheels that glide on a track. Depending on the quality of the rollers, this can create noise. The pedals in this configuration are closer to the ground and easier to mount.
- **Center Drive Ellipticals** – These machines tend to be a little more compact taking up less floor space. The pedals are mounted on a driveshaft that more closely mimics walking or jogging with a circular motion.
- **Rear-Drive Ellipticals** – With a smaller rear-mounted drive wheel, this machine can have a track-and-roller setup for the pedals. These models can often allow the user to tilt forward to provide an incline to your workout. As a result, they are a bit longer in their design and footprint. The ride on this machine can be very smooth and quiet.



The added features of ellipticals may be just as valuable to the user as the type of configuration. The level of resistance, monitor heart rates, and adjust workouts play a very important part in deciding which model to purchase. Due to the limited amount of resistance on these machines, they are not ideal to build strength. However, they are excellent machines for other fitness benefits.



BALANCE TRAINERS

This group of products is extremely broad in terms of design. Improving your balance is fundamental for living a healthy and active life. While balance for younger people may be less of a struggle, this can be a crucial aspect for older adults that may lose their natural balance and stability. Anyone can improve their balance with a little bit of helpful equipment. The goal of balance equipment is to create instability in the body, forcing your muscles and body to adapt. However, doing this safely is of the utmost importance. Remember, you are intentionally creating instability, so proceed with caution. Doing so helps strengthen key muscles to regain balance and improve overall stability. Below are a few examples of balance trainers that provide a range of benefits for balance and stability.

- **Balance Ball** – This is a soft, inflated elastic ball that can be extremely versatile in its application. Some designs include a full sphere/ball while others may be a half-ball mounted on a flat rigid platform. A key consideration when purchasing a balance ball should include the size, thickness of the material. You should also consider the weight limitations and the types of exercises that you will be doing. This one is not for beginners.
- **Balance Pad** – These are great for rehabilitation and for those recovering from injuries. They are easy to use and less unstable than a balance ball. They are generally pads made of foam with a uniform thickness.
- **Balance Board** – Although they may come in different shapes and sizes, their movement is either multidirectional or bi-directional. Larger designs allow for wider stance, making it easier to balance. They are designed to rock, roll, or wobble. Although primarily designed for standing on them, they can be used for other exercises where an unstable platform may help build stability and strength. Some designs include platform that rolls/floats on a separate roller.
- **Exercise Step** – With a wide range of designs, the exercise step is a simple but highly effective piece of fitness equipment. Stepping up and down and holding leg positions can dramatically improve balance. This product has value for those with very basic skills all the way to those requiring more advanced balance skill. These can vary in shape, length, width and height.



Materials and construction are important variable in design and function. Wood, rubber, plastic, foam, and metal construction can affect weight capacity, durability, cost, and versatility. Remember, that the possibility of injury is crucial based on the intended use and the intended user. Use of some devices on carpet versus hard flat surfaces can change the risk factor. Also, appropriate footwear when using them can dramatically affect the safety of the product. Always use proper footwear to avoid slipping. Products that can be used for balance are not limited to those referenced here, so understanding the nature of the product and its intended purpose and user are more important than the product itself.

Before you begin a fitness program using any type of fitness equipment, it is important that you visit with your doctor to be sure that your choices will not cause any unintended injury. This is true for the young, old, novice, or experienced fitness enthusiast. Fitness equipment can have great benefit in creating a fitness regimen that improves your overall endurance, strength, balance, and flexibility.



Resources

- ¹ Benefits of Physical Activity. (2022, September 23). Centers for Disease Control and Prevention.
<https://www.cdc.gov/physicalactivity/basics/pa-health/index.htm#print>

- ² Four Types of Exercise Can Improve Your Health and Physical Ability. (2022, October 14). National Institute of Health.
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- ³ Flexibility Exercise (Stretching). (2022, September 23). American Heart Association.
<https://www.heart.org/en/healthy-living/fitness/fitness-basics/flexibility-exercise-stretching>

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<https://www.consumerreports.org/health/ellipticals/buying-guide/>



Televisions

The electronics market is one of the most dynamic markets for consumer buyers. Based in constantly shifting and improving technologies, televisions have changed dramatically over the last decade. This is affected not only by television display technology but also by the trends and changes in how people access television programming.

The latest marketing features of television manufacturers boast Ultra High Definition (UHD) or 4K TV’s and some are even expanding to 8K TV’s with promises of even greater picture detail than its predecessors. Many sets even include high dynamic range (HDR) which promise sharper and brighter images with more vivid colors. However, like many other features that manufacturers highlight in their marketing, not all HDR (and other features) are created or delivered equally. Buyers need to do their homework and remember that the ones that do deliver better quality will likely be more costly than their discounted competitors. Either way, there is much to consider when buying a new television. This guide will focus on the most important features of televisions in today’s (2022) television market. The most important of features to consider include the following:

- Resolution
- Screen/Display Type
- Screen Size
- Luminosity (DR)
- Connectivity
- Sound
- Refresh Rate

While one might argue that some features may be more important than others, without doubt the most obvious features of a television focus on the screen and the picture that it displays. This is also the most dynamic feature of most televisions on the market today.

Resolution

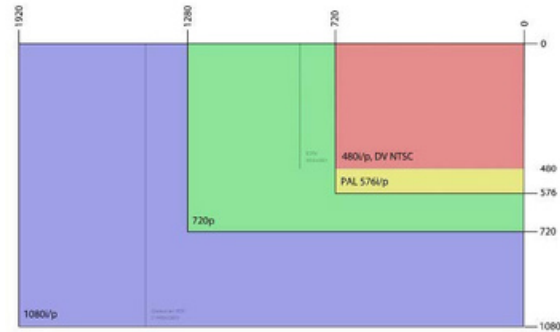
The resolution of a television is the quantity of horizontal and vertical pixels that are used in the display to show the image. One can think of pixels as “dots” or elements on the screen that make up the image. The more pixels on a screen, the higher the “resolution” and overall quality of the picture. Resolutions are identified by the number of vertical pixels.

| Resolution | Description | Width (in pixels) | Height (in pixels) |
|----------------|-----------------------------------|-------------------|--------------------|
| 480i or 480p | Standard Definition (SD) | 640 | 480 |
| 720p | High Definition (HD) | 1280 | 720 |
| 1080i or 1080p | High Definition (HD) | 1920 | 1080 |
| 2160p | Ultra High Definition (UHD) or 4K | 3840 | 2160 |

Tip: A 32-inch TV that displays 1080p resolution has the same number of pixels as a 55-inch 1080p TV. What is means is that the picture on the 32-inch TV will be a better quality than the on the 55-inch TV if the resolution on both is the same (1080p).

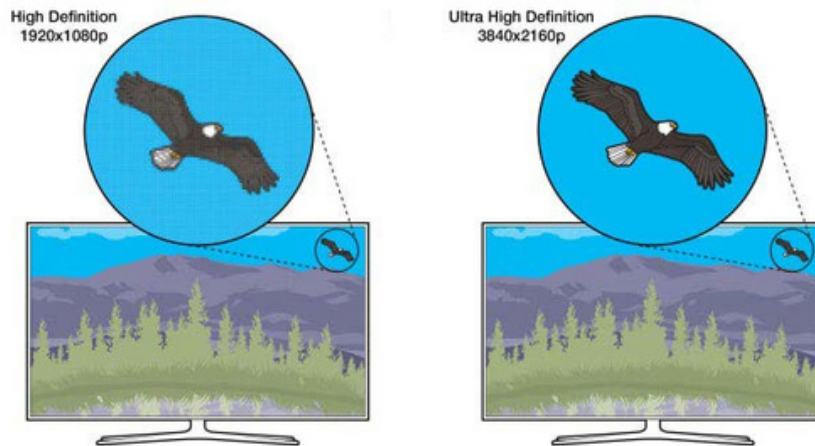


Ultra-High Definition (UHD) models, also called 4K, have a larger screen resolution than the HD models. The UHD televisions have 3840x2160 pixels (8 million pixels) which amounts to approximately four times the amount of an HD model. The UHD image quality is much more apparent in larger televisions (greater than 55 inches) or when you are sitting closer to the TV than with a 1080p.



More recently, the 8K televisions have entered the market and have screen resolutions of 7680x4320, exceeding 33 million pixels. This is the highest resolution defined in the current UHD standard. They are technically UHD televisions but there aren't many of them on the market. The ones that are on the market are considerably more expensive than the 4K models. It may be a bit too early for the average consumer to consider purchasing an 8K model, especially considering that there is a limited amount of viewing content that is designed for 8K. However, many streaming services offer plenty of 4K content.

Thanks to higher resolution screens, a 4K TV can display greater detail than a 1080p set but only if the content is also UHD.



Keep in mind that resolution should not be used as a single feature of image quality without considering the size of the television and the viewing distance from the television. Each of these criteria play an important role along with resolution in determining picture quality.

Screen/Display Type

The type of display or screen is also a very important aspect of any television. There is a wide range of display types including:

- LCD (liquid crystal display)
- LED (light-emitting diode)
- Plasma
- OLED
- QLED
- 4K UHD



The **LCD** and **LED** screens are flat panels that have continually improved in quality over the years. Both use very similar technology except for the source/type of light. LCDs use fluorescent lights for backlighting while LEDs use LED technology. These screens are essentially the lowest picture quality displays compared to the others referenced here but have contributed greatly to the evolution of flat screens. These are going to be the most economical models compared to other types of displays. One of the greatest disadvantages of LCD and LED displays is that the viewing angle may affect the quality of the image at extreme angles (greater than 45°).

The **Plasma** screen is usually found in larger displays (40 to 60 inches or larger). The display is simply a different technology and has a better picture quality than LCD or LED models. However, they are generally less energy-efficient and produce more heat than LCD or LED models. There are a variety of other differences, but these are the most relevant and significant differences between Plasma and LCD/LED models. Plasma screens, due to their high light emissions, have an excellent range of viewing angles compared to other types.

OLEDs (organic LED) is a bit different than LED but has dominated the television market for years. Unlike LEDs, the OLED can control individual diodes as opposed to backlighting that is inherent to LEDs. This improves the quality through darker blacks, higher contrast, and more vibrant colors. OLED also has better ranges of viewing angles than LED/LCD models.

QLEDs (quantum LED) are just another form of LCD but they use quantum dots to produce colors. They use a blue light source plus a thin film embedded with tiny quantum dots, or nanocrystals. This results in very saturated primary colors. They provide high quality images with vibrant colors but have a more limited viewing angle than OLEDs.

One of the newest display types is the **QD-LED** from Samsung® and Sony®. This is a hybrid between OLED and QLED that takes both quantum features and OLED features to add high contrast, deep blacks, and unlimited viewing angles.

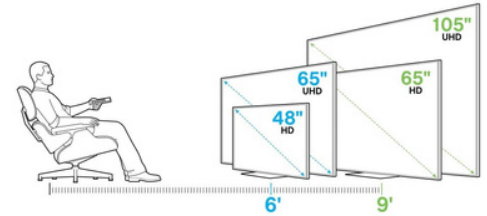
Screen Size

Screen size is another valuable consideration when purchasing a television. Aside from the obvious benefit of a larger screen, the assumption is that bigger is better. Until recently, the 50-inch screen was at the top end of model sizes. However, by the end of 2020, the 65-inch models even left the newer 55-inch televisions in the lurch.

ConsumerReports indicates that televisions between 60- and 69-inch models make up 16% of the market sales in the United States with 70-inch models making up 11%. That means that 1 in 4 televisions are 60 inches or larger.¹



If you buy a 1080p set, the closest you can sit to your television while still maintaining proper field of view is 1.6 times the diagonal measurement of your television. If you have a 60-inch television, you will want to sit at least 96 inches (8 feet) away. If you know your viewing distance (e.g., distance from sofa to the television), you can calculate the “minimum” size of television you need by dividing the distance to the television by the same factor, 1.6. For obvious reasons, bigger is not always better when you have a limited space to place your television and where people will be positioned when viewing it.



But don't feel obliged to perform these calculations. These days, just about all larger sets are 4K UHD models. Because these TVs have more densely packed pixels, you can go larger, and your seating distance can be as close as the screen diagonal itself. So, for example, with a 65-inch UHD TV, you could sit as close as 5½ feet from the set. The goal is to create a comfortable, immersive viewing experience. You don't want to be so close you can't see the entire screen nor too far where you miss out on the high definition.

Luminosity

This refers to the amount and quality of light that is being emitted to produce the picture. The more common term used is Dynamic Range. For televisions, one of the most exciting TV developments is HIGH Dynamic Range (HDR). This boosts the TV's brightness, contrast, and color. For the viewer, it makes the picture on the screen look more like real life. Of course, those without HDR are referred to as STANDARD Dynamic Range (SDR) and result in a comparatively lower quality image.



The quality difference between SDR and HDR, however, is not immediately apparent when you simply turn on the television. The show that is playing must be “mastered” to take advantage of the HDR feature. A more appropriate way to express this until all programs are mastered accordingly is to call a model “HDR capable.” Nonetheless, HDR is an improvement and having a unit that is HDR will certainly improve the viewing quality over SDR. Also, keep in mind that not all HDR models produce equally rich, lifelike images. Looking for HDR ratings or scores in reviews may be more valuable when choosing between HDR models.

Connectivity

The television's ability to “connect” to broadcast programs is important. Without your television's ability to receive either wired or wireless connections to programs, having a television would then simply be pointless. Nonetheless, there are slight variations in how televisions can receive programming and by no means are their standard connections included in every model. In addition, televisions may also include input and output connections that make it more versatile and useful in other applications like home theatre systems or networking.



Wired Connectivity

Connecting the television to a source of programming can be as simple as using a digital antenna and a coaxial connection. This allows you to connect via the air waves to any local signals being broadcast in your geographic area. Wired connections are also common among cable or satellite services that provide everything from local broadcasting to movies, sports, news, and other programs. Some of the different input ports can include the following:

- Antenna
- HDMI
- RCA Video/Audio
- Component
- Composite
- S Video
- VGA Optical Audio
- USB
- LAN

Each provides different functions for connecting programming (audio & video) to your television. Others provide the ability to connect your television to other devices like external sound systems. Some wired connections have limitations. For example, it is not recommended that HDMI cables be used over 50 feet in length before the quality of the signal is decreased. This application may include sending a signal to a TV in the back patio. With LAN connections, you can purchase other third-party hardware and send the same audio/video signal long distances to single or multiple televisions like you might see in an office lobby, sports restaurant, or other application.

Wireless Connectivity

Many televisions on today's market have the capacity to connect wirelessly to local area networks. Like the wired (LAN) input, this connection can be used to connect to other devices for streaming, mirroring, or remote connections. Network connectivity is extremely valuable when there is a need to connect to streaming services.

Smart TV

Most televisions on today's market, especially those in the mid- to large-sized range, have licensed software that is installed making them "smart." These televisions can access online content such as streaming video services from Amazon Prime, Hulu, and Netflix. There may be limitations to the most popular services on some models, while others provide a wide range of apps that can add value to the user. Some manufacturers even have their own proprietary apps that extend the options for the consumer. If a basic model does not have the apps or "smart" capabilities, having the correct wired or wireless connections can allow for third-party streaming devices like Roku, Amazon Fire TV, Apple TV and Google Chromecast.²

Also called internet TVs or connected TVs, can be a bridge to a world of online content that can be accessed directly from the TV itself. Most smart TVs these days let you access multiple streaming video services, such as Amazon Prime, Hulu, Netflix, Sling TV, and YouTube TV, plus one or more internet music services, such as Pandora and Spotify. Many smart TVs also let you check social media sites such as Facebook and Twitter, and several support casual games as well.

The latest features of many smart TVs are their ability to communicate with other voice-enabled digital assistants such as Amazon Alexa, Apple Siri, and Google Assistant. These capabilities can extend the ability of the consumer to turn on/off their television set and select programming through their digital assistant rather than a handheld remote control.



Sound

As televisions have increased in size, they have also decreased in thickness due to the screen technologies that make them slimmer. In addition, the interest in models that appear sleek, slim, and contemporary has affected the sound quality of many televisions. Smaller frames allow for less space to include adequate sound, especially in smaller models. While most televisions do provide sound that is adequate for small or closer viewing distances, larger screens in larger rooms may require an additional sound emitting device to match that size and quality of the screen. A television's ability to connect to a soundbar or surround-sound system via HDMI or single audio cable. Output ports on a television and be critically important to the consumer's ability to connect an adequate sound system to their television that matches the quality of the display and the size of the room.

Refresh Rate

A television's refresh rate refers to how many images the screen can display per second. What value does this play in viewing? For videos with lots of fast action, it can make a big difference in the quality of the picture. Sporting events and gaming are examples of when a higher refresh rate may be visible and beneficial to the consumer. A standard 60Hz refresh rate is suitable for most applications, while the avid gamer may prefer the 120Hz models for improved picture quality in high-motion gaming. The same would be true for anyone that likes clarity in high motion viewing like racing and action films as an example. Buyers beware, higher refresh rates marketed on packaging may be inflated by manufacturers. Be sure to look for "native refresh rate" values on the device specifications to make sure you are truly getting what they claim.

Resources

- ¹ TV Buying Guide. (2022, October 28). Consumer Reports.
<https://www.consumerreports.org/electronics-computers/tvs/buying-guide/>
- ² TV Buying Guide. (2022, November 23). HelloTech The Plug.
<https://www.hellotech.com/blog/tv-buying-guide>